

# The Way We Ask for Money... The Emergence and Institutionalization of Grant Writing Practices in Academia

Kathia Serrano Velarde<sup>1</sup> 

Published online: 30 January 2018  
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**Abstract** Although existing scholarship offers critical insights into the working mechanisms of project-based research funding, little is known about the actual practice of writing grant proposals. Our study seeks to add a longitudinal dimension to the ongoing debate on the implications of competitive research funding by focusing on the incremental adjustment of the funder/fundee relationship around a common discursive practice that consists in describing and evaluating research projects: How has the perception of what constitutes a legitimate funding claim changed over time and why? By investigating the normative framework enacted in the justification strategies of applicants, we shed light on the historical coevolution of the increasing competition for project funding, the epistemic culture of applicants, and grant writing rhetoric. To do this, we mobilize a comprehensive data set consisting of archival data from Europe's oldest and largest funding agency, the Deutsche Forschungsgemeinschaft, as well as a corpus of 80 successful grant proposals written between 1975 and 2005. We find that the 1990s mark an important normative consolidation of what we consider to be a legitimate funding claim: Ensuring the success of the project and the project's results becomes a major concern in applicant rhetoric. This time period coincides with a substantive rise in the level of competition for project funding. Yet, even though justification strategies might seem to address the same issues in grant proposals across the disciplines under investigation, the normative framework to which applicants refer differs according to the applicant's epistemic culture.

**Keywords** Research funding · Grant writing · Epistemic practices · Peer review

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✉ Kathia Serrano Velarde  
kathia.serrano@soziologie.uni-heidelberg.de

<sup>1</sup> Max-Weber-Institute of Sociology, Heidelberg University, Bergheimer Straße 58, 69115 Heidelberg, Germany

## Introduction

Researchers engaging with grant writing for the first time are confronted with a highly codified discursive practice. They try to come to terms with this challenging genre by mimicking the work of others, cooperating with seasoned grant writers, or attending workshops meant to train them in the art of writing a persuasive proposal. While scholarly work has been prolific in discussing the intended and unintended consequences of grant performances, we know very little about the actual practice of writing grant proposals. The present paper fills this lacuna by providing a longitudinal analysis of the emergence and institutionalization of grant writing practices in academia: How has the perception of what constitutes a legitimate funding claim changed over time and why?

By investigating the normative framework enacted in the justification strategies of applicants in different time periods and disciplines, we explain how funding competition and epistemic culture affect the way scientists ask for money. In essence, we argue that the more researchers compete for a funding source, the more they feel compelled to justify the legitimacy of their funding claim. This, in turn, leads to the homogenization and consolidation of grant writing norms. To access this process of discursive institutionalization, we apply a mixed methods approach: We analyze grant proposals written by organic chemists and political scientists between 1975 and 2005 for the Deutsche Forschungsgemeinschaft's (DFG) open call program, using different techniques of qualitative analysis. In addition, we sample and analyze archival data from the DFG and interviews with former practitioners in order to cover the grantmaker's funding history since 1959.

Our study seeks to add depth to the academic debate over the evolution of project-based research funding by examining how grant writing became the professionalized and standardized discursive practice it is today. By proposing an institutionalist account of grant writing, we contribute three insights to the ongoing debate on competitive research funding: First, we map and explain the historical coevolution of increasing competition for project money, the changing nature of funding claims expressed in the grant proposals, and the epistemic culture of the applicants. Second, we show how and why the institutionalization of grant writing practices has altered the relationship between the funding organization, the applicant and the peer in significant ways by establishing a common normative framework for the framing and evaluation of research projects (Lamont 2012). Third, we discuss the disciplining effects of grant writing beyond the formal incentive structures with which it is usually associated.

## On Grant Funding and Grant Writing

### *Literature Review*

Grant writing has become a central activity in academic life. As recurrent research funding has stagnated, academics have been forced to seek alternative resources to

support their work (Hornbostel 2001). The importance of external funding to the academic world has thus grown considerably, affecting public policy (Whitley 2007), research organizations (Krücken et al. 2013), and researchers (Bloch et al. 2014; Himanen et al. 2009; Smith 2010). This complicated phenomenon has been tackled from a variety of perspectives. The principal–agency approach to the governance of science has been especially influential, targeting the brokerage function of funding agencies in the political game (van der Meulen 1998; Howells 2006; Stampfer et al. 2010). Through the emergence of “intermediary agencies” (Braun 1993) in charge of allocating resources to scientists, the state effectively delegates the power to steer science. Newer research focuses on the institutional design of funding programs and their impact on knowledge production (Franssen et al. 2018; Laudel and Gläser 2014), innovation (Whitley et al. 2018; Heinze 2008) and career decisions (Blume-Kohout and Adhikari 2016). The lesson we have learned from the principal–agency approach to research funding is a substantial one—it underscores the need to acknowledge the power of funders in determining research priorities at both the organizational and the individual level (Guston 2000; Whitley 2007). Evidence suggests, for instance, that researchers in competition-driven funding systems tend to publish more, yet in less prominent journals, as well as they tend to adapt their research agenda to fit funding programs and to avoid risky research projects altogether (Butler 2003). Recent work has taken a more nuanced approach to the workings of research funding by highlighting the knowledgeability of researchers in dealing with grantmakers (Hallonsten 2014; Laudel 2006). In this perspective, the availability of external funding schemes allows researchers to make conscious choices concerning the specialization of their work and research profiles (Grimpe 2012; Harsh et al. 2018; Morris and Rip 2006).

Although existing scholarship offers critical insights into the way funding affects researchers and their work, little is known about the actual practice of writing grant proposals. Our study seeks to add a much needed longitudinal dimension to the debate by going beyond cataclysmic change scenarios or punctual stocktaking. Instead, we concentrate on the incremental adjustment of the funder/fundee relationship around a common discursive practice that consists in describing and evaluating research projects. As a result, our intellectual approach resonates with discursive perspectives on peer review and academic writing. Scholars in this research tradition understand knowledge production as a contextualization (Mallard et al. 2009; Swales 1990) and negotiation of scientific claims between author and peer (Gross 1996; Knorr-Cetina 1999; Lamont 2009). In his linguistic analysis of the different drafts of a biology paper before publication, Myers demonstrates how scientists reframe and delimit their explanatory claim through interaction with an anonymous peer (Myers 1985). In the same vein, Bazerman’s (1985) analysis of the way physicists read the work of their colleagues shows that researchers look for specific signals in the text that allow them to position a paper within their mental map of the field. As such, academic writing and reading experiences are active: texts are written and read not as static arguments, but as part of the dynamic process of research activity (Angermüller 2013). However refined linguistic approaches to academic writing may be, they do not develop a systematic understanding of the structural setting in which the writing experience is embedded. In contrast,

sociological work on the writing of academic texts—be they student essays (Lamont et al. 2000), academic papers (Cozzens 1985; Hargens 2000) or obituaries (Hamann 2016)—does address the performative aspect of writing. It stresses the author's impulsion to conform to social norms (Lamont et al. 2000; Hamann 2016) or to position one's work within the epistemic community by developing a coherent citation strategy (Cozzens 1985; Hargens 2000). Yet, few scholars attempt to explain how the production of academic texts has evolved over time and what this means for both research and researchers.

### *Explanatory Framework*

Our study aims to fill this gap by shedding light on the ways different scientific communities have learned to write about research projects as objects of investment: How has the perception of what constitutes a legitimate funding claim changed over time and why?

We therefore consider grant proposals as historical artifacts of a discursive practice that began as an individual negotiation between the applicant and the funding institution, and which evolved over time into a competition-driven “shared practice” (Barnes 2000) that involves the entire research community. In order to capture the changing perception of legitimate funding claims, we propose to focus on the justification strategies employed by grant writers. By establishing a connection between the normative framework articulated in the justifications of grant writers, rising levels of competition for project funding, and the epistemic properties of the scientific field to which the applicants belong, we develop an explanatory framework that enables us to understand the historical coevolution of structural and normative factors in the constitution of an academic “genre” (Swales 1990).

At the heart of our explanatory framework lies a process of discursive institutionalization. Building on Lamont et al. (2000), we argue that by emphasizing the features they perceive to be particularly relevant to the audience they are addressing, applicants construct an institutionally sublimated version of their research project. When writing a grant proposal, researchers mostly address two audiences – namely, the funding agency that finances the project and the anonymous peer who acts as competent member of the scientific field charged with evaluating the proposal's quality or “worth” (Boltanski and Thévenot 2006). To capture this process of discursive institutionalization, we propose to draw on Boltanski and Thévenot's work on justification. In their conflict theoretical approach to the social world, the aim of justifying oneself is to establish a common understanding of the situation and to develop a shared norm for discerning legitimate from illegitimate claims (Boltanski and Chiapello 2005). In situations of normative ambivalence, “justification“ is thus a medium through which tacit norms become explicit (Polanyi 1967) and conflicts of norms can be settled within a group. As a result, justification is a helpful tool to expose changes in the normative framework to which people collectively refer. It also happens to be a pervasive linguistic feature of grant proposals. By targeting the linguistic feature of justification in the qualitative content analysis of grant proposals, it is thus possible to investigate the moment in which new norms are negotiated and subsequently implemented by the research community.

We thus work with a processual understanding of institutionalization that starts with the identification of insecurities regarding the prevailing norm in the performative situation that is grant writing. This insecurity compels applicants to justify themselves, thereby making explicit the normative framework they consider legitimate. Over time, the norm becomes a taken-for-granted reference for applicants and leads to the implementation of new work practices in grant proposals. Finally, we argue that the discursive institutionalization of grant writing practices varies according to the degree of competition for research funds and the epistemic culture of the applicant.

## Method

### *Grant Funding and Grant Writing in Germany*

Germany has one of the oldest and most generous traditions of funding research through grants. With the founding of the Deutsche Forschungsgemeinschaft (DFG) in 1920, scientists could apply for extramural funding and generate additional means to do their research.<sup>1</sup> Since then, the number of public and private grantmakers has risen considerably. Observing how German scientists have engaged with grantmakers and grant writing thus represents a meaningful way of reconstructing the longitudinal process of mutual adjustment, mimesis, and actual learning that has since taken place in most scientific systems around the world. Our study focuses on the evolution of grant writing practices in the framework of the renowned “open call” program (“Normalverfahren”) at the DFG.<sup>2</sup> With a budget of €2.8bn per annum (DFG 2014) and a nearly 100-year-old history, the DFG is by far the most influential grantmaker in Germany and has been the main driver for the professionalization and standardization of grant writing practices since the post-war period.

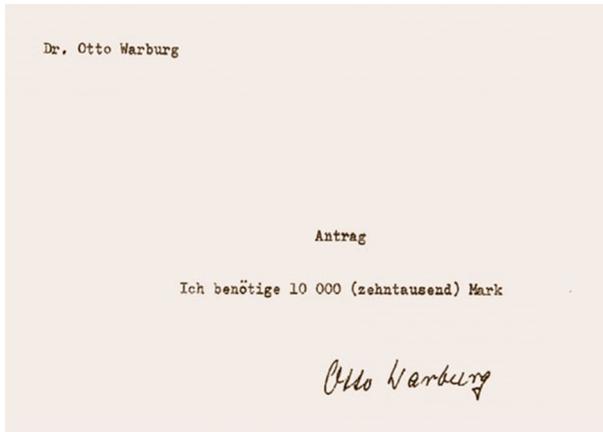
The beginning of modern grant writing practices dates back to the DFG’s introduction of the first application guideline in 1959. By formalizing the expectation framework of both peer and funding organization, the application guideline played a crucial part in the standardization of grant writing practices. Our archival data suggests that before 1959, the interaction between grantmaker and applicant was characterized by a long-term trust relationship. That is to say, the quality of a research idea was developed, adapted, and evaluated in direct dialogue between the applicant and the funding organization. Grant proposals then were but a short outline of a project, dedicated to archival purposes (Fig. 1).<sup>3</sup>

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<sup>1</sup> October 1920, the DFG was founded under the name “Notgemeinschaft der Deutschen Wissenschaft,” which loosely translates to “Emergency Association of German Science.”

<sup>2</sup> The “open call” program is not only the oldest but also one of the most important tools for funding basic research Germany.

<sup>3</sup> Otto Warburg was a well-known biochemist/physiologist who won the Nobel Prize in 1931. The application, which consisted of a single sentence, “I require 10,000 marks,” was funded in full. This is a reconstruction based on a detailed description from H. Krebs, published first in Koppenol et al. (2011). Reprinted with the permission of the authors and the journal *Nature Reviews Cancer*.



**Fig. 1** Facsimile of a research proposal submitted by Otto Warburg to the DFG (then “Notgemeinschaft der Deutschen Wissenschaft”) in 1921

The introduction of application guidelines by the DFG gradually transformed this relationship by designing and imposing an interactive template that was compulsory for all applicants: What had been an interactive framework that worked on a case-by-case basis was embedded into an institutionalized template that worked for many, enabling the DFG to process a drastically increasing number of applications. The practice of imposing guidelines on applications spread from the DFG into the field of scientific philanthropy and, by the mid-1970s, most German funding organizations worked with similar application guidelines. What changed between the introduction of the first application guideline in 1959 and the widespread adoption of application guidelines in the 1970s was the requirement that researchers formally apply for funding by writing grant proposals. Once the proposals were submitted, they would go through organizational assessment by means of peer review. Thus, the requirement to write grant proposals was the *sine qua non* for the implementation of a regular and systematic peer review process.

From the onset, the DFG “open call” program had common application guidelines for all disciplines. These guidelines have not changed substantially since 1977. A document analysis of the DFG application guidelines since 1959 (Serrano Velarde et al. 2017) revealed that while the information provided by the grantmaker on the different sections applicants had to fill in increased over time, the information they called for and the way the DFG framed its relation to the applicant remained essentially the same. Then and now, researchers who want to apply for DFG funding have to provide information on existing literature, preliminary work, research objectives, work program, and the resources they need. While applicants have had to conform to the same guidelines across disciplines, we show that they developed systematically different accounts of their projects nonetheless.

## *Method and Data*

To reconstruct the changing relationship between funder and fundee, we decided to marshal two main data sources: archival data from the DFG and interviews with former practitioners as well as grant proposals written for the “open call” program over a 30-year period.<sup>4</sup> While the archival data covers the grantmaker’s funding history since 1959, the grant proposals helped us to map the changing normative framework enacted by the applicants in the grant writing exercise. In order to account for differences in the epistemic practices of applicants, we constituted a corpus of 80 grant proposals written by organic chemists and political scientists between 1975 and 2005,<sup>5</sup> sampling the documents in 10-year intervals. As such, we were able to draw on ten grant proposals written by organic chemists and ten grant proposals written by political scientists for each of the years 1975, 1985, 1995 and 2005. The corpus contains about 700 pages of material. To unpack this complicated data, we combined different techniques of qualitative analysis.

In a first step, we mapped epistemic differences in the way applicants frame their research claims. We thereby assume that differences in the epistemic culture of applicants impact the discursive institutionalization of grant writing practices. This is why we decided to investigate grant writing in the dissimilar scientific fields of political science and organic chemistry. Following Whitley (1984), we argue that both fields reveal a relatively high degree of functional interdependence but vary dramatically with regard to task uncertainty, age, and work patterns. To gain a clearer picture of how the grant proposals of political scientists and organic chemists vary along the epistemic dimension, we concentrated our analysis on the research contribution applicants wished to make. By categorizing the research contribution according to predefined hermeneutic categories, we were able to observe systematic differences with regard to the degree of task uncertainty exhibited by the applicants as well as changes over time.<sup>6</sup>

In a second step, we focused on the applicants’ justification strategies in an interpretative analysis. Having observed general trends in the semantic structure of the data and matching them with our findings on funding competition in the DFG, we decided to approach the texts via qualitative content analysis (Miles and Huberman 1994). We therefore crafted an analytical framework focusing on both linguistic features of justification (Halliday and Matthiessen 2014) and the discursive positioning of the author (Harré and van Langenhove 1991). Next, we applied the integrated coding framework to the data with the analytical software

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<sup>4</sup> Although the grantmaker issued informal guidelines for the peer review from the 1990s on, these guidelines were never published. Since the DFG does not grant access to archival documents issued in the last 30 years, we were not able to include these documents in our analysis.

<sup>5</sup> We encountered substantial difficulties in accessing the peer reviews for the grant proposals in our observation period, since the university archives have only preserved the grant proposals and the financial documentation of third-party funded projects.

<sup>6</sup> The degree of task uncertainty refers to the degree of uncertainty a researcher may face when trying to solve a specific problem. The higher the field-specific consensus regarding the legitimacy of research methods (technical task uncertainty) as well as the relevance and importance of research issues (strategic task uncertainty), the lower the degree of task uncertainty.

ATLAS.ti and, in the course of coding, refined the sub-categories for our analysis. The final version of the coding framework contains 7 meta-categories and 25 sub-categories resulting in an Inter-coder Reliability value of 0.83 for organic chemistry and 0.74 for political science. For the interpretation of the data, we performed a qualitative cross-case analysis of the coded data. To this end, we used the ATLAS.ti query tool and explored the phenomenon of justification as a combined effect of linguistic and discursive positioning categories. As the resulting list of quotes respects both authorship and publication date, it was possible to compare justification strategies across disciplines and time periods. Finally, we compiled the insights generated in our case-based analysis into a “time-ordered meta-matrix” (Miles and Huberman 1994, 200) for systematic comparative analysis. All the displays were built collaboratively by two members of the interdisciplinary research team so as to allow for the variation of subjective readings in the interpretation process (Sandberg 2005).

## Analysis

The analysis is in three parts. We start by presenting the results of our archival analysis and show how the DFG has coped with increasing application rates by developing stricter selection routines for grant proposals. In a second step, we bring in the analytical findings from our grant proposals. We show how the epistemic properties of scientific fields influence the framing of research claims in grant proposals. We then turn toward the rhetoric dimension of our analysis and provide insights into the justification strategies of applicants. Although our data does not allow for the development of straightforward causal connections between (1) rising levels of competition for funding, (2) the epistemic culture of the applicant, and (3) justification rhetoric, our findings indicate a coevolution and imbrication of these three historical dynamics we intend to generalize upon in the discussion part of the paper.

### *Funding Competition*

Historically, the DFG experienced two drastic increases in the number of applications it had to process. The first increase took place in the early 1970s, following the massive expansion of the German university system. Not only did policymakers make teaching their priority by deciding to open up tertiary education to a larger share of the population (Kultusministerkonferenz 1977), but universities had to employ more researchers so as to come to terms with growing student numbers. Public funding was thus partly redirected from research to teaching, thereby curtailing the research funds of university researchers quite dramatically (Schimank 1995). As a result, the number of grant applications increased, as did the sums of money for which researchers applied. Since the overall budget allocated to the DFG did not match the growing demand for project funding in the open call program, the grantmaker had to introduce elements of selection that went against its traditionally inclusive funding logic. Mention of a second increase in application numbers can be found in DFG protocols and reports from the year 1990, owing to

the consequences of German reunification. Both application waves translated into decreasing funding ratios within the open call program, as shown in Fig. 2.

Increasing application rates also furthered the introduction of selection mechanisms and quality standards in the funding organization. The scientific community reacted strongly to the new funding strategy by questioning the legitimacy of the selection process:

The shock was tremendous for the research community [...]. There is an awareness of being subject to arbitrary decisions and partiality when it comes to research funding. People don't know any more whether their good ideas will be accepted or not. This leads to resignation and bitterness—especially at a time when universities have to expand their activities while the funding remains essentially the same (DFG 1976: 11).

Although different cost-cutting methods were applied in the years following the budgetary crisis, the dominant funding model consisted in delegating the selection process to the peer by upholding the abstract notion of scientific quality. The 1980s thus brought about a specification and consolidation of the peer review system while funding ratios continued to decline in all disciplines. The DFG repeatedly rationalized declining acceptance rates by stressing the central role of the peer in determining what proposals ought to be funded:

We base our work on peer review, for we believe that a good researcher is always capable of identifying and evaluating good research in his research area and beyond (DFG 1981: 13).

Albeit stressing the peer's responsibilities in the selection process, it is worth noting that the DFG did not attempt to clarify the notion of "scientific quality" on which funding decisions were formally based. The second rise of application numbers in the wake of the German reunification did not fundamentally alter the peer review

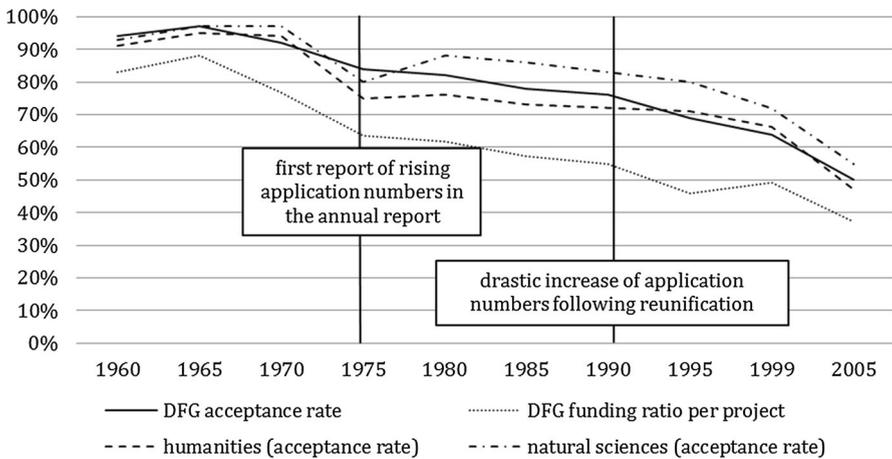


Fig. 2 DFG funding ratio in the open call program

system but stressed the importance of “competition” as necessary and legitimate selection modus. In its 1990 annual report, for instance, the DFG defended its evaluation framework by claiming that competition was a distinctive feature of its funding ethos:

The DFG always made clear that [...] research funding can only work if the projects are selected on the basis of their scientific quality. It is impossible for the DFG to apply less strict evaluation criteria for researchers from Eastern Germany—however disadvantaged they might be [...]. Free competition for funding is an essential feature of our funding autonomy (DFG 1990: 13).

In conclusion, the DFG coped with rising application rates by delegating the responsibility of selection to the peers, arguing that they were the only ones capable of distinguishing worthy from unworthy funding claims. Peer review has become essential to the institutionalization of a selective funding strategy and the ideal of free competition for funds; this is how the peer has become the “significant other” applicants consciously address in the act of writing a grant proposal. We hypothesize that drastic increases in the level of competition in the years following 1975 and 1990 generated a growing need for justification by the applicant, who felt compelled to anticipate the peer’s increasingly comparative judgment.

### *Epistemic Properties of Grant Proposals in Organic Chemistry and Political Science*

The way applicants frame their research claims in grant proposals varies between scientific fields. Grant proposals written by political scientists exhibit a great deal of variance regarding research objectives over time. In their critical appraisal of disciplinary history, Dryzek and Leonard observe that:

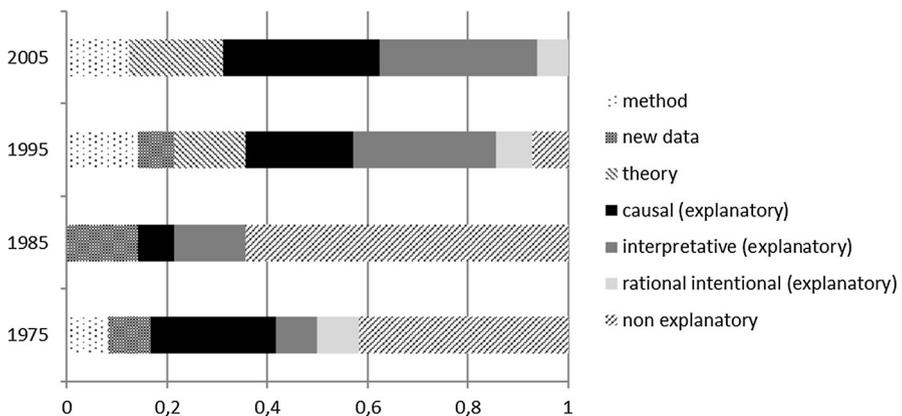
[political science lacks] general agreement on who counts as an important figure and what counts as a progressive development. Instead, we allow numerous competing accounts of the intellectual movements, research programs, traditions, and central figures that have shaped (or on some accounts misshaped) the discipline. We have a variety of histories to match our plurality of identities (Dryzek and Leonard 1988: 1250).

Thus it does not come as a surprise that political science is characterized by a plurality of research practices and agenda. Without entering into the hotly debated issue of their institutional origins (Laborier and Trom 2002), it can be said that German political science reinvented itself after World War II, being given the task to educate the population about democracy (Bellers and Kipke 2006). This educative mission of course permeated both the identity and the scientific understanding of this new generation of political scientists. As a result, the first decades following the institutionalization of the discipline were marked by intellectual school-building, the expansion of departmental structures at university level, and the increasing reception of American political theory among German scholars (Hartmann 2003). In order to gain an empirical understanding of how these developments translate into the historical evolution of epistemic work practices

among grant applicants in Germany, we decided to code the research claims in our sample ( $N = 40$ ). We therefore used a classification framework based on Little's influential categorization of explanatory (causal, rational-intentional, and interpretative) and non-explanatory (or "factual") research strategies in social sciences (Little 1991). We expanded the codebook in order to take three further types of self-reported contributions into account—"methodological innovation," "theoretical development," and the building of a "new database." The results of our textual analysis can be found in Fig. 3.

Although we cannot claim any generalizability for our findings given the amount of data we have at our disposal ( $N = 40$ ), it is possible to observe a clear shift from non-explanatory or factual research objectives to explanatory research objectives. Over time, we see that "causal," "interpretative," and "rational-intentional" explanations become increasingly relevant when it comes to convincing both peer and funder of the importance and necessity of the research project. In addition, we see a growing concern for "theory building" and "methodological innovation" among grant writers in political science. As a result, we might say that strategic task uncertainty is indeed high: Not only is there substantial variation of research objectives over time, suggesting generational differences in the way people conceive of valid research contributions, but we also observe a plurality of explanatory objectives in grant proposals from the same time period.

In contrast, grant proposals written by organic chemists do not vary substantially with regard to research contribution. Indeed, scientific progress in modern organic chemistry since the post-war period has been determined by the introduction of new analytical techniques (Knight 2002). By using new instruments such as mass spectroscopy, the difficult process of structure determination for small molecules became routine, which led to the development of rule-based theories regarding the relationship of structure to physical properties (Slater 2002); it also contributed to an increased focus on synthesis at the expense of more traditional chemical analysis such as classification (Schummer 1997a). Since this paradigmatic shift took place, however, it seems that research practices in organic chemistry have developed in an

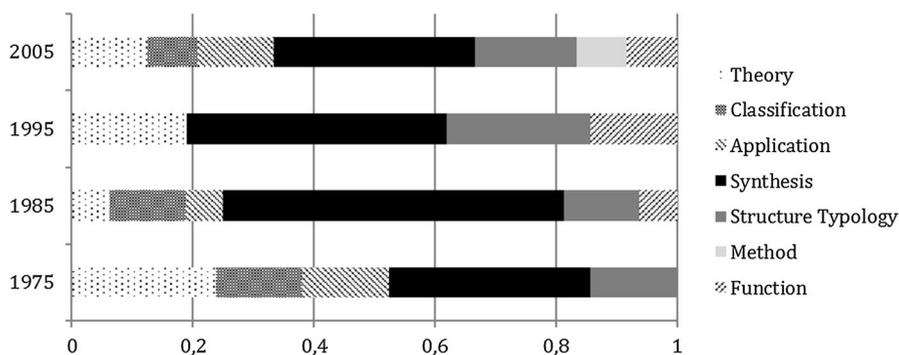


**Fig. 3** Research objectives in grant proposals written by political scientists (1975–2005)

incremental fashion. In his content analysis of 300 papers published in the internationally renowned journal *Angewandte Chemie* between 1980 and 1995, Schummer (1997b) came to intriguing conclusions regarding the aims and methods of published work in preparative organic chemistry: By categorizing the research claims of the authors into five hermeneutic categories—“theoretical contribution,” “classificatory purpose,” “synthesis relevance,” “application” and “structure typology”—Schummer found that research practices in preparative chemistry did not change fundamentally during his observation period. We applied Schummer’s classification of research claims to our data and refined the codebook in order to account for two newer yet empirically relevant research objectives—“methodological innovation” and “functional specification.” No substantial change was found in the preparative research process articulated in the grant proposals of organic chemists between 1975 and 2005 (Fig. 4).

Organic chemists apply for funding in order to improve preparative abilities (“synthesis relevance”) by finding new reagents, catalysis, and new experimental and theoretical methods. In addition to this, we identified a growing interest in the interdisciplinary applicability of research findings as well as in the selective synthesis of ever larger and more complex systems to be striking features of grant proposals written in the 1990s and early 2000s. With respect to “strategic task uncertainty” (Whitley 1984), it is thus possible to observe that our sample displays relatively little uncertainty about the priorities of tasks to be accomplished in the framework of a DFG funded research project: Over three decades, organic chemists displayed a relatively coherent pattern of epistemic objectives and techniques they wished to implement through project funding.

Given the variance of task uncertainty across scientific fields, we hypothesize that political scientists and organic chemists provide systematically different accounts of their projects’ epistemic embeddedness when justifying their funding claims. As such, we expect to find more rhetorical boundary drawing in the grant proposals of political scientists. Organic chemists, on the contrary, will be more likely to engage pro-actively with their research community.



**Fig. 4** Research objectives in grant proposals written by organic chemists (1975–2005)

### *Findings of the Qualitative Content Analysis*

By focusing on the applicant's justification strategies, this part sheds light on the institutionalization trajectories of grant writing in different scientific fields. The qualitative analysis shows that political scientists and organic chemists legitimize their planned projects along the same argumentative lines: applicants justify the need to embrace strategies of labor division, discuss the feasibility of their projects, and obsess over research performance. However, a closer look at the data allows us to refine our findings by accounting for differences in the normative dimension to which applicants refer. Indeed, although political scientists and organic chemists address the same themes when justifying themselves, the way they frame their funding claims strongly resonates with the respective epistemic cultures in which they are embedded.

### **Division of Labor**

One of the earliest justifications displayed in our data concerns the division of work among team members. In political science, justification strategies targeting the reasons for teamwork emerged in the 1980s, challenging the existing yet implicit norm that science is solitary work. Over time, the new norm of dividing and delegating research work in a project came to be accepted and collaborative work practices were introduced in the grant proposals. We juxtaposed typical justification strategies from different decades so as to gain a clearer picture of how changes are expressed in the grant proposals:

The main analysis will be carried out by the applicant himself. [...], the research assistant is in charge of the secondary analysis (f\_powi\_1975; 17:108).

The project will be implemented by the applicant and the research assistant. However, the research assistant will be responsible for the larger share of work since the applicant is constrained by his teaching duties (br\_powi\_1985, 14:366).

The following work division is based on the scientific background and competences of the research team: [the applicant] will focus on establishing the theoretical framework of the research project and lead the empirical investigation [...] (b\_powi\_1995\_1, 13:423).

First research assistant: N.N. works with 19.25 hours/week on the project. Key activities entail the systematization and operationalization of a commitment typology for the analysis of the textual data as well as the in depth analysis of selected processes [...] (br\_powi\_2005, 20:304).

Generally, we find that the 1995 proposals contain more details regarding the allocation of tasks and responsibilities within the project team. Applicants from this time period began to argue how the efficacy of task allocation was ensured through the recruitment of competent team members. As a result, competence-based techniques of work division and recruitment procedures are central features in our 1995 corpus. By the year 2005, however, researchers took these recruitment

practices for granted, focusing instead on assigning a feasible amount of activities per person/month.

The situation is slightly more complicated in the case of organic chemistry. Although teamwork had traditionally been a substantial feature of scientific work practices in chemistry, applicants felt compelled to justify their teamwork routines by the 1990s. However—and this is where organic chemists differ from political scientists—their justification tends to focus on the interactive framework of teamwork. Instead of clarifying who does what, chemists describe with great detail how the team members relate to each other. Grant proposals from 1995 onwards thus contain sophisticated repertoires of rights and duties related to the team structure. They also make the individual's contribution to the expected common outcome transparent:

The research project will be realized by a doctoral student under the guidance of the applicant (ka\_chemie\_1975\_1, 8:37).

Constitution of the research team: since [name of PhD] is finished soon, a new student has to start working on this. After graduation, this student is to take over the job of [name of PhD] and assume the bulk of the project work. The applicant will contribute here and there (ka\_chemie\_1985\_2, 6:176).

Task description, PhD: Synthesis of rigid rod coordination polymers [formula]; characterization of polymers [formula] in diluted solution as well as development of a synthetic strategy [formula], first attempts to display the formula for polycatenane [...] (ka\_chemie1995\_2, 12:419).

In [date], [name of staff] received a research grant to write his PhD study on chiral phosphines and enantiomers under my supervision. He finished his PhD and developed a method to represent chiral phosphines [that will be used in this project] (ha\_chemie\_2005, 4:47).

This justification trend should be considered against the backdrop of early argumentative strategies that considered the project team as an integral part of the applicant. In this *pars pro toto* logic, the applicant—or the professor—is the sole legitimate representative of the work group, thus making any further clarification of interactive work structures redundant. By 1995, however, this logic has been replaced by the need to rationalize team group relations.

## Feasibility

Feasibility issues represent a second rationalization trend that varies qualitatively across scientific fields. In political science, justifications addressing the feasibility of a project appear for the first time in the 1990s. Whereas earlier proposals framed science as a holistic process for which the outcome cannot always be defined in advance and for which explorative research strategies are the only means to ensure scientific progress, the emergence of feasibility issues in conjunction with detailed operationalization techniques marks an important normative turn in the art of writing grant proposals: It is not scientific progress that has to be ensured in the first place, but the success of the project. By guaranteeing that a project's research

design is both efficient and ready to be implemented, applicants comply with the expectation that the planned project ought to yield visible and scientifically viable results in a foreseeable future. In 2005, the feasibility norm furthered the introduction of new work practices in grant proposals: Detailed work programs, quality assurance, and risk contingency plans became pervasive features of the argumentative structure in political science.

The project can only address some aspects of this complexity. However, it will do so by mobilizing and testing an approach that has the potential to analyze larger implications (f\_powi\_1975, 17:39).

We believe that an open research strategy is an absolute necessity (tü\_powi\_1985, 5:255).

This variable serves one purpose: to constrain the coder to focus on the main message of the text, thereby [...] simplifying the coding task. The pretest will help to develop standardized categories to this end (b\_powi\_1995, 13:307).

The final section presents our work program. It encompasses the research plan, special features of organizing the research process, planned deliverables at different project stages as well as the integration of the research work into the teaching duties of the applicant (f\_powi\_2005, 21:86).

Again, feasibility issues address substantially different aspects of the scientific work process in the grant proposals of organic chemists. Indeed, their justification strategies mainly target the risks of failure. While failure is considered an integral part of the experimental research process in our 1975 corpus, the norm is challenged in the 1980s with the introduction of justification strategies that aim at identifying risks of failure. Risks of failure generally refer to the potential occurrence of errors or inconclusive outcomes in a series of trials. While early proposals mostly name sources of failure, grant proposals from the year 1995 display a proliferation of coping mechanisms that include the identification of ideal trial conditions in combination with preliminary studies and financial cross subsidization:

[...] many research groups have worked on the structural analysis without success. Given these risks, it is understandable that our work plan provides but a first orientation. Instead, it must continually evolve and adapt analysis to the research process (tü\_chemie\_1975, 40:275).

We encountered major difficulties with the amide hydrolysis (ka\_chemie\_1985, 11:31).

As the collision took place in a strong electric field, [...] it was impossible to measure the angular distribution of the ions. This is why the applicant worked these last two years on improving the reflection collider by developing an apparatus that allows to capture and analyze the diffusion of cluster ions while checking [...] for angular distribution (ka\_chemie\_1995, 11:279).

[Name of the partner] has agreed to train the members of our working group in the difficult fabrication of the chiral vinylphosphonic that is essential to the planned trial (ha\_chemie\_2005, 4:136).

Over time, applicants learned to take responsibility for the success of future operations by justifying how potential sources of failure would be addressed in their

projects. In anticipating the success of their experiments, grant writers from this time period also avoided the open use of vocabulary associated with the idea of failure, instead preferring to use euphemisms such as “it is to be expected that,” “it is unlikely that,” or “there is a risk.” Finally, in the last decade of our observation period, ensuring the feasibility of a project was made part of a network strategy. As we will see in more detail below, over time, the collaboration network became an important locus of an applicant’s identity. Our 2005 quote illustrates how the applicant situates the means and ends of dealing with the eventuality of failure within his network of trustworthy external collaborators. Through the rhetorical mobilization of additional resources within the larger research network, the applicant presents himself as equipped to deal with “difficulties” in the fabrication process and with the potential lack of success. Consequently, failure—long considered a problematic if not unwanted feature in grant proposals—resurfaces as an integral part of the research process: The difference being that it has become manageable thanks to the applicant’s research network.

## Research Performance

Justification strategies related to the research performance of applicants are twofold. Firstly, they include the promise of future research outcomes by introducing the notion of “expected results.” Secondly, they stretch beyond the limits of the proposal insofar as signaling research performance becomes an important moment in an applicant’s self-representation. By framing themselves as productive and successful researchers, applicants establish a link between a proposal’s projected results and their past research record. By the 1990s, applicants in both political sciences and organic chemistry had begun to legitimize the research outcomes of their projects.

In political science, the formulation of expected results goes hand in hand with the description of “deliverables” or project output such as publications, conference presentations, workshops, or follow-up projects. In addition, announcing expected results is linked to the applicant’s concern for his/her visibility within the research field. Grant proposals in political science display a tendency to emphasize the individual’s performance and position within the research community. In this perspective, we observe that proposals from 1995 are characterized by a substantial increase in valuative statements. Through positive and negative valuation, applicants aim to demarcate their performance by contrasting it with the work of others:

The specific debate on the legitimacy of the EU remains quite abstract due to the lack of a broad empirical data base. The empirical analysis of the social construction of legitimacy in supranational institutions [planned in this project] can help to address this deficit (ma\_powi\_1995, 6:108).

In a recently finished research project funded by the DFG [name of research project] [self reference, self reference], the applicant and his research team developed an interactionist analytical framework that allows to map the dynamic exchange between foreign trade and the existence of supranational governance structures (f\_powi\_2005; 21:68).

Whereas the applicant's research profile, network, and agenda are framed in positive terms, existing research is criticized on the basis of expressed shortcomings, biases, nuances, or desiderata. Valuating one's work and the work of others is still an important feature of today's grant proposals and relates to boundary drawing activities in the scientific field. Given the strong degree of task uncertainty in political sciences, applicants have to work by positive and negative association when they position themselves and their funding claim. This finding also indicates a low degree of interdependence among political scientists.

In contrast, organic chemists relate their expected results to future avenues of research. Instead of emphasizing deliverables, applicants tend to think about what other people could do with their insights, thus remaining more abstract with regard to the concrete form that research outcomes might take. Given the increasing degree of interdisciplinary cooperation contained in the grant proposals, it does not come as a surprise that, in the 2000s, we witness a growing concern for the applicability of a project's findings to other research areas:

For instance, we might find out that multinuclear benzofuran exhibits different structural characteristics [...] such as higher volatility. This would be of importance to environmental chemistry, especially if these were to form and diffuse in fires. [...] Given the program we outlined in this proposal it should be clear that the research goals can only be fulfilled through close interdisciplinary cooperation under the lead of organic chemistry (hu\_chem\_2005; 4:38).

This quote also highlights that the project's expected results are framed as part of a collective research endeavor. Hence, chemists tend to represent themselves as members of a highly functional network of peers that works on a long-term research agenda, draws on a large pool of common resources, and manages the eventuality of failure in a collaborative fashion. In a scientific field characterized by high interdependency among researchers, positive evaluative statements are predominant, as exemplified by the following quote:

By continuing the cooperation with [name of cooperation partner], we hope to gain precious insights into the reactivity of the biazirinyl's thermic aromatization (chem\_chemie\_2005, 22:195).

Comparing the justification strategies of applicants across time, it is possible to identify an important shift in norms between 1985 and 1995. While justifications before this period target the importance of clarifying the division of labor within project team structures, the 1990s mark an important normative consolidation of what is considered to be a legitimate funding claim: Ensuring the success of the project and the project's results becomes a predominant concern for the applicant. Yet, even though justification strategies might seem to address the same issues in grant proposals within the two disciplines, the normative framework to which applicants refer resonates with the epistemic properties of the scientific field. Our analysis revealed a highly cohesive and cooperative work pattern among chemists that, over time, becomes the primary locus for both rationalization and valuation efforts. The emerging network identity of the applicant in organic chemistry mirrors the structural and normative conditions of a scientific field in which there is high

consensus about research priorities and practices. The individual positioning and boundary-drawing strategy of political scientists in conjunction with a focus on individual performance and responsibility for a project's success is deeply anchored in an epistemic culture that is segmented and based on the individual interpretation of an intellectual lineage (Hargens 2000).

## Discussion

Our archival research provided evidence for the coevolution of funding competition and grant writing rhetoric. The DFG began to discuss the problematic discrepancy between a growing external demand for funding and available funding resources in the early 1970s. The impossibility of funding all research projects led the DFG to communicate the importance of selectivity to the peer. This dilemma sparked two related developments: First, the grantmaker imposed increasingly detailed application guidelines in order to ensure the comparability of grant proposals in the evaluation process. Second, the applicants feel increasingly compelled to develop justification strategies anticipating both the funders and the peer's expectations. A quantitative and qualitative intensification of justification took place between 1985 and 1995. This time period coincides with a drastic increase of competition for private funding in the early 1990s.

Textual analysis revealed systematic variation in the way grant writing practices have been institutionalized across scientific fields. Political scientists tend to cluster in epistemic communities or schools of thoughts due to the high degree of task uncertainty: As a result, the applicant in political science has to position the project's contribution in a complicated network of partly competing explanatory research traditions. In doing so, political scientists frame the "worth" of their proposals in evaluative terms that are both positive and negative, depending on the intellectual affinity of the project's explanatory dimension. With regard to self-representation, applicants in political science highlight individual performances as a key determinant for the project's likelihood of success. The applicant's past performance, network of collaborators, and management capacities become important signaling effects in the competition for extramural funding. Organic chemists, on the other hand, exhibit a high consensus regarding research priorities and practices. They work in an openly collaborative setting in which there is a general and shared understanding of what constitutes a legitimate research claim. Over time, however, the self-representation of organic chemists changed as the individual applicant became but a wheel in the well-oiled machinery of network-science.

Although we have to acknowledge the limited generalizability of our results, we have shown that the epistemic culture has an impact on the justification strategies of applicants. In particular, we observe a greater amount of rhetorical boundary drawing in the grant proposals of political scientists, who mean to persuade their reader through the description of individual contributions and research performances. We have further demonstrated that surges in the justification strategy of grant writers coincide with increases in the number of applications processed by the grantmaker. Competition for project funding has probably been the driving force

behind the rationalization of grant proposals. Evidence thus suggests that the more researchers compete for the same funding source, the higher the expectations of the peers who evaluate the grant proposals. As a result, the applicants feel increasingly compelled to make a legitimate claim for funding, thereby justifying different aspects of their planned research project. Over time, we argue that this dynamic has engendered the development of a refined repertoire of widely accepted grant writing standards and norms.

It is important to note that the discursive institutionalization process we observed occurred in “waves”: At different time periods, applicants justified different aspects of their proposal, thereby complying with an increasingly homogenized repertoire of expectations regarding work practices, risk management, and research output. Justification, we argue, has played an important role in disciplining generations of researchers to conform to these expectations that, over time, have become taken-for-granted by both grantmakers and the scientific community (Fig. 5).

There are two important insights we wish to stress with regard to our findings. First, taking a longitudinal view on grant writing practices helped us to understand the discursive mechanisms behind the justification strategies of applicants. By making the normative dimension of project ideas explicit, justifications contribute to the codification and standardization of grant writing. Since they exclude alternative normative readings of a project’s proposal, justifications narrow down what is to be considered a legitimate investment claim in a given scientific field. Over time, this has furthered a homogeneous (if not consensual) understanding about how research projects ought to work. For instance, justification strategies targeting feasibility issues have made it impossible to frame research projects as holistic or exploratory processes. In this perspective, the disciplining effect of grant writing has developed as a function of the process of discursive institutionalization, making it impossible to write a grant proposal that does not conform to the prevailing norm. Second, it

1975	1985	1995	2005
<i>implicit norm: research is a solitary work process</i>	<b>explicit norm: division of labor</b> (delegation)	<i>competence-based recruitment &amp; task assignment</i>	
			<i>rights &amp; duties of team members</i>
<i>implicit norm: applicant as sole legitimate representative of the research group</i>		<b>explicit norm: division of labor</b> (work group)	
			<i>work plan, quality assurance</i>
		<b>explicit norm: feasibility</b> (ensuring success)	
			<i>ideal trial conditions, cross-subsidizing, preliminary studies</i>
<i>implicit norm: research as an exploratory process in which failure plays a part</i>		<b>explicit norm: feasibility</b> (coping with failure)	
			<i>deliverables</i>
		<b>explicit norm: research performance</b> (individual positioning)	
			<i>applicability of results</i>
		<b>explicit norm: research performance</b> (network identity)	

- political sciences
- organic chemistry
- introduction of new practices

Fig. 5 Justification strategies in grant proposals across time and disciplines

turns out that researchers were not directly constrained by the grantmaker to conform to certain standards; rather, they adopted and refined the rules of grant writing within their epistemic community. That is to say, justification was triggered through direct or imagined interaction with the peers in charge of evaluating the projects' funding potential. In short, this paper shows how scientists have learned to make funding claims that enable their peers to make informed value judgments about a project's investment potential.

## Conclusion

Our analysis revealed promising avenues for future research on the disciplining effects of grant writing and grant writing performances. For instance, we have shown how demanding this genre is with regard to the writing skills of researchers. There is a long way between designing a good research project and making a legitimate claim for ever scarcer resources. Learning to write and talk about project ideas thus constitutes a major challenge for younger generations of researchers with little experience in this genre. Beyond the mere formalities of the grant writing exercise taught in so-called "grant writing seminars," there is a normative subtext that varies from discipline to discipline and has direct implications on the framing of successful research proposals. As a result, we hypothesize that peer learning is by far the most important strategy to learn how to ask for money. Young researchers embedded in a group/network/organization with a high density of successful and productive grant writers have a better chance at learning the skill than their isolated counterparts. In addition, our analysis has highlighted the importance of the institutional properties of funding programs for the way scientific fields engage with grant writing. The DFG "open call" program has been particularly successful in professionalizing grant writing culture and establishing shared standards and norms. Its openness to research projects from all disciplines has allowed researchers to adapt this specific funding tool to their own epistemic culture, thereby retaining substantial autonomy over their interpretation of what they consider to be of "scientific quality" or "worth." As we have seen, this process of adaptation has been incremental, thus allowing different generations of researchers to negotiate a consensus of grant writing norms within their communities. Given this long learning curve, it would be of great interest to analyze how researchers have coped with the challenging task of grant writing in research systems that only recently started to use this funding mode, such as in Spain and France: How will the epistemic properties of the applicant's research culture translate into grant writing rhetoric there?

Finally, studying grant writing offers access to a complicated and largely implicit process in scientific communities, namely, the negotiation of what constitutes a valuable contribution to the community's knowledge. This type of negotiation is not unique to the acquisition of grant funding, but can be found in many other community activities such as recruitment, publishing, and data sharing. In addition, the longitudinal study of grant writing highlights the importance of changing authority relations in scientific communities due to the increasing scarcity of funding. Shrinking state budgets in conjunction with an increased competition for

extramural funding have altered the social relationship between researchers by instituting the function of the peer for the allocation of scarce material resources (Musselin 2013). The paper thus draws attention to the increasing authority of scientific communities with regard to the individual researcher or applicant.

Our study challenges the taken-for-grantedness with which we consider grant writing practices nowadays. Indeed, we have shown how these practices first came about and then went on to evolve over time into a highly codified genre. By highlighting the incremental adjustment of the funder/fundee relationship around a common discursive practice that consists in describing and evaluating research projects, we have given evidence that the institutionalization of this particular genre came with an incremental restriction of what is considered a legitimate funding claim. More research is needed to enrich the cultural history of research funding and thereby to address the structural as well as the more subtle and disciplining effects of the way we ask for money.

**Acknowledgments** I would like to thank Christine Musselin, Stefan Hornbostel, Woody Powell, Julian Hamann and Wolfgang Schluchter for their comments on an earlier version of the manuscript. I am also immensely grateful to Jochen Gläser who provided insight and expertise that greatly improved the overall argument of this paper. Finally, I thank Kai Behrendt, Martin Hölz and Miriam Schwarz for their excellent assistance in the research process. This research was supported by the Deutsche Forschungsgemeinschaft.

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