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Article

Evidence of research mastery: How applicants argue the feasibility of their research projects

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Abstract

Although many studies have shown that reviewers particularly value the feasibility of a proposed project, very little attention has gone to how applicants try to establish the plausibility of their proposal's realization. With a sample of 335 proposals, we examined the ways applicants reason the feasibility of their projects and the kinds of evidence they provide to support those assertions. We identified three kinds of evidence for mastering research: the scope of scientific skills, the presence of different assets, and the use of stylistic techniques. Applicants draw on them to align the project with scientific standards, embed it in the current state of research, and meet the scientific field's expectations of how scientists should conduct a project. These kinds of evidence help substantiate a project's feasibility and to distinguish the project from other proposals. Such evidence seems to correspond with a project's positive review and approval (grant success). Evidence of research mastery was cited more often by the authors of the successful (approved) proposals than by the authors of the unsuccessful ones. The applicants of the successful proposals gave details of their planned experiments, emphasized their broad methodological and technical competence, and referred to their own preliminary scientific work.

Key words: feasibility; peer review; proposals; conservatism; projects

1. The conservatism of peer review

A general critique of peer review is that it has 'an inherent conservative bias' (Luukkonen 2012: 48). There is broad consensus that peer reviewers criticize, negatively evaluate, and reject unconventional research ideas and manuscripts treating uncommon topics (Travis and Collins 1991; Laudel 2006; Heinze 2008; Boudreau et al. 2016). Project proposals appear to be 'pre-structured' by the 'conservatism of peer review panels that judge project proposals' (Franssen et al. 2018: 29). This feature of the peer review process is often held responsible for 'conservative science' (O'Connor 2019). Studies reveal that the conservatism of peer reviews operates strongly even in the assessment of proposals submitted to funding schemes expressly designed to support groundbreaking and adventurous research (Luukkonen 2012; Laudel and Gläser 2014). However, it is too simplistic to assume that the conservatism of peer review leads automatically to conservative proposals. Studies have found that applicants actually do dare submit proposals that pose 'a radical new idea with polemical references to new findings that question established theories' (Philipps and Weißenborn 2019: 892) or claim to pursue 'revolutionary' treatment of a 'key research question' (Barlösius 2019: 924). The issue that therefore needs addressing is whether there is evidence of conservative scientific practices in the proposals themselves.

Which assessment criteria underlie the conservatism of the peer review process? Overall, the reviewers weigh whether the research project as described in the proposal can be executed as planned: Is the project feasible? Important clues that reviewers seek when considering this crucial matter as they examine a project include evidence that it reflects current research practice, involves up-to-date methodologies, and builds on previous research (Heinze 2008; Luukkonen 2012). Most studies on the conservativism of peer review are analyses of the review procedure itself. They are based on interviews with reviewers, participant observation of the process by which a project is selected for approval, or expert interviews with representatives of funding bodies (Langfeldt 2001; Heinze 2008; Lamont 2009; Luukkonen 2012; Laudel and Gläser 2014). Such studies have concluded that the conservativism of peer review is due mainly to the way in which the reviewers and panelists conduct the review process and to the criteria they apply when evaluating the research proposals. In particular, they attribute conservatism to the way in which the reviewers analyze the feasibility of a project, namely, by determining whether it follows existing approaches.

One aspect that has received little attention so far, however, is *how* applicants try to establish the plausibility that their proposed project can be conducted. With that issue in mind, we formulated three research questions: How do the applicants argue their project's feasibility, especially if they submit their proposal to a funding initiative that invites risky research? Do the applicants tend to favor broadly accepted research, an inclination that could be regarded as conservative? On what kinds of evidence do the applicants claim that their projects are feasible? We analyzed 335 research proposals to find answers.

This article starts with a review of the literature on the conservatism of the peer review process, the concept of scientific conservatism, and the specific genre of proposal-writing. Next, we describe and justify the empirical material and explain our methodological approach. We then show how scientists provide evidence for the feasibility of their projects, and we identify three kinds of evidence of research mastery. Thereafter we analyze how each kind of evidence can be used to argue that a proposed project is indeed workable. In the conclusion, we discuss whether the word *conservative* is the correct characterization of the way in which applicants show the feasibility of their proposals.

2. Conservatism of peer review and the specific genre of proposal-writing

Several studies on the 'conservative bias of the peer review' (Luukkonen 2012: 49) document the preference reviewers have for conventional research projects that assure a high degree of feasibility (e.g. Chubin and Hackett 1990; Travis and Collins 1991; Horrobin 1996; Berezin 1998; Langfeldt 2001; Laudel 2006). Lamont (2009) analyzed in detail how evaluation panels work, how they come to a consensus, and how disciplinary cultures and definitions of excellence are appraised during the evaluation processes. Luukkonen (2012), too, studied members of such panels and found that their overarching concern was the feasibility of the project (p. 55). The members of the panels verified feasibility mainly by five criteria: (1) the researchers' abilities to 'apply up-to-date methodologies, use required instruments, and carry out the research within the proposed time frame' (Luukkonen 2012: 55); (2) a research plan that is regarded as 'plausible and workable' (Luukkonen 2012: 55); (3) evidence that the applicants are 'prepared for any contingency and have an alternative course of action in case the plan does not turn out as expected' (Luukkonen 2012: 55); (4) the presentation of how the project builds on previous research; and (5) an explicit warranty that 'the needed equipment is available' (Luukkonen 2012: 55).Whereas Luukkonen (2012) asked which criteria reviewers apply to assess the feasibility of proposals, we investigate the manner in which applicants seek to demonstrate it. Luukkonen's work indicates that projects are subject to certain expectations and that the applicants are likely to be largely aware of them. However, it is possible that the applicants bring a far greater repertoire to bear on their effort to reason their project's feasibility persuasively.

Some studies have investigated how and why research traditions, personal involvement, and other interests may promote a conservative bias in the peer review process (Chubin and Hackett 1990: 62; Travis and Collins 1991). Other studies have scrutinized the effects of funding programs, notably those created to sponsor 'high-risk and outside-the-box research' (Heinze 2008: 303; Laudel and Gläser 2014; Van den Besselaar, Sandström and Schiffbaenker 2018). The scholars wanted to find out the extent to which particularly heterodox projects benefit from such initiatives. Overall, they concluded that the conservative wariness inherent in peer review appears to apply even to those funding schemes. For example, Heinze identified a 'tension between plausibility and scientific value of the research' and 'its originality' (Heinze 2008: 302). The research proposal's plausibility is assessed by its 'conformity with the current scientific practice' (302), which can be regarded as conservative. The reviewers survey the feasibility of the projects mainly by pointing out direct links to already established research. The great importance that reviewers and panelists attach to the achievability of the project appears to substantiate the conclusion that peer review tends to be conservative. 'Ensuring the success of the project,' as Serrano Velarde has shown, is a 'major concern in applicant rhetoric' (Serrano Velarde 2018: 85).For our analysis, this observation suggests the value of looking at how the applicants argue their projects' feasibility and at examining the reasons they give for this assertion. However, the researchers may have a different view of how they demonstrate the practicality of their project, so the analysis of proposals should be open to a broad understanding of feasibility.

Currie concluded that funding programs often promote what he called, 'conservatism-boosting features of scientific practice' (Currie 2019: 5). Like other scholars in this area, he is interested in how scientific conservatism is sustained and how it is reflected in research practices (Kummerfeld and Zollman2016: 1058; Stanford 2019). Bedessem (2021: 3) criticized the acquiescence of researchers who 'accept that current funding arrangements ... have conservative effects' on scientific practice. These studies do not focus specifically on the conservatism of the peer review process but rather on a broad understanding of scientific conservatism. They look at research practices to explain conservatism in science. This approach could be instructive for analyzing research proposals, for scholars generally outline the projected research process. Bedessem followed the discussion on scientific conservatism, which ties in with Kuhn, who addressed 'essential tensions' and developed the concept of 'convergent normal practice' (Kuhn 1991: 146). It is 'based firmly upon a settled consensus acquired from scientific education' (Kuhn 1991: 140). Taking up Kuhn's concept, Bedessem (2021: 3) introduced the notion of 'practical conservatism' which covers 'all the dimensions of scientific activities' and implies 'a tendency to congregate on the apparently safer alternatives to solve a given problem'. Practical conservatism prioritizes methods, theories, and practices that are recognized as feasible, plausible, and practicable. He referred to them as a 'system of practices' that tends to favor its own stability and prefers such scientific concepts and approaches that 'were currently being pursued' (Bedessem 2021: 14). These studies on scientific conservatism show how misleading it is to hold the peer review system exclusively accountable for the conservatism of research proposals. Presumably, there is a 'practical conservatism' affecting all dimensions of scientific activity. Rather than focusing solely on the matter of feasibility, we should therefore have the present study encompass all scientific activities described in the proposals and analyze the extent to which they are defined as doable.

Proposals constitute a specific genre of academic writing (Gross 1990; Swales 2004; Van den Besselaar, Sandström and

Schiffbaenker 2018). They draw on various rhetorical techniques to underscore the plausibility of a project. Myers (1990) found that the biological research proposals he analyzed were written in a cautious tone and a reserved style and did not harshly criticize existing research. However, other studies have shown that such restraint is not always the case; some applicants do in fact criticize past research directly and sharply (Philipps and Weißenborn 2019; Barlösius 2019). Applicants have to create 'textual evidence' of their project's viability (Myers 1990: 58), especially to allay the reviewers' concern that the project might not run as conceptualized in the proposal. Markowitz, for instance, has shown that 'expression of certainty positively correlated with funding success' (Markowitz 2019: 265). Researchers can resort to the typical rhetoric of the proposal-writing genre to portray themselves as 'good scientists' (Myers 1990: 59). They also have to demonstrate familiarity with existing research in their field (Myers 1990: 58). Furthermore, it is advantageous to adhere to conventional structures by identifying solvable research issues and extensively describing the planned research project (Connor and Mauranen 1999; Connor 2000).

Linguistic and rhetorical studies, particularly those that focus on proposals (Connor and Mauranen 1999), are helpful for identifying their passages that contain high 'textual evidence' and for practicing a genre-based approach. One of the recognized concepts that these studies have for identifying the organization of texts is move analysis, which is defined as a discursive segment that performs a particular communicative function (Swales 2004). Performing linguistic analyses of grant proposals, Connor and Mauranen (1999) identified 10 moves, such as 'reporting previous research', 'means', and 'competence claims'. We decided to use them as searchlights for the empirical analysis of the proposals in our study's sample.

In summary, this review of the literature reveals that our question has not yet been investigated but that related studies do offer some helpful input for approaching it. From the literature on the conservatism of peer review, we learned to look for how the applicants try to prove the feasibility of their proposals. The studies on scientific conservation showed that we should take into account all dimensions of scientific activities described in the proposals. Lastly, the analysis of the rhetoric of proposals indicated that we should pay special attention to rhetorical techniques for producing textual evidence and emphasizing the plausibility of the proposal.

3. The empirical material: research initiative and sample of proposals

For the empirical analyses, we sought out a research initiative inviting applicants to submit proposals for a bold research project. The VolkswagenStiftung[1] research initiative entitled 'Experiment!' satisfied that condition.[2] It called for 'fundamentally new research topics', and the projects were to be 'unorthodox' or 'radically new'. This conceptual orientation of Experiment! led us to expect rich empirical material on how feasibility is presented in the proposals. The proposals were not to exceed 1000 words. This limitation made it possible to analyze the whole text and treat all the described research activities as empirical material, enabling us to remain open for a very broad understanding of feasibility. Proposals, which had to be written in English, were accepted from people with doctorates in science, engineering, or the life sciences (including proximate disciplines in the behavioral sciences). No additional documents were required, such as a list of publications or a curriculum vita, which are usually included to substantiate the applicant's scientific experience and reputation. Details on the equipment and size of the lab or a list of successfully completed projects were not required, either. The applicants, therefore, could not avail themselves of additional documents to illustrate 'their own experience-based understanding of practice' (Kaltenbrunner and De Rijcke2019: 863) or to document their own scientific performance through, say, of a publications list. Nor was it necessary to submit a list of projects proving the lab's use of established methods and existing instruments. To ensure full anonymity of the applicants, the VolkswagenStiftung refrained from asking for these documents. A jury evaluated the proposals in a blind procedure.

When the VolkswagenStiftung set up the research initiative called Experiment!, we were asked whether we would be interested in doing research on it. We would have complete freedom to formulate our research question and determine the methodological approach. For this purpose, the organization facilitated the creation of different samples drawn from the 2,304 research proposals that had been submitted from 2013 through 2016. The proposals are anonymized. Gender, academic status (professor, postdoc) and discipline of the persons in the samples are recorded on a separate list. We have narrowed the pool of applications down to a representative sample of 335 proposals according to the gender, academic rank, and subject area of the applicants, who come from the natural sciences, medicine, and engineering.[3] The main disciplines in the sample are biology (including biophysics and biomedicine), chemistry, engineering, medicine, neurosciences, and physics. The sample also includes a few proposals from other disciplines, such as computer sciences, environmental sciences, geosciences, mathematics, and pharmaceutics. Overall, the representative sample encompasses the breadth of the natural sciences and medical and engineering disciplines. More important, the size of this sample allows in-depth qualitative analyses in order to discern how the applicants argue the feasibility of their research projects. The sample includes 11 successful proposals, which allows a preliminary consideration of whether and how they differ from the non-successful proposals in the way their authors reason the feasibility of their project.

4. Analytical methods

The first reading of the proposals revealed that, despite the thousand-word limit set by the funding body, the applicants had included copious explanations of the planned procedures, elaborate descriptions of the methods and instruments they bring to bear, and detailed presentations of the planned experiments. These descriptions comprised far more than mere statements about the planned projects. Many of the proposals included information about what would be changed if the experiments could not be conducted as initially planned and specified which additional competences, instruments, and experiences were to be tapped for the project. We also found specific stylistic techniques in the proposals. For example, the applicants dialogued hypothetically with the reviewers by raising a potential problem and then immediately solving the issue.

To determine as broadly and specifically as possible how the researchers substantiated the running of their projects, we adopted an open approach oriented to grounded theory (Schreier 2012). This methodological consideration led us to conclude that it was necessary for all discursive segments having a particular communicative function to be coded in a manner that distinguished between explanations of three aspects: (1) why the project would proceed as planned; (2) what the researchers would do if a step could not be taken as anticipated, and (3) which competencies and resources the researchers would rely on if something did not work out as proposed. We also identified instances of stylistic techniques designed to underscore the plausibility of the project. For example, we found that applicants wrote descriptors like 'simple and elegant' to justify confidence in their ability to conduct the project successfully. We looked for stylistic techniques that applicants employed to convince the reader that they had thought of every contingency. In summary, we first coded all assertions by the applicants that the project was feasible, that is, assurances that they would master whatever problems might arise and that they had already taken account of all challenges. This approach guarantees the broadest possible range of statements that the project was reasonable.

Next, we selected and minutely analyzed appropriate sections of text, honing our codes through systematic comparison of the passages that spelled out reasons why the project would run successfully. The segments were grouped into categories: 'the applicant's own preliminary scientific work', 'methods and techniques', 'detailed description of the experiment', 'technical equipment', and 'scientific cooperation'. Three stylistic codes were retained, namely, 'difficulties and solutions', 'different ways of organizing the text', and the description of the project as 'simple and elegant'.

The third step of analysis entailed systematizing these codes and assigning them to superordinate codes. To this end, we sought to identify the measure(s) that the applicants relied on for substantiating that their project would proceed as planned. We found that they cited different kinds of resources that they had at their disposal and intended to bring to the project. The applicants adduced three main kinds of resources they would draw on to guarantee the project's feasibility (scientific skills, different assets, and stylistic techniques). For each of these three resources, we formulated three superordinate codes:

1. *Scientific skills*, such as methods and techniques as well as a detailed description of the experiment. Methods and techniques subsumed all statements in which the applicants wrote that they themselves and/or their lab had all necessary methodological and technical competences. The code 'detailed description of the experiment' comprises the formulations about particulars of the empirical approach.
2. *Different assets* to be brought to the project, including 'technical equipment', 'scientific cooperation', and the researchers' 'own preliminary scientific work'. 'Technical equipment' encompasses passages assuring that all required instruments were in place and readily accessible. If the researchers pointed out that they could draw on expertise or instruments from other labs for their project, we coded these segments as 'scientific cooperation'. The reference to the applicant's previous work, such as preliminary experiments, data, and proofs, were coded as 'own preliminary scientific work'.
3. *Stylistic techniques*, including 'difficulties and solutions', 'different forms of ordering', and claims that the project was 'simple and easy' to conduct. Under 'difficulties and solutions', we summarized all passages in which the applicants employ the stylistic technique of raising a possible problem and then immediately solving it. The code 'different forms of ordering' referred to statements about the formal organization of the project. If the applicants made use of characterizations such as *elegant*, *simple*, *easy*, or *beautiful* to claim that the project would proceed as predicted, these segments were coded with 'simple and easy'. We coded the entire sample and trained a doctoral student[4] of sociology with several years of experience in qualitative coding to apply our coding rules. She coded 20% of the sample. The total intercoder reliability was 89.49% (see Table A.1 in the Appendix).

4. Kinds of evidence for mastering research

4.1 Scientific skills

The first of our three superordinate codes addressed scientific skills. To underline that the project would run as planned, the applicants called attention to their competence and proficiency, especially regarding the method(s) and technique(s) on which they would draw and the expected reliability of that repertoire. Four main arguments of this kind informed the effort to emphasize that the project would turn out well. First, the applicants professed that they were familiar with the full range of 'standard methods' and 'well-established techniques'. The scientists thereby indirectly signaled that they had broad methodological and technical experience. For instance, they stated that the 'fabrication of [specific] microwave resonators on a semiconductor substrate is now a standard procedure' for them (Ph_64).[5] The second strategy involved explaining that the applicant was already successfully employing the project's methods and techniques in his or her lab. They offered this information to mitigate concern about any methodological or technical aspects that might thwart the project. A third line of reasoning was that the project could accommodate more than only one or two methods and techniques and that they had already been tested successfully in the lab and were available. For example, 'the following features will be analyzed with modern signal-analysis methods developed and tested in [our/my] own previous studies'. This sentence was followed by an enumeration of four quite different methods (Bio_43).[6] The fourth methodological and technical approach to promising that the project would run as planned was to give a detailed description of how the methods and techniques were to be applied, how they would proceed, which adaptions were necessary, and which results would be arrived at. For example, 'The [specific] technique is relatively simple: while the subject lies in an MRI scanner, her [specific kind of] activity is measured and visualized in real time'. Further, the researchers described in detail what the subject would be asked to do in the scanner, how long it would take until the person knows how to act and what he or she would learn during his or her stay in the scanner. Then came an explanation about which data would be collected and what could be measured with this technique. The detailed explanation concluded with the following sentence: 'The risks and side effects of the technique are nearly as slight as those of standard fMRI measurements' (Ne_72). This kind of argumentation transitioned to the next way of assuring that the project would run as planned: demonstrating scientific skills through a comprehensive description of the experiments.

Closely related to methods and techniques was the detailed description of the experiment. In some cases, this description comprised an entire page, although the entire application was not longer than three pages. The description started with formulations that clarified how the applicants aimed to put the research idea into research practice. Typical phrases were, 'the proposed concept is to utilize', 'our concept is to design', 'we propose to develop [build]', 'a description of the procedure is', and 'the research concept starts with exploring'. The applicants would continue by detailing how the project was to proceed, as though the project had already taken place. For instance, they introduced their scientific knowledge and skills, described what the result would be in each part of the experiment, and stated which conclusions they would arrive at. These precise and detailed descriptions demonstrated the applicants' knowledge and experience, their ability to investigate the research question, the likelihood of reasonable research results, and confidence that they would successfully master the project.

4.2 Different assets

The second superordinate code—different assets—encompassed what the applicants bring to the project to ensure its success. We distinguished between three different assets: the applicants' 'own preliminary work/studies', 'technical equipment', and 'scientific cooperation'. The first of these three categories consisted of explanations of the scientific results the applicants had already achieved as a basis on which the project was to build and by which its feasibility had been proven. The applicants pointed out that they had already prepared the planned experiments so that they could start immediately. For example: 'These setups were developed in previous projects at [name of an institution] and are available for the investigations planned here' (En_35), and 'Meeting the first objective is feasible, as our institute [has] built several trackers over the last couple of years' (Ph_96). Second, the scientists also emphasized that they already had evidence of their project's practicality. They referred to 'initial tests', 'pilot studies', or a 'first proof of their concept': 'In a pilot study we have investigated chromosome segregation in young [animals]' (Bio_28). 'The project is based on a pilot study currently underway [experiment], and we seek to validate the results with the help of a [specific type of] study' (Me_95). 'In a proof of principle experiment, I managed to show the biological feasibility of the proposed concept' (Me_98). Third, the applicants cited outcomes of their own research to substantiate the correctness of their research hypothesis. They referred to 'recently published results', '[my/our] own unpublished results or data', and 'results of my own doctoral thesis'. Typical statements were, 'We base our concept on a recent observation from our lab [unpublished results]' (Ph_85), and 'Our preliminary data shows that in [animal], high-salt diet impacts' (Biome_52). These three variants of references to the applicants' own preliminary work or studies addressed different concerns about the functioning of the planned projects—the questions of whether the scientists would succeed in setting up and running the experiment, whether it would be possible to test the hypotheses empirically, and whether the experiment would yield any relevant results. The applicants tried to discount all these potential research problems by stressing that they had already successfully dealt with them.

The second asset, technical equipment, is understood broadly to mean necessary research infrastructure. The applicants informed the reviewers that their labs are well equipped. They did so without referring to specific technical needs of the planned project. Then they reported having 'access to the full range of facilities, technologies, and expertise required for this experiment' (Ph_24). Often, the authors of the proposals underscored that project-related technical devices and specific objects exist in their laboratory: 'Our lab is fully equipped to carry out the majority of the experiments and analysis' (Bio_85), and 'All necessary prerequisites (micro-fabrication, advanced imaging techniques, [animal] cell culture, and initial observations of directed polarized motion in narrow channels) are well established in our lab' (Ph_85). Such confirmations of access to all the technical devices needed for the project were meant to allay the concerns about this matter.

The third asset to which the scientists referred, scientific cooperation, related to the external expertise and equipment that they would draw on for the project. Again, three explanatory variants surfaced. As with the first variant pertaining to the second asset (technical equipment), the applicants spoke in general terms of abundance—in this case, of having comprehensive scientific cooperation outside their lab, though they did not indicate the part of the project for which these resources would be necessary. By mentioning their interinstitutional contacts, the applicants showed their integration into the scientific community and the fact that their scientific performance is appreciated by the scientific community. An example of this kind of general statement was, 'collaboration for exploring this research area has already been formed' (Ph_24). The second variant was emphasis on contacts or cooperation that the applicants had with labs and scientists who would bring in expertise or equipment that would otherwise be lacking or unaffordable. Two examples were 'We will overcome this obstacle through close cooperation with our partner institutes' (En_11), and 'To attain this goal I will collaborate with a colleague from social sciences renowned for her studies on the quality and structure of online social content' (Ne_25). A third variant consisted of assurance that the applicants were engaging in research cooperation, meeting the expectation of good scientific practice. The analyzed proposals contained statements that organizing scientific exchange would be an important part of the project. For instance, 'By collaborating with other scientific groups that use [name of equipment], the value of this novel approach would increase dramatically' (Me_16). By emphasizing the intention to have the project's procedures include external expertise and equipment, the scientists asserted their awareness that scientific cooperation—more generally, scientific networking—is considered to an asset needed not only for successful research but also for recognition as a good scientist. Specifying the three assets subsumed in our second superordinate code enabled the applicants to confirm that they had what was needed to meet the scientific objective they had set.

4.3 Stylistic techniques

We come now to our third superordinate code: the stylistic techniques that shaped the research proposals. They did not originate in the field of science; they were applied rather generally to elicit approval, convince other people, and generate textual evidence (Myers 1990). One of the patterns that we identified as having a stylistic character was what we named 'difficulties and solutions'. The scientists described a difficulty they might encounter, then immediately offered the solution to it. These text sequences were constructed like a dialogue between the writer of the proposal and the reviewer. They varied in length and appeared mostly in the passages detailing the experiment. The presentation of the possible problem often began with a formulation such as 'the obstacle', 'it could [will] be critical', and many of the ripostes began with expressions such as 'therefore', 'thus', 'to address these issues [this problem]', 'to tackle ... this possibility', and 'we will modify [the procedure] if this is the case'. In the following two examples, the first ellipsis marks the shift of focus from the potential problem to its solution: 'The major problem of our approach is that we don't know yet ... We believe that this can be clarified with ...' (Bio_35). 'One possible obstacle to overcome during the project is ... One strategy is to substitute ...' (Ch_89). Often, the applicants did not introduce a real research problem. Instead, they demonstrated that they had thought about possible objections from the reviewer. This stylistic figure addressed foreseeable doubts about the practicality of the project. Generally, these concerns related to the reasonableness and feasibility of the research approach.

'Different forms of ordering', too, informed the presentation of the experiment or the overall project. The applicants resorted primarily to four formats for this purpose. The first was chronological order, often signaled by expressions 'at first ... secondly', 'first ... second step [phase, stage]; or similar ordinal formulations'. The second format consisted of alphabetical sequencing: a, b, c. The third format consisted of a Roman or Arabic cardinal numbering scheme (I, II, III or 1, 2, 3). Lastly, the applicants organized their research process in different units by either defining elements like work packages and milestones or by inserting typographical symbols such as bullet points or dashes to demarcate the sections. Two organizational approaches were commonly coexisted. They were generally combined with an outline of the working process, sometimes with a project schedule. This practice can be regarded as a desire to show that the research processes were well conceived. These ways of conveying the research process draw on principles of organization from outside the field of research. They help systematize the research process and are broadly recognized as applicable to the organization and planning of operations.

Another stylistic device that the scientists turned to was the depiction of the entire project or aspects of it as 'simple', 'elegant', 'easy', 'robust', and the like. In some proposals, the applicants wrote that they were posing 'a few radically simple and new questions' (Ch_87) or described their research idea as 'simple' (Biome_17). Others stated that the 'procedure is quite easy' (Ne_72) or that the model or the techniques were simple and easy. In general, this argument surfaced where elegance, simplicity, and functionality serve as proof that the research idea is realizable. This aspiration harks back to the assumption that a true statement is often simple and beautiful (Ivanova 2017). Scientists often choose a theory for its elegance and simplicity (Gross 1990: 16). Gross recommends that one 'not ... deny that there is an aesthetic dimension to science' (5). Ivanova agrees, underlining that 'aesthetic judgements are an integral part of scientific practice' (Ivanova 2017: 2582) and that simplicity 'aids the development of hypotheses, our choice of hypotheses, and ultimately guides our choice between theories that equally fit the data' (Ivanova 2017: 2587).

References to the three resources served to assure the reviewer that the project would be successfully conducted as described in the proposal. Each type of resource represents a particular way of presenting evidence that the scientists will master the research. Accordingly, we call them 'kinds of evidence of research mastery.' We propose this expression rather than import the linguistic term *move* used by Connor and Mauranen (1999), because research mastery fits best to the nature of research ventures. Table 1 provides an overview of the various kinds of research mastery we have identified.

As noted in the literature review, feasibility is closely connected with methodological and technical aspects of the research process. Our empirical inquiry has disclosed an understanding of feasibility that encompasses the entire research process and the gamut of scientific practices and competences. Significantly, this study also includes the self-presentation of the applicants as experienced, competent, and integrated into the scientific community. The first kind of evidence calls attention to the broad scientific skills the researchers would tap to meet the expectations the scientific field has of a good scientist. The applicants cited their familiarity with the established knowledge and customary skills recognized as a manifest indication of a 'great mastery' (Bourdieu 2004: 38) of research practices.

The second kind of evidence stresses that all of the project's necessary assets will be in place. The applicants demonstrated their awareness of the assets needed to guarantee the practicability of the project. In addition, they described their lab's quality equipment, a strategy that also sets that facility apart from other labs without the applicants needing to blow their own horn. The applicants sought to substantiate their project's feasibility by describing their entire range of available technical equipment that past research had proven to be essential.

Table 1. Kinds of evidence of research mastery

Description	Example formulations and typical characteristics
Scientific skills	
Methods and techniques	Familiarity with standard methods, successfully established in the lab, broad methodical and technical experience
Detailed description of the experiment	Detailing how the project proceeds as though it had already taken place
Different assets	
Own preliminary scientific work	Feasibility of the project proven by (a) ready-to-start experiments, (b) pilot studies, (c) published or unpublished results
Technical equipment	Well-equipped labs, access to the full range of the requisite facilities and technologies
Scientific cooperation	Comprehensive cooperation outside the applicant's own lab, use of specific experts and equipment
Stylistic techniques	
Difficulties and solutions	Possible difficulties which might come up are already answered in advance
Different ways of organizing the text	Chronological order, alphabetical sequencing, numbering scheme, defining work packages or milestones
Simple and easy	Elegance, simplicity, functionality as reasoning for correctness

This interpretation is supported by the third kind of evidence—stylistic techniques—that the applicants marshaled to prove their research mastery in the proposals, which exemplify the expected modes of organizing research projects and their processes. Availing themselves of these modes, the applicants adopted the expected proposal-writing style for generating textual evidence (Myers 1990). Similarly, portraying the research idea as 'simple' and 'elegant' is broadly recognized as a criterion that validates scientific hypotheses. Appropriate stylistic techniques thereby help communicate that the applicants know and accept how science is and should be pursued. Through effective writing style, scientists exhibit their mastery of the discipline.

In summary, the three kinds of evidence of research mastery were cited by the applicants to align their projects with scientific standards, embed them in the current state of research, and meet the scientific field's expectations of how scientists should conduct a research project. The applicants thereby increased the chances that their projects would proceed successfully to their conclusion. One could say that the three kinds of evidence refer to the way the scientific field describes and understands itself (Bourdieu 2004).

The three kinds of evidence of research mastery we have distilled in our inquiry have some similarities with those studied by Luukkonen (2012), but ours include a number of new aspects as well. Like Luukkonen (2012), we found strong reference to the applicants' own preliminary scientific work and to the availability of the needed technical equipment. Luukkonen's study and ours also align in the finding that reviewers are keen on seeing evidence that the researcher is ready for all eventualities. Indeed, we noted that the applicants presented themselves as being prepared for any contingency and offered alternative solutions. By contrast, our study enabled us to give a detailed account of how the researchers substantiated their preparedness, namely, by highlighting their vast repertoire of methods and techniques and by minutely describing their experiments. This comparative advantage of our study is highly relevant for demonstrating feasibility (see the next section). We not only learned that research plans and timetables were used to promote feasibility but also showed how they were enriched with different stylistic techniques to increase the textual evidence of the applicant's competence. Luukkonen (2012) did not take such stylistic techniques into account. Parsing the elements of our sample's research proposals into three kinds of evidence that substantiate research mastery was yet another innovation making it explicit that the applicants draw on different kinds of resources for emphasizing their projects' feasibility.

5. Differentiation by the kinds of evidence

At first glance, the three kinds of evidence of research mastery seem to codify nothing more than fulfillment of scientific expectations of how research must be conducted and of what a successful research process requires. In principle, all researchers should have access to these resources. At second glance, however, it becomes clear that the three kinds of evidence of research mastery serve not only to bear out a project's feasibility but also to distinguish the project from other proposals. We can assume that not all researchers have the same capacity to offer the three kinds of evidence in the same way. Experienced researchers and those who have the privilege of working in a large lab are more likely than others to be in a position to verify that they will bring broad methodical and technical experience to their project (Hackett 2005). Nor will researchers be equally able to give a detailed description of an experiment to signal that it has already taken place as a means of demonstrating its practicability. It requires a 'practical mastery', 'a kind of "connoisseurship"' (Bourdieu 2004: 38), to design experimental setups that yield a persuasive description of the experiment—particularly when the experiment is still on the drawing board.

In general, it can be assumed that researchers who have already successfully mastered the first research steps surpass junior researchers in opportunities to point to their own preliminary scholarship, such as publications or self-developed proofs of a concept. Usually, junior scientists do not have enough of their own preliminary work to cite; such assets 'focus on prior merits' (Langfeldt 2001: 836). Nor do researchers all have equal access to a broad range of equipment. Applicants who work at particularly well-equipped labs (Hackett 2005) can refer to the availability of the full range of requisite facilities and technologies and thereby set their project apart from others. Such disparity in opportunities also applies to references to impressive scientific cooperation to which the applicant has access, with the odds favoring established researchers and scholars in well-known scientific institutions. By the same token, some applicants find it easier than others to use the stylistic techniques in ways considered appropriate for the specific genre of academic writing. Linguistic studies on proposal-writing have shown that senior researchers are significantly more experienced than their younger colleagues in that skill (e.g. Urquhart-Cronish and Otto 2019). This finding suggests that experienced researchers in our sample, too, are more likely than junior applicants to have mastered the stylistic techniques we have identified.

Overall, we find that senior researchers and applicants from relatively large and well-known labs can provide the three kinds of evidence of research mastery not only to demonstrate that their projects meet the scientific field's expectations of good research but also to convince reviewers that it is highly likely achievable as planned. Moreover, they can do so to substantiate the practicability of their proposals by virtue of their excellently equipped labs, extensive previous work and experience, and valuable scientific cooperation. They are able to use institutional attributes to confirm themselves as researchers and can point to their lab to indicate their merits and stress that their proposal is feasible. Scientists can be at a disadvantage if they have little or no access to this institutional asset. In addition, studies on gender-specific differences suggest that female researchers tend to be more cautious than male researchers in academic writing (Ramnial, Panchoo and Pudaruth 2016; Lerchenmueller, Sorenson and Jena2019). Accordingly, it may well be that the resources we have identified are exploited less by female than by male researchers in their respective proposals.

This factor is particularly important in the research initiative that we studied, for the funding body specifically intended to level the playing field by excluding additional documents such as CVs and lists of publications. Analyses have shown that such documents are used by reviewers to 'provide a meaningful basis for judging scientific potential' (Kaltenbrunner and De Rijcke 2019: 871). Our study has found that even anonymized proposal processes enable the applicants to use the three kinds of evidence of research mastery to substantiate their scientific potential. It is therefore not surprising that many of the proposals we examined encompassed far more than the conception of the research project. For example, they referred to scientific skills, assets, and stylistic techniques that have no direct bearing on the planned project—such as vast experience accumulated in other projects and a sophisticated outline for the proposal. These forms of substantiation show that proposals cannot be examined only as a specific genre of academic writing. Studies should also analyze which kinds of substantiation are used in the proposals and how they differentiate proposals. Such work should focus on comparing successful with unsuccessful proposals, for our results, as we show below, suggest a link between use of the three kinds of evidence of research mastery and an increase in the odds of success.

6. Conclusion

Our sample of research proposals allowed us to study how applicants can argue the feasibility of their proposed project. We identified three kinds of evidence of research mastery that encompass the planned project's entire research process: scientific skills, different assets, and stylistic techniques. The sample consisted of 11 successful proposals, that is, they had been approved after having received a positive review. We studied whether the separate categories of resources and the three resources themselves had been used more frequently in those proposals than in the proposals that had not been reviewed positively or approved. Because of the small number of our sample's successful proposals, our results are not conclusive, but some differences are striking. Except for 'simple' and 'easy'—the only codes for which the successful and unsuccessful proposals did not differ—all the codes were present more often in the successful proposals, with 'difficulties and solutions', 'technical equipment', and 'scientific cooperation' being slightly in the lead. The small absolute number of cases warrants caution in the interpretation of these differences, however. We identified rather large divergence (from 25 to 28%) in the number of times the applicants made use of methods and techniques, their own preliminary work, and different ways of organizing the text. The number of detailed descriptions of a given experiment was fully 40% higher in the successful proposals than in the unsuccessful ones—a conspicuously great difference. Overall, it seems unsurprising that a proposal's convincing presentation of the applicant's scientific skills augured particularly well for the proposal's success. This finding plainly illustrates that this kind of evidence of research mastery is what is crucial for making credible claims about the project's feasibility. There is reason to believe it is also important to point out one's own preliminary work and to carefully organize the proposal's text. Affirming the availability of the needed technical equipment and the existence of scientific cooperation seemed less central to success that these other codes did. We reiterate, however, that the proposals under review had been anonymized. It could be that the reviewers very likely consider these two categories when reading applications that have not been anonymized.

Our results show that even a short proposal can be formulated to portray oneself as a skilled scientist and demonstrate one's practical mastery at designing experimental setups. The three kinds of evidence of research mastery serve to signal that the project meets the scientific field's expectations of how a scientist should conduct a research project. In other words, they correspond to the self-image of the scientific field. They clearly have the character of an authoritative, binding standard, especially, it seems, for the categories from which the authors of positively reviewed (and thus successful) proposals had drawn more liberally than had the authors of unsuccessful proposals in the effort to underscore the feasibility of their respective projects.

The question remains as to whether three kinds of evidence of research mastery can be considered an expression of scientific conservatism. One can certainly interpret scientific skills and different assets—the two kinds of evidence that meet the expectations, requirements, and standards of the scientific field—as examples of a 'practical conservatism', for they build largely on existing research. However, it would be misleading to conclude from this point that the entire proposal is conservative and representative of conventional research. Recent studies (Barlösius 2019; Philipps and Weißenborn 2019) have shown that proposals can indeed contain revolutionary and radical research ideas. It could be useful to have the analysis of research proposals distinguish the research ideas, which may be revolutionary or conventional, from the *presentation* of the project's feasibility, which usually cites existing practices and methods. This aspect can be considered practical conservatism, but thorough examination of this differentiation was not possible in the present study. That engaging topic invites future research. It would also be instructive to clarify how the third resource—the stylistic techniques used by the writers of successful research proposals—could be linked with the moves identified by Connor and Mauranen (1999).

A limitation of this study is that it was based on relatively brief proposals, although this length made it possible to analyze each document in its entirety. A helpful contribution for future research would be a study of whether long proposals harbor additional kinds of evidence of research mastery. We bear in mind, too, that the research initiative Experiment! only funds proposals from the natural sciences and engineering, and it would be enlightening to learn how the feasibility of projects is argued in the social sciences and the humanities and whether similar kinds of evidence of research mastery surface there as well in principle. The key question resulting from our analysis is whether additional studies will confirm our initial results. After all, successful proposals are characterized by an especially liberal use of the three kinds of evidence of research mastery, especially references to the extensive competence the applicants have in methods and technology, the preliminary work of those researchers, and a detailed description of the experiment.

Notes

1. The VolkswagenStiftung is the largest private research foundation in Germany.
2. https://www.volkswagenstiftung.de/en/funding/our-funding-portfolio-at-a-glance/experiment
3. We thank Axel Philipps for preparing the representative sample.
4. We thank Johanna Johannsen for her help with coding the proposals.

5. The names of the disciplines represented in our representative sample are abbreviated in the remaining text: Bio: biology; Bioch: biochemistry; Bioph: biophysics; Biome: biomedicine; Ch: chemistry; En: mechanical engineering; Me: medicine; Ne: neurosciences; Ph: physics; and Psy: psychology.
6. To preserve the anonymity of the applicants, passages can no longer be quoted.

References

Barlösius, E. (2019) 'Concepts of originality in the natural science, medical, and engineering disciplines: An analysis of research proposals, Science, Technology', *Human Values*, 44: 915–937.

Bedessem, B. (2021) 'Two Conceptions of the Sources of Conservatism in Scientific Research', *Synthese*, 198: 6597–6614.

Berezin, A. (1998) 'The Perils of Centralized Research Funding Systems', *Knowledge, Technology & Policy*, 11: 5–26.

Boudreau, K. J., Guinan, E. C., Lakhani, K. R., and Riedl, C. (2016) 'Looking across and Looking beyond the Knowledge Frontier: Intellectual Distance and Resource Allocation in Science', *Management Science*, 62: 2765–83.

Bourdieu, P. (2004) *Science of Science and Reflexivity*. Chicago: University of Chicago Press.

Chubin, D. E., and Hackett, E. J. (1990) *Peerless Science: Peer Review and U.S. Science Policy*. Albany: State University of New York Press.

Connor, U. (2000) 'Variation in Rhetorical Moves in Grant Proposals of US Humanists and Scientists', *Interdisciplinary Journal for the Study of Discourse*, 20: 1–28.

Connor, U., and Mauranen, A. (1999) 'Linguistic Analysis of Grant Proposals: European Union Research Grants', *English for Specific Purposes*, 18: 47–62.

Currie, A. (2019) 'Introduction: Creativity, Conservatism & the Social Epistemology of Science'. <http://hdl.handle.net/10871/35767> accessed 26 Apr 2021.

Franssen, T., Scholten, W., Hessels, L. K., and De Rijcke, S. (2018) 'The Drawbacks of Project Funding for Epistemic Innovation: Comparing Institutional Affordances and Constraints of Different Types of Research Funding', *Minerva*, 56: 11–33.

Gross, A. G. (1990) *The Rhetoric of Science*. Cambridge, MA: Harvard University Press.

Hackett, E. J. (2005) 'Essential Tensions: Identity, Control, and Risk in Research', *Social Studies of Science*, 35: 787–826.

Heinze, T. (2008) 'How to Sponsor Ground-Breaking Research: A Comparison of Funding Schemes', *Science and Public Policy*, 35: 302–18.

Horrobin, D. F. (1996) 'Peer Review of Grant Applications: A Harbinger for Mediocrity in Clinical Research?', *The Lancet*, 348: 1293–5.

Ivanova, M. (2017) 'Poincaré's Aesthetics of Science', *Synthese*, 194: 2581–94.

Kaltenbrunner, W., and De Rijcke, S. (2019) 'Filling in the Gaps: The Interpretation of Curricula Vitae in Peer Review', *Social Studies of Science*, 49: 863–83.

Kuhn, T. (1991) 'Chapter 7: Scientific Revolutions—A. The Essential Tension: Tradition and Innovation in Scientific Research', in Boyd R., Gasper P., and Trout J. D. (eds) *The Philosophy of Science*, pp. 140–7. Cambridge: MIT Press.

Kummerfeld, E., and Zollman, K. J. S. (2016) 'Conservatism and the Scientific State of Nature', *The British Journal for the Philosophy of Science*, 67: 1057–76.

Lamont, M. (2009) *How Professors Think: Inside the Curious World of Academic Judgement*. Cambridge: Harvard University Press.

Langfeldt, L. (2001) 'The Decision-Making Constraints and Processes of Grant Peer Review, and Their Effects on the Review Outcome', *Social Studies of Science*, 31: 820–41.

Laudel, G. (2006) 'The Art of Getting Funded: How Scientists Adapt to Their Funding Conditions', *Science and Public Policy*, 33: 489–504.

Laudel, G., and Gläser, J. (2014) 'Beyond Breakthrough Research: Epistemic Properties of Research and Their Consequences for Research Funding', *Research Policy*, 43: 1204–16.

Lerchenmueller, M. J., Sorenson, O., and Jena, A. B. (2019) 'Gender Differences in How Scientists Present the Importance of Their Research: Observational Study', *BMJ*, 367: l6573.

Luukkonen, T. (2012) 'Conservatism and Risk-Taking in Peer Review: Emerging ERC Practices', *Research Evaluation*, 21: 48–60.

Markowitz, D. M. (2019) 'What Words Are Worth: National Science Foundation Grant Abstracts Indicate Award Funding', *Journal of Language and Social Psychology*, 38: 264–82.

Myers, G. (1990) *Writing Biology: Texts in the Social Construction of Scientific Knowledge. Science and Literature Series*. Madison: University of Wisconsin.

O'Connor, C. (2019) 'The Natural Selection of Conservative Science', *Studies in History and Philosophy of Science Part A*, 76: 24–9.

Philipps, A., and Weißenborn, L. (2019) 'Unconventional Ideas Conventionally Arranged: A Study of Grant Proposals for Exceptional Research', *Social Studies of Science*, 49: 884–97.

Ramnial, H., Panchoo, S., and Pudaruth, S. (2016) 'Gender Profiling from PhD Theses Using k-Nearest Neighbour and Sequential Minimal Optimisation', in Berretti S., Thampi S., and Dasgupta S. (eds), *Intelligent Systems Technologies and Applications: Advances in Intelligent Systems and Computing*, vol 385. Cham: Springer.

Schreier, M. (2012) *Qualitative Content Analysis in Practice*. London: Sage.

Serrano Velarde, K. (2018) 'The Way we Ask for Money…the Emergence and Institutionalization of Grant-Writing Practices in Academia', *Minerva*, 56: 85–107.

Stanford, P. K. (2019) 'Unconceived Alternatives and Conservatism in Science: The Impact of Professionalization, Peer-Review, and Big Science', *Synthese*, 196: 3915–32.

Swales, J. M. (2004) *Research Genres: Explorations and Applications*. Cambridge, UK: University Press.

Travis, G. D. L., and Collins, H. M. (1991) 'New Light on Old Boys: Cognitive and Institutional Particularism in the Peer Review System', *Science, Technology and Human Values*, 16: 322–41.

Urquhart-Cronish, M., and Otto, S. P. (2019) 'Gender and Language Use in Scientific Grant Writing', *FACETS*, 4: 442–58.

Van den Besselaar, P., Sandström, U., and Schiffbaenker, H. (2018) 'Studying Grant Decision-Making: A Linguistic Analysis of Review Reports', *Scientometrics*, 117: 313–29.

Barlösius, E. (2019). 'Concepts of originality in the natural science, medical, and engineering disciplines: An analysis of research proposals', *Science, Technology, & Human Values*, 44: 915–37.

Appendix

Table A.1. Intercoder reliability between the authors and doctoral assistant

Code	Agreement[a](in %)
Risk	86.96
Difficulties and solutions	90.24
Simple and easy	100.00
Idioms such as *high risk*, *high gain*	88.89
Methods and techniques	83.84
Own preliminary work	88.24
Technical equipment	96.77
Scientific cooperation	93.75
Detailed description of the experiment	91.84
Different ways of organizing the text	92.86
Total intercoder reliability	89.49

[a] The proposals coded by the authors and the doctoral assistant encompassed 390 codings, of which 349 matched and 41 diverged.