Success? Learning to Navigate the Grant Funding Genre System

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Abstract: *An award as principal investigator (PI) is an aspiration for many post-PhD researchers. However, we know little of the actual journey from PhD graduation to achieving this goal. Using a qualitative narrative approach, this study explored how eight science, technology, engineering, mathematics and medicine post-PhD researchers (on contracts and fellowships) achieved PI-ship, specifically, how they learned to use and navigate the funding systems within their working contexts to achieve grant success. They were in two European Union (EU) universities, one in the UK and the other in the Netherlands. The analysis draws principally on their high and low grant-funding experiences. The results show the interaction between individual goals and intentions and the social and structuring elements of their local and extended workspaces—institutional, national and EU. For instance, the funding systems on offer were designed to invest in promising early career researchers, so while these awards provided a research career structure, this was only for a limited number of post-PhD researchers. While the eight were ultimately successful in this competitive environment, their journeys were still challenging. They succeeded by using failure in positive ways, that is, investing in specific learning in respect to different failures. There was a chronology of learning, with immediate past experiences influencing where they invested their learning efforts in order to navigate the funding system successfully. The implications for institutional support are explored.*

Keywords: *Research Grant Funding System; Post-PhD Researcher; Workplace Learning.*

Context

The postdoctoral period is viewed as a time in which individuals develop their scholarly profiles and research independence (Laudel & Glaser, 2008). Becoming a principal investigator (PI) and managing a team is often a key aspiration and sign of success—as is gaining a tenure-track (or in the UK permanent) position (for which a grant as well as publications are seen as powerful). However, little is known of the actual journey to PI-ship in an environment that is viewed as a rejection culture (Baruch & Hall, 2004). This paper explores this developmental journey through the eyes of eight science, technology, engineering, mathematics and medicine (STEMM) scientists who achieved both grant and academic job success. They were in two research universities, one in England and the other in the Netherlands. Given the data were collected in 2014 and the eight graduated 2005-07, they navigated their journeys in a research climate of continuing drops in university infrastructure and funding council budgets due to the global economic crisis.

The study takes a developmental workplace learning perspective in which individuals learn key elements of practice through observation, trial and error experience, and interaction with others. However, individuals are agentive and can choose how they participate, including modifying or refusing to participate (Billett, 2006). Further, the workplace consists of both social and structural elements. The social is constituted in the relationships and networks that individuals participate in within their institutions and beyond. The structural elements, within both host university and relevant funding agencies, offer affordances (e.g., specialized equipment) and constraints (e.g., meeting institutional deadlines) that create a much larger tacit, often unrecognized, workplace learning environment.

As regards research award success, post-PhD researchers need to learn to negotiate successfully the different funding systems on offer (Laudel, 2006)—in this study, national and European Union (EU) ones. They must sustain motivation despite extremely low funding rates, below the 30% that Bazeley (2003) reported reduced the incentive to apply. And they need to do this while building a research profile (publishing in well-recognized journals) as well as continuously seeking their next post-PhD contract and/or a tenure-track position (applying for jobs). In other words, their ultimate success depends on their ability to skillfully negotiate a range of research-related genre systems—grant proposals, peer-reviewed research papers, and job applications (both tenure-track and post-PhD contract).

This study focuses on the first, the grant funding genre system, referred to hereafter as the funding system. It asks: How do STEMM early career researchers (ECRs) develop their understanding of the funding systems on offer and navigate them to success?

Learning to Write Research

Writing and Emotion

Positive emotion, intertwined with motivation, intention, and intellectual thought (Nardi, 2005) has long been viewed as underlying sustained commitment to academic work (Neumann, 2006). Academic work is traditionally identified as behaviour associated with writing research proposals, participating in research projects, and publishing research results, with the increasingly competitive environment around these activities seriously hindering new researchers (Cole, 2007). Therefore, sustaining commitment to such work is not straightforward, with newer academics turning away from research and academia as a result of negative emotion (O'Meara et al., 2014).

As regards writing specifically, the journey can be emotionally challenging. Multiple studies have documented the development process during the postgraduate journey (e.g., Vos, 2013) as well as in the immediate post-PhD period (e.g., Castelló et al., 2017), showing individuals' emotional relationship to writing plays an important role in whether they achieve writing success. This may explain why even more experienced academics are often not productive writers. For instance, Lee and Boud (2003) noted that writing generated fear and anxiety for a significant number of academics, which limited their capacity to publish. Similarly, McGrail et al. (2006), in a review of writing interventions for academics, reported individuals may not be productive due to emotional barriers such as lack of confidence, fear of rejection, belief their writing is not good

enough. They may also not be productive due to a limited understanding of both the writing process and publishing practices, or in this study, the funding system, and the web of connections within which the funding proposal is embedded.

Grant Writing

What exactly are the elements that make up the funding system? While it is clear that mastering the written genre of the research funding proposal is crucial, more than this is required since writing a proposal is not an isolated experience. Tardy (2003) notes applicants must develop knowledge of the funding system—that is, how the creation of the proposal is related to many other documents (e.g., funding call, university requirements) as well as individuals with the crucial procedural knowledge of how the system operates and how best to navigate it. Even with a brilliant idea, not knowing the rules can prohibit success. And, of course, as in any workplace, political and social aspects of the funding system can play a role.

In other words, to achieve the rhetorical goal of obtaining funding, people must go beyond producing writing to considering the differing motivations of multiple readers, alongside addressing the multiple conventions and contextual factors (Ding, 2008). Following submission, the process continues to be interactional, given different meanings of excellence among reviewers (Lamont, 2009), the splitting of hairs in panel meetings when all proposals are good (Porter, 2005) and individuals applying different standards of excellence at various points in the process (van Arensburgen & van den Besselaar, 2012). The result is most frequently rejection (sometimes with no reviewer comments), with subsequent negative emotional response, and then a decision whether or not to invest the time to revise and resubmit.

There has been some research into enhancing the funding experiences of more experienced academics. Shuman (2019) noted the importance of informal workplace learning as well as formal learning, and Wiebe and Maticka-Tyndale (2017) reported the value of an eight-month grant-writing group, and a semi-structured form of workplace learning. However, there has been less research into the workplace experiences and learning needs of researchers in their earlier careers—post-PhD researchers who face additional challenges to those in tenure-track posts, including the lack of an institutional home as well as frequent institutional and international mobility.

So, what new learning is involved in this high stakes activity for post-PhD researchers? Most importantly, grant writing is a new skill even if one is well published (Porter, 2007). Thus, PhD graduates who have experienced success in publishing peer-reviewed papers cannot necessarily transfer such knowledge directly to grant writing since the two are distinct genres in their purpose and structure. That is, the latter is an expository report on what has been achieved written for a specialized group of readers so "jargon" can be used. The former is a form of promissory note, needing accessible language to persuade readers from a range of specializations that investing financially in the plan is worthwhile.

Recognizing the learning demands of the differences in genres may be why some universities (e.g., University of Washington, Emory University, and Ludwig Maximilian University) are starting to

offer final-year PhDs training on writing post-PhD grant proposals. It is unclear if such training includes learning the genre system or focuses only on writing. If training is directed to learning the system, PhDs gain greater ability to bend the rules, and to evaluate whether they can apply the rules from one system to another (Cheng [2014] on PhD, not post-PhD funding).

Conceptual Framework: Individual Development within Nested Contexts

Adopting an identity-trajectory perspective (McAlpine & Amundsen, 2018), learning is conceived as integrating both life and work experiences through time—with work experiences in three nested contexts: macro-, meso-, and micro-. In other words, there is interaction between individuals' intentions and the social and structuring elements in which they each are embedded.

As well, learning is cumulative over time with agency playing an important role in learning and development; that is, the extent to which individuals articulate and progress towards personal and work intentions and goals while navigating supporting and constraining structures (McAlpine & Amundsen, 2018)—and in doing so, develop and draw on the support of extended and local networks. (While the focus here is funding success, individual's personal lives played a role in their journeys.) Of special interest in the post-PhD context is an individual's efforts to demonstrate independence. This means building a record of being "first" in different contexts, e.g., a unique intellectual profile, and having experiences in the best universities, thus enhancing potential collaborations while maximizing publications that demonstrate innovation (Felt et al., 2012).

As regards the macro- and meso-contexts, PhD numbers are growing so there is increasing competition for the reduced numbers of secure research-teaching positions resulting from the shift towards more teaching-only and research-only posts. In other words, the path to a traditional academic career is no longer short nor assured (Van der Weijden et al., 2015), the post-PhD contract period is lengthening (Cantwell, 2011), and post-PhD researchers must find a way to develop a unique and attractive profile—one in which PI-ship can be helpful.

Study Macro- and Meso-Contexts

What are the macro- and meso-contexts for the ECR in this study? In the Netherlands, around 30% of PhD graduates continue in academia, usually in their own university. Notably, 85% of these are not in tenure-track posts but in positions as researchers or teachers. Later, only 13% transfer into academic positions in the same institution and 7% to other universities.

The picture is similar in the UK. Only three or four in every hundred PhD students will find a permanent academic position (Nature Editors, 2017). Another study notes that seven to nine years after graduation only 26% are employed on a permanent or open-ended contract in higher education, with a greater percentage of social scientists than STEMM scientists achieving this status (CFE Research, 2014).

In this context, international experience, while potentially important for all researchers, may for those from non-English-speaking countries, be particularly useful in integrating into international

scholarly networks and ultimately advancing their publication record (Horta, 2009). Within the macro-European context, there is a consistent pattern of in-flow of international researchers to the UK (Cantwell, 2011), with many academics from EU countries later drawn home by their national granting systems.

In the EU, mobility is particularly valued and supported through Erasmus financial support for short-term mobility of student, administrative and academic visits. Also. individual countries have their own mobility schemes (e.g., the Dutch Rubicon program). Further, EU policies ensure easy movement across countries to take up different posts, so individuals can look beyond the country they are in when seeking advancement. For instance, in the Netherlands, the proportion of foreign academics is growing, and many Dutch academics work abroad (de Goede et al., 2013).

As for the macro-level funding systems pertinent to this study, post-PhD researchers can consider the general funding opportunities provided through the European Research Council and their national funding providers. In addition, given the desire to support post-PhD researchers to develop their research potential, there are a number of funding schemes designed particularly for them. At the time when the data for this study were collected, post-PhD researchers in any EU country, in addition to grants open to all researchers, could apply for:

1. Starting grants: for those between five and seven years since graduation, with the host university either where the post-PhD researcher applied or elsewhere.
2. Marie Skłodowska-Curie actions: for applicants with a PhD or four years' research experience; and for career development and training in all disciplines through international and inter-sectoral mobility.

In the Netherlands, the Netherlands Research Council offered three grants geared specifically to different stages in an ECR's development, with the aim to encourage talented researchers to remain committed to an academic career:

1. Veni grants: for (young) talented researchers who have recently completed their PhD, to allow them to continue to develop their ideas.
2. Vidi grants: for researchers who want to develop their own innovative line of research and appoint one or more researchers.
3. Vici grants: for senior researchers to form their own research group.

Notably, at the research-intensive Dutch university where four individuals in this study were located, the percentage of awards against applications was consistently lower than 15% for both Dutch and EU grants. (The success rate gives a sense of the probability of being funded.)

Within the UK, there was a more diverse structure of funding than the Netherlands, thus it was more confusing to navigate. Such differences in national research funding systems have been shown to lead to different application strategies (Laudel, 2006). In this case, early career funding is offered through both disciplinary funding councils, in the case of STEMM researchers, engineering and physical sciences, medical sciences and biotechnology and biological sciences—as well as trusts which are more open as to discipline, for example:

1. Leverhulme Early Career Fellowship: for researchers within five years of graduation; with a research record, but not yet a permanent academic post; designed to allow the researcher to undertake a significant piece of publishable work.
2. Royal Society University Research Fellowship: for researchers with three to eight years of post-graduation with the potential to become leaders in their field; focused on the chance to build an independent research career.
3. Wellcome Trust Early New Postdoctoral Fellowship: for those with no or initial postdoctoral experience; designed for the researcher to undertake guided research with an aim to go on to lead their own independent research.

Similar to the Dutch university, the success rate across grant schemes in the research-intensive UK university was low; in fact, it was closer to 10% than 15%.

At the meso-level, institutional processes and behaviours can hinder or facilitate research success (Cole, 2007). This has led to calls for universities to invest in building research capacity (Debowski, 2012)—though such support may not be directly for post-PhD researchers. However, both universities in this study are research-intensive and offer relatively good resources, though in some cases resources may only be available to academics. For instance, the UK university has a well-recognized support program for post-PhD researchers, including for grant applications, as well as junior research fellowships for those in the institution within six years of PhD graduation. In the Dutch university, while there is not a distinct post-PhD researcher center, there are support services for post-PhD researcher career planning and a separate unit that offers support for research grants.

Research Question

How do eight STEMM ECR develop their understanding of the funding systems within their working contexts and navigate them to success?

Research Approach and Design

This study draws on data from a larger study carried out principally in 2014. It took a qualitative interpretive narrative approach (Riessman, 2008), one in which, in the first instance, the focus was on analyzing each individual's data to create an account that preserved the meaning that the individual brought to his or her life experiences. Using these accounts, the next step in analysis was looking across-case to seek patterns. The validity of this approach is assessed in terms of its coherence, credibility and the extent to which it provides a solid base for application (Creswell, 2007). Given the nested contexts perspective, a) a purposive sample was created from the 60 participants and b) pertinent websites and databases were searched to provide the information included in "Study Macro- and Meso-Contexts" above. (For earlier reports from this research, see McAlpine et al. [2017; 2016]; McAlpine [2016]; and Mitra & McAlpine [2017]).

Participants: Process of Creating a Purposive Sample

Ethical consent was secured, and an email was sent within three universities in the UK and one in the Netherlands inviting participation. It sought individuals who self-defined as meeting the following criteria: a) awarded own grant funding for the first time in the past five years; b) supervising others; and c) overall responsibility for the intellectual leadership and management of the research project. The email generated responses from 60 individuals representing all fields; all were accepted to participate in the larger study, so a non-purposive sample. (See Figure 1.)

The following criteria were used to create a purposive sample: a) in the same disciplinary cluster to help avoid differences in grant funding and job opportunities between STEMM and social sciences; b) from the Dutch university and just one of the three English universities to vary macro-level national context but reduce variation at the meso-level institutional context to two rather than four; c) awarded first PI grant within six years of graduation since six years was the mid-point for time to grant success for the 60 participants (time varied from one to 11 years) so a measure of success; and d) in a tenure-track position, an additional measure of success.

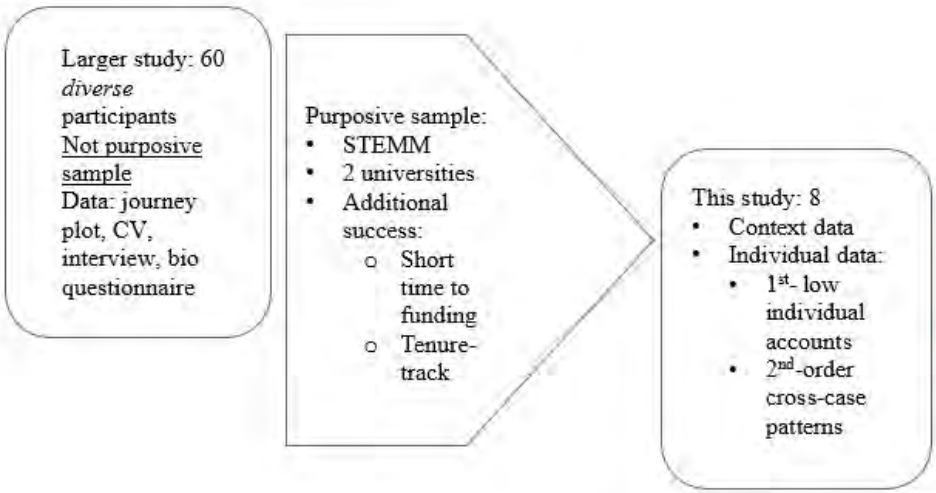
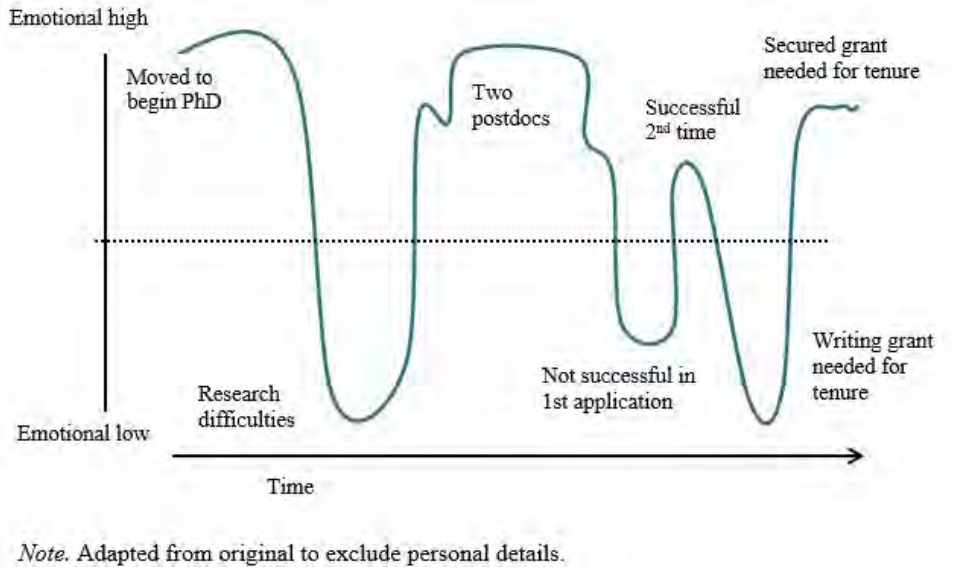


Figure 1. Research Process.

Individual Data Sources

Each participant provided a CV, completed a short biographical questionnaire and participated in an interview that began with a journey plot capturing the highs and lows of the journey from the PhD to first grant award.

Journey plots are a visual data collection method that capture emotion, agency and motivation through time in an open, less-inhibited manner than just an interview (Miller & Brimicombe, 2003). The journey plot template was designed to capture the chronology of experiences over time on the horizontal axis, and related emotion from high to low on the vertical axis—with the mid-point marked (see Figure 2 for Romeo's journey plot). Individuals mapped the emotional highs and lows of their experiences from the PhD to their first PI grants. Then, they were asked to reconstruct the journey verbally explaining the emotional high and low experiences. They were not directly asked to describe how they navigated the funding system, but rather to describe their experiences in a relatively undirected way, with probing to expand on information they provided. It is this part of the interview was the focus of the study. In the remainder of the interview, they described their experience of being a PI and finally, any advice they would offer individuals starting on a similar journey.



Note. Adapted from original to exclude personal details.

Figure 2. Romeo's Journey Plot.

Analysis

To ensure anonymity, participants chose or were given pseudonyms. Further, their CVs and biographical questionnaires were summarized in a highly structured manner to preserve the information but with identifying information removed. Then, all the data for each of the eight cases (interview, journey plot, summarized CV and biographical data) were imported in MaxQDA. Taking a narrative approach (Reissman, 2008), the first step was to create a brief low-inference case summary for each individual to capture the uniqueness of each life experience.

This primary analysis preserved the accounts provided by the research participants while providing a starting point for a secondary thematic analysis of their positive and negative reported experiences related to the funding system. This was done as follows for each individual in the context of the individual's case summary: 1) all the experiences from the journey plot were noted and characterized as to their focus; 2) those not related to the funding system were set aside; 3) then, the interview was examined to find the excerpts related to the experiences about the funding system; 4) these were extracted in chronological order for each individual; and 5) then were analysed as to how individuals negotiated the funding system. Finally, a cross-case analysis was done.

Results

Who the Participants Were

The eight individuals, six males and two females, with four in each university, represented six STEMM fields. All had a language other than English as their home language, and graduated within a three-year period of each other. Only three at time of interview were in their home country, the Netherlands (see Table 1 for characteristics).

Table 1. Participant Characteristics (anonymized)

Name	Discipline	Gender	University	Home language	Prefer	In home country (at interview)
Cathy	Materials	F	England	Not Eng.	2006	No
Dan	Biotechnology	M	Netherlands	Not Eng.	2005	Yes
Fabien	Biotechnology	M	Netherlands	Not Eng.	2006	Yes
Frances	Materials	F	England	Not Eng.	2007	No
Geoff	Neurosciences	M	England	Not Eng.	2006	No
Mike	Engineering	M	England	Not Eng.	2006	No
Romeo	Maths	M	Netherlands	Not Eng.	2005	Yes
Sam	Chemistry	M	Netherlands	Not Eng.	2005	No

Their High and Low Experiences

Experiences reported by each individual varied from 3-7 with an average of 5.5 over roughly a decade. Perhaps not surprisingly, the most frequent experiences (high and low) were about grants (40.1%), with all reporting at least one experience related to this theme. Smaller numbers of experiences referred to efforts to publish, and secure jobs, with the remaining a range, for instance, running a large research group, family relationships, undergraduate and postgraduate experiences. In describing the results, Sam's and Dan's experiences are explored in detail as Sam had four and Dan three funding system experiences—with reference to the others' experiences as appropriate.

Two Cameos

Sam and Dan both graduated in the same year, and were at time of interview in the same Dutch university but different fields. Sam is international and Dan is Dutch. Their cameos provide a sense of the a) uniqueness of each journey, and b) the interaction between the social and structural elements of the funding system and individual's efforts to navigate these successfully. (To ease reading the cameos, I have limited the use of ellipsis in editing quotes.)

> Dan, in his late 30's, left his home in the Netherlands for England in 2005 after completing his PhD. He was already well-published. His supervisor had suggested he go abroad, so he emailed a PI in an English lab he had heard was doing interesting work and was invited to visit. Dan had no funding, so offered to apply for some. But, the PI said "I'll pay for the first year or whatever it takes to get your own money." So, he applied the first year and secured a one-year EU Conference Fellowship in his field, and then a two-year Marie Curie Fellowship – following his supervisor to another English university in 2006. The grants 'didn't really feel like a high' though they achieved what his supervisor wanted which was to 'just write a cool story.'
>
> Then, he met his PhD supervisor at a conference and the supervisor offered him a job as a post-PhD researcher on a grant he had: 'You can come [back] and do your own research.' So, he returned to his PhD university in 2008, and won a Marie Curie Reintegration Grant to support his research (available only for those with Marie Curie Fellowships), but still wanted a tenure-track position. One came up, but he was not successful. This was a real low; he began to have doubts: 'How many years do I play this game of being a postdoc ...you have to think of an alternative, at some stage.' He actually applied for a clinical chemist post, but was not successful. But then, in late 2009, a mentor directed him to a tenure-track position in another university. He applied and moved there in 2010 – with five years to prove himself: 'All these people saying ... we ...think you will get this big grant, which we also expect of you.' Thus, although he had already received awards, he needed to ramp up to more competitive grants. He applied and was 'really hammered,' coming in the bottom quartile. Despite being warned his proposal was likely too fundamental for the competition, 'I was quite...surprised I didn't go through the first round' (being sent out for review) since 'I'm typically quite high' in ranking. He even questioned if he was suited for this work.

After much discussion with colleagues and considerable reflection, he applied the following year (only two applications are allowed). Many colleagues had suggested he switch to another source of funding, given the fundamental nature of his plan. But, one colleague convinced him that he should try again from the perspective that 'they [the panel] really want to see how you're going to use this knowledge.' Further, he said: 'You're too good to let this opportunity go, so ...you're going to focus one complete year on getting this.' 'So, what made me believe him? ... Well ...this guy has a lot of experience with this council ...and he's really great.'

Early on in that year, he had an 'ah-ha' experience at a meeting when he saw the kind of competition he was up against – a researcher describing research with economic and social value – 'the first learning lesson.' So, he invested in better understanding what the funding council found important. He also did research to gain more proof of principle to show 'what I want to do ...is actually useful for industry.' He contacted industries who were enthusiastic and wrote support letters. He also obtained feedback on his ideas using colleagues and university resources. As a result, he wrote a totally different proposal, one he felt would be competitive. This time, it went out for review, 'the first barrier,' and he was called for interview. He rehearsed two times with critical friends outside his field so he learned to withstand harsh questions and respond politely. He also continued to draw on institutional support, e.g., how to give a good talk, body language. And, 'I ended first in the competition ...that was pretty high!'

Sam, in his late 30's, graduated in 2005 in his home country with some publications. He had applied for a Marie Curie Fellowship in a host university in the Netherlands (not his home country), but wasn't awarded it. He was told: '"your CV is not big enough" ...so you don't get the grants.' As a result, he took a post-PhD researcher contract at another Dutch university.

Over the three years from graduation, he had four different contracts. 'It was a hard time ...being a postdoc ...a bad situation. I was thinking, at that time...what the [!!!] is going on...why do we need to prove the quality over and over and over and over again?' Still, he preferred to stay since the career structure in his home country made it more difficult than in the Netherlands for researchers to gain visibility. There, 'you will work for the one who ... hired you for at least 10 or 15 years before you can get your own group, and [can] apply in your own name' for grants. Here, 'I'm already visible.' On the other hand, he had to rethink his research approach. In his home country, you 'can do really pure research, and you don't necessarily need to claim an application.' But in his new country, 'they do not accept the idea of doing research that has no purpose.'

He strategically presented at conferences noting: 'You should ...go ...when you have a big paper because you have more chance of showing what you have just done, whereas if it was a three year old paper, then the response was "this is the general kind of thing he's doing ...but what did he do this year?!"' Then he changed universities on another contract and applied for a VENI grant but didn't succeed. He applied the following year feeling his recent 'big paper' made it 'a good time.' 'If I would have resubmitted a year after ... your big paper starts to be a bit older, so the question is always: 'well, what did you do recently?"' He sought

advice from a senior colleague that he often cited and secured university help to draft a good budget: for him something that was 'real tough' yet 'very important.' In the end, 'I had re-written so ...the project had become better [and] there is a difference between a very good and less good project.' But, in the rebuttal session, 'I had the feeling my answer was not really good ...but ...I got [it] so they are testing you on your ability to answer difficult questions.' He also wondered about 'how much time [the panel] have to look at these rebuttals ...and that's very tricky.'

Obtaining the grant was 'the most important step ...out of the postdoc time, where you have to beg for contracts to big bosses ...so, in terms of visibility, it's really not your research.' Further, 'four contracts in three years is quite a lot, and then suddenly you have three years ... an infinity!' But, it also meant moving back to the first university, the host. From this time, his publication record increased and he then applied for a VIDI grant and was successful, again on the second try. He strongly believed 'building your own research line is really starting when you can publish on your own.'

He also applied for an ERC grant around that time. When he finally heard back, the response was in the grey zone: 'it's fundable but we don't have enough money,' so he had no expectation that he would secure funding. He was even told by grant panellists he met later that his CV hadn't been strong enough. But, then three months later, shortly after receiving the VIDI grant, he learned that he was funded. 'That's really the best you can...have at my level ...So, it was like an enormous amount of money that was coming to my hands, so that was really ...quite special!'

Dan's and Sam's stories were chosen to demonstrate the variation within the group. You may note that Dan a) was relatively well published on graduation; b) returned to the Netherlands, his home country, after a period post-PhD in England; c) experienced doubts he would succeed as an academic and applied for a non-academic job; d) was mostly successful on his first application for each scheme; e) decided to ignore the majority opinion about how to proceed upon receiving a major grant rejection; and f) used the new proposal process to re-think his research direction. Sam, on the other hand, a) was less well published than Dan on graduating; b) moved from his home country after his PhD and did not want to return there; c) had a large number of contracts in a short period of time, before obtaining some funding; d) doubted his future when his applications for tenure-track posts were not successful; e) generally only succeeded on his second attempt for each of the grant schemes he applied for; and e) felt his publications played a crucial role in his success and failure. Still, they both experienced doubt as to their ability to succeed. As well, both were mobile, won national and EU funding, and focused on understanding the aspects of the funding system where they experienced difficulty. In this regard, they are largely representative of the eight. I now turn to the themes that emerged in the analysis of the eight individuals' experiences of learning to navigate funding systems.

Learning the Funding System

The key themes that emerged from the analysis of the 19 high and low funding system experiences are the following: a) differences in the nature and quality of the two types of experience; b) the link between an individual's intentions and actions; c) the chronology of each individual's learning of the funding system; d) the influence of the different nested contexts; and e) the aspects of the funding system that received the most learning attention.

High and low experiences: The likely outcome of many academic efforts is lack of success. For instance, peer-reviewed paper acceptance rates in the sciences are higher than in the social sciences and humanities but still average about 50% with 4/5 of these provisional acceptance after revision; no figures were provided as to final acceptance (Ware & Monkman, 2008). While this is challenging enough, grant success rates, as noted earlier, can be as low as 10%. Grant submission requires a large time investment against the small chance of success, yet an award creates security to move forward professionally and intellectually. Thus, while lack of success could generate doubts about an academic future (cases: Dan, Sam, Romeo), these upsets generally led to profound learning: work to integrate, reorient thinking and actions, and create alternatives (Maitlis et al., 2013). In the process, individuals developed resilience. That is, they learned to think of success as unlikely yet value the deep research thinking that is inherent to the process—to view resubmission as par for the course, and accept the many things beyond their control. Invoking luck to explain outcomes beyond one's control is a useful strategy in this regard (Day & Maltby, 2005), which four did (cases: Geoff, Sam, Romeo, Fabien).

Positive emotions, in Neumann's (2006) words 'passionate thought,' served an alternate and important function. Positives reinforce the notion that all the effort, including responding positively to rejections, is worthwhile. Their role in learning is to sustain our commitment; recall Sam's words when he won the grant: 'that's really the best you can have at my level ... quite special.'

Link between intentions and actions: Inherent in the theme described above is the notion of agency, i.e., efforts to achieve a goal. These eight individuals articulated clear intentions related to the funding system activities they engaged in; these were often related to where they were in their career development. Recall Dan, in a tenure-track position, saw achieving the 'big' grant as ensuring permanence as well as meeting collegial expectations; or Sam, while still on contract, seeing his fellowship as providing security so he had independence in developing his career as he wished. Other examples include:

1. Fabien experiencing difficulty in advancing in his PhD field, so changing disciplinary direction after his PhD to become more competitive.
2. Frances, immediately after graduating, applying for a fellowship—not because she expected success but to go through the experience to better understand it (she was successful the second time).
3. Romeo going for even brief research stays to what he considered the best teams to advance his thinking.

4. Geoff applying for minor grants as a researcher, not for the money, but to help him learn what kind of information should go in and be left out in later larger grants.
5. Mike moving to England and investing in learning the new funding system.
6. Cathy, knowing she would shortly be starting a tenure-track post, seeking a particular kind of fellowship in order to have practice leading a team and being a PI.

Such examples make clear the influence of macro- as well as meso- and micro-workplace contexts in learning (Billett, 2006); individuals were learning the funding system practices and possibilities, and how to use them effectively, in all these contexts.

Individual chronology of learning: Further, there was an individual chronology of focused learning on different parts of the funding system. That is, as individuals experienced challenges in particular aspects of the system, these became the focus of their learning. To make this process more concrete, here is first Sam's, then Dan's chronology.

Sam:

1. Moving countries led to learning about the new funding system.
2. Then, not gaining a Marie Curie grant and receiving feedback on his CV made him focus on publishing successfully and speaking at every opportunity.
3. Then he applied for funding nationally and failed—again with feedback about his CV. The next year he decided to apply again because he had a recent 'big' paper. But he also sought advice from a respected colleague and help from the university about the budget, and re-wrote to create a 'better proposal.'
4. This time he went as far as the rebuttal phase, his first experience of this, and felt he hadn't done well. Nevertheless he was awarded the grant and learned that in the rebuttal: 'they are testing you ...on your ability to answer difficult questions' about your proposed research. He also saw a connection between the demands that are made on panellists and his own minimal experience of review.

Dan:

1. Experiencing doubt about his future as an academic led him to explore and then apply for a non-academic job.
2. Coming in the lowest quartile in a competition—not even going for review—after relatively constant success led him over the following year to seriously assess his research approach. He sought guidance from a trusted mentor; experienced his 'first learning lesson' as to how to change his proposal in listening to another researcher present; did a research pilot for proof of concept; engaged with industry partners; drew on institutional and personal resources for help, including rehearsal for the rebuttal.

Dan's and Sam's experiences exemplify the cumulative nature of the learning process, particularly the relationship between immediate past experience on intentions for the present and the future (McAlpine & Amundsen, 2018). The result was that Sam and Dan changed their research thinking and actions and developed more sophisticated understandings of the funding systems within their unique nested contexts.

The influence of the different contexts: Interaction between individuals' intentions and the contexts in which they were working were sometimes positive and other times negative. At the macro-level, moving countries involved not just the demands of a physical relocation, but also learning the ways in which the national funding systems and career structures differed from their previous locations, for instance:

1. Sam's needing to develop a broader view of career structures, particularly as regards funding systems; while there were similarities in the overall system, there were differences in the specificities which could be demanding.
2. Dan needing to learn and choose from a more complex set of funding systems in his new country than the one he had known, or Sam's need to make his research less intellectual as a result of moving countries.
3. Romeo realizing his (overly) confident stance in the rebuttal, learned during his stay in North America, 'just didn't work ...at the interview, it went wrong.'

At the meso- and micro-contexts, even moving within the same country involved learning the new set of university resources for gaining funding as well as local work climates, which could be supportive or not, for instance:

1. Romeo's experience of plentiful support from the PI and Head of Department and colleagues who helped with a mock interview.
2. Geoff's 'workaholic' environment and tensions with the PI's wife, also in the lab, leading to seeking another post.

Funding system and focus of learning: The key areas where individuals focused their learning when they experienced a lack of success (or saw others whose work was similar) are noted below. The citations refer to previous research. Ten refer to the funding genre system and the learning of more experienced researchers, with only three about ECR: Cheng (2014) and Ding (2008) about PhDs and Felt et al. (2012) postdocs.

1. Decision-making about the possible funding systems (Laudel, 2006; Tardy, 2003) when moving to a new country or choosing whether to seek fundamental research grants or strategic ones.
2. Writing a persuasive proposal (Porter, 2007) including demonstrating one's own record through self-citation (Cheng, 2014).
3. Dealing with negative emotion to writing (Lee & Boud, 2003) and rejection (Ware & Monkman, 2008) to establish an effective publishing record that leads to an excellent CV given its role in convincing panellists that the work can indeed be accomplished (Felt et al., 2012).

4. Drawing on more senior colleagues for advice as to how to interpret feedback or how to proceed (Ding, 2008).
5. Recognizing the important role of the rebuttal (Porter, 2005) and how to navigate this.
6. Understanding the political and social aspects of the process (Lamont, 2009), such as variability in reviewer responses (van Arensburgen & van den Besselaar, 2012).
7. The importance of institutional resources on offer throughout the process (Cole, 2007).

This summary highlights the little that is known about the learning that ECRs engage in as they develop their funding system expertise. Noted here are the aspects of the system that need more attention: choosing the funding system, publishing effectively, and dealing with the rebuttal process. Generally, the evidence shows that individuals understood that submitting persuasive proposals, while essential, was not sufficient. They recognized they needed an excellent and unique research idea, visibility in their network, and a competitive CV. They each drew on their own experiences to make decisions as to where to invest their learning.

To this end, they engaged in multiple concurrent activities alongside grant writing to both become more competitive and build their knowledge about the funding system. They continued to apply for post-PhD researcher contracts that would either further their research direction or stretch their thinking in other ways (e.g., Romeo submitted 40-50 applications for researcher posts as he completed his PhD and sought even short-term visits to key thinkers); to make presentations (e.g., Sam, for greater visibility as an individual beyond his publishing record); and to network to build collaborations and trusted colleagues (e.g., Dan in deciding how to proceed after being 'hammered') —alongside seeking tenure-track positions. Overall, individuals through their varied work experiences built their own more robust understanding of the multiple interconnected aspects of the funding system—so not a complete vision but one honed to the challenges they had experienced. Notably, none made reference to the fact that they were operating with English, a language not their own.

Debowski (2012) reported that the university leaders she interviewed identified the following elements as critical to research success and thus skills to focus on in building research capacity. Individuals need to be able to 1) write papers published in top-tier journals; 2) seek and obtain research funding to support their research and build their university's reputation; 3) engage with industry partners; 4) build inter-disciplinary and cross-institutional collaborations; and 5) translate research into the community to broaden its impact. The results across the eight participants in the study clearly demonstrated the first two, but only Dan reported the third and fifth. While this may be due to the nature of the study, the list is a reminder of the range of funding system learning that post-PhD researchers need to engage in if they are to be well-prepared to advance their careers.

Discussion

The contribution of this study is threefold. First, it addresses the learning associated with the whole research grant funding system, not just proposal writing (a traditional research focus). Second, it focuses on the learning experiences of ECR, individuals who are just starting out, who have not yet found an institutional home, and are dealing with the need for both institutional and international mobility.

Third, it expands our understanding of the informal workplace learning that ECRs engage in as they develop their funding system expertise, especially the evidence on how particular past experiences influenced present learning investment in developing expertise in the funding system. This phenomenon, which I have characterized as the chronology of the learning experience, deserves more research attention which could then be used to inform institutional learning support.

The study reported on the funding system stories of those who were ultimately successful in an environment where roughly nine out of ten applications do not succeed. Yet, these individuals still experienced challenges and engaged in much learning. While this analysis focused on those related to the funding system, individuals also reported a range of others related to publishing, finding a job, and problems supervising a PhD student—in other words, they had more general career development challenges.

The importance of emotion in their learning and in sustaining motivation was clear; negative experiences particularly prompted new learning, and positive emotion provided an intermittent reward for their hard work. In fact, the eight participants in the study invariably re-applied as long as they were able to, given the funding system constraints.

The eight also decided what to learn more about and when in relation to their previous negative experiences (McAlpine & Amundsen, 2018) in the funding scheme. In other words, the results speak to the need for more attention to individuals' focused learning intentions. These individuals were learning key elements of funding system practices on the basis of their own trial and error and interaction with others (Billett, 2006). To do this, they engaged in both the social and structural elements of the workplace at micro-, meso- and macro-levels. Thus a further implication is that the workplace needs to be understood as global—not just their department and institution and those within them, but also colleagues and networks elsewhere as well the national and EU funding schemes on offer. This notion of workplace learning could be useful in framing institutional support.

Other aspects of the funding system not referred to in previous studies also emerged, for instance, the rebuttal process; conceptualizing research differently (fundamental through applied); and the important role played by more senior colleagues as mentors, both financially and intellectually. So, though these individuals were agentive and generally sustained their motivation, support from others who showed a belief in them was also important. As significant, they structured their learning, for instance, understood and used earlier simpler, less competitive applications to prepare themselves for the more demanding and competitive ones ahead as they moved from ECR to mid-career and the scope of grants changed.

Notably, these individuals were in institutions that provided multiple forms of support, internal grants, research offices, and ECR development offices, even to the level of receiving feedback on posture and stance during rebuttal interviews. As well, quite a number were offered jobs in these same institutions, which leaves one to wonder if such support is envisioned as part of a long-term institutional investment related to academic hiring.

The goal of this study was to explore a previously unexamined phenomenon with the intention to generate results with implications for application elsewhere. So, what does this study suggest as to institutional support? In addition to the points raised above, it suggests that the needs of post-PhD researchers may be somewhat different from more established academics. It is a reminder when planning institutional support for grant writing, such support cannot be treated as a distinct activity but rather needs to be woven into a coherent plan for career progression. Further, the extent to which individuals focused on specific learning based on distinct personal experiences and drew on colleagues for support and advice suggests that faculty-level interventions, which build local community might be more productive than institution-wide activities.

While achieving its goal, the study has limitations and thus implications for future research. The sample is small though purposive, limited to STEMM participants and located in only two universities in two countries, thus there are many directions for future research. First of all, the study context could be broadened to similar studies in different nested contexts to better understand how STEMM ECRs respond to differences in national funding options and university resources. As well, studies could examine closely the less visible features of the genre system where these participants focused their learning, e.g., deciding which program to apply to, the role of the CV, and handling the rebuttal process. Further, studies of those who have been less successful might provide insight into other, perhaps qualitatively distinct, learning challenges. Additionally, studies could be conducted of social scientists and humanities researchers to seek disciplinary differences. The overall goal of such studies should be to broaden inquiries into research funding in order to explore the totality of the proposal genre system and then use the results to expand the nature and range of training activities for ECRs.

Conclusions

Overall, while the ECRs in this research study were successful, the journey was not easy. In other words, behind "success" lie many rejections, which require sustained commitment and learning. It is apparent that individuals demonstrated clear learning intentions and actively engaged in a range of activities—not just grant writing—to enhance success. They also drew on social networks and the structuring elements of the universities and funding agencies. The findings remind us that if we wish ECRs to develop success in the funding system, we must engage them in learning activities that look much beyond the proposal itself. Support needs to encompass the life-cycle of funding systems in order that ECRs understand how to set goals to navigate funding systems successfully—and to do this within a career development framework.

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References

Baruch, Y., & Hall, D. (2004). The academic career: A model for future careers in other sectors? *Journal of Vocational Behavior*, 64, 241-262. https://doi.org/10.1016/j.jvb.2002.11.002

Bazeley, P. (2003). Defining 'early career' in research. *Higher Education, 45*(3), 257-279. https://doi.org/10.1023/A:1022698529612

Billett, S. (2006). Relational interdependence between social and individual agency in work and working life. *Mind, Culture and Activity, 13*(1), 53-69. https://doi.org/10.1207/s15327884mca1301_5

Castelló, M., Pyhältö, K., & McAlpine, L. (2017). European cross-national mixed-method study on early career researcher experience. In A. Jaeger & A. Dinin (Eds.), *The landscape for postdoctoral fellows* (Chapter 7, pp. 143-174). Elsevier.

CFE Research (Diamond, A., Ball, C., Vorley, T., Hughes, T., Moreton, R., Howe, P., & Nathwani, T.) (2014). *The impact of doctoral careers: Final report.* https://www.ukri.org/files/skills/full-report-idc-pdf/

Cheng, Y.-H. (2014). Dissertation grant proposals as "writing games": An exploratory study of two L2 graduate students' experiences. *English for Specific Purposes*, 36, 74-84. https://doi.org/10.1016/j.esp.2014.07.001

Cole, S. (2007). Researcher behavior that leads to success in obtaining grant funding: A model for success. *Research Management Review, 15*(2), 16-32. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.129.3501&rep=rep1&type=pdf

Creswell, J. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Sage Publications, Inc.

Day, L., & Maltby, J. (2005). "With good luck": Belief in good luck and cognitive planning. *Personality and Individual Differences, 39*(7), 1217-1226. https://doi.org/10.1016/j.paid.2005.04.011

Debowski, S. (2012). *Strategic research capacity building: Investigating higher education researcher development strategies in the United Kingdom, United States and New Zealand*. The Winston Churchill Memorial Trust of Australia.

De Goede, M., Belder, R. & De Jonge, J. (2013). *Academic careers in the Netherlands 2013*. Facts & Figures 7. The Hague: Rathenau Instituut. https://www.rathenau.nl/sites/default/files/2018-05/Facts_and_Figures_Academic_Careers_01.pdf

Ding, H. (2008). The use of cognitive and social apprenticeship to teach a disciplinary genre. *Written Communication, 25*(1), 3-52. https://doi.org/10.1177/0741088307308660

Felt, U., Fochler, M., & Müller, R. (2012). *Biography and/or career? Young Researchers' perspectives on knowing and living in contemporary research*. University of Vienna: Department of Social Studies of Science.

Horta, H. (2009). Holding a post-doctoral position before becoming a faculty member: Does it bring benefits for the scholarly enterprise? *Higher Education, 58*, 689-721. https://doi.org/10.1007/s10734-009-9221-1

Laudel, G. (2006). The art of getting funded: How scientists adapt to their funding conditions. *Science and Public Policy, 33*(7), 489-504. https://doi.org/10.3152/147154306781778777

Laudel, G., & Glaser, J. (2008). From apprentice to colleague: The metamorphosis of early career researchers. *Higher Education, 55*, 387-406. https://doi.org/10.1007/s10734-007-9063-7

Lee, A., & Boud, D. (2003). Writing groups, change and academic identity: Research development as local practice. *Studies in Higher Education, 28*(2), 187-202. https://doi.org/10.1080/0307507032000058109

Maitlis, S., Vogus, T. J., & Lawrence, T. B. (2013). Sensemaking and emotion in organizations. *Organizational Psychology Review, 3*(3), 222-247. https://doi.org/10.1177/2041386613489062

McAlpine, L. (2016). Becoming a PI: From 'doing' to 'managing' research. *Teaching in Higher Education, 21*(1), 49-63. http://dx.doi.org/10.1080/13562517.2015.1110789

McAlpine, L., & Amundsen, C. (2018). *Identity-trajectories: Ways of understanding post-PhD career choices*. Palgrave MacMillan.

McAlpine, L., Turner, G., Saunders, S., & Wilson, N. (2016). Becoming a PI: Agency, persistence, and some luck! *International Journal for Researcher Development, 7*(2), 106–122. https://doi.org/10.1108/IJRD-12-2015-0033

McAlpine, L., Wilson, N., Turner, G., Saunders, S., & Dunn, B. (2017). How might we better design our support for postdocs? *International Journal for Academic Development, 22*(4), 374-379. https://doi.org/10.1080/1360144X.2017.1375414

McGrail, M., Rickard, C., & Jones, R. (2006). Publish or perish: A systematic review of interventions to increase academic publication rates. *Higher Education and Research Development, 25*(1), 19-35. https://doi.org/10.1080/07294360500453053

Mitra, M., & McAlpine, L. (2017). A balancing act: The interaction between the work and broader lives of male and female early career researchers. *Higher Education Review, 50*(1), 5-34.

Nardi, B. (2005). Objects of desire: Power and passion in collaborative activity. *Mind, Culture and Activity, 12*(1), 37-51. https://doi.org/10.1207/s15327884mca1201_4

Nature Editors. (2017, October 25). Many junior scientists need to take a hard look at their job prospects Permanent jobs in academia are scarce, and someone needs to let PhD students know [Editorial]. *Nature 550*, 429. https://www.nature.com/news/many-junior-scientists-need-to-take-a-hard-look-at-their-job-prospects-1.22879

Neumann, A. (2006). Professing passion: Emotion in scholarship of professors at research universities. *American Educational Research Journal, 43*(3), 381-424. https://doi.org/10.3102/00028312043003381

O'Meara, K., Lounder, A., & Campbell, C. (2014). To heaven or hell: Sensemaking about why faculty leave. *Journal of Higher Education, 85*(5), 603-632. https://doi.org/10.1080/00221546.2014.11777342

Porter, R. (2005). What do grant reviewers really want, anyway? *Journal of Research Administration, 36*(2), 47-55.

Porter, R. (2007). Why academics have a hard time writing good grant proposals. *Journal of Research Administration, 38*(2), 37-43.

Riessman, C. (2008). *Narrative methods for the human sciences*. Sage.

Shuman, K. (2019). Grant proposal preparation readiness: A glimpse at the education level of higher education faculty. *Journal of Research Administration, 50*(1), 89-107.

Tardy, C. (2003). A genre system view of the funding of academic research. *Written Communication, 20*(1), 7-36. https://doi.org/10.1177/0741088303253569

Vos, L. (2013). *Dissertation study at the postgraduate level: A review of the literature*. Higher Education Academy.

Ware, M., & Monkman, M. (2008) *Peer review in scholarly journals: Perspective of the scholarly community – an international study*. Publishing Research Consortium.

Wiebe, N., & Maticka-Tyndale, E. (2017). More and better grant proposals? The evaluation of a grant-writing group at a mid-sized Canadian university. J*ournal of Research Administration, 48*(2), 67-92.