

# Entrepreneurship and Academic Employment – More Alike than You'd Think

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**Abstract:** Recognising the increasing value of knowledge and technology transfer, the scientific and political communities in Germany have recently devoted much attention to academic entrepreneurship. Seeking to explore similarities and differences between academic employment and entrepreneurship, we interviewed 112 postdoctoral students from the four major German research organisations and 16 senior transfer managers whose responsibilities included spin-off facilitation.

Our findings indicate that those involved in such occupations often believe that academic employment and entrepreneurship differ substantially on many levels. Both interviewed senior managers and postdoctoral students considered engaging in commercialisation activities to be a risky and serious undertaking and a significant career change. Simultaneously, the opinions and observations of postdoctoral students helped us identify a wide range of similarities between academic employment and entrepreneurship. Our findings can help make entrepreneurship more accessible to researchers, re-define the boundaries between scientific and commercial activities, and, ultimately, foster knowledge and technology transfer.

**Keywords:** Academic spin-off, entrepreneurship, knowledge transfer, paradigms of (German) academia.

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## 1. Introduction

As the lines between science, industry, and government grow increasingly blurry (Etzkowitz, Webster, & Healey, 1998; Etzkowitz & Leydesdorff, 2000; Ranga & Etzkowitz, 2013), the role of knowledge and technology transfer, KTT, in the utilisation of research findings continues to increase (von Kortzfleisch, Bertram, Zerwas, & Arndt, 2015; Bozeman, Rimes, & Youtie, 2015). In view of these developments, both the scientific and political communities have begun paying greater attention to academic entrepreneurship (e. g. Shane, 2004; Wright, 2007; O'Shea, Chugh, & Allen, 2008). To this end, the European Commission initiated the European Institute of Innovation and Technology, EIT, as a part of its Horizon 2020 program (European Commission, 2014, p. 28). In Germany, the High-tech Strategy of the German federal government is intended to foster knowledge and technology transfer, to increase the national capacity for innovation, and, in particular, to increase the commercialisation activity of national research institutions (Federal Ministry of Education and Research, 2010, p. 10).

Academic entrepreneurship can help more efficiently utilise research findings, create jobs, and provide economic benefits (Dickel, 2009). Germany's capacity for innovation is currently estimated as very high (Frietsch, Rammer, Schubert, Bühner, & Neuhäusler, 2012; Poirson 2013). Simultaneously, a relatively small number of businesses are initiated every year (Brixy, Hundt, Sternberg, & Stüber, 2009;

Schubert, Rammer, & Frietsch, 2014) and only approximately one percent of these businesses are initiated by researchers (Braun-Thürmann, Knie, & Simon, 2010, p. 9). Seeking to increase the number of such businesses and to generally reduce the existing gap between academia and business, the government and many research organisations have recently initiated a range of programs.

The impact of these programs, however, has remained low. In 2013, only 45 businesses were initiated by the employees of the four major national research organisations (Helmholtz Association, 2014; Leibniz Association, 2015; Fraunhofer-Gesellschaft, 2014; Max Planck Society, 2014). Such small proportions of academic spin-offs can be explained, for example, by potential entrepreneurs being unclear about their objectives and strategies and lacking necessary information and skills in business administration (Hemer, Schleinkofer, & Göthner, 2007; Riesenhuber, Walter, & Auer, 2006; Franklin, Wright, & Lockett, 2001; Vohora, Wright, & Lockett, 2004). Especially during the start-up stage, such lack of information and skills can lead to poor decisions (Spath, Winter, & Pape, 2010). One structural barrier, identified by Braun-Thürmann et al. (2010), is the lack of support by the employing organisation.

Many of the publications on the subject share the assumption that the gap between academic employment and entrepreneurship would be extremely difficult to bridge and that for a scientist to engage in commercialisation activities would be a non-trivial undertaking (e. g.

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Braun-Thürmann et al., 2010; Jain, George, & Maltarich, 2009; van der Sijde, David, Frederik, & Redondo Carretero, 2014). In line with these findings, we have formulated the following research questions: *Where do transfer managers and postdoctoral students see the differences between academic employment and entrepreneurship and how do their perceptions match the existing common perceptions about such differences? What causes these perceptual differences? Considering job profiles, required skill sets, and existing organisational practices, how different are academic employment and entrepreneurship precisely?*

Our findings suggest that this “tale of two logics” (van der Sijde et al., 2014) might largely be a widely-shared and self-perpetuating illusion.

## 2. Theoretical background

### 2.1. Existing paradigms

By commercialising innovations, academic spin-offs have the potential (e. g. Bollinger, Hope, & Utternack, 1983; Gottschalk, Fryges, Metzger, Heger, & Licht, 2007) to re-shape the existing technological landscape (Breznitz, O’Shea, & Allen, 2008). Scholars have explored the challenges that potential academic entrepreneurs might face (e. g. Franklin et al., 2001; Vohora et al., 2004, Hemer et al., 2007; Riesenhuber et al., 2006). While their studies vary substantially in approach and method, these scholars share the view that academic employment and entrepreneurship belong to two different worlds, which are opposite of one another in a variety of ways and each of which has clear boundaries. Crossing these boundaries would require fundamental changes in social and symbolic order (Braun-Thürmann et al., 2010). Braun-Thürmann et al. (2010) distinguish between three types of such boundaries, which define (1) research types and contexts, (2) organisations, and (3) individual identities. From individuals, crossing these boundaries would require, respectively, (1) resetting their priorities, (2) developing new professional identities outside of their current organisations, and (3) conforming their behaviour to norms that are compatible with entrepreneurship. According to Jain et al. (2009), engaging in commercialisation activities typically require individual scientists to modify their role identity, which entails norms, processes, and outputs (Jain et al., 2009, p. 924). The transition between the two worlds can be achieved gradually and will result in the scientists adopting a hybrid role identity (Jain et al., 2009) and the development of a new community with its own norms and practices (Braun-Thürmann et al., 2010, p. 24).

Merton (1959) identified the four following components of the scientific ethos: (1) universalism, implying that scientific observations should be verifiable and independent of the observer, (2) communism, implying that scientists share their work for the common good, (3) disinterestedness, implying that scientists have no emotional or financial attachments to their work, and (4) organized scepticism, implying that scientists should wait until they have gathered all the facts before they make a judgment about a particular theory. These norms are often incompatible with those of entrepreneurship (Jain et al., 2009, p. 924). A scientist’s notion of universality is in conflict with an entrepreneur’s belief in the unique selling point (Barney, 1991).

Communism is incompatible with the definition of private property, while the academic ideal of scepticism contradicts the entrepreneurial ideal of passion (Baum & Locke, 2004; Camerer & Lovo, 1999). While delayed dissemination of findings in academia would conflict with the principles of universalism and communism (Merton, 1959), from an entrepreneurial perspective, a premature disclosure of certain findings might violate patent protection and compromise potential intellectual property (Ndonzuau, Pirnay, & Surlemont, 2002). Given these incompatibilities, reconciling both worlds poses a non-trivial challenge and requires a substantial amount of “identity work” from an individual scientist engaging in entrepreneurial activity (Jain et al., 2009, p. 924; Bird, Hayward, & Allen, 1993). Other factors that such scientists might need to consider include planning, risks, management styles, and money (Samson, 1990). As compared to entrepreneurs, scientists usually have the opportunity to make longer-term plans, face fewer risks, have the opportunity to appreciate more consensus-oriented management styles, and place a lower value on money (Samson, 1990).

Some recent studies, however, challenge this “tale of two logics” by indicating that some of these incompatibilities might be relative. Sass (2011, pp. 55-57.) demonstrates that commercialisation activities and patent applications have long become part of academic occupation (see also Lee & Rhoads, 2004). In some cases, the principles of communism are not strictly adhered to and findings are disseminated with restrictions or not at all, especially when different groups research in similar directions and are considered mutual competitors (Campbell et al. 2002; Blumenthal, Campbell, Anderson, Causino, & Louis, 1997). Some studies indicate that more scientists would potentially be interested in commercialising their findings if they had the time (Braunerhjelm, 2007). In a group studied by van Looy, Callaert, & Debackere, (2006), those who were more open to entrepreneurship usually demonstrated higher academic productivity. All these findings challenge the above-described paradigms.

### 2.2 Beyond the paradigms

Since the late 1930s, scholars in different research fields have explored how individuals related to their work (Ekehammer, 1974; Lewin, 1935; Murray, 1938; Pervin, 1968; Kristof-Brown, Zimmerman, & Johnson, 2005). While their studies vary in approach and method, most of them address individual values, preferences, aspirations, skills, and personality traits in relation to occupation and workplace. Drawing from their literature review, Kristof-Brown et al. (2005) have developed probably the most comprehensive model of person-environment fit. This model has four dimensions. The first dimension, *Person-job*, refers to individual knowledge, skills, abilities, and job responsibilities. The second dimension, *Person-organisation*, refers to fundamental organisational norms, values, and practices including organisational culture. The third dimension, *Person-group*, refers to relationships with co-workers, team composition, and work atmosphere. Finally, the fourth dimension, *Person-supervisor*, refers to organisational hierarchies and relationships between employees and their superiors.

For the purposes of our research, we have slightly adapted this model. Kristof-Brown et al. (2005) regarded supervising activities as part of group dynamics, and egalitarian work relationships and loose hierarchies are common practice in both academia and entrepreneurship. Our model therefore regards the third and fourth dimensions as one. We also expanded the second category and renamed it *Person-structure* to shift the focus toward more structural aspects of organisations.

Drawing from this model, we analyse the perceptions of transfer managers and postdoctoral students about differences between academic employment and entrepreneurship and analyse possible causes of these perceptions. By considering job profiles, required skill sets, and existing organisational practices, we precisely discuss the differences and similarities of academic employment and entrepreneurship.

### 3. Method

In order to explore similarities and differences between academic employment and entrepreneurship, we conducted a comprehensive literature review and 128 qualitative interviews. We used the review and the method of theoretical sampling (Glaser & Strauss, 2010) (1) to identify the criteria for interviewee selection, and (2) to “deductively derive” (Flick, 2007; Mayring, 2010) categories, which helped develop semi-structured questionnaires for the interviews and later helped analyse the gathered empirical data.

For the interviews, we selected 112 postdoctoral students from the four major German research organisations<sup>1</sup> and 16 senior transfer managers from scientific organisations and government agencies, including former researchers, whose responsibilities included spin-off facilitation. The managers were selected (1) because of their long-term and vast experience in KTT and academic entrepreneurship and (2) because, due to their positions, their views carried substantial weight in setting KTT agendas.

The 112 individual problem-centred interviews (Witzel, 2000) with postdoctoral students focused personal aspirations, career drivers, career development strategies, career paths both within and outside of academia, and existing practices in research organisations including shared norms, values, and basic assumptions (Schein, 1985).

The questionnaire contained both yes/no and free-response questions in order to approach the subject at hand from different angles. Each interview was recorded, and these records were transcribed and analysed. For this analysis, we utilised a range of qualitative methods from empirical social research, including that of Mayring (2010). By adhering to “the principle of openness” (Flick, 2010; Lamnek, 2010), these methods enabled us to assess individual perspectives and points of reference. With the purpose of theory building (Eisenhardt & Graebner, 2007), this analysis focused on individual perceptions of self and others and behaviours

typical within different types of KTT teams. Finally, we utilised the gathered data to “inductively restructure and expand” the above-mentioned categories (Mayring, 2010).

The following section presents our findings, including a selection of interview quotations. In accordance with the major principle of qualitative research, these quotations are intended to illustrate the findings rather than provide a representative sample (Haas & Scheibelhofer, 1998). For reasons of confidentiality, only the sexes and positions of quoted interviewees are revealed.

## 4. Findings

In this chapter, we show where interviewed senior transfer managers and postdoctoral students saw differences between academic employment and entrepreneurship, present the students’ perceptions about their jobs and workplaces, and describe the similarities between the two worlds that we established based on these perceptions.

### 4.1 Academic entrepreneurship as perceived by interviewed senior transfer managers and postdoctoral students **Scientists are scientists to the core, they don’t start businesses. (Senior manager, female)**

Most of the aspects of academic employment and entrepreneurship addressed by interviewed senior transfer managers can be referred to person-job and person-structure fit and only few can be associated to person-group fit (Kristof-Brown et al., 2005). These managers most often spoke about the individual traits of scientists and entrepreneurs and their intrinsic motivations. This section presents the managers’ observations, and quotations supporting these observations.

Many interviewed managers explained the low number of national academic spin-offs by scientists being too averse to risk and “lacking courage,” as illustrated by the following quotation.

*[It] is because too few are that open to risk and ready to do it. For a scientist to leave his or her organisation and to start a business, I think, the stretch would be too big. He or she would also need much endurance. (Senior manager, male)*

Many studies indicate that business owners often exhibit high risk tolerance and more risk adverse individuals are less likely to start a business (e. g. Stewart, Watson, Carland, & Carland, 1999; Wagner, 2003; Ekelund, Johansson, Järvelin, & Lichtermann, 2005). Unlimited-term employees have been shown to be particularly unlikely to start a business (Caliendo, Fossen, & Kritikos, 2007), and women have been shown to be more risk averse than men (e. g. Wagner, 2007; Caliendo et al., 2007).

German research organisations mostly provide limited-term employment contracts, which often cover at most two years. Nonetheless, many researchers appear to regard academic employment as “the more secure option” and would rather endure its hardships than expose themselves to the risks of entrepreneurship.

(1) The interviews were part of *Career and leadership – women in research organisations and technical universities*, funded by BMBF, grant ID 01FP1303, and jointly conducted by Fraunhofer and RWTH Aachen in four major research organisations and five TU9 universities respectively between June 2013 and June 2015.

Many research organisations provide business support programs, including the training of managerial skills. Simultaneously, interviewed managers observed that potential entrepreneurs in their organisations often did not find themselves “fit for surviving in the free market” (senior manager, female) and possessing necessary business management skills and understanding of the law. These findings match those of many empirical studies (e. g. Franklin et al., 2001; Vohora et al., 2004). Within their samples, Walter, Auer, & Ritter, (2006) and Dickel (2009) discovered that those new academic entrepreneurs who put a higher value on networking and cultivating entrepreneurial spirit were usually more successful in general and with their first product in particular (Dickel, 2009). To summarise, interviewed senior transfer managers identified the following two major issues related to person-job fit: most scientists are too averse to risk and lack necessary skills.

Similarly in relation to person-structure fit, many interviewees identified significant barriers that one might face while switching from “relatively secure” academic employment to “insecure” entrepreneurship. Some even referred to the latter as “the risky area”, as illustrated by the following quotation.

*To say, I am entering the risky area, where I have to face all these completely different problems and possibly, a bankruptcy, that would be a really big deal. (Senior manager, male)*

In German academia, working extra hours on top of normal hours required in the office is standard practice. Simultaneously, many interviewees believed that entrepreneurship was more demanding and that it would be nearly impossible to combine entrepreneurship with family obligations and interests outside work. In view of the fact that women usually carry a larger load of family responsibilities it is perhaps not surprising that in 2009, for example, only eight and two percent of highly technological start-ups in Germany were founded by all-female and mixed-gender teams respectively (Metzger, Niefert, & Licht, 2008).

While the government and many research institutions provide different business support programs, including help with networking and the development of business plans, finance remains an issue, in particular when a potential new business requires complicated equipment. Many interviewed managers identified access to external finance to be another major challenge, as illustrated by the following quotation.

*I mean, there are opportunities [to find investors]. But you have to know about them. At the beginning, you need to be very... incredibly motivated and to want, want, want to find all this information. (Senior manager, female)*

Many of the managers identified certain cultural beliefs to be a substantial barrier. As compared to other nations, Germans might be more prone to the fear of failure (Singer, Ernesto Amorós, & Moska, 2014) and more willing to believe in the gap between science and business, as illustrated by the following quotation.

*In Germany, there is this divide in people's heads. We believe that good science can not possibly be driven by considerations of commerce. (Senior manager, male)*

The language that interviewees used was a manifestation of this perceived divide. To engage in commercialisation activities, a scientist would have “to take the plunge,” “to jump into the deep end,” “to go down a rough road,” “to be ready to suffer,” and “to be a real bulldog.” These choices of words suggest that the managers believed that engaging in commercialisation activities would require much courage, endurance, and assertiveness. To summarise, most interviewed senior transfer managers believed that academic employment and entrepreneurship differed substantially on many levels and that engaging in commercialisation activities entailed a range of challenges, as illustrated by the following quotation.

*Starting a business is just a huge life change. (Senior manager, female)*

Most interviewed postdoctoral students mentioned differences between academic employment and entrepreneurship similar to those mentioned by interviewed senior transfer managers. Most spoke of the risks and downsides of academic entrepreneurship and few spoke of the upsides and opportunities that it provided. Both those who could imagine starting a business at some point and those who could not associated entrepreneurship with a range of challenges, primarily those related to financing and planning, as illustrated by the following quotation.

*Well, that would be extremely risky and require a huge investment. That's why it probably wouldn't work. (Postdoc, male)*

Simultaneously, more than one-fourth of the interviewed postdoctoral students found entrepreneurship appealing and considered it a valid career option. These students included men and women in approximately equal proportions. Among those whose organisations provided spin-off support, as compared to those whose organisations did not, a greater proportion either already had some entrepreneurial experience or intended to start a business in the immediate future, as illustrated by the following quotation.

*This program [provided by the institute] is actually quite generous. [...] They funded four full-time positions for a start-up. We also have quite a mix of backgrounds in our team, in a good way, everything a company needs, right at the start and later, after it takes off. (Postdoc, male)*

Many interviewed postdoctoral students found that good, marketable ideas were essential for a successful start-up. Many believed that the specifics of one's academic field determined how much opportunity one had to develop such ideas and that applied research, as compared to basic research, provided better opportunities. Many believed, sometimes with regret, that it would be nearly impossible to commercialise most findings in certain basic research fields, as illustrated by the following quotation.

*To start a business, one needs to have ideas that have that kind of potential. We often have interesting ideas here, but being outside of our*

*field... they're just ideas. And then we say, yeah, that would be useful, it would be great to do it. But you can't, not with this group. (Postdoc, male)*

Many interviewed postdoctoral students believed that to attempt entrepreneurship, one needed to have certain personality traits such as high risk tolerance and to possess certain skills, such as business administration. Most believed that they lacked both and found that entrepreneurship would require too much time and effort, as illustrated by the following quotation.

*I don't think I'm cut out for that. There would be just too much uncertainty. (Postdoc, female)*

To conclude, most interviewed postdoctoral students believed that academic entrepreneurship was an option only for those scientists who were more risk tolerant, were interested in practical application, had the necessary knowhow and skills, and were willing to invest a great deal of time and effort. Although many found entrepreneurship potentially appealing, they believed that they lacked the necessary skills, had "the wrong personality," and were generally unfit for entrepreneurship.

When looking at possible causes for the outlined perceptual differences of academic employment and entrepreneurship two main factors can be identified: First, scientists and entrepreneurs lack the opportunity to identify themselves within the other group. It requires opportunities for reflection and change of perspective to find out about the working conditions and tasks in science and entrepreneurship respectively.

*The fact, that scientists have long been employed in their field, makes entrepreneurship seem really strange and far away. So they are just not interested in it and don't see potential overlaps. (Senior manager, female)*

University-industry cooperation could be a promising way to overcome these perceptions, as pointed out by a senior KTT manager: *Cooperation between research institutions and businesses are certainly a good way to simply have a change of perspective and also to see how companies work, what markets need, and what research can and cannot do. (Senior manager, male)*

Secondly, academic entrepreneurship as part of KTT-activities is still a young topic and not yet well established in research institutions. The findings indicate that – apart from a small number of exceptions – entrepreneurship and academic spin-off formation is neither part of university curricula nor is it well communicated in the research institutions.

*A huge barrier is that the issue of technology transfer and spin-offs is just not on the agenda of [the research organization] and the directors of the institutions. (Senior manager, male)*

Additionally, there is a lack of incentives and appreciation for transfer activities and spin-off formation within research organizations as research and teaching are still perceived as being of greater value.

*There are many ways to incentivize spin-off activities. An award or financial benefits could be a good idea. [...] but that just does not fit to the strategy of [the research organization]. Here it's mainly projects with industry that count. (Senior manager, male)*

The results are in line with the findings of Grave, Hetze, & Kanig (2014) that more than half of the scientific staff at German universities do not know that KTT-support programs exist at their research institutions and less than 25% of German universities provide incentives or reward structures to foster spin-off formation (Grave et al., 2014). In order to increase the engagement of scientists in entrepreneurship activities, supporting structures for spin-off formation must be adequately and frequently communicated (Kolb & Wagner, 2015). Universities, that provide established policies and procedures for the management of technology transfer and articulate entrepreneurship as a fundamental element of their mission, perform significantly better with regard to the number of spin-offs created (Caldera & Debande, 2010; Huyghe & Knockaert, 2015).

The above-described opinions and observations of both interviewed senior transfer managers and postdoctoral students match the widely-shared assumptions that academic employment and entrepreneurship are fundamentally different and that engaging in the latter would be an enormous career change and not worth the effort. In the following section, we explore to what degree this assumption is grounded in reality.

#### **4.2 Similarities between academic employment and entrepreneurship**

The postdoctoral students were interviewed about their perceptions of German academia, its existing practices and infrastructures, their own place in it, and the specifics of their work. By analysing their responses, we concluded that academic employment and entrepreneurship share a range of similarities. Drawing from Kristof-Brown et al. (2005), we associated each similarity with one of the three dimensions described in Section 2.2 – person-job, person-structure, and person-group.

The responses of interviewed postdoctoral students suggest that their decisions to work in academia were primarily determined by considerations that can be referred to person-job fit. Most interviewed postdoctoral students stated that their major drivers were their assignments, research subjects, and the opportunity to research by itself. An occupation in science helped them explore their interests and provided variety of assignments, personal autonomy, and creative freedom. Many found their work to be rich and exciting. Many were motivated by the given autonomy to determine when, where, and how they will work. Many felt that their work was meaningful and its results useful to others. The following quotation illustrates.

*I was always driven by the substance, by its role. And when a project spoke to me, when I thought that it mattered, that was always a factor. That it was about some important issues, not just producing knowledge. And that it could be implemented and resolve these issues. (Postdoc, male)*

Many studies indicate that the most appealing aspects of entrepreneurship are very similar. Most entrepreneurs are driven by

the opportunities to realise their own ideas (Hünnies-Stemann, Rulle, Seel, & Terbel, 2010), to take responsibility, and work autonomously (Shane, 2004; Kulicke & Schleinkofer, 2008; Roberts, 1989; Egel, Gottschalk, Rammer, & Spielkamp, 2002).

When asked about their responsibilities, interviewed postdoctoral students mentioned research and project management, including team management, fundraising, and time management. Applying for grants, in particular, has long been a major part of researcher's job, as illustrated by the following quotation.

*My responsibilities include project supervision and my own research. I mentor graduate and PhD students, network with both researches and business people, and manage my own projects. So, applying for and managing money grants. (Postdoc, female)*

Entrepreneurial activities are very similar to those described above – entrepreneurs raise money, supervise other people, and manage time and finances. Lack of skills necessary for performing these activities can hinder a start-up (Hünnies-Stemann et al., 2010). Some interviewed postdoctoral students commented on these similarities between entrepreneurship and a job in academia, as illustrated by the following quotation.

*Because I have to find the money by myself... it's like in business. I find the funds for everything here [at the institute]. That's what the overhead is for, so to say, for my co-workers. And if this money stops, I'll be unemployed. It's not that different from entrepreneurship. (Postdoc, male)*

With regard to the person-structure relationship, most postdoctoral students spoke of the shortcomings of existing practices in academia and very few spoke of their benefits. Many mentioned that the system provided limited opportunity for long-term career development planning, and wished that their organisations would more actively communicate with them about their professional prospects and potential career steps, as illustrated by the following quotation.

*And then there's career planning, which is a really big issue in academia. I would like to have more certainty with that sometime soon. Not that I necessarily need an unlimited-term contract, but it would be great if we could discuss what I can achieve here and how exactly I can achieve that. (Postdoc, male)*

Simultaneously, only few postdoctoral students associated entrepreneurship with similar uncertainties and commented on these similarities between the two worlds, as illustrated by the following quotations.

*Because academia doesn't do unlimited-term contracts as much anymore, all you can be sure of is one year or two. And then there's the 12-years regulation. I simply see no point for myself [in staying in academia], especially if I want to start a family. (Postdoc, female)*  
*In business as in academia – there're no guaranties that a project will succeed. (Postdoc, female)*

In entrepreneurship, such uncertainties are balanced by a large degree

of personal autonomy (Sass, 2011; Shane, 2004; Hünnies-Stemann et al., 2010). Similarly in academia, many organisations give their employees the autonomy to determine when, where, and how they will work. This flexibility, however, continues to erase the boundaries between professional and private, and actual workloads exceeding contractual workloads has long been standard practice throughout academia. All postdoctoral students often worked and were available to their co-workers and superiors outside of regular working hours, as illustrated by the quotation below. While the students accepted this investment of time as natural and acceptable within the research context, they considered similar demands of an entrepreneurial lifestyle overwhelming.

*I read my mails. I am available on weekends for emergencies. I respond to mails after work. If you count all this, I start at 7 a.m. and finish around 10 or 11 p.m. (Postdoc, male)*

The students were to a large degree driven by intrinsic motivations – they were passionate about their work, felt that it gave them the opportunity to satisfy their curiosity, and associated it with feelings of excitement, enjoyment, and freedom, as illustrated by the quotation below. Most described the given opportunity to fulfil themselves through their work as one of their major drivers. In a similar manner, actual and potential business owners are often driven by intrinsic motivations (Sass, 2011), including the opportunity to fulfil themselves (Hünnies-Stemann et al., 2010; Autio & Kauranen, 1994).

*As a scientist, I feel [...] free. I am more free to choose, what I want to research [...]. What motivates me most, is my own curiosity... and then the discoveries, the wonders, and figuring things out. (Postdoc, female)*

With regard to the person-group relationships, most postdoctoral students found the atmosphere in their workplace to be very encouraging and described it as open, friendly, cooperative, and supportive. In particular, many found discussions with their co-workers to be interesting and motivating. Some even chose to accept their current positions because of their co-workers and atmosphere in the workplace. In a similar manner, actual and potential business owners are often motivated by relationships with their employees and partners (Sass, 2011). Egalitarian relationships are characteristic of academia and its hierarchies are often loosely defined. Almost all postdoctoral students supervised projects and mentored PhD students. Simultaneously, their leadership was not institutionalised and they did not have any sanction power, which often allowed for loose interpretations of their own position in the hierarchy. Some wished for a stricter definition of hierarchies and clearer instruction from their superiors, and others did not question the existing order and appreciated the large degree of personal autonomy it provides. In this regard, some recognised the similarities between their current position and self-employment, as illustrated by the following quotation.

*That you are, I'd say, your own boss. I mean, you have autonomy, you are not restricted and nobody tells you that you can't do this or that. Working here, at this institute, is really not that different from being self-employed. (Postdoc, male)*

Figure 1 shows the established similarities between entrepreneurship and academic employment.

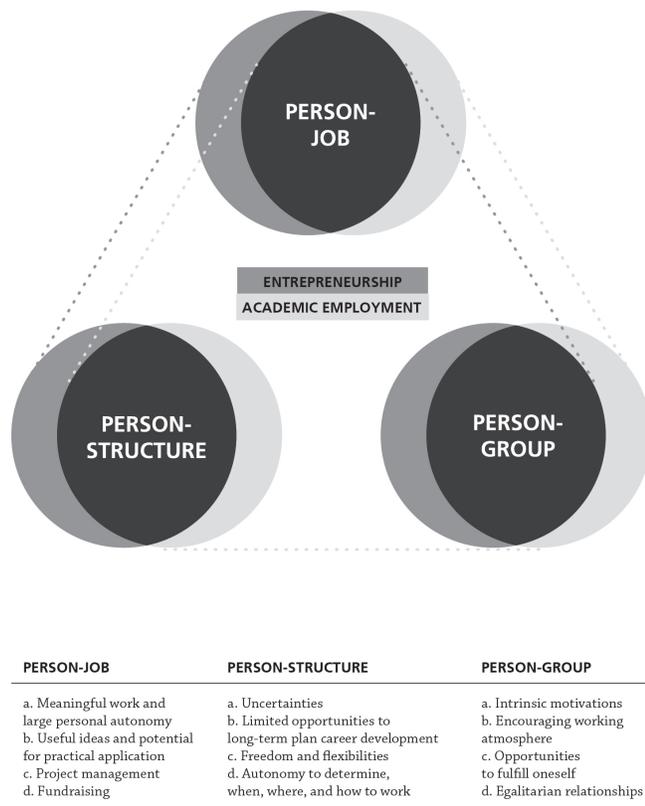


Figure 1: Similarities between entrepreneurship and academic employment – the three-dimensional construct (drawing from Kristof-Brown et al., 2005)

Entrepreneurship and academic employment appear to share precisely those traits that a majority of interviewed postdoctoral students found most appealing in their occupation, such as opportunities for stimulating and meaningful work and a large degree of personal autonomy. Similarly, while most postdoctoral students considered entrepreneurship to be a risky and serious undertaking because it provides only limited opportunities for long-term planning, they already faced such challenges in their jobs as researchers. In view of these similarities, the perceptions expressed by both postdoctoral students and senior transfer managers regarding the greater challenges entailed by entrepreneurship and the un-fitness of most researchers for that task appear to be largely unjustified.

### 5. Conclusions

The worlds of science and entrepreneurship have each developed their own different norms and practices. Simultaneously, our findings challenge the widely-shared perceptions of the gap between these two worlds and suggest that academic and entrepreneurial careers might be more alike than different.

A majority of interviewed postdoctoral students were largely driven by the idea that the results of their work could be useful and have a

variety of applications. At the same time, many were neither interested in nor considered themselves fit for realising such applications. In other words, they desired to provide the foundation for potential innovations but not to participate in their commercialisation. In view of the many uncertainties that researchers in Germany currently face, on the one hand, and the large number of patents granted to German researchers every year, our findings can be useful to both researchers and transfer managers. By challenging the perception of entrepreneurship as “a completely different occupation,” our findings can help researchers – both men and women – recognise it as a valid career option and themselves as already possessing the necessary skills, especially if they are willing to re-evaluate how averse they really are to risk. Transfer managers, on the other hand, might want to utilise our findings to adjust both their ideas of researchers’ capabilities and their business supporting strategies.

In view of established similarities between academic and entrepreneurial careers, it would be interesting to explore what can motivate scientists “to take the plunge” into entrepreneurship and what could be the real barriers to such a plunge, as opposed to it remaining merely illusory. To tackle the identified misperceptions and to outline that both roles in entrepreneurial and academic employment share similar characteristics, university-business cooperation could be a promising solution. Joint research projects or internships at entrepreneurial businesses are possible cooperation formats to foster collaboration among scientists and entrepreneurs and may help to overcome the perceptual differences of academic employment and entrepreneurship. Also, entrepreneurial education in university curricula could make entrepreneurship more tangible for scientists and encourage entrepreneurial ideas. By bringing researchers and transfer managers together, accommodating their perspectives, and helping them develop joint strategies, we can foster technology transfer and tap into a vast potential for innovation.

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