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van Arensbergen, P.

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1 Introduction

For decades there has been an ongoing discussion about quality in science. Questions related to quality have been the subject of a long research tradition, i.e. what is scientific quality and how to evaluate and improve it (e.g. Butler, 2007; Gibbons and Georghiou, 1987; Hemlin and Montgomery, 1990; Wolff, 1970)? The same questions have been asked with regard to the societal quality of research (e.g. De Jong, Van Arensbergen, Daemen et al., 2011; Donovan, 2007; Spaapen, Dijkstra and Wamelink, 2007), and to human capital and academic talent (e.g. Van den Brink, Fruytier and Thunnissen, 2012). Due to both the complexity and relevance of these concepts the discussion is still ongoing.

1.1 Current debates in academia

Recently there has been rising turmoil within the academic community. While not everyone agrees, many academics worldwide are expressing more and more criticism and concerns about the functioning of contemporary academic systems. The current academic incentive system is criticized as overemphasizing the need to publish in high-profile journals. This is said to encourage rapid submissions (Collins and Tabak, 2014), and to prevent data sharing and replication of previous studies (*The Economist*, October 19th 2013a). The principle of self-correction by means of verification is generally considered to be an important cornerstone of science, but is considered under threat by the current academic climate. As research aiming to verify earlier studies is generally considered not to be highly pioneering or interesting, it is often difficult to get funded and published. Replication studies are claimed to do little to advance a researcher's career (*The Economist* October 19th 2013b).

Universities are criticized as supposedly transforming themselves into 'publication factories', where publishing is strongly overrated and teaching underrated (Dijstelbloem, Huisman, Miedema et al., 2013). In the current debates, mentoring and teaching are emphasized to be very important, as they involve educating new generations of researchers, but to be lacking in the assessment of researchers for hiring, funding or job promotion purposes (Fang and Casadevall, 2011). Whereas mentoring and teaching achievements are perceived as hardly contributing to career advancement, publishing in prestigious journals is claimed to do so, even to such an extent that publishing is criticized as having become the ultimate goal of academic labour these days.

Furthermore, it is claimed there is too much focus on scientific excellence and star scientists, and too few career opportunities for young researchers. Growing numbers of PhD students and post-doctoral researchers are trained at universities. They are alleged to do significant work without much perspective on an academic career (Halffman and Radder, 2013). Early career grants are available, but only for what is seen as the small group of excellent young researchers. This relates to the severe competition characterizing modern science. Academia is even described as a 'hyper-competitive' environment: "While some competition is inarguably good for science, excessive competition is demoralizing, destructive, and counterproductive" (Fang and Casadevall, 2011, p. 897).

Lately, several alignments have been established which revolt against the current situation and plead for change. For example, the San Francisco Declaration on Research Assessment (DORA)

was initiated in 2012 by the American Society for Cell Biology together with a group of editors and publishers from scholarly journals. This group predominantly aims at reducing the dominant role of journal impact factors in research assessments. These factors are said to have become a powerful proxy for scientific value and to be widely misused in the assessment of individual academics. According to DORA, the focus of assessments should be on the content of primary research papers instead of where they are published (am.ascb.org/dora). In the Netherlands similar alignments include the Concerned VU group (*Verontruste VU'ers*, 2012) and Science in Transition (Dijstelbloem, et al., 2013). The Concerned VU group, consisting of academic and administrative staff of the VU University Amsterdam, claims that the university is too strongly steered by economical motives and too strongly managed by managers who lack affinity with scientific work or ethics. The movement called Science in Transition pleads for more appreciation of the added value of science for society: decisions regarding knowledge production should not only be in the hands of scientists, but should involve societal stakeholders as well.

1.2 General scope of this dissertation

Not everyone agrees on the claims described above and although some of them are broadly supported worldwide, in general they lack a sound empirical basis for thorough analyses. This dissertation is about academic careers, and more specifically, talent selection regarding early career researchers in the competitive context of grant allocation within the Netherlands. It provides empirical material which may offer the opportunity to test several of the claims related to the overpowering role of publications, the negative consequences of competition and the lack of career opportunities for early career academics. Through analyses of current evaluation and selection processes, we will create a better understanding of which criteria are used and the weight assigned to publications as criteria for talent assessment within the young generation of academics. Furthermore, we look at the potential consequences of competition and at career opportunities for early career researchers.

We based our research on data from the Netherlands as this is an interesting case for several reasons. First, the Netherlands is one of the better performing Higher Education systems. It has a high position in various international university ranking tables and it has high average publication and citation scores. Second, the personal funding program *de Vernieuwingsimpuls* of the Dutch Research Council (NWO) is considered to be highly successful. Internationally it is often seen as a model example, proven by several similar funding programs being set up in the recent past. And third, in the Netherlands the role of talent management is growing in Dutch academia. In the past decade, many talent programs and initiatives were implemented to stimulate, attract and develop academic talent. For a better understanding of the current academic career and selection system in the Netherlands, including the focus on talent and excellence, the most important changes within higher education in the past few decades leading to the current system, are briefly described below.

1.3 Changing relations within academia

Since the 1980s, overall R&D expenditures in most OECD countries more than doubled, and within the higher education sector, even tripled. Growing investments in higher education have resulted in substantial growth in student numbers, causing a transition from elite to mass education (Vincent-Lancrin, 2006). There was also a strong increase at the PhD level: OECD countries

showed a 40% increase in doctoral graduates between 1998 and 2006 (Auriol, 2010). The 'massification' of higher education has subsequently affected the academic profession, leading to a rise in the number of academic staff on all levels. There has been a strong worldwide increase in the category of postdoctoral researcher in particular. For example, in the United States, the number of postdocs in 2010 increased by about 30% compared to 2005 and by 250% when compared to 1979 (Einaudi, Heuer, and Green, 2013). In the Netherlands within this similar more recent period (2005-2011), the number of postdocs increased by around 40% percent (De Goede, Belder and De Jonge, 2013), compared to rises of 11% for assistant professors, 7 % for associate professors and 17% for full professors (VSNU/WOPI).

At the same time due to increasing pressure towards more efficient use of public resources, 'New Public Management' was introduced. The government's role in higher education diminished, empowering European universities as institutional actors (Goedegebuure and Meek, 1997; Leisyte, 2007; Vincent-Lancrin, 2006). This responsibility incited universities to develop more management and evaluation tools. Assessment has become an ongoing activity. The object of assessment procedures varies from individual researchers to whole institutes, from teaching to research performance, and from ex-post to ex-ante. Academics currently face many more moments of evaluation than in the past, in line with the emerging audit culture as also exists in broader society (Strathern, 2000). Nowadays academics are continuously monitored in terms of their performance not just in situations related to recruitment or promotion. Besides increased emphasis on output control and performance measures, decisions with regard to budgets, staff and strategies, previously mainly managed by public authorities, have to a large extent been transferred to universities. Nowadays most European universities, although there are differences between countries, have the authority to manage their budgets, implement their scientific and organizational strategies and policies, and over recruitment and staff management. They determine the size of their staff, the type of positions (e.g. academic, administrative, junior, senior, temporary, tenure) and the timing and procedure of recruitment. This has led to the situation in which universities have more control over academic careers (Musselin, 2013a). However, these transitions have not only changed the balance of power in university management, but also for academic elites (Musselin, 2013b). Full professors and academic staff play a crucial role in internal university policies. They are key actors in the execution and management of academic organizations (Thunnissen and Fruytier, 2014).

At the same time, as rising numbers of students and academic staff has not been matched by an increase of public funding, universities have become more dependent on external funding and more market oriented. Although in most European countries the amount of government funding is generally still increasing and it is a major funding source for academic research, funding has become more project- orientated (Lepori, Van den Besselaar, Dinges et al., 2007) and other sources like private funding gained importance (Vincent-Lancrin, 2006). The shift from block funding towards project funding has contributed to increased competition and a changing role for intermediary organizations. Instead of government funding being allocated to the entire university or research institute, it is to an increasing extent allocated via intermediaries directly to individual researchers or research groups (Lepori, et al., 2007). Universities are encouraged to compete for external funding from industry, national and European research councils, or charity foundations, also as part of a deliberate strategy to strengthen ties with society and stakeholders (Mouwen, 2000).

The increases in academic staff supply and the changes in the funding landscape have required universities to adjust their career system and recruitment policies. They have reduced the share of tenured staff in order to increase their flexibility and adaptive power towards varying external demands and circumstances. This has led to a rise in temporary staff, but also to a wider variety of academic positions, e.g. research project staff and teaching-only staff (Huisman, De Weert and Bartelse, 2002; Santiago and Carvalho, 2008). Until recently, academic careers could be described in terms of two stages: a training and temporary position stage and a permanent position stage. At the start of a career, people were predominantly engaged in training and developing academic skills, followed by a selection. Those who passed were appointed to fixed-term contracts. The second period was characterized by access to permanent positions. Nowadays, this clear structure is no longer generally valid, as people more often work in several temporary positions successively, without getting a permanent contract (Enders and Musselin, 2008).

1.4 Academic career structures in the Netherlands

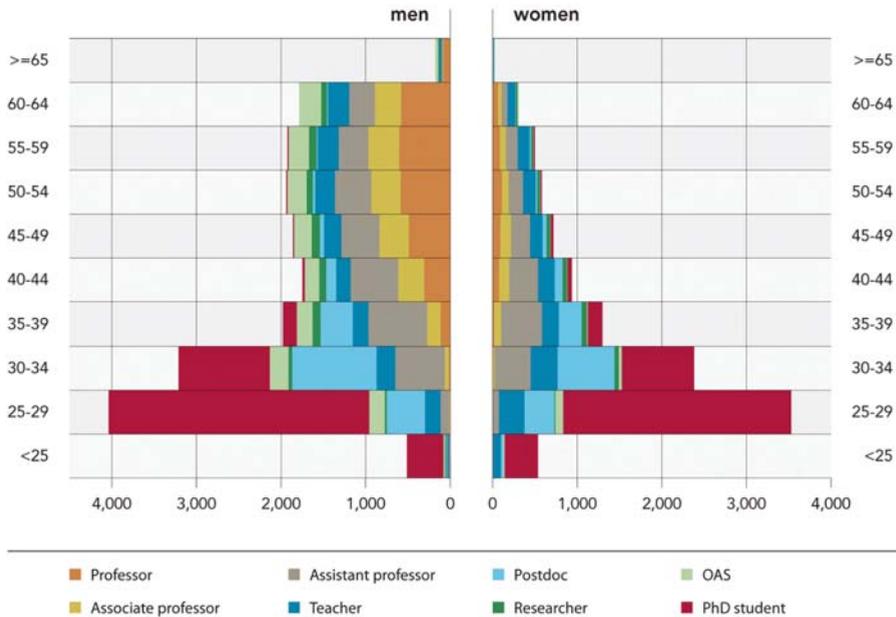
As this study is conducted within the context of the Dutch career system, we will now zoom in on the Netherlands. *Figure 1* illustrates the academic ranking structure in the Netherlands, according to position, age and gender. Professors, associate professors and about two thirds of the assistant professors have permanent contracts; postdocs and PhD students generally have temporary positions (De Goede et al., 2013). About 60% of all academic staff is employed on a temporary basis. This percentage includes PhD students, whose number is rising and who all have temporary contracts.¹ Excluding PhD students, the share of temporary academic staff is 40%, still more than twice as high as in the national labour force, where 19% of the employees has a temporary contract (www.vawo.nl).

Two main conclusions can be drawn from the figure: strong selection takes place in early career phases and there are gender differences in career structures. The first observation related to *figure 1* is the significance of selection in the early career phases, where the number of positions strongly reduces with each next step upwards.² The supply of young academic staff exceeds the academic career opportunities by far. Even though this selection is not unique to the academic sector, it does point out that doctoral education cannot be considered as a mechanism to create new generations exclusively of scholars. Due to the status of PhD candidates' contracts in the Netherlands (formal work contract), PhD positions are generally considered a first step in an academic career. And in line with this general perception, most postdocs aspire to an academic career (Thunnissen and Fruytier, 2014). However, as a growing number of graduates will be employed outside academia, doctoral education to a large extent trains people for the non-academic labour market (Huisman et al., 2002). For example, in the U.S. approximately half of doctoral graduates pursue an academic career (Hoffer, Dugoni, Sanderson et al., 2002), in the

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- 1 In the Netherlands, PhD students are generally employed by the universities, and are included in staff numbers. Besides this type of PhD student, there are external PhD students (e.g. working part time on their PhD while working elsewhere) and scholarship recipients (provided with a stipend or scholarship for their PhD research). The exact size of these two groups is unclear, as they are not registered as such by universities, but is estimated together to be at least as large as the first group.
 - 2 Note that only PhD students employed by universities are included. Although external PhD candidates might differ in their ambitions for an academic career, as they are not included in *figure 1*, the actual selection is stronger than depicted here.

Netherlands this is about 30% (Van Balen and Van den Besselaar, 2007). The large majority will seek a job outside academia.

Figure 1 Academic ranking structure in the Netherlands according to age, function and sex



Source: VSNU/Wetenschappelijk Onderwijs Personeelsinformatie (WOPI)

Rathenau Instituut

Related to the second observation, the figure shows men are still overrepresented in higher positions. The shape of the career figure for women academics looks much more like a pyramid than that of men, where the ranking goes up more evenly. All over the world the share of women is growing for all academic positions, however the general rule still is 'the higher the rank in academia, the lower the number of women' (Brouns, 2000; De Weert, 2001; Timmers, Willemsen and Tijdens, 2010). In the Netherlands the current share of women students and PhD students are 50% and 45% respectively, whereas the share of women professors only slowly moved up to 15%, one of the lowest percentages in Europe (Gerritsen, Verdonk and Visser, 2012). Currently, the largest bottleneck seems to be at the transition from assistant to associate professor (De Goede et al., 2013). The claim that this would be the result of women being less ambitious than men, does not hold as previous studies do not confirm gender differences in ambition (e.g. Dikkers, Van Engen and Vinkenburg, 2010). The stagnation of women in the academic system is considered to be the result of persistent gender disparities in science (Lariviere, Ni, Gingras et al., 2013). More generally, gender disparity can be ascribed to a 'male model' of science, including masculinity of organizational, social and cultural norms within academic organizations (Bleijenbergh, Blonk, Schulte et al., 2008). For example, university standards implicitly prescribe working fulltime and overtime, full availability and flexibility of staff. Furthermore, there is a strong

emphasis on early achievements and mobility, mainly disadvantaging female academics who often have greater responsibilities towards starting and maintaining a family, particularly early on in their career (Bleijenbergh, Benschop and Vennix, 2013; Etzkowitz and Ranga, 2011; Ranga, Gupta and Etzkowitz, 2012).

In order to prevent excellent scholars from leaving academia and due to a growing awareness of the importance of human capital, more and more attention is being paid to talent selection and talent management. More than ever before, universities explicitly aim for attracting and retaining talent. A growing number of European organizations is currently using the Human Resources Strategy for Researchers (HRS4R) to align their policies and practices to the principles of the European Commission's Charter and Code. In acknowledgement of their efforts they can display the HR Excellence in Research logo awarded by the European Commission. With this logo organizations can present themselves as providers of a stimulating and favourable work environment, committed to fair and transparent recruitment and appraisal procedures. Various talent selection and development programs have been implemented so far. For example, following the American example, many European countries currently recruit academics via tenure tracks, offering high potentials a promotion trajectory based on individual performance. The employee is hired on a temporary contract, with the prospect of a permanent contract if (s)he meets certain performance criteria within the first few years. Furthermore there are scholarships for excellent PhD students, mentoring programs for early career researchers, programs promoting equal opportunities for women, and coaching programs stimulating and supporting high potentials in applying for external funding (De Boer and Jongbloed, 2010; Huisman, De Weert and Bartelse, 2002; Neufeld, Huber and Wegner, 2013; Van den Brink, Fruytier and Thunnissen, 2012).

Also with regard to funding worldwide there is an increased focus on talent and excellence. Not only because grants are to a large extent distributed via competition, but also as various countries set up personal funding programs especially directed at talented early career researchers (e.g. the 'Future Research Leaders' grants of the UK's Economic and Social Research Council (ESRC), the Saupere Aude Postdoc grants of the Danish Council for Independent Research (DFR) or the Veni grants of the Netherlands Organization for Scientific Research (NWO)). Although the size of these programs varies, they do take up a significant part of the research councils' budgets (Van Arensbergen, Hessels and Van der Meulen, 2013). The growing importance of these programs, reflected in their budget sizes and application pressures, places these intermediary organizations - peopled with members of the academic community - in a more central position within the academic playing field (Musselin, 2013b).

1.5 Focus and outline of this dissertation

In short, in the past decades, the balance in temporary and tenure positions has shifted much more towards temporary positions. Academics have become more dependent on competitive external project funding and individual funding. The relations have altered between the various actors within the academic playing field: the academic staff and their peers, the academic organization including human resource management (HRM) and administration, and the intermediary research councils. All these developments have led to an increase of evaluation practices and occurrences, to intensified competition for funding and academic positions, and finally to more emphasis on talent and excellence, especially in early careers. In this study the main focus is

on the concept of talent and we will examine the process of talent selection within the academic community. The overall aim of this study is to create a better understanding of the process of talent selection. By using different methods and combining various levels of aggregation, we will answer overarching research questions as *what is academic talent* and *how is it selected?*

Chapter 2 analyses the notion of talent in more detail. Based on interviews with established academics involved in the allocation of personal research grants, we will compare concrete and general views on talent. How do they recognize talent among grant applicants and among academics in their own daily work environment? Furthermore, by analyzing the process of grant allocation we create a better understanding of which criteria are used during the selection process and how final allocation decisions are established within panels.

Since talent selection is increasingly performed by panels, *chapter 3* shows what is known from the literature on this type of panel reviewing and group decision making. This literature review combines peer review studies from the *sociology of science* and *science policy studies* with group dynamics studies from *social psychology* to better understand the dynamics of these selection decisions within panels.

Chapter 4 is a quantitative study of the talent selection procedure. Through statistical analyses of the reviews of about 900 grant applications, we will show how the followed procedure affects the selection decisions. Furthermore, it shows the importance of the various phases and criteria within the procedure. For example, what is the influence of the external peer reviews and what is the influence of the interview with the candidate? This chapter also answers the question how evident talent is and whether real top talents can be identified. Subsequently it studies the relation between talent selection and gender. Is talent selection gender-neutral and does panel composition matter?

In *chapter 5* we take a closer look into the issue of gender bias. One of the potential factors explaining the underrepresentation of women in higher academic positions is the difference in scientific performance between men and women. Are men outperforming women? By analyzing the publication and citation records of 843 social scientists, we study whether these often demonstrated gender differences still exist in younger generations of researchers, and whether men still outperform women in terms of productivity.

After several chapters on the process of talent selection, *chapter 6* is about the talents themselves. Interviews are conducted with academics who were previously identified as talent, but of whom several have left academia in the meantime. A comparison is made between the careers of talents who stayed in academia and of those who left academia. It is an exploratory study on the importance of various factors deciding for talents to stay within science or to switch to a career outside science.

This dissertation concludes with a general discussion on the current mechanisms of talent selection. After summarizing all chapters and more specifically the main findings regarding the notion and recognition of talent, we discuss the potential impact of the current selection mechanisms on academic talent. What are the potential consequences for the talented academics and for the academic organizations? Finally, the implications for practice and future research are given.

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