EARLY CAREER RESEARCHERS: THE HARBINGERS OF CHANGE?

Literature Review

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Early career researchers: a review of the literature and definitions

The challenging circumstances of the early career researcher

As Friesenhahn and Beaudry (2014) point out, young scientists, widely recognized as being among the most creative and energetic researchers, constitute a vast pool of global talent that can play a central role in knowledge economies. So much so, that they possess the potential to provide the intellectual capital needed to grow a strong national research and innovation system. Yet on the individual level ECR life is repeatedly reported to be fraught with difficulties that render it a particularly challenging, vulnerable and precarious experience (Corkery et al., 2013; Graham et al., 2014; James et al., 2009; Müller, 2014a, 2014b; National Academies, 2014). Indeed, as Fransman (2014) puts it, ECRs are in a constant state of 'becoming', with their academic identity evolving through their ongoing negotiation of interests, values, assets and lifestyle with pressures around authenticity, visibility, status, security, belonging, freedom/ independence and support. Thus, this stage in a researcher's career, when they attempt to establish themselves in the ever more competitive world of academia whilst trying to navigate the demands of a new role in their discipline, institution and peer group, is plainly of paramount importance but also a trying one.

The uncertainty around the ECRs' academic lives has at its very heart the need for the status passage from the apprentice to the colleague state of their career, which, in turn, hinges on the crucially important transition from dependent to independent research (Laudel and Gläser, 2008). Highly appreciative of the intellectual challenge, independence and creativity scholarly work is seen to offer, newcomers to academia are deeply committed to their chosen vocation (Friesenhahn and Beaudry, 2014; Fransman, 2014; Sauermann and Roach, 2012; Waaijer et al., 2016). However, with the move from the apprentice/postdoc stage perceived to depend on the academic capital acquired by the age of 35, which seems to be the commonly held cut-off point, swift scientific progress and the time pressures it entails become an inescapable fact of life for the ECR (Müller, 2014a). Junior scientists need to publish more, at a younger age and in more prestigious journals than their seniors needed to, which, as they report, creates a climate of constant rush and fear of lagging behind (Müller, 2014b).

The onus to place a strong focus on fast and massive individual research achievement in order to become a full-fledged member of the scholarly community is further fuelled by the harsh competition for the few coveted tenure-track academic positions available these days. In most cases supply does indeed seem to exceed demand in modern day academia (National Academies, 2014; see also the evidence reviewed in Powell, 2015 and Waaijer et al., 2016). Opportunities to occupy tenured or tenure track faculty positions have decreased, as the number of such positions

has not kept track with the number of doctorates awarded. Thus, while in some countries the majority of those employed at a university subsequent to the award of a doctoral degree are likely to be promoted eventually to a senior academic position, in other countries this might be true for only about one tenth (Teichler and Cummings, 2015). In fact, as Brechelmacher et al. (2015) note, the academic career often starts out with the double bottle-neck of the postdoctoral phase: at the stage of entering it after the PhD in trying to obtain a postdoctoral position and at the stage of leaving it by securing permanent, tenured employment.

Not only do young scholars' future employment prospects thus look rather gloomy, but their institutional positions in the first years of their academic career are typically fragile, too. With part-time and/or contract-based non-tenure track having become widely adopted in many countries' higher education systems (Teichler and Cummings, 2015), they are often on 'soft money' and their employment is characterised by moves between institutions (Bennion and Locke, 2010). Well aware of the high uncertainty and risk associated with embarking upon an academic career, ECRs are pressured to fast-track their academic development, hoping thereby to pave their way to greater job security (Brechelmacher et al., 2015). Add to this that many ECRs feel overwhelmed by their workloads and the range of their responsibilities, especially when they need to balance work and family responsibilities (Friesenhahn and Beaudry, 2014), and there can be little doubt that precariousness is truly the defining feature of the realities in which academics at the beginning of their careers find themselves.

The coping behaviours of ECRs
It is only to be expected, probably even inevitable, that junior scientists, as arguably the most vulnerable populations in the scholarly community, will cope with their challenging circumstances by hewing to the norms of their chosen discipline, which indeed they do (Harley et al., 2010). ECRs have been repeatedly found to be particularly conservative in their attitudes and behaviours, tending to toe the line and foregoing the possibility of acting upon any revolutionary thoughts that they might have about the current system at least until their position stabilises (Fransman, 2014; Housewright et al, 2013; James et al., 2009; Jones, 2014; Nicholas et al., 2015a; Watkinson et al., 2016).

True, they may be carrying through the new attitudes and technical facility characteristic of digital natives into their research careers and this may eventually bring about changes in their behaviour. As Graham et al. (2014) contend, today's ECR is a new breed of scholar: no longer the individualised researcher, but rather a connected and communicative knowledge broker, translating between different worlds of academy, community and often also policy or general public. Nevertheless, as long as the dictates of the academic reward system relate employment, tenure and promotion exclusively to the volume of papers published in high-ranking journals and

the number of citations they obtain (Harley et al., 2010; Housewright et al., 2013; Mulligan and Mabe, 2011; Mulligan et al., 2013; Nicholas et al., 2015b, 2015d; Van Dalen and Henkens, 2012), it is only prudent for them to abide by traditional values, principles and practices. Their position as apprentices, coupled with their understandable reliance on the help and guidance of their mentors on the way to becoming fully independent scholars (Brechelmacher et al., 2015; Cusick, 2015; Foote, 2010; Friesenhahn and Beaudry, 2014; Gu et al., 2011), also speak against their straying from the well-trodden academic paths.

This state of affairs is nowhere more pronounced than in the crucially important area of constructing an academic identity via demonstrable research achievements. With research universally held to be the principal professional endeavour and focal point of the scholarly enterprise and the yardstick by which scholarly success is measured (see Nicholas et al., 2015b for a more in depth discussion of the subject), its centrality is conveyed early on the way as part and parcel of the socialisation of newcomers to the world of scholarship. In fact, as Sinclair et al. (2014) conclude from their review of a number of pertinent studies, producing publications is increasingly expected as early as during doctoral candidature and completing doctorates with some publications are better placed for future employment, including research employment. No wonder then that in their study of the stability and longevity of the publication careers of US doctorate recipients Waaijer et al. (2016) find that the time of doctoral recipients' first publication has shifted from after the PhD to several years before the PhD in four of the five fields they looked at. With good reason, too, it seems, as the findings of Horta and Santos (2015) indicate: publishing during PhD studies leads to greater research productivity and visibility in the long run.

Well aware of the strong focus on research achievements in academic reward systems, ECRs do indeed see the importance of concentrating their efforts on the research-related aspects of their scholarly work as the key to prevailing in the race to establish themselves and make progress in their career. In direct result, as Müller's (2014a, 2014b) findings suggest, underscoring the earlier evidence accumulated on the subject, they perceive investing in the reproductive aspects of academic labor, such as education-oriented activities, i.e. teaching, supervising and mentoring students, as hindering rather than propelling forward their careers. However, as we have noted elsewhere (Nicholas et al., 2015c), this is one aspect of the academic world that might change yet, as it runs counter to today's changing societal priorities, which see the future in the globalised knowledge society as hinging not only on research and innovation, but also on education for all. Also, the emerging paradigms of Science 2.0, with its collaboration-centred, web-based socio-technical systems (Shneiderman, 2008) and open, increasingly democratised practices of scholarship (Veletsianos and Kimmons, 2012), both call for and enable taking a much more wide-ranging, inclusive and representative view of scholarly achievement.

Still, at least for the time being, if they have their hearts set on an academic career, ECRs are obliged to aim for traditional ways and means of achieving success in their research efforts. Very much mindful that it is the one area where an aspiring scholar can least afford to make mistakes (for example, as Creaser et al. found in their 2010 study, they were particularly wary of infringing on publishers' copyright), their best bet seems to be opting for 'the tried and true' in their undertakings. Indeed, although today's novice researchers are plainly cognisant of the need for and even the advantages of alternative or at least additional ways and means of conducting research (Nicholas et al., 2015c), they tend to steadfastly adhere to the long-established scholarly standards and principles of research work, modeling their behaviour on those of that mentors (Harley, 2010; Housewright et al, 2013; James et al., 2009; Nicholas et al., 2015b; Tenopir et al., 2010; 2011; Watkinson et al., 2016).

It is only natural, of course: as trainees, they have to adopt the behavioural norms of groups they seek to join; they need to learn what new group behaviours and values are required; and they need to demonstrate them to show they have 'what it takes' to be a potential member (Cusick, 2015). Indeed, how else can a young person aspiring to an academic career behave in the face of the advice consistently given to pre-tenure scholars, as cited by Harley et al. (2010): "...focus on publishing in the right venues and avoid spending too much time on public engagement, committee work, writing op-ed pieces, developing websites, blogging, and other non-traditional forms of electronic dissemination (including courseware)".

This conservativeness is perhaps best exemplified by young researchers' uptake of innovative, social media based platforms, techniques and metrics for publishing and evaluation purposes. As the young are commonly held to be 'tech-savvy' and preoccupied with the social media, ECRs might be expected to be among the more enthusiastic proponents of participatory and social ways of research work. However, young academics do not seem to be keener to employ novel, social media based methods and tools than their senior counterparts; rather to the contrary at times. Indeed, as Harley et al. (2010) point out, across the board it is in fact post-tenure scholars that are pushing the boundaries, much more than their younger colleagues, since they have already earned tenure and are therefore less risk-averse in their research and publishing practices.

Thus, for example, a study into researchers' perceptions and use of Web 2.0. (Procter et al., 2010; RIN, 2010) showed that high usage for producing, sharing and commenting on scholarly content was positively associated with older age groups and those in more senior positions, but the differences between the age-groups were relatively small. These findings are borne out by a CIBER study into social media use in the research workflow, conducted a year later (Nicholas and

Rowlands, 2011; Rowlands et al., 2011). The age distribution of research users of each of the eight social media tools examined failed to indicate any general overall pattern and a crystal clear distinction between junior and senior researchers. By the same token, Tenopir et al. (2013) found no relationship between age and creation or use of social media other than blogs, RSS feeds, and Twitter; in the case of the latter high-frequency users or creators were more likely to be age 50 or younger.

ECRs' conservativeness: an inescapable imperative?
The hard realities of ECR life, as they emerge from the literature, seem to indicate that the answer must be a resounding yes until hiring, tenure and promotion requirements in academe are changed and expanded to include novel ways of disseminating and measuring scholarly achievement. However, as already noted, developments in these directions seem to be quite conceivable, if not necessarily imminent. With scholars not only increasingly visible on the web and social media (Bar-Ilan et al., 2012) but also using social media at all points of the research lifecycle, from identifying research opportunities to disseminating findings at the end (Nicholas and Rowlands, 2011; Rowlands et al., 2011), novel, real time, social web based methods of working show potential for becoming a necessary complement to the traditional ones.

If and when this happens, young scholars will be well positioned indeed to reap the benefits of the ensuing change in Higher Education employers' policies. They have already been found to be more likely to use all the outlets available to them in order to improve the chances of ensuring their work is published (Nicholas et al., 2015a) and will certainly make the most use of the social media, with which they are more familiar, for other scholarly purposes, too. Their more positive views of open access publications (James et al., 2009; Nicholas et al., 2015a) also seem to indicate that they are basically more liberal in their professional choices, as long as these do not harm their future prospects. Plainly then, once the main barriers to adopting novel ways of conducting, disseminating and evaluating scholarship, still inherent to the academic reward systems (but not for long?) are removed, there is a good chance for ECRs to come more into their own and realise the full scholarly potential of today's innovative Web 2.0 based tools and methods.

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Appendix 1: Early Career Researchers Definitions

Bazeley, P. (2003). Defining early career in research. *Higher Education*, 45(3), 257-79.
A definition for early career
In order to satisfy the needs of the ARC project grants scheme across the range of disciplines and taking into consideration the most critical of those factors outlined above, early career status can most simply be defined as follows:
An early career researcher is one who is currently within their first five years of academic or other research-related employment allowing uninterrupted, stable research development following completion of their postgraduate research training. This definition assumes that completion of postgraduate research training (typically, PhD) is an essential foundation to build on, and that five years is sufficient time in which to begin to build a track record, assuming stability of employment sufficient to allow development of a personal research program.
It does not discriminate on age, and allows for the quite different tracks in different disciplines where, on the one hand, the PhD might be followed by a period of instability, and on the other, where there has been lengthy employment but with a non-research focus until PhD studies were begun.

James, L., Norman, J., De Baets, A. S., Burchell-Hughes, I., Burchmore, H., Philips, A., Sheppard, D., Wilks, L. and Wolffe, J. (2009). *The lives and technologies of early career researchers*. JISC; CARET, University of Cambridge; The Open University, UK. Available at: http://www.webarchive.org.uk/wayback/archive/20140615163656/http://www.jisc.ac.uk/ media/documents/programmes/vre/earlycareerresearchers.pdf
This study defines an early career researcher as being someone who is either currently engaged in a PhD, whether full-time or part-time, or who is working as a researcher after completing a PhD up to five years before. Early career researchers are a wide range of ages, with those from the older age tranches having usually already had careers in non-research areas. Despite being in higher age brackets, they are undergoing the same initiation into a new career and gaining new opportunities to make use of technologies as are those in the younger age tranches. It should be noted, however, that this definition was not rigidly applied: participants in the study were invited to self-define as ECRs. It should also be noted that an early career researcher is not necessarily 'young' in age terms: many ECRs enter the research profession as a mid-life career change, for example.

National Academies (National Academy of Sciences, National Academy of Engineering, and Institute of Medicine). (2014). *The Postdoctoral Experience Revisited*. Washington, DC: The National Academies Press.

This study uses a definition of a postdoctoral researcher agreed upon by the NPA, NIH, and NSF as a guide—An individual who has received a doctoral degree (or equivalent) and is engaged in a temporary and defined period of mentored advanced training to enhance the professional skills and research independence needed to pursue his or her chosen career path.

Hemmings, B. (2012). Sources of research confidence for early career academics: A qualitative study. *Higher Education Research & Development*, **31(2), 171-184.**
In the current study, ECAs are defined as those 'within their first five years of academia under a sessional, part-time or full-time load' (ECA and WIL Networks, 2006, p. 1). This definition is consistent with the one adopted by Hemmings and Kay (2010) in their recent Australian study, but varies considerably from other definitions used by researchers working outside Australia. For example, in North America the ECA phase can span more than 10 years, with full-time doctoral enrolment as a starting point (Foote, 2010).

Müller, R. (2014). Postdoctoral life scientists and supervision work in the contemporary university: A case study of changes in the cultural norms of science. *Minerva*, **52(3), 329-349.**
There are perceived cut-off points in terms of age for transitioning from the postdoc to the group leader stage: 35 is often considered the age at which one should have made the transition. Someone, who is a postdoc at or after the age 40, is suspicious in and of him/herself, because that "is somehow a sign that this person is not very successful, is not motivated.

Foote, K. E. 2010. Creating a community of support for graduate students and early career academics. *Journal of Geography in Higher Education*, **34(1): 7–19.**
Here the term 'early career' spans the period from the final one to three years of graduate study through the probationary period, and up to the point where faculty are offered permanent, long-term or continuing employment contracts. In the US, this period usually begins at the time a doctoral student advances to candidacy, continues after the student graduates and takes a position as assistant professor, and ends when that person is promoted to associate professor with tenure (The MA/MSc is sometimes the qualification for faculty teaching in US two-year colleges offering associate of arts and associate of sciences (AA, AS) degrees. For these faculty, the early career period begins during their master's training). The length of the early career period is 10 to 13 years for most US academics (In the US, the length of most geography doctoral programmes averages about six years. The position of assistant professor is a probationary rank lasting no longer than seven years at a given college or university. The early career period may last longer depending on how quickly individuals finish their doctorate and whether they accept post-doctoral fellowships or short-term, non-tenure track positions before moving into a tenure-track position. If a faculty member changes institutions while still an assistant professor, the seven-year tenure 'clock' is reset to zero unless

a shorter period is negotiated at the time of hire). The length of this period varies considerably from country to country because systems of higher education differ and tenure—like that offered in US universities—is rare.

Fry, J., Probets, S., Creaser, C., Greenwood, H., Spezi, V. and White, S. (2011), *PEER Behavioural Research: Authors and Users vis-à-vis Journals and Repositories***, available at:** www.peerproject.eu/fileadmin/media/reports/PEER_D4_final_report_29SEPT11.pdf
Researchers who were in the early stages of their careers (i.e. fewer than five years research experience).

Bridle, H., Vrieling, A., Cardillo, M., Araya, Y., & Hinojosa, L. (2013). Preparing for an interdisciplinary future: A perspective from early-career researchers. *Futures***,** *53***, 22-32.**
Early-career researchers are defined as those undertaking a doctorate or those working in academia up to 10 years after PhD completion but without holding a permanent position.