Early career researchers: Scholarly behaviour and the prospect of change

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Abstract
Early career researchers (ECRs) are of great interest because they are the new (and biggest) wave of researchers. They merit long and detailed investigation, and towards this end, this overarching paper provides a summary of the first-year findings of a 3-year, longitudinal study of 116 science and social science ECRs who have published nearly 1,200 papers and come from 7 countries and 81 universities. ECRs were interviewed in their own languages face-to-face, by Skype, or telephone. The study focused on the attitudes and behaviours of ECRs with respect to scholarly communications and the extent to which they are adopting new and disruptive technologies, such as social media, online communities, and Open Science. The main findings include: publishing in high-impact factor journals is the only reputational game in town; online scholarly communities, and ResearchGate in particular, are gaining ground; social media are beginning to have an impact, especially in the dissemination arena; outreach activities have become more important; libraries are becoming increasingly invisible to ECRs; Open Science is not gaining traction; and more transformational ideas are being expressed, especially in the US and UK.

INTRODUCTION

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 plays a central role in knowledge economies. Thus, they merit long and detailed investigation for a number of reasons:

- Most importantly, perhaps, representing as they do the ‘new wave’ of researchers, born digital or long conditioned by living in a digital environment, early career researchers (ECRs) constitute the breeding ground for tomorrow’s established researchers.
- There are a great many of them. It is claimed that they constitute the biggest group of researchers (Jones, 2014), and thus, they are not just the new wave but also the ‘big’ wave.
- They are also growing rapidly in number as most countries, regarding educated workers as a key to economic growth, are building up their higher education systems. Thus, for example, the number of science doctorates earned each year grew by nearly 40% between 1998 and 2008 in OECD countries (Cyranoski, Gilbert, Ledford, Nayar, & Yahia, 2011).
- They are researchers still making their way, most often in academia. They are at a status passage from the apprentice to the
They are unestablished researchers at the start of their careers, which hinges on the crucially important transition from dependent to independent research (Laedd & Glaeser, 2008).

- They are unestablished researchers at the start of their careers, seeking a permanent job. However, the supply of jobs has long outstripped demand: there are more and more researchers who are in some respects (economically and in status terms) ECRs because they are not established (Brechelmacher, Park, Ates, & Campbell, 2015; Cyranoski et al., 2011).

- They work in very competitive, selective, and precarious environments (Belluz, Plumer, & Resnick, 2016). With part-time and/or contract-based, non-tenure track having become widely adopted in many countries’ higher education systems (Teichler & Cummings, 2015), they are often on short-term money, and their employment is characterized by moves between institutions (Bennion & Locke, 2010). This has always been the case in Europe (not so much in the UK), but it is more and more the case elsewhere too. Thus, for example, as a broad guide, the proportion of part-time staff amounts to 50% in the UK, 84% in Brazil (Shin & Cummings, 2013), and 51% in the US (Weir, 2011). These short contracts mean that ECRs are under considerable pressure to fast-track their development in order to obtain a scholarly reputation while maintaining the delicate balance between mutual support from peers and competition for funding, jobs, and publications (James et al., 2009; Muller, 2014a, 2014b).

- They are an unstable community. Technological commentators tell us that the younger generations are not ‘stable’ (constantly changing what they do/buy), and they naturally want to use new and different platforms from their mothers and fathers and, maybe, this extends to their managers and professors (Chudziak, 2015).

- Finally, ECRs are a target for many publishers, such as Elsevier, who develop dedicated services for them. Obviously, for these services to be effective, they need to be based on robust evidence about ECRs’ specific practices and needs.

Not surprisingly, then, ECRs attract a lot of attention. They are a favourite topic of conferences, seminars, and blogs (Jones, 2014; Poli, 2016). Surprisingly, however, this interest has not translated into robust research projects. In fact, nothing substantial has been undertaken for 7 years, an aeon in the digital age in which we find ourselves. The most relevant study was funded by Jisc in 2009. The lives and technologies of early career researchers (James et al., 2009). However, it was technology/tools usage-focused, setting out as it did ‘to examine the ways in which current or recent doctoral-level researchers use (or do not use) ICT to support their research activities’. It is also obviously very much dated now, as ICTs are now endemic and really predate much of the Science 2.0 developments and the real growth in social scholarly networks and emerging reputational platforms. Still, there have been some major studies that have investigated young researchers, as part of a broader study looking at the research population as a whole, to see how different or similar they are. CIBER studies on social media use (Nicholas & Rowlands, 2011; Rowlands, Nicholas, Russell, Canty, & Watkinson, 2011) and trustworthiness (Nicholas et al., 2014; Nicholas, Jamali, et al., 2015; Nicholas, Watkinson, et al., 2015; Tenopir et al., 2016) are in this camp.

It seems from the research that there are currently two contrasting views about the behaviour of ECRs. On the one hand, they are carrying through the new attitudes characteristic of digital natives into their research careers, which may eventually bring about fundamental changes in their behaviour too. These, in their turn, could result in the collapse of the whole current journal system (Laine, 2015). Others, on the other hand, have observed the way in which ECRs have recognized their position as apprentices and their reliance on the guidance of mentors, which tends to make them more conservative and less adventurous than established researchers (Jones, 2014; Harley, Acord, Earl-Novell, Lawrence, & King, 2010).

Previous CIBER research has not concentrated wholly on the attitudes and practices of ECRs. ECRs have only been part, and sometimes a small part, of the populations studied. However, this research suggests that the truth lies somewhere between these two suppositions. Yes, traditional behaviours dominate, but the seeds of change are there. It is also much more complicated than this, and younger researchers can differ in their beliefs/behaviours according to, for instance, discipline, nationality, role in the research group, and gender.

In order to determine the current position and the scale and rate of change, we have initiated a 3-year longitudinal study of ECRs, funded by the Publishing Research Consortium (PRC), and this paper represents the findings of the first year.

**AIMS AND HYPOTHESES**

The principal aim of the project was to study the current and evolving scholarly communication behaviours and attitudes of
ECRs in order to determine whether they are going to be the harbingers of change, utilizing, for instance, Science 2.0 developments that promote information sharing and collaboration. From this standpoint, the study concentrated on the key scholarly activities of information use and seeking, citing, publishing, peer review, sharing/collaborating, and reputation building. These questions were asked with a special focus on the impact of open access (OA) publishing, the social media, online social networks, and emerging reputation mechanisms on these activities.

A direct comparison with tenured/mature researchers is not made in this paper as we are concentrating on laying down the markers of the study and will return to this in the second year of the study. However, indirect comparisons are made by (1) asking ECRs themselves whether their behaviours and attitudes differ from those of their seniors and tenured colleagues and (2) evaluating the published research on senior, tenured researchers and referring to that in the text.

A secondary aim was to investigate whether there were differences between ECRs with respect to country, discipline, gender, age/experience, type of institution (e.g. research intensive), and according to their role in the research group to which they belonged. Because of the qualitative nature of the study, this could only be undertaken in an exploratory, albeit considered, manner, with the full picture obtainable only after ‘following’ researchers for a number of years. So, this aim is only partly met in this paper.

To provide the project with shape and direction, a series of hypotheses were generated about how ECRs are thought to utilize scholarly research and communication, and interview questions were shaped around them. These hypotheses were drawn from the literature review (see http://ciber-research.eu/download/20160901-Harbingers-ECRs_literature_review.pdf) and the focus groups that preceded the interviews and can be found listed on the project website (http://ciber-research.eu/download/20160901-Harbingers-hypotheses.pdf).

The first year of the project generated a very large amount of data (see methods section), and this paper, which seeks to provide an overarching view of the extensive findings, can only generalize and summarize; much more detail, evidence, and explanation can be found on the project website (http://ciber-research.eu/harbingers.html), especially in the first-year report on which this paper is largely based (http://ciber-research.eu/download/20161120-ECR_Year_1_final_report_071116), and in a series of depth articles on specific topics, such as discovery (Nicholas et al., 2017) and publishing practices (Nicholas et al., 2017). This paper functions as an interface to many of the project’s documents.

**SCOPE AND DEFINITIONS**

There are different and conflicting definitions of ECRs circulating (Polli, 2016), and they vary from country to country, which is very important of course for an international survey such as this one. After an examination of the literature, available on the project website (http://ciber-research.eu/download/20160901-Harbingers-ECRs_literature_review.pdf), and consultations with a focus group formed of publishers and our international partners, this definition was agreed upon:

*Researchers who are generally not older than 35, who either have received their doctorate and are currently in a research position or have been in research positions, but are currently doing a doctorate. In neither case are they researchers in established or tenured positions. In the case of academics, they are non-faculty research employees of the university.*

The age of the ECR and whether to include PhD students were the main issues that had to be resolved in establishing a definition. Discussions with national partners resulted in the adoption of a higher age limit than initially envisaged because we discovered that ECRs are getting older as a result of the decline in job opportunities, greater competition, and the raising of the bar for tenured posts. Initially, doctoral students were going to be excluded on the basis that they are a different scholarly animal (students rather than staff). However, it soon became clear that there was a need for more flexibility as a good number of ECRs are doing a PhD at the same time or have undertaken research before doing their PhD. Doctoral students who have not been in research positions before were not included. ECRs were therefore defined by role and career position rather than by age.

The main focus of the study was on ECRs in the sciences and social sciences, which is where the main priorities of the project funder (PRC) lay and also where the vast majority of ECRs come from (see, e.g. Higher Education Funding Council for England [HEFCE], 2015). The study also aimed to obtain a wide geographical reach as we wished to support research on issues facing the STM industry globally. Balancing the need for representativeness (with regard to size, importance, level of development, and language) with PRC interests and the availability of interviewees on the ground, the following seven countries were chosen: UK, USA, China, Malaysia, Poland, Spain, and France.

**METHODOLOGY**

A key feature of the study is that it is a longitudinal, 3-year investigation, asking the same ECRs substantially the same questions each year in order to map attitudes and behaviour and identify any changes to them. Structured interviews are used rather than questionnaires given the complexities, nuances, and uncertainties of the subject being studied and the need to establish a personal link with ECRs in order to obtain their full cooperation. Interviews were conducted face-to-face and/or remotely (Skype or telephone). There were no differences detected between methods in terms of data yield, but face-to-face interviews tended to run for longer. A detailed interview schedule was compiled and sent to interviewees ahead of the interview (see Research Instruments document on http://ciber-research.eu/harbingers.html). The structure and scope of the interview and the nature of the questions to be used were informed by two focus groups held prior to...
the start of interviewing, one with publishers and the other with ECRs recruited through the aid of the aforesaid publishers. The interview schedule contained around 60 questions. Not surprisingly, the interviews took between 60 and 120 min.

Interviews were generally conducted by national interviewers in their own languages. This was in order to obtain maximum cooperation and compliance and build a relationship that could last 3 years. The proceedings of the interviews were taken down in note form as it was felt that the subjects of the questions were too personal to record during the sessions, especially when over the phone or on Skype. A transcript of the interview was returned to the interviewee for validation and further data collecting purposes, which was necessary to plug the inevitable gaps in the interview record. Checking with interviewees increases the reliability and validity of the data. The record was then translated into English for all non-English-speaking countries (but not Malaysia where interviews were conducted in English) and then manually coded using a heuristic approach and a standardized thematic framework (see Research Instruments document on http://ciber-research.eu/harbingers.html for full details). Because of the complexities of ECR identification and the need to ensure that volunteers met our definitional requirements, we asked those who came forward to send us their CV. The CV was also useful in supplementing and providing context for the interview questions, especially to check publication records and research groups worked for.

The project was resourced to follow around 100 ECRs, but anticipating attrition as the project proceeded, 116 ECRs were recruited from the case study countries (Table 1). In reaching this number, interviewers for the case countries were given a recruitment quota of 20–29 for the UK and US (the larger number is a reflection on the importance of these communities to publishers) and 10–15 for the other countries. Within this number, the general guidance was to build the sample along the following lines: (1) two thirds science and one-third social sciences (to reflect the larger numbers of ECRs in science), (2) a representative balance of men and women with regard to the population of ECRs, (3) a range of ages within the 20s and 30s age groups, and (4) a mix of ECRs from research- and teaching-intensive universities. ECRs came from 81 institutions, and the variation between countries is down to the method of recruitment. There were more men in the sample (mainly because there are just more of them, especially in the sciences); it was generally skewed towards the sciences, and there were big country variations in the numbers of ECRs studying for a PhD.

The number of ECRs in their 30s was higher than anticipated, and there were good reasons for this. First, as already noted, tough economic circumstances and competition meant that researchers are ECRs for much longer because of the scarcity of tenured jobs. It takes much longer to climb the ladder. Also, there is an assumption in many of the participating countries that an ECR will have to do at least two post doctorates before even being considered for a tenured job. Second, younger researchers might not have put themselves forward in numbers because they might have felt they lacked sufficient experience to answer our questions.

Recruitment was undertaken in various ways because of convenience and national preferences as to the best way to ensure maximum cooperation and compliance. The basic methods were to enlist publisher help in getting in touch with their authors resident in the countries covered (UK, USA, Spain) and to use university and researcher networks (UK, Poland, France, Malaysia, China). In some cases, these methods were supplemented by personal contacts, workshop attendances, and by the ECRs themselves (the invitations going viral). Using publishers naturally attracted a higher institutional count.

Much more detail on sampling, recruitment, the demographics of the sample, and the detailed findings themselves can be found in Nicholas et al. (2017), the aforementioned final report, and on the project website.

RESULTS AND DISCUSSION

With 116 ECRs from seven countries being asked 60 questions in interviews lasting up to 2 hours, a very large amount of qualitative data was produced. Add the extra data that was obtained as a result of returning transcripts to interviewees for comment and clarification and the contextual data obtained from the CVs each ECR furnished, the project has produced a veritable mountain of qualitative data, and only summarized data is presented here (for more information see project website, http://ciber-research.eu/harbingers.html and in sister articles in this journal (e.g. Nicholas et al., 2017). Because of the relatively small numbers and the qualitative nature of the methodology, the evidence presented is not suitable for statistical analysis.

Publishing practices

The four functions of Oldenburg’s journal – registration of new research, dissemination, peer review (certification), and archival record – are so fundamental to empirical scholarship that even in these digital times, all the journals published conform to Oldenburg’s model (Mabe, 2010, 2015). It is hardly surprising, then, to

<table>
<thead>
<tr>
<th>Country</th>
<th>Number (%)</th>
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<tbody>
<tr>
<td>Poland</td>
<td>10 (8.6)</td>
</tr>
<tr>
<td>Spain</td>
<td>18 (15.5)</td>
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<tr>
<td>France</td>
<td>14 (12.1)</td>
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<tr>
<td>Malaysia</td>
<td>12 (10.3)</td>
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<tr>
<td>China</td>
<td>13 (11.2)</td>
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<tr>
<td>UK</td>
<td>21 (18.1)</td>
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<tr>
<td>USA</td>
<td>28 (24.1)</td>
</tr>
<tr>
<td>Total</td>
<td>116 (100)</td>
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TABLE 1 Numbers and nationalities of ECRs (table first published in Nicholas et al., 2017).
find that the new wave of researchers (ECRs) is still fixated by article publishing. Publishers today see themselves as investing in and organizing journals to provide these functions for researchers, and we found little evidence to suggest they are misguided. ECRs dance to the same reputational tune as researchers have done for a very long time. As we shall learn later, some ECRs do ponder on novel research outputs and acknowledge the unfairness of the existing, unbalanced reward system. However, they do not do so enough, or in sufficient numbers, to fundamentally challenge this traditional picture and (possibly) undermine the role of publishers in the short or medium term. Still, we will be much more confident saying this after another 2 years of longitudinal research.

ECRs were found to be more productive than members of our focus group assumed, the ones in our sample having published on average about 10 papers each (and, at least, double that if conference proceedings and book chapters are included). Publishing outlets for them in a number of countries, notably Poland, tend to be very prescribed, with ECRs having to refer to lists of acceptable journals. In most cases, it is a proprietary list, normally Web of Science (WoS), but sometimes, it is a government list, as in the case of Poland, although these lists are built on the foundations of proprietary ones. China, in fact, operates both lists, with the government list useful for fields where it is difficult for researchers to publish in WoS journals and as a means to promote Chinese journals. The dominant influence of the WoS is particularly marked, but not with medical researchers where PubMed inclusion, arguably a lower bar, is regarded as being acceptable.

For ECRs to be first author, on the whole, was found to be not that difficult, and they are, typically, first author in one-third to one-half of all the papers to which they contribute, and few complaints were made about authorship order. Where to publish is generally a group decision, especially in the sciences, and ECRs do have an influence in the decision-making process. For instance, ECRs in the UK and US claim to have considerable influence on the decision of where to submit in, respectively, 25% and 30% of all instances. If the research cannot get published in top journals – and there is always a tension between the wish to get into the very top journal and the wish to be more pragmatic for whatever reason – there has to be other criteria. For ECRs, these include submitting to journals: (1) where the chances of acceptance are higher; (2) where they have had good experiences in the past; (3) which provide a rapid turnaround, referred to as ‘quick journals’; (4) that are thorough and efficient (and give lots of helpful feedback); (5) which have the most appropriate audiences; and (6) which cater for OA (see under the OA section for more on this).

ECRs were asked whether they had a long-term publishing strategy. Not surprisingly, for many, this was publishing in high-impact factor journals. US researchers have this pressure, but seemingly less so than their colleagues in other countries, such as Poland, although this might be partly explained by the fact that the US sample was comprised of more established researchers, who, consequently, were less driven to publish in high-impact factor journals. There was a feeling in some countries (e.g. China) that journal impact factors (JIFs) were going to be more, rather than less, important in the future.

More detail on the publishing practices of ECRs can be found in a forthcoming article ‘Early career researchers: their publishing and authorship practices in the digital age’.

Peer review

Unaware or, perhaps, simply unimpressed by the many shortcomings of the system, at least according to the literature (Bornmann, 2011; Egge & Bornmann, 2013; Souder, 2011), most ECRs express an overall, if hedged, satisfaction with the peer review system as it is. In fact, they blame its few perceived inadequacies (e.g. badly chosen, bad/biased reviewers) on the editors, who, in other cases, are thought to have too much power. Nevertheless, ECRs are of two minds about open peer review as a possible solution to the problem: they appreciate its transparency, but tell us it would not work in practice. They worry about letting incompetent (low-quality) researchers into the system – something French ECRs are particularly anxious about – as it is thought that this it would make it more difficult to reject papers, and it would be more detrimental for ECRs because they are afraid to reject articles when the authors are colleagues/researchers who hire/recruit them. With blind peer review they are more comfortable to recommend the rejection of poor papers, whoever the authors are.

Social media and online communities

There are patches of social media and online community use among ECRs, and these patches are bigger than we have witnessed in our previous investigations (Watkinson et al., 2016). ResearchGate (RG, the most popular platform), LinkedIn (for profiles), and Twitter are the tools of choice. Finding information, communicating information, sharing, building a digital profile/presence, obtaining PDFs, and engaging in outreach activities are the main uses to which these platforms are put. This constitutes quite a long list of scholarly activities, but active collaboration is a notable absentee activity. Social media have a firm foothold, especially in China and Malaysia.

Smartphones

Given society’s widespread use of smartphones, the fact that it is the main platform for connecting to the Internet, and that, like the rest of the population, many (three-quarters) ECRs have smartphones, it might come as a surprise how little ECRs in the study admit to utilizing them for scholarly purposes. Even when smartphones are used, it is mostly occasional, for communicating while away from the office, travelling, and at conferences or for alerts, rather than for reading and marking papers. Of course, social media and smartphones go hand in hand (Nicholas et al., 2017), so the increases in the former that we have already detected might result in similar increases in the latter. Resolution
is getting better all the time, and screens are larger, and research published elsewhere indicates that academics now read more HTML web pages on their tablets, e-readers, or smart phones compared to 2 years ago (Halevi, Moed, & Bar-Ilan, 2015). In our sample, Chinese ECRs are the most active users of smartphones for scholarly purposes, using them particularly for discovery purposes (Nicholas et al., 2017).

**OA publishing**

Gold OA is universally thought by our ECRs to be a good and worthy thing, but they are largely lacking detailed knowledge about OA journals, although UK/US ECRs are more knowledgeable. OA is not really an issue for them in any regard, never mind being a big issue, although there is some disquiet regarding page charges that are thought to be too high as well as unfair. It is because it is making the playing field uneven between those researchers who can pay for it and those who cannot. This was especially thought to be the case by Spanish ECRs. There is a lot less distrust of OA than encountered in earlier studies, but few ECRs are queuing up to get published in OA journals – less than 10% – unless they are also top-ranked journals. Publishing in OA journals is generally not part of any ECR publishing strategy despite the OA mandates (mainly in UK/US) that ECRs are (only vaguely) aware of.

**Repositories**

Somewhat surprisingly, as ECRs might be thought to be interested in taking every opportunity to showcase their achievements in order to fast track their career, they regard archiving their research work in repositories as a non-priority because there are many more pressing issues; if undertaken, it is held to be a matter for librarians or research administration. It is done when obligatory, but without much enthusiasm – so much that there is a general absence of knowledge of and interest in repositories. The feeling from the interviews is that this is unlikely to change fast, unless depositing obtains reputational credit. ECRs are, however, more likely to deposit to thematic repositories, which are supported widely by the scientific community. The community is much more important than the institution in this regard. French ECRs in general do not think of searching a repository and say that ResearchGate, for example, offers an easier way of finding content (Google appears to prioritize RG links), so why not deposit there?

**Open Science**

There is much talk about the open agenda in the press and at conferences; however, ECRs display little understanding of, or interest in, Open Science, Web 2.0, and so forth and their technologies as possible agents of scholarly change even when explained. Indeed, French researchers are antagonistic to the concept, seeing it as a further restraint on their scholarly freedoms. But related questions about open data and software (components of Open Science) did stir a little interest among a few UK/US researchers. They are not so interested in sharing data, which is an important element of Open Science, because many wish to exploit the data they have gathered to the full (for their own publications) and not give it away. The Open agenda includes blogs as non-traditional scholarly outputs, but no one, certainly in the UK/US, is really interested in blogs as an alternative to submission to high-impact factor journals. Again, the game changer might be giving ECRs reputational credit for such activities. Tenure and promotion committees have as much, if not more, influence on researcher practices than funder mandates.

**Sharing and collaboration**

Sharing is easier to do ever since the emergence of social media and online scholarly community platforms, such as ResearchGate, and is thought to be a reputation-accruing activity, which might be expected to take science to greater heights (Nicholas, Herman, & Jamali, 2015). While the large majority of our ECRs share ideas and interim data, much of this actually takes place at the research group level, at internal meetings, and within local networks. While sharing is much mentioned by US and UK ECRs as being central to the way they want to work, they are a little conflicted when they have to act by the academic rules, so the sharing of ideas and interim results, using social media, is little undertaken. Sharing research outputs, ‘after publication’, via RG in particular, is a different case and is a popular activity, especially among UK researchers.

Collaboration is clearly a weightier issue, and the question was asked whether ECRs collaborate extensively. In fact, there was no country consensus here, with just French researchers collaborating extensively. For French ECRs, collaboration is clearly king, despite eschewing social media for the purpose. Besides publications, collaboration is a constant objective because ECRs tell us their strategies for getting a job, and publishing more and better papers rely on collaboration. Conferences and meetings are key activities, dedicated to searching for collaborations and for making ECRs visible to senior scholars. ECRs believe that they are hired not only for their CV, but also for the potential of their collaborations. A different picture emerges from the UK/US where ECRs have their networks with whom they interact outside their groups, but there is little evidence of formal research collaboration. It tends to be rather basic and piecemeal, providing help among friends as well as giving feedback, links, and advice. Nevertheless, while there is no broad consensus as to the (presumed) value of social media in building research collaborations, there is still activity and interest.

**Metrics**

ECRs are well aware of citation-based metrics associated with journals and their articles, but despite the importance accorded to metrics as a (future) fundamental element of reputational assessments, ECRs show little interest in usage or altmetrics,
although a few do check their publication downloads. This is because altmetrics are not widely used and accepted by both their colleagues and the university evaluation system. However, some ECRs, but not those in the UK/US, believe that it is a potential new method to evaluate researchers’ output and influence.

Impact

Most ECRs see the conducting of good research and its publication in prestigious journals as the best way to impress others and to have an impact on the community to which they belong. Still, UK ECRs, most probably influenced by the Research Excellence Framework, which awards scores for impact, showed a wider interest in reaching out to the general public and using innovative means (including social media) to do so.

Publishers and libraries

There is mixed news for publishers and bad news for libraries, the two main pillars of the traditional scholarly communication system. Thus, despite publishers’ possession of the reputational diamonds in the mine (their highly ranked journals), views about ‘commercial’ publishers tended towards the negative – although, admittedly, not many ECRs had particular views. In fact, when discussing the topic, they show a lack of understanding of what publishers (or libraries for that matter) do. This, taken together with the fact that ECRs in the sample do not choose to publish on the basis of publisher, and few use publisher websites (with the exception of Elsevier), poses challenges for publishers. On the positive side, ECRs are satisfied with publishers managing the peer review process, but not with learned societies doing it because they are not thought to be sufficiently independent.

There are more challenges for libraries, however, as they seem to have lost their visibility altogether (Nicholas et al., 2017).

Transformations and transitions

We seem to have moved on from the situation we found in our previous research (Watkinson et al., 2016), where no one had any ideas at all about what changes may occur, never mind transformations, and those who disliked the existing situation just railed against it without coming up with solutions. They felt powerless.

A few years down the line, and we do find ideas for changes and even some for transformation. Ideas are mainly associated with moving away from the current preoccupation with papers and towards greater sharing, collaborating, and more outreach. Social media use is clearly up and, if not quite at the tipping point, is being used for dissemination. Researchers, who happen to be ECRs, are thinking about change and transformation, and these are the top young researchers in our sample from the best research-intensive universities. Some even accepted the idea that they might change things when in a position to do something about it.

Diversity

Clearly, we have to be careful making comparisons at such an early stage in the project’s life; however, it is possible to point to possible areas that have caught our eye.

Country

The fact that the project was organized by country meant, in part, that there is an assumption that there are national differences. In fact, we found real differences and also plenty of similarities. There is clearly a UK/US special relationship and a sort-of cluster of EU countries, but there is no ‘Asian’ cluster, with China closer to the EU in scholarly behaviour than to Malaysia. The latter, in fact, seems to be way out on a limb and a contrarian to France (see the hypotheses document on http://ciber-research.eu/harbingers.html for more details and methodology.) Some of these differences could be due to the small differences in the make up of the national ECR samples, and hence, we need to take care with national comparisons. In Poland and Malaysia, ECRs are especially carefully drilled by the scholarly systems and have less freedom of choice than in the UK and US. US ECRs seem to have a greater degree of freedom than others. ECRs live very precarious academic lives everywhere, but this was especially so in Spain, partly the result of nearly a decade of economic recession.

Scholarly communication experience

ECRs who have reviewing experience hold different scholarly views from those who do not, perhaps because they are more familiar with the system and can talk about it more fully. They are also more defensive of a system of which they are a part.

Lone researchers

There is a difference between those who work more or less on their own, usually doing a doctorate after preliminary experience, and those who are embedded in groups. In the US, less than one-fifth of ECRs are lone researchers, whereas it was more than two fifths in the UK. Those not in groups tend to be social scientists, and as a generalization, they provided fewer answers to the questions asked and are less productive in terms of published articles. Indeed, most of them (three-quarters) are basically uninterested in scholarly communication, and more of them said that they are probably not going to continue in academic life. We shall be seeking the reasons why they should think like this in the following years.

Prestigious research groups

Those who work in strong research groups feel more secure about their prospects and tend to be more content with the academic communication process, perhaps just because they are more optimistic about their future.
Subject of research

Some research topics are more or less ‘bankable’ than others because they are more ‘in the spirit of time’. The consequence is that those who have ‘bankable research subjects’, such as digital education, nanotechnology, and data mining, feel they are more visible, their results are more likely to be published, and they are more contacted by colleagues in their countries and abroad. It is a kind of ‘Matthew’ effect (Merton, 1968).

Gender

Generally, there was little evidence of differences between genders in the way they see career progression (or anything else for that matter), which might be surprising given the findings of some commentators testifying to problems of women (not) breaking through the glass ceiling. (For a review of pertinent studies, see Savonick & Davidson, 2016, and also Sugimoto, Lariviere, Ni, Gingras, and Cronin (2013) who find that gender imbalances persist in research output worldwide.)

Service and applied researchers

Those researchers who work in a service capacity, usually in medicine, offer expertise in techniques and methods, for instance, with regards to clinical trials. Their attitudes show differences with those whose research is purer and less applied. Those ECRs who work either in industry or in government or medical laboratories where the nature of research is different are cut off from some of the concerns of the academia, and their attitudes are different too. Thus, there is the case of a cytogeneticist offering services with no worries about academic advancement. They have their main job, and doing research is an add-on to their basic ‘clinical’ work.

INTERIM CONCLUSIONS

It would be premature to make firm conclusions because we are at an early stage in a potentially lengthy study. The study is all about change, and so far, we have only laid down the foundation stone of ECRs’ current behaviour and attitudes. While we need to be careful about generalizing across the whole dataset at this stage, we can reflect on the key question that we set ourselves at the beginning of the project. Are ECRs harbingers of change, or are they simply followers? The answer, albeit based on just the first year of the study, is that ECRs do not invariably follow the scholarly practices of their mentors and seniors because that is what they told us and what we observed. True, in the crucially important area of publishing, ECRs still have little choice, but to abide by the established rules – at least until these are changed, which might happen yet, with a nudge from the funders (Nicholas & Herman, 2016). Indeed, it is hardly surprising to find that ECRs are even more driven to publish in highly ranked JIF journals because of their precarious positions and their belief that it leads to career advancement. However, in other areas of their scholarly undertakings, they are plainly more adventurous – if not always in their practices, then at least in their attitudes. Thus, for example, they may not prefer publishing in a journal with innovative features, such as video articles, but they are aware of the concept or even excited by it. By the same token, quite a few ECRs use social media regularly, if mostly for getting PDFs, connecting with their colleagues, and, increasingly encouraged by their institutions, to maximize research impact. Even those who do not tell us that they should make more use of the opportunities presented and might do so in the future, especially for building research collaborations. Significantly, online scholarly communities and ResearchGate in particular are gaining ground, and more transformational ideas are being mentioned than we have come across in earlier studies, such as the desire to communicate more with the public/policy makers and to dwell more on the research itself than where it is published. UK/US researchers if not leading the changes are certainly articulating them more vocally. However, there is not much movement on the Open Science front yet.

Independent of discipline or nationality, these results clearly show the tensions that occur in a context of transition. In this transition, we have signs that scholarly ‘things’ (practices, behaviours, representations, wishes, objectives) are moving in many directions, while the formal frame of evaluation and competition is strengthening. Some of the apparent contradictory results are, related to these tensions. ECRs see the opportunities of change, but do not seize the occasion to actually bring it about because they just do not have the time and space in an insecure and busy environment.

Finally, a reminder that what is reported in this paper is an overarching summary of the data collected by the project in just the first year of its life, and supporting and evidential data can be found in supplementary documents on the project website (http://ciber-research.eu/harbingers.html) and related articles in this journal.

LIMITATIONS

This study is based on a sample of 116 ECRs and might not be representative of the ECR population at large. It is also based on personal interpretation of the questions and ECRs’ willingness to report honestly and objectively, all of which may introduce bias.

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