

EARLY CAREER RESEARCHERS: THE HARBINGERS OF CHANGE?

Final report from CIBER

August 2016

Year one
(2016)

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Note

The project was funded by the Publishing Research Consortium and conducted during the period October 2015 to August 2016 by a team of researchers from the UK, China, France, Malaysia, Poland and Spain. Subject to review, the report provides the results of year one of a three-year project. In addition to this report, a number of other, more detailed reports are available on the CIBER website (<http://ciber-research.eu/harbingers.html>):

Harbinger Working Report 1: Literature Review

Harbinger Working Report 2: Hypotheses Tests

Harbinger Working Report 3: Comparative National Findings

The individual national reports will form a single database, which will be made available on request.

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1.0 Executive summary

Context

Early career researchers are of great interest not just because they are the new wave, but because they are also the biggest wave – they are by far the largest group of researchers (Jones, 2014). Therefore, they merit long, detailed and continuous investigation. Towards this end this report provides the first year findings (the foundation stone) for a proposed, novel, three-year, longitudinal study of 116 science and social science early career researchers (ECRs), who have published nearly 1200 papers between them, come from seven countries (China, France, Malaysia, Poland, Spain, UK and US) and 81 universities.

The wide-ranging study, funded by the Publishing Research Consortium, focuses on the attitudes and behaviours of ECRs in respect to scholarly communications and the extent to which they are adopting such potentially disruptive technologies as social media, online communities and Open Science/Science 2.0 that might prove transformational. Uniquely, we believe, ECRs were interviewed in their own languages and by people who understood the national contexts, face-to-face, by Skype or telephone, with a structured schedule and typically lasting 90 minutes. This research is very timely as the last piece of research to look at this topic comprehensively, but from a largely UK perspective, was undertaken seven years ago by JISC in a very different scholarly world, one in which social media, online communities, reputational platforms and smartphones were very much in their infancy.

Qualitative methodologies, as those deployed by the project, are best at providing deep conversations and understanding and personal insights and context, rather than making robust generalizations and comparisons, which is the territory of the ubiquitous questionnaire. Nevertheless, there is still a need to offer summarization and quantification, albeit with qualification and to that end we have used a structured interview schedule and coded up the responses rigorously. Furthermore, our sample, despite our best efforts to obtain some balance in selection, because of funding restraints is only a tiny fraction of the total population and cannot be regarded as representative, more suggestive. For all these reasons we have used tables, percentages and statistical calculations selectively and, wherever possible, allowed the ‘voices’ of the ECRs to come through. [Sections 3-6 for detail]

Main findings

- **Career and motivation.** The vast majority of ECRs interviewed wanted to continue to do research and hoped to move to a position where they had a job (tenure) and, in the case of the sciences, usually in their own group, but in the US in particular there were some who were either providing a research function or (in the social sciences) were doing - and intended to continue doing - at least part of the time their own individual research. There was clear evidence, too, of tactical thinking connected with career planning and of looking ahead to what they might do in the future if they obtained tenure and were, for

instance, in a position to use social media to reach out to a wider audience. [Sections 8.1; 8.2.3.4; 8.14]

- **Followers or harbingers?** The answer to the main question driving the study is that ECRs do *not* invariably follow the scholarly practices of their mentors and seniors. 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 could happen yet, with a nudge from the funders (Nicholas and Herman, 2016). Indeed, it is hardly surprising to find that ECRs are even more driven to publish in highly ranked Journal Impact Factor journals because of their precarious positions and their belief that this 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 of the ECRs use social media, 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. [Section 8.2]
- **Paper-driven behaviour.** 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 and the new wave of researchers (ECRs) are still fixated by them. Publishers today see themselves as investing in and organizing journals to provide these functions for researchers and we can find little evidence to suggest they are misguided. ECRs dance to the same reputational tune as researchers have done for a very long time. Some ECRs do ponder on novel research outputs and acknowledge the unfairness of the existing, unbalanced reward system, but not enough, or in sufficient numbers, to fundamentally challenge this traditional picture and thus to undermine the role of publication in peer reviewed journals in the short or medium term. However, we would be much more confident saying this after three years of longitudinal research.
- **Publishing practices.** ECRs are more productive than is sometimes assumed, having published around 10 papers each (and at least double that if conference proceedings and book chapters are included) and as mentioned they are very driven to publishing in highly ranked JIF journals. Publishing outlets in some countries 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), 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 Web of Science journals and as a means to promote Chinese journals. The dominant influence of the Web of Science is particularly marked, but not with medical researchers where PubMed inclusion, arguably a lower bar, is important. For ECRs to be acknowledged as first author is, on the whole, not that difficult and they are typically first author in one-third to one-half of all the papers to which they contribute. Where to publish is generally a group decision and ECRs do have an influence with ECRs in the UK and US claiming to have considerable influence on the decision where to submit in, respectively, 25% and 30% of all instances. Of course, if the research cannot get published in a top journal - and there is always a tension between the wish to get into a very top journal and the wish to be more pragmatic for whatever reason - there have to be other criteria and these include submitting to journals: a) where the chances of acceptance are higher; b) where they have had good experiences in the past; c) which provide a rapid turnaround, referred to as 'quick journals'; d) that are thorough and efficient (and give lots of helpful feedback); e) which have the most appropriate audiences; and f) which cater for open access (see under the Open access Section 8.4 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, although this might be partly explained by the fact that the US sample was more established and consequently were less driven to publish in high impact factor journals. There was a feeling in some countries that JIFs were going to be more rather than less important in the future. [Section 8.2.3]

- **Peer review.** Another interesting fact, surprising perhaps, is that there is no strong evidence to support the widely held belief, which is by now almost a truism, that the existing peer review system is 'a closed club', from which ECRs (inter alia) are locked out. Some have heard of such things, but not really experienced them. Indeed, unaware or perhaps simply unimpressed by the perceived shortcomings of the system, at least according to the literature, most express an overall, if hedged, satisfaction with peer review as it is. In fact, they blame its inadequacies (badly chosen, bad/biased reviewers) on the editors, who in any case are thought to have too much power. Nevertheless, ECRs are of two minds about open peer review as a possible alternative. They appreciate its transparency, but do not believe it can work in practice and worry about letting undesirable people into the system – something French ECRs are anxious about – as it was thought this it would make it more difficult to reject papers, which will be more detrimental for ECRs. [Section 8.3]
- **Social media and online communities.** As mentioned already, there are patches of social media and online community use and these patches are bigger than we have witnessed in our previous investigations. ResearchGate (possibly the fastest grower in the field),

LinkedIn 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 scholarly list, but active collaboration is a notable absentee. Social media have a firm foothold, especially in China and Malaysia. [Section 8.5]

- **Smartphones.** Given society's widespread use of smartphones, the fact that smartphones are the main platform for connecting to the Internet, and that, like the rest of the population, many ECRs themselves have smartphones, it might come as a surprise for our research to report to how little ECRs (admit) to utilizing them for scholarly purposes. Even when they are said to be used, it is mostly occasionally, 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, so the increases in the former that we have already detected look likely to result in similar increases in the latter. Unsuitability for reading is claimed to be the main reason, and that of course is a valid reason, but the same was said about laptops and desktops. Resolution is getting better all the time and screens larger, and research published elsewhere indicates that academics now read more HTML web pages on their tablets, e-readers or smartphones compared to two years ago (Halevi et al., 2015). The Chinese seem to be leading the smartphone change/charge, will others follow? This is something to watch for the future. [Section 8.7]
- **Open access.** Gold open access (OA journals) is universally thought to be a good thing, but ECRs are well aware of the problems associated with open access journals. Open access (OA) is not really an issue, never mind a big issue, although there is some disquiet regarding article publication charges (APCs) which are thought to be too high and unfair because they are making the playing field uneven between those researchers with access to funds that can pay for APCs and those that do not. There is a lot less distrust of open access than was encountered in earlier studies on trust, but few ECRs are queuing up to be published in OA journals. Publishing in OA journals is generally not part of any publishing strategy, despite the mandates (mainly in the UK and US) that ECRs are (only vaguely) aware of. [Sections 8.2.3.3; 8.4]
- **Repositories.** Somewhat surprisingly, since ECRs might to be thought to be interested in taking every opportunity to showcase their achievements, they regard archiving their research work in repositories as a non-priority; if undertaken at all it is thought to be a matter for librarians or research administration. Archiving is done when obligatory, but without much enthusiasm; so much so, that there is a general absence of knowledge about and interest in repositories, to the extent that a significant number of ECRs do not even know that their institution has an institutional repository. This is unlikely to change quickly unless archiving in repositories obtains reputational credit. ECRs are however more likely to deposit to thematic repositories such as arXiv.org, which are supported by

the wider scientific community. The community is much more important than the institution in this regard. ECRs are also wise enough to know that researchers in general do not think of searching in repositories and that community networks such as ResearchGate offer an easier way of finding content, so why not deposit there? [Section 8.4]

- **Open science.** There is much talk about the open agenda in the professional press and at conferences; however, ECRs display little understanding of or interest in Open Science, Web 2.0 et al. and its technologies as possible agents for change in scholarly practice. 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 some interest among a few UK and US researchers. The sort of "pain free publishing" (<https://elifesciences.org/about>) that *eLife* promises also merited some interest, because of the preoccupation of ECRs with publication. They are not so interested in sharing data (an important element of Open Science) because many want to exploit the data they have gathered to the full (for their 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 publications. 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. [Section 8.8]
- **Sharing and collaboration.** Sharing is easier to do than ever since the emergence of social media and online scholarly community platforms such as ResearchGate, and sharing is thought to be a reputation accruing activity, which might be expected to take science to greater heights (Nicholas et al., 2015). While the large majority of 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 ECRs as central to the way they want to live their scholarly lives, and, perhaps, they are a little conflicted when they have to act by the academic 'rules', the sharing of ideas and interim results using social media is little undertaken. Sharing research outputs 'after publication' via ResearchGate in particular is a different matter and is a popular activity, especially among UK researchers.

Collaboration is clearly a weightier issue and the key hypothesis we tested was: *Early career researchers share and collaborate extensively even at the risk of losing their competitive edge.* In fact, there was no country consensus here with just one country, France, fully confirming that this is the case and three other countries partially confirming it. For French ECRs, despite eschewing social media for this purpose, collaboration is clearly king. Besides publications, collaboration is a constant objective. The strategies of ECRs for getting a job and publishing more and better papers rely on collaboration. Conferences and meetings are key moments, dedicated to searching for collaborations. ECRs believe that they can be hired for their CV, but also for the

potential of their collaborations. A different picture emerges from the UK and US where ECRs have their networks with whom they interact outside their groups, but there does not seem to be much evidence of formal research collaboration. It tends to be rather basic and piecemeal, providing help among friends, 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. This is an area where things are a little confused and unclear, and possibly waters are getting muddier as a consequence of social media and scholarly collaboration platforms. This landscape will need close monitoring over the next two years. [Section 8.9]

- **Metrics.** Despite the importance accorded to metrics as a (future) fundamental element of reputational assessments, ECRs demonstrate little interest in usage metrics (known as 'altmetrics'), although some do check their publication downloads. This is only to be expected, of course, for altmetrics are not yet widely used and accepted either by researchers or by the university system. However, some ECRs, but not in the UK/US, tend to agree that altmetrics is a potential new method to evaluate researchers' output and influence. Nevertheless, our study shows that the hype associated with altmetrics is not matched by ECR interest. It is still very early days for altmetrics and this is another landscape to watch. [Section 8.11]
- **Impact.** Most ECRs see that conducting good research and getting it published in prestigious journals is the way to influence others and to have an impact, but UK ECRs, undoubtedly influenced by the metrics of the Research Excellence Framework used by HEFCE to assess priorities for dispersing funds, demonstrate a wider interest in reaching out to the general public and using innovative means (including social media) to do so. [Section 8.12]
- **Publishers and libraries.** There are mixed messages for publishers and bad news for libraries, the two main pillars of the traditional scholarly communication system. Despite possession of the reputational diamonds in the mine, the highly ranked journals, most ECR views about "commercial" publishers are negative, although not many ECRs had views on particular publishers, and in general they demonstrated a lack of understanding of what publishers (or libraries) do. This, taken together with the fact that ECRs do not choose to publish on the basis of the publisher but of their journal, and do not appear to use publisher websites (often preferring free and open services, such as arXiv.org and ResearchGate) there is the challenge for publishers of looking worryingly anonymous and unpopular in transitional times. On the positive side, ECRs are comfortable, but not necessarily happy, with publishers managing the peer review process and nor are they happy with learned societies doing it, largely because societies are thought not to be sufficiently independent. Perceived independence seems to be a real positive for publishers. [Section 8.13]

Much more worryingly, libraries seem to have lost all their visibility. Lots of ECRs have not gone to the library for years. Libraries are mainly considered as places for undergraduates to sit and work. Their discovery systems have been bypassed by Google to a large extent and to make matters worse their institutional repositories are not popular either. Libraries appear to have little to offer to the big new wave of researchers, so down the line there have to be worries for their long term future as resources for postdocs. And this, of course, poses some challenges for publishers as they have long worked hand in glove with libraries. [Section 8.14]

- **Diversity.** Clearly we have to be careful in making comparisons at such an early stage in the project's life and in dealing with quite a heterogeneous dataset. However, it is possible to point to areas that need to be monitored:
 - a. *Country.* The fact that the project is organized by country means that there is a premise that there would be national differences. In fact, we found real differences and similarities. There is clearly a UK/US special relationship, EU countries sort-of cluster, but there is no 'Asian' cluster, with China closer to EU than to Malaysia. Malaysia, in fact, seems to be a contrarian. Some of these differences could be put down to the different make-up of the national ECR samples.
 - b. *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 feel they are a part.
 - c. *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. The former tend to be social scientists and as a generalization they provided fewer answers to the questions asked and are less productive. Indeed, most of them (though not all) are basically uninterested in scholarly communication and more of them are probably not going to continue in academic life.
 - d. *Prestigious research groups.* Those who work in prestigious research groups feel more secure about their prospects and tend to be happier with the academic communication process, perhaps, just because they are more optimistic about their future.
 - e. *Subject of research.* Some research topics can be more or less 'bankable' than others. Some topics are more transient. The consequence is that those who have 'bankable' research subjects are more visible, their results are more likely to be published, are more contacted by colleagues in their countries and abroad. It is a kind of 'Matthew' effect (Merton, 1968).
 - f. *Age and experience* are clearly correlated and are added values for ECRs, which contribute towards a deeper understanding of the system and knowing how to behave and what to do in many situations and contexts.
 - g. *Gender.* Generally, there is little evidence of differences between genders in the way

ECRs see career progression (or anything else for that matter), which might be surprising given the views of some commentators about the problems of women (not) breaking through the glass ceiling. Thus, Sugimoto et al. (2013) find gender imbalances persist in research output worldwide: men dominate scientific production in nearly every country; globally, women account for fewer than 30% of authorships of collaborative papers, whereas men represent slightly more than 70%; for every article with a female first author, there are nearly two articles first-authored by men; and, arguably most importantly, when a woman was in the prominent author position (sole, first or last authorship), the paper attracted fewer citations than in cases in which a man was in one of these roles. Given all this, it is quite surprising to find that Chinese women are the only ones to admit to at least some gender disparity among ECRs, saying that they are driven more by pure subject interest than their male, promotion-driven counterparts.

h. *Service and applied researchers.* Those researchers who work in a service capacity, usually in medicine, offer expertise in techniques and methods. 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 Academy: their attitudes are inevitably different, too. [Sections 8.15; 8.16]

- **Transformations and transitions.** On the broad front, independent of discipline or nationality, our results show clearly the tensions that occur in a world in transition. In this transition, there are signs that scholarly ‘things’ (practices, behaviours, representations, wishes, objectives) are moving in many directions while the formal frame of evaluation and competition is strengthening, almost unbending. Some of the apparent contradictory results we see in the research are down to these tensions. ECRs see the opportunities to change, but do not take the opportunity to do so because they just do not have the time and space in an insecure and busy environment. They of course also have limited scope to change as they (and their tenured colleagues) are constrained by a reputational system that promotes, above all else, publication record and citation scores.

Nevertheless, we seem to have moved on from the situation we found in a previous research (Watkinson et al., 2015), where no one had any ideas at all about change, never mind transformation, and those who disliked the present situation just railed against it. Three years on we do find ideas for change and even some for transformation, mainly moving away from the current preoccupation with published papers. Researchers, who happen to be ECRs, are thinking about change and transformation and these are top young researchers. Some even accept the idea that they might change things when in a position to do something about it. Social media use is clearly up and, if not quite at the tipping point, it is creating waves. [Section 8.14]

2.0 Background

ECRs as the new wave, not surprisingly, attract a lot of attention and much hot air. They tend to be a favourite topic of conferences, seminars and blogs (see, for example, Jones, 2014; Poli, 2016), where ECRs are often produced as scholarly ‘exhibits’ to pour over. However, surprisingly, this interest has not translated into much in the way of robust research projects. Thus, an extensive literature review shows that nothing substantial has been undertaken for seven years, an aeon in the digital age in which we find ourselves. The closest anyone has come to what this research proposes to do was a JISC study conducted in 2009, *The lives and technologies of early career researchers* (James et al., 2009). However, it was very much 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 obviously very much dated as ICTs are now endemic and really predates much of the Science 2.0 developments and the real growth in social scholarly networks and emerging reputational platforms. Thus it found, for example, that 72% of ECRs did not use Web 2.0 or social media to share their research. Given the rapid pace of change in this area (e.g., smartphones, open science and online communities) it is highly unlikely that the JISC findings still hold true.

There have been some major studies which 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 and Rowlands, 2011; Rowlands et al., 2011) and trustworthiness (Nicholas et al., 2014; Nicholas et al., 2015a; Nicholas et al., 2015b; Tenopir et al., 2015) are in this camp.

It seems from the research that there are currently two contrasting assumptions 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 early career researchers 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 et al., 2010).

The CIBER research, which we have referred to, 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, the 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 differ in their beliefs/behaviours according to, for instance, discipline, nationality, role in the research group and gender.

3.0 Who are ECRs (and why are they so important)?

There are different and conflicting definitions of early career researchers circulating (Poli, 2016) and they vary from country to country, which is very important of course for an international survey such as this one. After an extensive trawl of the literature and consultations with a focus group formed of publishers and our international partners (senior academics), the following definition was agreed on:

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 were informed that ECRs are getting older as a result of the decline in job opportunities (because of the economic recession), 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 hybrids and are doing a PhD at the same time or have undertaken research before doing their PhD.

Why, then, are ECRs such an interesting and important community to research? For these reasons:

1. Most importantly, perhaps, because they are mostly relatively young. They constitute the Generation Y/Millennial generation (born 1982-1994) and they represent the 'new wave' of researchers, born digital or long conditioned by living in a digital environment. They represent the future and we are all fascinated by the future. They constitute the breeding ground for tomorrow's established researchers. They could be the harbingers of change, ushering all things new. However, if our sample is anything to go by, they are not that young, more likely to be in their thirties than twenties (Table 5).
2. There are a great many of them. It is claimed that ECRs constitute the biggest group of researchers (Jones, 2014) and hence they are not just the new wave, but also the 'big' wave. They are also growing rapidly in number. There are more and more researchers who are in some respects (economically and in status terms) early career researchers, because they are not established in tenured positions. 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 percent in the UK, 84 percent in Brazil (Shin and Cummings, 2013) and 51 percent in the US (Weir, 2011). It is worth noting however that there is a bottleneck in places caused by the overproduction of PhDs and the relative scarcity of faculty posts, Poland being a good example.

3. They are researchers still making their way, most often in the Academy. They are at a status passage from the apprentice to the colleague state of their career in their scientific communities, which hinges on the crucially important transition from dependent to independent research (Laudel and Glaser, 2008).
4. They are non-established researchers at the start of their careers, seeking a permanent job. In a few 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, while in other countries this might be true for only about one tenth (Teichler and Cummings, 2015).
5. They work in very competitive, selective and precarious environments (Belluz et al., 2016). Early career employment is characterized by moves between institutions, a state of affairs prevalent in Latin and North American and continental European countries (Bennion and Locke, 2010). This is hardly surprising, for the part-time and/or contract-based, non-tenure track is becoming widely adopted in many countries' higher education systems (Teichler and Cummings, 2015). These short term contracts mean that ECRs are under considerable pressure to fast-track their development in order to obtain scholarly reputation, whilst maintaining the delicate balance between mutual support from peers, and competition for funding, jobs, and publications (James et al., 2009; Müller, 2014a; 2014b).
6. They are an unstable community. Commentators tell us that the younger generations are not 'stable' and they naturally want to use new and different platforms to their parents, and maybe this extends to their managers and professors as well (Chudziak, 2015).
7. ECRs are a target for many publishers, who develop dedicated services for them. For these services to be effective, they need to be based on robust evidence as to ECRs' idiosyncratic practices and specific needs.

4.0 Aims and hypotheses

The principal aim of the project is to study the evolving scholarly communication behaviours and attitudes of early career researchers in order to determine whether they are the harbingers of change, utilizing for instance Science 2.0 developments. From this standpoint, the study concentrates on the key scholarly activities of information use, information seeking, citing, publishing, peer review, sharing/collaborating and reputation building. All of this with a special focus on the impact of open access publishing, the social media, online social networks and emerging reputation mechanisms on these activities. Additionally, we were especially tasked to investigate how ECRs go about selecting the journal

in which they publish, something which publishers are very interested in.

A direct comparative element with tenured/mature researchers cannot be made because they are not included in the study. However, indirect comparisons will be made by: a) asking ECRs themselves whether their behaviours and attitudes differ from their seniors; b) evaluating the published research on senior, tenured researchers.

A secondary aim is to investigate whether there is any evidence of differences between ECRs, especially in respect of country, discipline, gender, age/experience, type of institution (e.g., research intensive) and according to their role in the research group to which they belong. Because of the qualitative nature of the study this can only be undertaken in an exploratory, albeit, considered manner and only after 'following' researchers for a few years.

To provide the project with shape and direction and to avoid producing tired old platitudes, a series of hypotheses were generated about how ECRs are thought to utilize scholarly research and communication and interview questions were shaped around them. They can be found listed in Appendix 1.

5.0 Scope

The main focus of the study is ECRs in the sciences and social sciences, which is where the funders' (PRC) main priorities lie and also where the vast majority of ECRs operate. The study aimed also to obtain a wide geographical reach, as the funders wanted to support research on issues facing the publishing industry globally. Balancing the need for representativeness (with regard to size, importance, level of development and language) with funder interests and the availability of interviewers on the ground, the following seven countries were selected: UK, USA, China, Malaysia, Poland, Spain and France. See Table 1 for a list of the institutions and individuals that collaborated

Table 1: Interviewers and partner institutions

Country	Interviewer	Institution
China	Jie Xu	Wuhan University
France	Chérifa Boukacem - Zeghmouri	Université Claude Bernard Lyon 1
Malaysia	Abrizah Abdullah	University of Malaya
Poland	Marzena Świgoń	University of Warmia and Mazury in Olsztyn
Spain	Blanca Rodríguez Bravo	University of Leon
UK	Anthony Watkinson	CIBER Research
USA	Anthony Watkinson	CIBER Research

6.0 Methodology

6.1 Research method and instrument

A key feature of the study is that, uniquely, it aims to be a longitudinal, three-year investigation, asking the same ECRs the same questions each year (during January to March) in order to map attitudes and behaviour and identify any changes to them. This was thought to be essential as the project is fundamentally about change, whether things are changing and at what speed. Structured interviews were 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 co-operation. Questions were essentially compulsory and many required a yes, no, don't know response. National interviewers were given the choice of doing the interviews face-to-face or remotely (Skype or telephone). Travel distances and fitting in with the busy schedules of ECRs meant that interviews could not be all face-to-face. The various instruments used are shown in Table 2. Interviewers who used more than one method did not report on any differences between methods in terms of data yield, but personal interviews tended to run on for longer.

A detailed interview schedule was compiled and sent to interviewees ahead of the interview (Appendix 1). 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 covered 12 main subjects and for each subject there was commonly five or more questions, meaning there were more than 60 questions in all. You could not ask that many in a questionnaire. Questions were quite detailed in order to make it easier to make year-by-year comparisons. Not surprisingly, the interviews generally took between 60 – 90 minutes.

Finally, a statistical (correlation) analysis was conducted in order to obtain a better idea of how similar or different countries are and whether clusters could be identified, which would merit closer inspection. This was largely undertaken for visualization purposes and a health warning has to be posted. This is because, while all countries were provided with quotas in respect to the subject and demographic backgrounds of interviewees, there were the inevitable differences, most notably in respect to age, subject specialization and number of ECRs interviewed. The power of this analysis should become more obvious as we repeat in it ensuing years.

Table 2: Instruments used for interviews

Country	Method
Poland	Face to face; Telephone
Spain	Telephone; Skype
France	Face to face
Malaysia	Face to face
China	Face to face; Skype
UK	Telephone; Skype
USA	Telephone; Skype

6.2 ECR sample

The project was sufficiently resourced to follow 100 ECRs. Anticipating wastage as the project proceeded over the three years, more than that number of ECRs were recruited and, as a result, we ended up with 116 ECRs (Table 3). In reaching this number, interviewers for the various countries were given a rough recruitment quota of 20-29 for the UK and US (the larger number being a reflection of the importance of these communities to publishers) and 10-15 for the other countries. Within this broad number the general guidance was to build the sample in these ways: a) two-thirds science and one-third social sciences (to reflect the larger numbers of ECRs in science); b) a representative balance of men and women; c) a range of ages within the twenties and thirties age groups; d) and, if possible, to include researchers from a mixture of universities and research group types in regard to standing.

Obviously, with the relatively small numbers involved, the prescribed balance could not always be achieved. Tables 4 and 5 give the outcomes. ECRs come from 81 institutions and the variation between countries is explained by the method of recruitment (see below). Generally, publisher-based recruitment generated a more heterogeneous sample. What Tables 4 and 5 show is that there are more men in the sample (mainly because there are just more of them, especially in the sciences), the sample is generally skewed towards the sciences (see Appendix 3 for more details) and that there is a big country variation in ECRs studying for a PhD.

Perhaps most surprisingly, the number of ECRs in their thirties (generally 35 or under) is relatively high. There are two reasons for this. First, tough economic circumstances and competition mean that researchers are ECRs for much longer, because there are just not the tenured jobs out there. It takes much longer to climb the ladder. There is an assumption in most of the participating countries that an ECR will have to do at least two post docs before even being considered for a tenured job. Second, younger researchers did not put themselves forward in numbers because they might have felt they lacked sufficient experience or felt insecure because of the nature of the questioning (e.g. how many articles have you published?). In the case of Malaysia, where all the ECRs are in their thirties, ECRs will have had to have completed their PhDs first and only those with PhDs are hired by research-intensive universities (a similar situation exists in China). They would have begun

their PhD at the age of 28-30 (eligible for government scholarship because they have working experience), spent three to five years on it, so completing at the age of 31-35, and only then start their career as researchers.

Table 3: Numbers and nationalities of ECRs interviewed

Country	No.
Poland	10 (8.6%)
Spain	18 (15.5%)
France	14 (12.1%)
Malaysia	12 (10.3%)
China	13 (11.2%)
UK	21 (18.1%)
USA	28 (24.1%)
Total	116 (100%)

Table 4: Subject representation of ECRs

Subject	Total	%
Biology & agriculture	25	21.6
Medicine and health	15	12.9
Engineering and technology	12	10.3
Chemistry	10	8.6
Computer science	10	8.6
Physics	8	6.9
Psychology	6	5.2
Other social sciences	22	19.0
Other sciences	8	6.9
Sciences	88	75.8
Social sciences	28	24.2

Table 5: Gender, age and status of ECRs

	Females		Males	
	N	%	N	%
Gender	49	42	67	58
	Twenties		Thirties	
Age	36	31	80	69
	Doctoral		Postdoc	
Doctoral/Postdoc	28	24	88	76

6.3 Recruitment

Recruitment was undertaken in a number of different ways and this was because of convenience and national preferences as to what was the best way to ensure maximum co-operation 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 (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 institution count. Given the length and complexity of the questions it was, surprisingly, not as difficult as anticipated to recruit ECRs. A voucher worth £50 or the foreign currency equivalent proved an added attraction.

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.

6.4 Recording and coding

Interviews were generally conducted by national interviewers in their local language. This was in order to obtain maximum co-operation and compliance and build a relationship that could last three 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. 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. The record was then translated into English for all non-English speaking countries (but not Malaysia where this was not necessary because of widespread proficiency in English) and then manually coded up using a heuristic approach and a standardized thematic framework.

Because of language differences and possible misunderstandings coding was very prescriptive and detailed (Appendix 2). Finally, for ECRs, yes or no responses do not always work. Their responses tend to be usually 'yes, but' or 'no, but'. That is the advantage of interviewing, because quite a number add something other than yes or no and this would not otherwise be captured.

7.0 Literature review

As has already been noted, no one appears to have undertaken the type of study conducted here, the closest anybody has come to doing so being the aforementioned, now dated JISC study (James et al., 2009). Piecing together data from more recent studies, our knowledge of ECRs is as follows (our full literature review can be found in Harbinger Working Report 1, available at: <http://ciber-research.eu/harbingers.html>).

ECRs are conservative in their scholarly behaviour

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 stabilizes (Fransman, 2014; Housewright et al., 2013; James et al., 2009; Jones, 2014; Nicholas et al., 2015a; Watkinson et al., 2016). Their safest career bet is opting for 'the tried and true' in their scholarly undertakings. Indeed, although today's novice researchers are plainly cognizant of the need for, and even the advantages of alternative or at least additional ways and means of conducting research (Nicholas et al., 2015d), they tend to steadfastly adhere to the long-established scholarly standards and principles of research work, modeling their behaviour on those of their mentors (Harley, 2010; Housewright et al., 2013; James et al., 2009; Nicholas et al., 2015c; Tenopir et al., 2010; 2011; Watkinson et al., 2016).

As long as the dictates of the academic reward system in relation to employment, tenure and promotion focus exclusively on the volume of papers published in high-ranking journals and the number of citations they obtain (Housewright et al., 2013; Mulligan and Mabe, 2011; Mulligan et al., 2013; Nicholas et al., 2015b, 2015c; Van Dalen and Henkens, 2012), it is only prudent for ECRs 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.

ECRs have a one-track mind

Müller's (2014a, 2014b) findings suggest, underscoring the earlier evidence accumulated on the subject, that ECRs perceive investing in the reproductive aspects of academic labour, such as education-oriented activities, i.e. teaching, supervising and mentoring students, as

hindering rather than propelling forward their careers. 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)".

However, as noted elsewhere (Nicholas et al., 2015d), this is one aspect of the academic world that might change yet, as it can be argued that it runs counter to today's changing societal priorities, which see the future in the globalized 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 democratized, 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.

Authorship is coming earlier

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 (Nicholas et al., 2015c), its centrality is conveyed early on the way as part and parcel of the socialization 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 surprisingly then, 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, as the findings of Horta and Santos (2015) indicate: publishing during PhD studies leads to greater research productivity and visibility in the long run.

Social media centric they are not

ECRs 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 any 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 CIBER's 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.

Things might be changing though

There are some reasons to think ECRs will introduce the 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 individualized researcher, but rather a connected and communicative knowledge broker, translating between different worlds of academy, community and often also policy or general public. 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. Also, their more positive views of open access publications (James et al., 2009; Nicholas et al., 2015a; Watkinson et al., 2016) also seem to indicate that they are basically more liberal in their professional choices, as long as these do not harm their future prospects. True, the realities of ECR life, as they emerge from the literature, seem to indicate that their conservativeness will persist 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.

8.0 Results

With one hundred and sixteen ECRs from seven countries being interviewed for up to two hours each a large amount of qualitative data (around 170 hours of transcripts) was produced. Add in the extra data that was obtained as a result of returning transcripts to interviewees for comment and clarification, the contextual data obtained from the CVs each ECR furnished, and the project has produced a veritable mountain of qualitative data. It is not just the volume of data that is impressive, there is also its originality as there has been no major study like it in recent times.

Because of its qualitative nature the evidence presented is rich in depth, detail, explanation and diversity and, as such, not suitable for statistical analysis at this stage. Therefore, we have been careful about generalizing and cumulating the data, and expressing results in percentages, which would give data more precision than deserved. There is also another reason for being careful - preliminary analysis shows sizeable differences between the national results and hence we have often expressed findings in terms of country consensus. Given that the UK and US accounted for well over 40% of ECRs and that there are many similarities between the two countries, this meant we had a reasonably large and homogenous sub-set about which we could generalize and, as a consequence, we have undertaken more analyses with the UK/US dataset.

Designed as a longitudinal study, with the investigation of change at its heart, the full fruits of the project can only be delivered after year-by-year comparisons have been undertaken, two years down the line. Unless you are going to second-guess change (as so many studies do), this is the only way you can make robust statements about change. The first year findings, then, lay down the foundation stones for the full study, providing a framework, an overview, snapshots and highlights of the first year's data. It identifies areas where there is consensus, differences and opportunities for generalizing the data and identifies topics to watch.

This report is part of a family of reports, and the other reports should be consulted for more detail, specifically:

- a) Harbinger Working Report 2, which provides the results of a hypotheses test for each partner country. It identifies which of the two dozen hypotheses driving the study were confirmed and obtained the greatest consensus.
- b) Harbinger Working Report 3, which provides the results of a canvas of the partner countries regarding their main findings. The interview team were asked what they considered to be the main findings for their countries and then once we had these, they were presented to the whole group to see if they obtained wider support.

The results of the seven national studies will be made available in autumn 2016 available as Harbinger Working Report 4 and entered on a database in order to make year by year analyses should the project proceed to the second stage.

The report focuses on 16 key areas of scholarly communication: 1) Careers and job ambitions; 2) Characteristics of scholarly communication behaviour, featuring an in-depth investigation of authorship and publishing; 3) Peer review; 4) Open access; 5) Social media and online communities; 6) Discovering/finding publications/information; 7) Smartphones; 8) Open science; 9) Sharing and collaboration; 10) Reputation and assessment; 11) Metrics; 12) Impact; 13) Role of publishers and libraries; 14) Transformations; 15) National comparisons; 16) Diversity.

8.1 Careers and job ambitions

Most ECRs are driven by their own subject interests. They regard an academic life as their ambition and are wholly focused upon becoming tenured academics. At the same time, they complain about low income, low status jobs and heavy burdens. In spite of their complaints, no one really wants to quit. The strong impression conveyed is that they love research; indeed, they openly profess this. Money is clearly not as important as reputation and prestige. For Chinese and Spanish ECRs, flexibility of working is a big attraction, too. Freedom to develop their career, albeit one without security, is another attraction for many researchers. While Malaysian ECRs complain that they are forced to think about survival and building academic reputation, instead of focusing on contributing to knowledge/science, for them meaningful progress in research, nevertheless, has to come from people who care about science rather than those who care about success in their careers.

Generally, UK and US doctoral students want to get a job in academe and most post docs nearing the end of their time want to get tenure ideally, but they are all very realistic and even the best see that they might have to spend time in industry. There are, of course, some who are in industry already and mostly they want to continue in industry. Most believe that a PhD is a passport to job mobility, although for Chinese researchers, a PhD is not sufficient to start an academic career, a post-doc or overseas degree is also needed. There is evidence, too, that not only is there is a high bar to getting an ECR job in China (and elsewhere), but that bar is getting higher. Thus, top universities in China recruit people with internationally top university doctorates. Although evaluation policies are thought to be relatively fair and generally clear, ECRs believe that the standards are challengingly high and it is difficult to meet the requirements.

There is a belief among ECRs that their future is very dependent on the importance of the research group to which they belong. It is widely felt that there are no differences between genders in the way they see career progression, although Chinese female ECRs appear to be driven more by pure subject interest than their male, promotion-driven counterparts. This is a topic we shall return to.

Seven hypotheses were tested in respect to careers. In order of strength of agreement, they were:

- *The environment in which they work is precarious.* This was conclusively and universally agreed on. There are, then, few doubts that the ECR environment is precarious.

- *ECRs do many jobs for short periods of time.* This hypothesis was confirmed or partly confirmed by ECRs in most countries, with the exception of the UK and Malaysia.
- *ECRs are not very happy with their lot as research ‘apprentices’ or ‘slaves’.* This hypothesis was widely supported, with only Malaysian and American ECRs not supporting it. Spanish ECRs, for instance, see themselves as scholarly slaves and that their status will only change if more positions for young researchers are offered, which, in turn, hinges on a sorely needed increase in research investment.
- *ECRs have little personal freedom and security.* There is a general feeling that ECRs have plenty of personal freedom in regard to career development, but no security. Hence, five countries partly confirmed the hypothesis. The one country that made an unqualified confirmation, Spain, is a place where conditions are particularly precarious.
- *ECRs do many things on a project (multi-taskers).* This was confirmed by just over half the (four) countries with the exceptions being the UK, US and Malaysia.
- *There is a big drop-out rate among ECRs.* This hypothesis obtained a relatively low level of agreement, with only China and France the exceptions. This supports the earlier finding that ECRs are very committed to their jobs and will do anything to keep it.
- *Getting a good job is the major motivation, not changing the world/science.* Five countries either confirmed or partly confirmed the hypothesis, which probably is a reflection on ECRs precarious positions. China and the UK rejected the hypothesis.

Malaysian ECRs are very much the odd ones out and this can be partly ascribed to the fact that they tend to be older and operate in a much more stable environment.

8.2 Characteristics of scholarly communication behaviour

8.2.1 ECRs as followers

The literature review found that ECRs follow the scholarly practices of their mentors and seniors and we ran with this as a hypothesis. However, we only found this to be partly the case, with just two countries (Poland and the USA) fully confirming the practice. It is said of Polish ECRs that they have great respect for their seniors and their practices and so follow them. Regarding the US, while not all ECRs knew about the scholarly communication practices of their mentors, advisors and supervisors, their assumption is that the practices of their senior counterparts are much the same as their own, except, possibly, in regard to social media and sharing, something which we shall return to later. In France, as in a number of countries, the situation is much more nuanced than this, with ‘colleagues’ who have equal CVs, age and standing, but who are tenured and fulfill supervisor roles or serve as members of recruitment commissions, being a big influence. China is at the other extreme, with ECRs believing that while the groups which they used to work for had a great influence on their current work and determined their research orientation, in general they did not adopt the practices of their mentors in scholarly communication.

However, another hypothesis tested, that *ECRs toe the line (do what they are told)* when it comes to publishing, obtained more universal agreement, being either fully supported or partly supported by seven countries. We can probably ascribe the more widespread support obtained by this hypothesis compared to the previously cited one that *ECRs adopt the practices of their mentors and heads of groups to which they belong* to the fact that there is less room for manoeuvre when it comes to the critical task of publishing.

8.2.2 Paper-driven behaviour

Publishing and citing are almost exclusively focused on journal articles. Reading, albeit still dominated by papers, is somewhat less prescribed with more than a dozen types of material mentioned, including social media and policy documents. Dissemination is also less paper-centric with conferences vying for popularity and social media and online communities also being frequently mentioned. Conferences do count more in certain disciplines, such as Computer Science and Physics, but even here papers are still very much king. This is all simply explained by the method by which ECRs are evaluated, which focuses largely on publishing in journals.

8.2.3 Publishing and authorship practices

The funders (PRC) requested us to pay special attention to the journal choices ECRs make when publishing their research. Clearly this is a topic very close to publishers' hearts and economic health, and if there are any changes in practices this might challenge publishers the most, and they naturally would want to be the first ones to know. The question was not addressed directly, instead information was pieced together from a number of related questions. Most of the questions used came from Section 5 (Authorship) of the interview schedule, but data have also been sourced from elsewhere in the interview schedule. The CV too has been invaluable here, especially because ECRs, understandably because that is how they are judged, tend to exaggerate their independence and reputation as authors.

The topic is complicated by the fact that ECRs do not have an unfettered choice, because they are not always the main author and/or corresponding author, are boxed in by assessment procedures that strongly favour publishing in high impact factor journals and influenced by other members of the group to which they belong and, of course, their supervisors/mentors. The quest for authorship data makes the assumption that ECRs publish in journals and that this is their main method for disseminating research results; this, as we have heard, is indeed mainly, if not exclusively, true. Thus, taking our ECR sample, they published an impressive

1,178 journal articles. There are big variations between individual ECRs and countries (see Table 6), with a few individuals publishing more than 50, but most publishing more than eight articles (and double that in the case of Malaysia). The relatively low numbers reported for Polish ECRs is explained by the fact that monograph publishing is popular and equally rewarded. Therefore, overall, the hypothesis that *ECRs are not very productive (in terms of publications)* was not proven.

Table 6: Number of articles published by ECRs

No. of articles	China	France	Malaysia	Poland	Spain	UK	USA
0 – 5	5	8	3	6	5	10	11
6 – 10	4	5	3	2	5	3	10
11 – 15	3	1	2	2	2	5	4
16+	1	-	4	-	6	3	3
Total no. of articles	107	133	193	48	248	191	258
No. of articles per ECR	8.2	9.5	16.1	4.8	13.8	9.1	8.9

ECRs' publishing practices are also constrained by the fact that in a number of countries they have to refer to lists of acceptable journals. A case in point is Poland, where ECRs are formally directed towards a Government list and appear to have limited room for manoeuvre. This is the case too in China, France, Malaysia and Spain, but their lists tend to be the proprietary ones, such as the journals indexed by the Web of Science. In the UK/US ECRs appear to have more freedom, but that is still only relative. Of course, our prime interest is to see if this is all changing and we shall not know that until we question the ECRs again, the next year and the year after.

Overall, the findings point to the possibility that ECRs are even more driven to publish in highly ranked JIF journals because of their precarious positions and the belief that it is this that leads to career advancement and security.

8.2.3.1 ECRs as first authors

It seems, perhaps surprisingly, that for ECRs to be first author is, on the whole, not that difficult. It is normal for them to be first author on any scholarly outputs, including papers, based on their dissertation. Most Principal Investigators (PIs) allow postdocs to be first authors when they are the ones who have undertaken most of the research behind a paper. Some postdocs have experience derived from their past work, which may be a technique or an area of expertise that provides them with knowledge of journals in a particular field and puts them in a good position to choose. They make the decisions, but it very much “depends on the subject”. There are other special circumstances – “I decide where to submit, except where a special issue is involved”. It can also depend on country and China is an interesting and complex case. Thus, in China, most universities acknowledge that graduate students/postdocs/PhD candidates can be first authors, but only if they put their supervisors' name before theirs. So, ECRs might be the first author who did the main research, but their name is placed second. In most cases, ECRs will do this to please their mentors or to make the paper easier to be accepted because their mentors are more influential and well known, thus will help them to get published.

Table 7 shows that ECRs are, typically, first author in around one-third to one-half of all the papers to which they contribute, but it can vary between 0 - 100%. In France the proportion is generally at the higher end. While ECRs are first author in the cases where they do the most work on an article they do not have the main choice as to where to publish as that decision is very much that of their supervisor or head of research team. French ECRs appear not to mind, as they see their mentors/supervisors helping them to publish in top journals, and mainly as a first author. Indeed, they regard the practice as a kind of “help” that may compensate for the fact that there is no other special treatment from the institution regarding their precarious situation in the university.

Table 7: First author and main choice

	CH	FR	ML	PO	SP	UK	US
% as first author for all papers contributed to	26-50%	51-75%	26-50%	26-50%	26-50%	26-75%	26-50%
Journal choice for papers mainly responsible for	Yes	No	Yes	Yes	Yes	Yes	Yes

ECRs have problems with co-authorship, sometimes serious ones, concerning uncongenial practices. Interviewers from five of the seven countries felt this to be the case. France and Poland, where practices are well defined, are the odd ones out. In China there are particular co-authorship difficulties, with sharing credit among authors being a particularly thorny problem in domestic collaborations. This is because many Chinese ECRs want to be the first author, or the corresponding author, so that their work can be recognized by their institutes and funders.

8.2.3.2 Journal selection in the hands of ECRs?

In order to provide more details on whose choice it really is when it comes to where to publish, the criteria are used in selection and whether ECRs have a publishing strategy, we shall concentrate especially on the UK/USA data. This is because of the large numbers of ECRs that come from these countries (43% of all ECRs) and because their similarities provide us with a relatively homogeneous group, so that it is easier to make generalizations. The question was asked: *What influence (if any) have you had on the choice of journal?* In the UK one ECR did not answer the question in a relevant way and in the USA one interviewee had nothing to say as they are only just writing their first paper, so our evidence refers to 20 and 27 ECRs, respectively. An important determinant as to how ECRs answered the question is whether they are part of a group or not and for the great majority in the USA and the majority in the UK ECRs are party to group decisions. In the group they do have some influence, which seems to vary a great deal, on what journal they submit to in the first place and how they choose the backup, although we have less evidence on the backup. Where ECRs are not in a group, for example in the case of many social scientists, they do make decisions on

their own, but not always as there are supervisors and mentors to consult. In the case of multidisciplinary research, the choice goes more to the person in whose discipline they wish to publish the research.

A large group of ECRs in both countries do claim to have considerable influence on a decision where to submit: 25% in the UK and 30% in the US. At the other end of the scale, a quarter of UK ECRs say they have very little influence and the same is true for US ECRs. Around the same proportion are ECRs who have some influence, but (for example) the PI always decides: the figures are 30% in the UK and 30% in the US. This all looks very definite, but in practice there is a continuum and the judgements made by the interviewer are of necessity subjective. It is also difficult to disentangle the influence in group decisions, even when they are the first author (much greater influence), rather more so when they are just one of the authors. A UK zoologist told us, "Always take advice from people who know best, even when first author". The above statistics are based on the ECRs who said they were first author.

8.2.3.3 Criteria for selection

When making a selection, are ECRs opting for impact factor, prestige or the same, trustworthy journals? Impact factor is, by far, mentioned the most and seemingly this is set in stone. However, it is not as simple as that, because there always has to be a plan B if the research cannot get published in top journals, for whatever reason, and a plan for papers which are already acknowledged as being less important (and there are always plenty of these). In fact, there is often a tension between a wish to get into the very top journal and the need to be more pragmatic. Even in prestigious research groups, ECRs are only expected, for instance, to publish one paper out of every three or four in a top journal. Much of the research, therefore, inevitably goes to less important journals. Many ECRs emphasize that it is the research itself and what it tells us that is important and not any one publication.

Some research groups in the UK and US (China and Spain as well) try to get into the top ranked journals and then go down the ranked list if rejected, which as they commonly point out leads to delays and this is bad for the all-important career progression and getting new jobs. Sometimes, too, as many of them note, there is a trade-off between importance and speed, but this is in the case of the social sciences – in economics, for example, it is not so important.

Other criteria (and possible plan Bs) mentioned are: good chances of acceptance, familiar territory, a 'quick journal' and efficient journal. There are a small number of ECRs – less than three in both the US and UK - who think largely in terms of number of publications and a similar small number who (still) aim for second or third rank journals that are just right for their audience. These are people who are, to some extent, out of the rat race and can do what they like. They seem to be happy either to be in a 'service' capacity or to enjoy working in a less demanding environment in a less important university, where teaching is a big component.

It is interesting to find that, for ECRs, ranking in the UK/US Web of Science (WoS) is more important than Scopus (as it is in Poland and China, where Scopus counts very little), but there is not much discussion in the UK or US about this. Certainly not as much as in Malaysia, where Malaysian ECRs in the sciences do not have complaints about the requirement that they have to publish in WoS indexed journals, but social science ECRs do. For both US and UK ECRs in the medical sciences, being indexed by PubMed is quite important.

What about open access (OA) as a criterion used by ECRs when deciding where to publish? This, of course, might very well be a decision imposed on them, although in the US it is only now that funders have begun to adopt mandates, whereas this has been the norm in the UK for a while. Also, universities in the US may have mandates, but these are not very successful on the whole, are more green OA than gold, and they do not have the Research Excellence Framework to deal with. In the UK, 11 (52%) ECRs said they are aware of a policy positive towards OA, usually at university level, and some of these (3) are aware of the need to put papers into institutional repositories as (part of) this policy (one mentioned “green”). However, the unaware group masked a number (6) who are very aware that the funders required OA publishing and two of the others said it did not affect them as they did not have Research Council grants. Two mentioned that “chemists did not like this policy”. Two said that they prefer to publish OA anyway. So, what was the impact on decisions about where to publish? Two mentioned that they publish in 'hybrid' journals as a result. There was mention of group preferences in three responses and they were positive towards OA.

In the USA the picture looks very different with 23 (82%) of the ECRs saying that their university has no policy on open access publishing. There are three 'don't knows', one of whom is at a university with a very well-known positive policy. Here is a quote from someone who is aware of one of these policies, and it represents one of the very small number of mentions of institutional repositories/green OA: “The University has started a Harvard-type system and get copy for the IR”. He personally looks for an OA journal. One also has to bear in mind that maybe 50% of the 23 ECRs, whose universities do not have policies have no views to express under this heading and probably are agnostic towards OA and it does not enter into their decision making process.

Finally, the hypothesis that *ECRs publish in OA journals because they are easier to get into*, posed to ECRs in all countries, was roundly rejected. Clearly, there is a lot less distrust of open access than there once was, which is in line with CIBER findings in 2013 in the Alfred P. Sloan Foundation funded study of trustworthiness in the digital age (Watkinson et al., 2016).

What then of choosing a journal having innovative features, such as video articles (e.g., Jove), to ECRs when placing their research? In the US nine (32%) answered yes when queried about their possible preference for such journals, and 19 (68%) answered no. But at least half are either aware of journals with innovative features, or the concept, or are excited by it. One would expect a proportion of interviewees to be in disciplines where video is not used, so this is an interesting result. Negatives included: “it is the prestige that counts” and “it has to have a good IF” and “I look to balance of readership and IF”, but “too busy” was

really the big excuse. The UK responses are similar, if a little more muted. Six (29%) answered yes and 15 (71%) answered no, but there are positive remarks about innovation among the latter. Several have been asked to produce videos by publishers, but had declined because of lack of time.

8.2.3.4 Publishing strategies

ECRs were asked whether they had a publishing strategy, for instance publishing in high impact factor journals, or whether they operated in an ad hoc way. In the UK only four (19%) denied there is pressure to publish in high impact factor journals and one of them was impelled to explain that he was not “going for low quality”. Of the 17 (81%) agreeing, several (three at least) said the pressure is self-induced. A social scientist stated that the “balance between high IF and high readership worried her”, an assistant professor on tenure track in an applied science department worried that IF was becoming more important in his research lifetime, and an experienced neuroscientist pointed out that the most important requirement is to get a publication out.

In the US only six (21%) ECRs denied any pressure and this was surprising in view of the wider range of universities involved. One who answered 'no' suggested that you did not need any publications to get a doctorate in her current university. Another took a different position: “No, but it is an ego thing and I will go for it anyway”. Some of the 79% (22) who said 'yes' were keen to make the same point. Pressure was self-induced. “I have to, in order to get a job. I do the pressure” was a typical reply. Others said that the pressure is not strong and might even be described as encouragement. One post-doctoral made the point that the big pressure is to get funding.

8.2.3.5 Experiences other countries

China

As a matter of course, Chinese ECRs check if the journal is indexed in SCI, SSCI, A&HCI, and EI, or Chinese indexes, such as CSSCI and CSCI. ECRs need to reach the particular requirements of the institutes, which are very demanding, so the standing and rank of the journal is very important. Lists and indexes are very important. Second, they will determine whether the journal is related to their research field and within this they generally prefer journals which are really specific to their “small field”. Such journals bring their research to their target audience, so that they can make maximum impact. However, having said all this, a few do opt for the top journal with highest JIF and a big rejection rate (this is a desirable factor), because they want to “challenge” themselves or, maybe, the system. Third, they consider a range of other factors, such as processing duration, the journal's broader reputation in academia and publishing cost (OA publishing fee, for instance).

Chinese ECRs do have a clear, fixed publishing stratagem. Most will follow the steps listed above, some will opt for the top journals and, if they get rejected, they will submit to the second ranked ones. One even said that they will study the journals before writing, as long as

they have the "target journal", they will "tailor" their paper for that particular journal.

France

French ECRs are very pragmatic when it comes to making their journal choices. Whether it is their choice or that of their supervisors, they select the journal to which they publish on the basis of relevance to the topic and its IF. Thus, within the group of the most relevant journals to their research topic, ECRs try to target the journal with the highest IF. In some cases, the fact that a journal is ranked in the first quartile (WoS) is an important criterion for ECRs, their supervisors and head of department.

When the choice of a journal is the result of a discussion, the consensus between the ECRs, the supervisors and head of department is based on the appropriate IF level (not too high, not too low). However, in the case of articles having the name of the ECR as first author, the "high" IF argument takes prominence as it improves their chances of getting a job. Four ECRs also mentioned that, when choosing a top ranked journal, they factored into account how likely they were to be accepted. Above all they do not want to waste time as it is a commodity they do not have in abundance. Rejections waste valuable time (but not, interestingly, for Chinese ECRs who said rejections produce valuable advice). The name of the publisher, the editor in chief, the open access policy (embargos) or any other criteria do not seem to play any role in the selection process.

It is interesting to note that publishing in "indexed journals", an important reputational requisite, is implicitly understood as indexed in Web of Science, which has a unique reputational position in France, especially for evaluators. A journal indexed in Scopus (and not indexed in WoS) is less highly regarded, or not considered at all (as in the case of Physics).

Malaysia

Malaysian ECRs are unanimous in stating that they first choose journals on the basis of their relevance to their research field and this, probably, can be taken as true for all ECRs everywhere, even if not made implicit. Three quarters of ECRs say this. After that, interestingly, comes choosing multidisciplinary journals related to their discipline (nearly half say that). Then, in order of popularity, come such factors as: IF journals (Web of Science); journals listed by Scopus; journals with no page charges or submission fees; journals with an early view online function (a sure sign of rapid publication); journals approved by the university and the Ministry; and journals that review quickly. As ECRs progress through their academic career, attitudes towards dissemination change. In the case of Malaysian ECRs, this means they are even more occupied with journal quality and publishing impact. Nothing new here, but they have also to adopt a more open approach to disseminate their research works on social media platforms and in digital repositories.

Poland

In Poland things are highly prescribed and seemingly routine. Firstly, and most importantly, ECRs take account of the List provided by the Ministry of Higher Education, which is updated

annually. The List comprises three parts: part A (the best journals, with JIFs and indexed by WoS, mostly international), part B (mainly Polish journals which do not have an IF, but have a Polish score/points) and part C (Polish and international journals without JIFs, but with Polish scores). List A is the best, then C and last of all is B. The list is very important, not only for individual researchers, but for the universities/departments as well. Every year the sum of points for every university is counted and grants are provided according to this sum of points. After the list the relevance to the topic and appropriate audience is a consideration.

It is also worth pointing out that in Poland books and book chapters contribute towards official point scores and can attract similar points as publishing in List B journals.

Spain

As with their Chinese, Malaysian and Polish counterparts, Spanish ECRs will conduct an authentication check of the rankings and whether the journal is indexed in WoS or Scopus, but mainly WoS. They will look for journals in the first or second JCR Quartile. Metrics are the main criteria in determining where to publish. They choose top ranked journals and if their work is not accepted by the first choice in the time honoured way they will try another top title and so on until the article finally finds its level. They know that the publishing process can be a long one, but they prefer to try more than one high impact journal before going down in the list. They also try to select the journal more closely related to their research field. As in China, Spanish ECRs prefer specialist journals because such journals will bring their research to their target audience. The quality of reviews and the duration of the publication process are two other factors to take into account. A few say that if they had the funding, they would choose OA journals, but few do.

8.3 Peer review

The majority of ECRs have experience of being reviewed and being a reviewer, although just 30% in Poland and as we shall see this impacts on their opinion of peer review. The question asked, which was deliberately probing, was: *Do you feel that peer review for most journals is in the hands of established researchers who are not always sympathetic to new ideas?* It transpired that ECRs appear positive about peer reviewing, although not without reservation, and the majority have good experiences in responding to peer review, even though it could be a long and painful experience. However, beyond the general warm feeling towards peer review, attitudes to it are complex. There tends to be a continuum of responses to peer review questions from positive, positive with qualifications, negative with qualifications and completely negative, with most in the middle. Some ECRs did feel that established researchers are not always receptive. They usually said other people they knew had had bad experiences and only some of them had had such experiences themselves or thought that this was the reason for a rejection. Regarding the latter some ECRs suggested that it is more difficult to get papers published (in top journals) if you are not established or in an established and well known group. US researchers were more likely to believe this might be the case. Overall, though, there is not a lot of evidence to support the hypothesis that ECRs

feel alienated/locked out by the existing peer review system, which they think of as a closed club. Thus, four countries rejected the hypothesis and the rest only partly confirmed it.

Those that have undertaken peer reviewing are the most positive about the process and that is very much the case with French ECRs. Among the positives, the most important are said to be: a) it improves the quality of a paper; b) it stops them being sloppy. The few negative ones tend to focus on: a) Editors. They are thought to have too much power and they do not control bad/biased reviewers sufficiently. ECRs have suggestions for improvement, but fundamentally, are fairly satisfied with peer review. This was found to be the case in all seven participating countries; b) Reviewers. There are complaints that peer review falls down in respect to reviewer selection; frequently they are thought not to be specialists in the paper subject (this was the case for four countries).

French ECRs, mainly bio-scientists, were very specific regarding their criticisms of editors and reviewers. They said:

- It is hard to publish an original research; new ideas are not appreciated by reviewers.
- There are too many authors and too few experts who can handle the reviewing process.
- There are too many articles for the reviewers to deal with, who therefore do not spend enough time on the reviewing process. As a result, they do not really do the job well and do not always provide evidence for rejection.
- The process gets dumbed down by the peer reviewers, who ask ECRs and PhD students to do the job, because they do not have enough time to do it themselves.
- Reviewers are the competitors and colleagues, which can introduce an unfair personal element to the process.
- There needs to be more turnover of reviewers in order to reduce their influence.

Suggestions for improving peer review, which had reasonably widespread support (from ECRs in four countries) include: authors and reviewers should be in contact to solve doubts or misunderstandings during the process and reviewers should be identified. A Spanish ECR even wanted to know the name of reviewers when the process was completed and a Polish ECR suggesting having three reviewers, which is not uncommon. There is universal support for double blind peer review, with all countries supporting the hypothesis that *ECRs prefer double blind peer review because it provides fairer appraisal*, but with the proviso that it should be properly blind. The latter would prove difficult to achieve in Poland because in very narrow specializations all experts/reviewers' names are well known.

In the scholarly world much is currently claimed of open peer review with advocates arguing, for instance, that: "by adopting a more transparent process of research evaluation, we move one step closer towards a fairer and democratic research process" (Tennant, 2016). What then do our ECRs think of a process that appears to deal with some of their concerns? The question put to them was: *would you like all peer review to be open?* In fact, it turned out that they are not sure because there seems to be a conflict for them. They believe that

transparency is a good thing, but that it does not work in practice. Thus, of the UK ECRs, just 10 out of the 18 who answered the question said they would like all peer review to be open; this compared to just eight out of 23 for US ECRs. Their specific criticisms reflect the uncertainty: 'too risky', 'more of a worry for ECRs but OK for seniors', 'unwanted effects', 'dangerous' and 'it would be more difficult to reject'. In general, French ECRs are also very suspicious of anything labeled as 'open' or transparent. Ironically, the European Commission want to move scholars further down this road.

No surprise, then, that the hypothesis *Early career researchers are worried by too much transparency in peer review because it will make it difficult for them to criticise the submissions of their seniors* did not obtain universal support. Views are very much split on open peer review, with ECRs in three countries in support (UK, US and France), three not confirming and one only partly confirming.

Researchers were also asked whether publishers, the present incumbents, should organize peer review. In the case of the UK, nearly three quarters of ECRs said they should do it, although some not with a great deal of conviction. There was a sense that there really is no alternative and, as one researcher said, "publishers are independent".

Finally, while writing this report, a PRC funded report was published on peer review (Publishing Research Consortium, 2016), so we have taken the opportunity to compare our results with those of the report. The report covers all researchers and not just ECRs, and although around a quarter of respondents were aged 35 or less, the data have not been cut by age. Nevertheless, the general results are very similar to ours, with around two-thirds saying they are satisfied with peer review and three quarters saying it improved the quality of the paper. It might be profitable to identify ECRs in the PRC survey and then enhance the analysis with data in this report to provide something really substantial.

8.4 Open access

Open access has been discussed already in terms of publishing and we discuss it in broader terms here. OA is generally understood by ECRs to be gold open access. The green route is not really considered, or confused with social media depositing (on ResearchGate, for instance). Gold open access is universally thought to be a good thing, but this is not argued by ECRs with any real passion or commitment. There is some disquiet among Spanish ECRs that OA is making the playing field uneven between those researchers that have access to funds that can pay for it and those that do not. This is a good point that needs further investigation.

Archiving their research work in repositories is a non-priority for ECRs, they see this as the job for librarians or research administration officers. Researchers from every country agree on this. There is a general absence of knowledge of and interest in repositories, to the extent that a significant number do not even know if their institution has an institutional repository. Depositing is not undertaken with any warmth, it is considered obligatory. Spanish ECRs are especially not committed to archiving their research output.

8.5 Social media and online communities

All countries reported that their ECRs do not cite social media or release their research findings or data on social media. However, they do use social media for communication and findings and passing information around. The case of UK ECRs is illustrative, where social media are widely used for finding information, with all 20 researchers who answered the question saying they did so. ResearchGate (14 mentions) and Twitter (8) are clearly the tools of choice and they come into their own when looking for difficult to find things, and the all-important serendipity.

Except in the case of China, ECRs use online communities passively and mainly ResearchGate. Many talked about sharing and most knew about and are at least registered on ResearchGate, but few used its sharing or collaborative mechanisms. Obtaining PDFs and connecting with their colleagues are the main activities undertaken by ECRs on social network platforms.

There are, though, signs that there could be changes in the pipeline. Thus, in the UK/US, where although by no means all researchers used social media in their scholarly communications, a lot of them did. However, those who did not often felt that they should make more use of the opportunities presented and might do so in the future. Significantly, the drive to use social media, especially to reach practitioners and policy makers, appears to be coming from university management, marketing departments and, less so, their senior colleagues. Spanish and to a certain extent British ECRs consider outreach and dissemination to industry and society as very important scholarly activities, but do not have enough time to do as much as they would like. They would like to increase their presence in scholarly social media as a means to achieve this aim.

Because of the hype (and promise) associated with the topic, four hypotheses powered the social media analysis:

1) *ECRs would like to use social media more, but traditional norms that dominate scholarly behaviour prevent them from doing so.* Evidence from five of the seven countries confirmed or partly confirmed this. The hypothesis was unsupported in France and the UK, although in the case of the latter, as we have heard, researchers are being encouraged by their universities, mainly for outreach and showcasing purposes, with what seems to be a growing impact.

2) *ECRs do not see social media as being scholarly 'noise', but useful for research purposes.* Countries were split about this, with China, Malaysia and Spain believing this to be true.

3) *Social scientists are more favourable towards the scholarly use of social media.* There is very little support for this hypothesis, with just Spain partly confirming it. So social scientists, despite having (potentially) more degrees of freedom than their scientific counterparts, do not favour social media more than their scientific colleagues.

4) *ECRs are detached from institutions and more closely networked/connected with their peers.* This is thought to be an impact of online communities and something ResearchGate encourages. It received a reasonable amount of support, with just two countries (UK and USA)

not supporting it wholly or partially. Maybe the US/UK ECRs are better connected and online communities actually provide a real advantage to other countries where international connections are not so easily established and, hence, are more prized.

As already mentioned, more information on social media and online communities can be found in the Sharing and Collaboration and Metrics sections.

8.6 Discovering/finding publications/information

Google Scholar (GS) holds a virtual monopoly for finding scholarly content. In all countries bar China, GS is very much the tool of first choice. For instance, in the case of Malaysia 11 out of the 12 ECRs interviewed rated it first as a discovery tool. Library-based and publisher systems very much take a back seat. It would be the same, too, for China, but there GS has been blocked by Government authorities and so a whole variety of databases have to be used instead - PubMed, WoS, CNKI and Baidu, for instance. However, even so, 10 out of the 13 Chinese ECRs find ways of accessing GS, via a proxy server, for instance. Established just over a decade ago, GS has moved from being a figure of ridicule to a dominant and respected member of the scholarly communications community. It has transformed the discovery (and reputational) landscape and is certainly a change agent to watch in the next decade.

8.7 Smartphones

Of course, smartphones are associated with the social media, and like the rest of the population most ECRs (but not in Poland) have smartphones, too. However, with the exception of the Chinese ECRs, they tend to use smartphones only occasionally for scholarly purposes. And Polish ECRs not at all. In the case of the Chinese, smartphones are widely used for scholarly communication purposes, but not for reading papers (“the screen is small and marking them up is difficult”). Malaysian ECRs' main use of smartphones is for finding and checking information on the Internet, and only a small number acknowledge using it for scholarly reading and note-taking. ECRs in other countries said that they read mainly on computer screens, but hardly ever in print or on smartphones. United States and UK ECRs do use smartphones when away from their desk. Thus, a majority of UK ECRs (12) used them in this way, but only occasionally, for alerts, while travelling and at conferences. Generally, smartphones are not talked about with any passion and certainly not with the devotion that they get in personal and social environments. So, only a little impact here from this technology, but we need to monitor this activity closely as research published elsewhere indicates that smartphones are increasingly used in an academic sense for reading purposes (Halevi et al., 2015) and most frequently used for checking social networking sites (Madhusudhan, 2015), and we know from our research that ECRs are using these sites.

8.8 Open science

In the information science community there is much talk about the open agenda, which is sponsored by the EU and UNESCO inter alia. Despite this, and the associated hype and promotion surrounding the topic, ECRs displayed hardly any understanding (or interest) of open science, Web 2.0 et al. whatsoever. Not surprisingly, then, ECRs have few opinions on the topic, and those who ventured some tend not to be very well informed. It was not just the case of them not understanding the topic because of the confusing nomenclature, for even after prompting ECRs with examples they offered little on the topic. ECRs are clearly not harbingers in this regard. Take, for instance, Chinese ECRs: eight of the 13 stated that they had never heard about open access and nine of them clearly said that they knew nothing about open science or Science 2.0. It was the same with British ECRs, with just three out of the 21 showing any understanding of or interest in the topic.

Even the few ECRs who have thoughts about scholarly transformation are more interested in the sort of "pain free publishing" that *eLife* promises (<https://elifesciences.org/about>), because they are preoccupied with publications. Having said that, the related question about open data and software (components of open science) did stir some interest among UK/US researchers. They are keen on obtaining credit for such activities, but not quite so interested in sharing data (an important element of the open technologies), because they want to exploit the data they have gathered and not give it away.

The open agenda includes blogs as non-traditional scholarly outputs, but no one, certainly in the UK/US, are really interested in blogs as an alternative to publications. This is probably unlikely to change because the current evaluation system does not recognize non-scholarly outputs.

For those few French ECRs who knew a little about the open concept, they see it also as a new means of imposing control and evaluation. It is seen more as a constraint, something you rarely hear mentioned elsewhere.

8.9 Sharing and collaboration

Sharing and collaborating, in theory easier to do now with the emergence of social media and online communities, are highly thought-of activities, which are expected to power science. Researchers were, thus, asked in what ways they share: a) ideas and interim research results; b) research findings, data and publications. We shall first look mainly at what UK and US ECRs said. As just two US ECRs said they do not share ideas and interim data, and one ECR clearly misunderstood the question, it seems that 25 (89%) do share such information. In the UK there are also only two ECRs who do not share, and 19 (90%) who do. In the USA 13 (52%) of the 89% share at internal meetings, workshops or team talks. In the UK only five (26%) mentioned internal sharing (maybe it is just assumed by others and the figure could be higher?). 16% of the US sample who did share, share on their network, as do 21% of the UK sample. This could mean quite a wide network (one mentioned a professional site), or it could be a closed network of friends using email (the latter still being a very

important sharing instrument). It is not certain whether interviewees are talking about sharing among peers to obtain feedback or if are they putting it all out there for purposes of outreach. “Sharing” is much mentioned by ECRs as central to the way they want to live their scholarly lives and, maybe, they are a little conflicted when they have to act by the academic “rules”. Finally, there is sharing of ideas and interim results using social media. Surprisingly, perhaps, only one US interviewee mentioned social media and they did not specify which particular type. Six (31%) UK ECRs mentioned social media and were quite specific mentioning ResearchGate, Academia and LinkedIn, in that order.

Regarding the sharing of research findings, data and publications, many of the interviewees understood the question as referring not to sharing of publications or data, but of findings, so the normal answer tended to be “publications” and “conferences”. Other questions elsewhere, about publishing practices and about dissemination using social media, provided the additional information needed to obtain a better idea of what goes on. Of course, dissemination is a different thing than sharing, but how much it is conflated in ECR minds is something we shall have to probe next time around. All ECRs from both countries did mention publications and conferences and 19% of UK interviewees (4) and 11% of US interviewees (3) appear from the evidence available to abstain from any other form of sharing/dissemination. Some actually said they do not use social media in this regard.

There are interesting differences between US and UK ECRs. Among those using social media in order to inform others about their research outputs in the UK, 58% use Twitter and 52% use ResearchGate. In the USA, 48% use ResearchGate and only 8% Twitter. Numerical totals covering both countries are 21 using ResearchGate and 12 tweeting. The overall numbers using ResearchGate for dissemination could be even higher because in both countries there are other mentions of putting up “profiles”, which is likely to mean the use of ResearchGate. Elsewhere, answers to questions suggest that for many the use of ResearchGate is mainly limited to putting up a profile: very few mentioned “upload” in the context of this question, but maybe they are less likely to admit this given the sponsors of the research project. Other use of profiles to showcase publications etc. refer to using LinkedIn for the purpose. In the UK 29% (5) of those who attempt to draw attention to publications and conference presentations mention LinkedIn, whereas it is not mentioned specifically in the US. In the US, however, 20% (5) mention Facebook in this connection, whereas in the UK only two (12%) did so. In the UK Academia.edu was mentioned twice, but surprisingly (it is US based) not at all in the US. Blogs were mentioned once in the US and twice in the UK. There was also mention of presentations within internal seminars and also among networks. Presumably, there are more dissemination of links, at least, than is mentioned – probably, it was just assumed. It is also not clear what the mention of networks really meant – closed or open? In the UK there is only one mention of outreach in this context, and that is a negative one, which is rather surprising in view of the REF. In the US, a couple of interviewees mentioned “outreach” and a third, who also mentioned outreach, qualified it by pointing out that there is no encouragement to do this. One US interviewee mentioned that making research available meant only after publication – “as she had been trained to do” - but what she is

making available was not clear? No one suggested that they might be pointing to versions available in repositories.

What then of collaboration? It is difficult to be sure because ECRs portray a mixed and confused picture, just the kind of picture you get when evaluating a disruptive technology. As has already been noted, there is not much collaboration conducted through social media and online communities. As far as we can tell, and although almost all UK/US ECRs have their networks with whom they interact outside their groups, there does not seem to be much evidence of formal research collaboration. It is rather piecemeal help among friends, 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. Thus, a majority of UK ECRs (12) think that there is a benefit here, with ResearchGate and LinkedIn the tools of choice. Social media particularly seem to work, too, for Chinese and Malaysian researchers, in accelerating academic collaboration, but then on the other hand not for French researchers. French ECRs spend little time using social media and do not think that it can bring them anything other than more (digital) visibility on the Web, which of course is important in itself. Spanish ECRs are not committed to building reputation through sharing papers on social media and academic social network.

The hypotheses to test in the context of collaboration were:

a) *Early career researchers share and collaborate extensively even at the risk of losing their competitive edge.* There is not much of a consensus here, with just one country, France, confirming that this is, indeed, the case and three other countries partially confirming it. For French ECRs, despite eschewing social media for this purpose, collaboration is clearly king. Besides publications, collaboration is a constant objective. ECRs' strategies for getting a job and publishing more and better papers rely on collaboration. Conferences and meetings are key moments, dedicated to searching for collaborations. ECRs believe that they can be hired for their CV, but also for the potential of their collaborations.

b) *ECRs make use of social networking sites in order to build up their own networks, separate from the networks already established by the research groups they work in or the connections of their mentors.* Generally, there is very little support for this, although matters are probably in too much a state of flux to be really sure. Just one country (Malaysia) supported it and it pays to look at the situation in this country to see what we can learn. In Malaysia, ECR scientists (not social scientists) are said to be more familiar with academic social networks and share their research data on them. While invisible colleges, in the form of discussion forums (online) and meetings (face-to-face), are still mostly used for the sharing of ideas and collaborating, online communities are making their mark. International collaboration through academic social networking sites, such as ResearchGate, Mendeley and Academia.edu, is thought by Malaysian ECRs to be a feasible and effective means to address important research challenges, by increasing opportunities for professional support and networking, problem- solving, discussion of data, and ultimately publishing. ECRs believe that their sharing/collaborating behaviour is different from that of their research mentors in

current and previous jobs. They feel that their behaviour with respect to sharing/collaborating is changing, as they have become more experienced. Real-time, open, collaborative science tools, however, such as ThinkLab and F1000Workspace, were mentioned by only one ECR. All the Malaysian ECRs have no fears of losing their competitive edge through sharing and collaborating extensively.

8.10 Reputation and assessment

Almost all early career researchers recognize that publications are essential research outputs in order to climb the academic career ladder. Everything we have heard so far confirms this. Nevertheless, ECRs do feel they are “slaves”, albeit willing ones, to a publishing-based reputational system. While ECRs believe the system of reputational assessment is imperfect, they find it difficult to think of how to change it for the better, except perhaps by obtaining a more comprehensive evaluation of scholarship and making it less paper-centric. Spanish researchers are particular vocal about this. A minority of researchers, especially from the UK/USA, are also worried that too much pressure to publish in top journals could distort the way research is done, and in doing so could slow down scholarly progress. Although ECRs admit the importance of the social media to facilitate communication and reach out, they rely solely on peer reviewed journals to build their reputation.

From ECRs in five countries there were complaints about differences between the disciplines with regard to the time and difficulty of obtaining results and then publishing them, which they feel puts them at a reputational disadvantage. Some feel this needs to be factored into scholarly reputational assessment, as it does in Malaysia. Data from five countries also provided support for a Spanish finding that ECRs who work in big groups have a reputational advantage.

Periodic evaluations are the norm for ECRs. Take the example of British ECRs, for instance, with 17 out of the 21 researchers being subject to formal evaluation. Evaluations are held typically yearly, half-yearly and termly. Productivity, impact, outreach and presence/reputation are among the factors contributing towards the evaluation of other ECRs. One British researcher is evaluated purely on outputs – published papers and grants won.

There was one hypothesis to test relating to evaluation: *ECRs are ‘slaves’ to a metric-based/journal focused system, which they have to adhere to in order to climb the academic ladder.* As mentioned previously, no country disputed this, although two (France and UK) only partially confirmed it.

8.11 Metrics

Metrics, although not universally liked by ECRs, are thought to be a fundamental element of reputational assessments. Metrics are important because of the highly competitive environment in which ECRs find themselves. After all, in chasing high impact journals ECRs are chasing highly cited ones, a metric that has been with us a very long time and one which is

very much still king. Thus, data from five countries supported a finding first emerging from the study of Polish ECRs, which was that metrics are important because of the assessment system that is embedded in academia – collecting points/scores for publishing in excellent, international journals and other prescribed academic activities. They are a necessity, although not quite so much in the UK and US, where systems are less prescriptive, so far anyway.

Citations (in all their forms) are considered of great value to ECRs in building reputation. There is little discussion about the merits of citations, they are simply regarded as a *fait accompli*. But it is a very different story when it comes to the other (alt) metrics. Despite the fact that many commentators are busy talking-up the prospects of altmetrics (Williams June, 2016), there is not much evidence that they are popular or widely employed by any scholars, never mind ECRs. Our ECRs demonstrated little interest in social media and usage metrics as reputational measurements. There is a little more interest in China and Malaysia, but still not a lot. Thus only four of the 13 Chinese ECRs and three of the 12 Malaysian ECRs knew what altmetrics are about. While altmetrics are not widely used and accepted by either researchers or the university system, ECRs tend to agree that it is a potential new method to evaluate researchers' output and influence. Some of them do check their publications downloads. But nothing, including citations, beats publishing in a good journal for their career, so why bother with altmetrics?

The other barrier for Chinese ECRs to accepting and using altmetrics is the lack of a credible altmetric standard or integrated platform. For instance, nowadays an author can check their book altmetric score on Springerlink, but they cannot compare the score to that of their peers because they have published their book with Sage. As one of the Chinese ECRs said: "if an internationally accepted platform is established, the new metrics, such as usage data, will work."

To conclude, the vast majority of our 100+ researchers, boasting around 1200 publications between them, are at best lukewarm when it comes to altmetrics. Not surprisingly then, the hypothesis which actually acknowledges one of altmetric's alleged reputational attractions: *ECRs are interested more in social media and usage metrics because citations take so long to count*, obtained no support, not even in China.

8.12 Impact

With pressure placed on researchers by the likes of the UK's Research Excellence Framework to demonstrate that their research has an impact, and knowing how important communicating to the public is to policy makers and industry in order to help achieve that impact, it might be expected that impact is an area where things are happening, maybe changing. Thus, the investigation of impact led with the hypothesis that: *ECRs see connecting to a wider audience as being an important [research] impact*. This turned out to be the case, with only China rejecting the hypothesis, Malaysia confirming it fully, and all the other countries partly confirming it.

Looking at the Chinese naysayers first, ECRs there consider scholarly communication to be an essential component part of scientific research, and believe that this communication is mainly academic oriented. Seven out of the 13 ECRs listed “peers” as the most important group that researchers should target, and most said that to publish papers in the top journals in their field is the best way to influence peers. Unlike the research finding released by Springer (Springer Nature Publishing Group, 2015), Chinese participants in our study showed little interest in communicating to the public. Only one participant thought that the public is the most important group that her research should have an impact on, but that could be explained by her field of research, which is strongly application-oriented and public-serving.

Turning to Malaysia, another country in Asia, the very opposite is true. Malaysian ECRs believe that it is important for the research they are involved in to have an impact outside academia. After their academic peers it was felt that their work should impact on, in priority order, the general public, industry and the government (policy makers). The best way to influence the general public is through the social media, industry through meetings and conferences, and the government through the mainstream media.

In Spain ECRs would like to have more time to work more closely with their local community or industry. In other words, in order to obtain ‘real’ impact. Unfortunately, because they are focused on publishing in high impact journals for the sake of their careers, they do not have the time. The same can be said about Polish ECRs.

8.13 Role of libraries and publishers

Most views about “commercial” publishers and about libraries are negative, though not many ECRs had views on particular publishers, and in both cases they demonstrate a lack of understanding of what publishers or libraries do. It is almost as though they see them both as part of an invisible scholarly wallpaper, and not as high profile actors, as they might like to think they are. In respect of publishers, this could be partly explained by the fact that, in the case of the nearly 50 US/UK ECRs, only two had close connections with journal management, such as being members of an editorial board. The others saw journal editors as the key figures who should adopt particular policies, policies that usually reflect their own experiences as a published author. Taken together with the fact that ECRs do not choose where to publish on the basis of the publisher and do not appear to use publisher websites (often preferring free, more visible and open services, such as arXiv.org and ResearchGate), publishers are thus looking a little anonymous. Fortunately, as has already been noted, ECRs are satisfied enough (not necessarily happy) with publishers managing the peer review process. However, ECRs are not so satisfied with learned societies managing peer review, largely because they are not thought to be sufficiently independent.

Libraries are, perhaps, in a much worse place. While publishers might have a brand issue, their journals have no such problems. Libraries have nothing similar to offer, unless you count ‘their’ discovery systems which are hardly ‘theirs’, and they appear equally anonymous to ECRs. Also, making matters worse, institutional repositories in which a lot of

store has been set are not popular, and are certainly hardly searched. As our French colleague said after interviewing 14 ECRs, they simply do not “see” libraries any more. Some of them have not gone to the library for years. Libraries are mainly considered as a place for undergraduates to sit and work and that obviously makes them very expensive assets.

8.14 Transformations

In general, not many ECRs were forthcoming about current and future modes of scholarly communication and most of the ideas we obtained were prosaic in character, such as more sharing, greater access and transparency, better/more open peer review, more credit for non-standard outputs and less metrics. The possible reasons for this are as follows:

- ECRs do not have the time/need to think about transformations because they are overloaded with many responsibilities: research, publications, teaching and administration, as well as the necessity of earning money (five countries supported this view).
- In general, ECRs know the importance and necessity of changing, but due to their humble and lowly positions they believe they cannot impact on the current system. So they adopt a negative or non-plus attitude on short-term change. However, some are positive towards long-term, systemic reform (all seven countries believe this to be the case). Perhaps it is easier to gaze into a distant future?
- New behaviours cannot really take hold while academics are recruited, promoted and obtain funding on the basis of their publication record and citation scores. Four countries felt this was the case and the remaining three did not have enough evidence to say for certain.

However, there are some signs of possible change in the pipeline:

- There are a few ECRs who did have quite innovative although not revolutionary ideas, which may not have been complete but which had the seeds of a new system, although most seem more resigned than positive. See below for instances in connection with US ECRs who seem more forthcoming.
- Those who do not use social media, particularly Twitter and ResearchGate, at the same time regularly used the words "not yet", often accompanied by the word "should".
- There is surprisingly high use of LinkedIn in the UK and USA. Use of LinkedIn, like much of the use of ResearchGate, is to maintain a profile. It is surprising because LinkedIn is usually not thought of as a place where academics go.
- Similarly, the regular use of the words "transparency" and "sharing", as future decision actions, is another small sign, perhaps.
- Many accepted the idea that they might change something when in a position to do so.
- A minor rebellion seems to be in the air over the dominant and overbearing position that highly ranked journals currently possess.

Looking at the issues raised in more detail, a few UK/US ECRs thought that there are accessibility problems, with research locked in lab books or theses which cannot be easily accessed, and that the data that makes it into papers are often presented in the traditional way, which does not enable easy re-use/reproduction.

Some more wider ranging complaints were made about the present system and a minority had ideas to help deal with some of their complaints. Thus, it was said that there are so many papers published each year that it is impossible to keep up with developments in the literature, so maybe it is time to do something about the current preoccupation with this stellar research output. It was argued by a few that it might be better to move towards a system in which more results are made available through data bases (and credit given to Principal Investigators and students for doing this) and figures shown in journals are deposited in searchable databases that allow the data to be used by others. Also, papers that are published in top journals could be adverts/interfaces that bring together larger bodies of research in a useful way that adds value to the data and explains key developments and trends. This would be better than salami slicing key results into separate communications. One ECR gave a very good explanation why all this might not work: "If I were to 'go it alone' and implement such a strategy (give my results and ideas away unrecognized in data bases and only publish a few, longer papers that would be tricky to get into top flight journals) I would not expect to get promoted and it would be difficult to get funding".

French ECRs, though, are very pessimistic about the future, especially regarding the pace required and the pressure to publish in high ranked journals. They do not believe that even open access is going to improve or change the system. They are also worried that creativity and originality have no place any more and that they have to publish even unconsolidated results to stay in the race. They argue for a 'slow' science that will save it from a collapse. They tinker with the rules as best they can and try to incorporate new ways of behaviour in the traditional behavioural set, but they do not see themselves as the generation that will change anything. Harbingers they think they are not.

Few Malaysian ECRs have answers to the various problems they perceive in current modes of scholarly communication, but a few did articulate the foundations of a model, which sees sharing and transparency (not to mention security) at its heart and holds the keys to a better scholarly future. Chinese researchers are not very forthcoming, as they felt that they are not in a position to comment, being too junior for their opinions to be taken into account – a sentiment felt in other countries, too.

Finally, as to the hypothesis being tested in respect to transformations: *The system is unchanging and unbending, but there is little evidence of the desire for change among ECRs.* The only countries that disagreed with the hypothesis – that is, provided plentiful evidence of a desire for change – were the UK and US. US ECRs are vocal in desiring change, with 22 saying so; in the UK 14 are also of this opinion. On the whole the US ECRs are more definite and revolutionary about what changes they require. For instance, one said: "Researchers are fundamentally provoking that change. They are sharing papers illegally and it is changing

the system, like Napster. It is a reality. Journals will have to evolve and change. It is happening now”. Another said: “Currently, there are more ways to communicate with people than has been recorded in our history, so with that we do have an opportunity to change how communication of scholarly works continues”. Others feel that the presence of social media is the tipping point or disrupter. UK researchers usually answer yes or no in regard to change agents, although open access is said to be having traction (see OA section of report for more details), scientific rigour is not being upheld in the new information order, and change will be driven by the funders. However, we have to be careful not to view the use of social media and the wish to publish OA (quite common) as two aspects of an overall wish to transform the system. For example, an ECR who is keen on transformation was hostile to social media.

Overall though, certainly in the case of the UK/US, we seem to have moved on from the situation we found in a previous research project that we conducted a few years ago, which sought to discover whether the digital transition had led to changes in the way academic researchers placed their trust in scholarly communications (Watkinson et al., 2016). There, open comments showed no one had any ideas at all about change, never mind transformation, and those who disliked the present situation just railed against it with no positive intent. Three years later we do find ideas for change, and even some for transformation. Admittedly we are now talking about ECRs, but it is our hypothesis that ECRs might be where transformation may start. Our study shows that at least some researchers, who happen to be ECRs, are thinking about change and transformation and these are not the embittered minority – those who are never going to progress – but some top young researchers.

8.15 Country comparisons

We have referred throughout the report to the specific differences between countries; we now look at similarities and differences in the broad. A correlation analysis of the hypothesis tests shows (Table 8) that: the UK is much like the US; Spain is much like Poland; France is quite like Poland; China is not dissimilar to France and Spain, but does not have much in common with the UK/US. Malaysia is very much the odd one out and a contrarian in relation to France and it is possible that a little of the closeness between the UK and US could be put down to the fact that the same person interviewed them both.

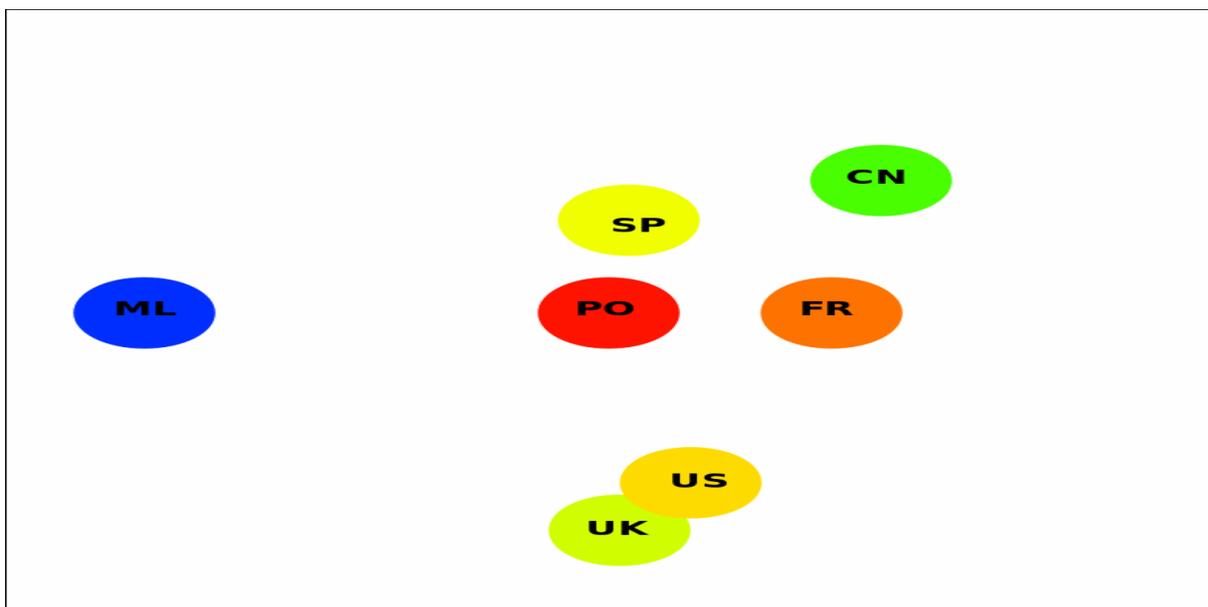
Table 8: Similarities between countries based on hypothesis tests

PO	SP	0.7	Most Alike
UK	US	0.7	
FR	PO	0.6	
CH	SP	0.5	
CH	FR	0.5	
PO	US	0.4	
FR	UK	0.4	
CH	PO	0.4	

FR	US	0.4	
FR	SP	0.4	
SP	US	0.4	
ML	UK	0.4	
PO	UK	0.3	
ML	SP	0.3	
ML	PO	0.3	
SP	UK	0.3	
CH	US	0.2	
ML	US	0.1	
CH	UK	0.1	
CH	ML	0.1	
FR	ML	0.0	Least Alike

As for clusters (Figure 1), there is a UK/US 'special relationship'; EU countries sort-of cluster; but there is no 'Asian' cluster, with China closer to EU than to Malaysia. Perhaps not surprisingly, because of their common language and similar cultures/institutions, UK and US ECRs hold very similar views and are quite different from the other countries, which might be the variations in size and different composition of ECR populations, which will be the subject of further investigation as the project proceeds – see Table 9. However, in the UK in some cases the influence of the Research Excellence Framework (REF) was paramount. Thus, for example, in the UK ECRs are much more likely to be interested in influencing the general public, something encouraged by the REF. The explanations for other country differences could also be partly down to the different profiles of the ECR population in each country and local factors. Thus, in the case of Malaysia, the differences could be put down to the age factor (all their ECRs were in their thirties because of local conditions and the fact that they need to have a PhD first in order to become an ECR).

Figure 1: Country clusters based on hypothesis tests



It is interesting to see that the consensus (positive or negative) regarding the hypotheses tends to derive from the globalized aspects of academia. Thus, the very high degree of agreement obtained for the statement *'New behaviours are not really taking hold, while academics are typically recruited, promoted and obtain funding on the basis of their publication record and citation scores'* is the result of international evaluation policies. The lack of consensus seems to come from the variety and differences of the national environments. Take the statement *'They do many things on a project (multi-taskers)'*. Typically, this a locality issue, it depends on how scientific activity is organized and managed from one country to another, one institution to another. ECRs clearly have to juggle with local and global factors, so their struggle is a difficult one both on the local and global fronts.

Table 9: Country ECR profiles broadly compared

Country	No.	Subject	Gender	Age	PhD	Institutions
China	13	Science: 40% Soc.Sci.:30%	Female: 46% Male:54%	Twenties: 46% Thirties: 54%	8% Doctoral students	6
France	14	Science: 82% Soc.Sci.: 18%	Female: 35% Male: 65%	Twenties: 65% Thirties: 35%	100% Postdocs	4
Malaysia	12	Science: 58% Soc.Sci.: 42%	Female: 50% Male: 50%	Thirties: 100%	100% Postdocs	5
Poland	10	Science: 80% Soc.Sci.: 20%	Female: 40% Male: 60%	Twenties: 40%: Thirties: 60%:	50% Doctoral students	1
Spain	18	Science: 78% Soc.Sci.: 22%	Female: 44% Male: 56%	Twenties: 40% Thirties: 60%	28% Doctoral students	16
UK	21	Science: 62% Soc.Sci.: 38%	Female: 38% Male: 62%	Twenties: 24% Thirties: 76%	33% Doctoral students	20
USA	28	Science: 79% Soc.Sci.: 21%	Female: 41% Male: 59%	Twenties: 27% Thirties: 73%	34% Doctoral students	28

8.16 More diversity

There is evidence from four countries that ECRs who have reviewing experience hold different scholarly views from those who do not, perhaps because they are more familiar with the working of the system. Thus, in Spain older and more expert ECRs naturally enough are more forthcoming in interviews and are more critical about an assessment system focused only on publications in a limited number of elite journals.

However, when they participate in the peer review mechanism themselves they feel a lot less critical. A case, maybe, of being conditioned by the system.

There are also significant differences in five countries between those who work more or less on their own, usually undertaking a doctorate after preliminary experience, and those who are embedded in groups. The former tend to be social scientists and as a generalisation they provide fewer answers to the questions asked and are less productive in terms of papers published. Indeed, most of them (though not all of them) are basically disinterested in scholarly communication and more of them are probably not going to continue in academic life. Also, Spanish ECRs who work in strong research groups feel more secure about their prospects and tend to be happier with the academic communication process, perhaps just because they are more optimistic about their future.

The French study, like the Malaysian one, found differences according to subject. Thus, many ECRs clearly explained that some research topics could turn out to be more or less “bankable” than others. Some topics are more “in the spirit of time” and others are less so. The consequence is that those who have “bankable” research subjects are more visible, their results are more likely to be published, and they are more contacted by colleagues in their countries and abroad. It’s a kind of Matthew effect, whereby eminent scientists get disproportionately greater credit for their contributions while relatively unknown scientists tend to get disproportionately little credit for comparable contributions (Merton, 1968).

In the French study age and experience were clearly correlated, and are added values for ECRs, which contribute towards a greater understanding of the system and the knowhow as to how to behave and what to decide in many situations and contexts.

In the US, a number of ECRs (perhaps, 15%) worked in what one might call service capacities, usually in medicine. They offered techniques and methods. Their attitudes showed differences from those whose research was purer and less applied. Again in the US there was another group of about the same size who were either in industry or in government or medical laboratories. The nature of their research was different and again they were cut off from some of the concerns of the Academy: their attitudes were different, too. A small percentage of these types of researchers were part of the UK cohort also.

With regard to gender, females represented over one-third of all interviewees, but the serial inequalities uncovered by Sugimoto et al. (2013), especially in regard to authorship, did not crop up in interviews, although further analysis will be conducted in this regard. With respect to career progression, no issues were raised, although Chinese female ECRs appear to be driven more by pure subject interest than their male, promotion-driven counterparts. Most of our interviewees were women.

9.0 Interim conclusions and reflections

It would be premature and hasty 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. The main interest lies in mapping change in the years to come. Not wanting to duplicate the executive summary and because of the dangers in making generalizations across an immature, complex, variable, and possibly dynamic dataset, we have chosen instead to report on the reflections of national leads, the people who did the interviews, in regard to what they think they have discovered in relation to the project's aims and hypotheses.

Independent of discipline or nationality, these results show clearly 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 take the opportunity to do so because they just do not have the time and space in an insecure and busy environment. This is also, possibly, the reason why harbingers of change are thin on the ground, for the moment.

CHINA

There are several strong leads coming from the Chinese study. Firstly, in regard to reputation and evaluation, there is no evidence that altmetrics will replace traditional metrics in the scholarly communication system, unless things change radically. On the contrary, ECRs believe that the current evaluation system, which is based on high IF journals, works well, because it is open and fair. Second, in respect to the dominance of peer reviewed journals, as their mentors do, ECRs read and cite peer-reviewed journals and publish their final findings in these journals, although they do use smartphones and social media to publicize their articles, follow scholars and topics that interest them, and to contact their friends and colleagues. Third, ECRs know little about OA and open science or, indeed, show little interest in these topics. They will not publish papers in gold OA journals, because they could not afford the cost, nor will they upload their papers to institutional repositories, since it does not generate any credit for their staff assessments. Fourth, ECRs do feel that some things need to change in the current system, such as the fixation with Web of Science indexed journals, but they do not think they are the people who are capable of making the changes. They believe that reform needs to come from the top, not the bottom. Lastly, compared to their seniors, ECRs: a) feel much more career and financial pressures; b) they are more willing to cooperate with their peers and have more interaction with international researchers.

FRANCE

ECRs in France are getting older, as they are in many other countries, as it takes more time to be recruited and obtain tenure. In respect to scholarly behaviour, they behave strategically and conservatively all the time whatever the kind of scholarly activity they are involved in. They are unlikely to move away from citation metrics because of greater levels of competition and evaluation. For the seeds of change in France we need to look at: a) ResearchGate and Google Scholar, which are becoming the major sources of information (discovering articles and obtaining PDFs); b) Smartphones: although only a few ECRs have smartphones and use them for scholarly purposes (for current awareness and reading), it is possible to see that it will not be long when all ECRs will want to be connected and linked all the time, in real time; c) Globalization (mobility and collaboration, most notably), which is widely admitted to be a key area, much desired and targeted by ECRs; d) libraries, because they are losing visibility; e) the desire, but not yet practice, in disseminating research findings in less formal ways, though not necessarily via social media outlets, which are currently not popular; f) disruption caused by ECRs getting closer to their peers and more detached from their home institutions, courtesy of online communities and increased opportunities for collaboration. Open access is seen positively by most ECRs, but it is not considered as a game changer.

MALAYSIA

A strong drive to get published in indexed journals has played a major role in shaping the scholarly communication landscape in Malaysia and especially so for research-intensive universities. In general, then, Malaysian ECRs' behaviour is still very traditional and mainly paper-driven with a focus on productivity and impact indicators garnered from WoS and/or Scopus databases. Scientists (compared to non-sciences) are notably more strategic about where they publish and are more interested in self-promotion. They make use of scholarly metrics, but are more concerned with traditional metrics than altmetrics. ECRs want to publish in their preferred journals, whether or not they are open access or subscription-based, but they demonstrate an increasing openness to sharing and a desire for the support to make that possible. ECRs who publish in either an open access journal or a hybrid open access journal make sure that the journals are indexed by either WoS or Scopus. ECRs are, though, concerned about article processing charges (APCs) as their institution will only bear the cost of APCs for “those journals that are in Q1 of WoS” and there are not that many of them. Although they do not seriously use social media platforms for scholarly purposes, they do see social media as useful for research purposes. ECRs agree that online scholarly networks lead to greater collaboration and/or connectivity, and help build reputation. And they are concerned with digital visibility and are encouraged to make their academic profiles and research metrics openly available through ResearcherID and ORCID. Those who did not use them felt that they should make more use of the opportunities presented and might do so in future. They may want to use social media more, but traditional norms that dominate scholarly behaviour perhaps prevent them from doing so.

POLAND

It seems that, reflecting on all the data collected, Polish ECRs are the most unlikely to change, that is they will not be the harbingers of change or anything remotely like that. Their behaviour is very conservative, with Polish ECRs eschewing social media, online communities, altmetrics and smartphone use for scholarly communication purposes. Changing, even tinkering with, the scholarly system is far from their thoughts. Three important factors help to explain this: 1) in Poland there is no such thing as research-intensive universities. All state universities and all faculty have to do half teaching and half research and that means they do a lot of jobs in addition to researching. It is a level playing field; 2) all academic staff have to do a Habilitation after their PhD if they want to keep their job (Habilitation involves publishing a monograph and this partly explains the following point); 3) they are much less journal focused in their dissemination activities, embracing in particular monographs, book chapters and conference proceedings.

While Polish ECRs seem unchanging, albeit because they are particularly overworked and have no time to think about change, they and their employers are aware of the fact that they will have to follow, and cannot ignore, what is happening to the US/Western scholarly model. They need to keep up with international rankings if nothing else. Indeed, there is a desire that should happen and provide a fairer and more appropriate system. The necessity to publish in international journals with high IFs is a real problem because of the language barrier and delivers a big reputational advantage to native English language speakers. Another concern is that if social media is having so big an influence in our daily life, why not inscience?

SPAIN

The ECRs interviewed are, like their US/UK colleagues a very mixed group, and they are also getting older because of the serious lack of tenured positions in Spain over the past five years due to the economic recession. This shows up in the findings. ECRs in Spain are, like Polish ECRs, probably, some of the most conservative. The prominent findings for Spain are that ECRs are very hardworking people, very involved in the competition for obtaining a tenured position or the first/next post-doc. They are, probably, more worried and dedicated to the job than US/UK ECRs who have greater (other) job opportunities. They know that the evaluation system is focused on publishing in high rank journals and play the game, even though they consider it unfair. ECRs would much prefer a more comprehensive evaluation process that takes into account every achievement and the differences between scientific areas, but this will only happen when the economic pressure is off and more jobs are generated.

They are very concerned about pushing science forward *and* having real impact on their communities and industries. ECRs consider knowledge transfer and dissemination to industry and society to be very important, but do not have enough time to work on it. They would like to increase their presence in scholarly social media as a means to achieve this aim. Their next goal is to use reputational tools. Open access is seen as a positive innovation and as a means

for changing the system, but as publishing in OA journals is expensive, they feel that its use is making the playing field uneven between those research groups that can pay for it and those that cannot. They are big advocates of 'proper' double blind peer review, but would like more transparency and, as part of this, they feel that reviewers' names should be released at the end of the process.

UK/US

UK and US ECRs have much in common. The ECRs interviewed are a mixed group and thus it is not easy to generalize about their behaviour and attitudes. Some have been trained originally in another country and are aware that they have to learn to fit in. Some never really adjust and you can see this. Others who have been through the UK or US process are also clearly not going to make it as real researchers and will remain as a sort of assistant or mainly a teacher, and some are basically interested in industry or working in medical back up services. We would expect only those who are really keen on research to discuss seriously scholarly behaviour or point to transformations.

Clearly, researchers tend to be conservative, for very good reasons (nobody wants 'hippy' science), and some of those who are serious researchers are consciously conservative and happy with current scholarly communication systems. This does not mean they do not use social media, but they do not use it in ways that are connected with change, more enhancing existing practices. The ones we are really interested in as potential harbingers are, we suspect, not much more than half of all the ECRs. It is these we might expect to be changing, to want to see changes, and will have changed in a year's time as they get more opportunities for carrying through their ideas/principles. A lot of these ECRs tended to answer our questions "not yet". There is a fair minority (10%) who do have new ideas, newer than any of the interviewees in the aforementioned study of trustworthiness in the digital age had (Watkinson et al., 2016). They are trying to implement these when they can, which is not often, because they are bound to publish in top journals, etc. What are these new ideas that they have? They are principally based around new ways of sharing, greater transparency and building reputation. They appear not to worry about the dangers of sharing. They are keener on doing 'proper' research, but are not keen on the way they have to spend so much time on determining where and how to devise research outputs. Finally, we believe we have identified a wish for change, which may for the moment not be possible but might be some time soon, fueled by the general push for openness, including outreach.

On reflection, the strangest thing about the UK/US interviews is how rarely ECRs mention publishers (many of whom are based in the UK/US), although our questions led the talk to a lot of their publications, and of course they knew we were funded by them. In the sections relating to peer review ECRs never mentioned the friction in the system which is the feature of publisher meetings currently – the ways in which the user experience is diminished because of all sorts of obstacles to seamlessness and accessibility. All editorial online systems are known for being difficult to work with. ECRs do not mention this. Why not? Is it because the actual submission is usually done by someone else – the group PA or maybe

some assistant? We have no evidence on this yet, but we will have in the future. They do not blame or praise publishers for peer review policies. It is always the editor or reviewer or the system. They also do not seem to expect to get much feedback from the publication of papers, though some do mention post publication review. ELife and Peer 1000 Research do make a big deal about post publication feedback as did PLOS, but publishers generally do not. As we know from the Sloan Trust study and occasionally in the current study, getting feedback comes from internal talks, etc., conference presentations and posters, but papers are not mentioned in this context. As one ECR said in a blog following a recent ALPSP seminar “I find that publishers want to know what we want, and we should tell them”: this report should help in this regard.

10.0 References

- Bar-Ilan, J., Haustein, S., Peters, I., Priem, J., Shema, H. and Terliesner, J. (2012). "Beyond citations: Scholars' visibility on the Social Web". *arXiv preprint*. arXiv:1205.5611.
- Bennion, A. and Locke, W. (2010). The early career paths and employment conditions of the academic profession in 17 countries. *European Review*, 1These 8(S1), S7-S33.
- Brechelmacher, A., Park, E., Ates, G., and Campbell, D.F. (2015). The rocky road to tenure–career paths in academia. In *Academic work and careers in Europe: Trends, challenges, perspectives*, 13-40. Springer International Publishing.
- Belluz, J., Plumer, B., and Resnick, B. (2016). The 7 biggest problems facing science, according to 270 scientists. Available at: <http://www.vox.com/2016/7/14/12016710/science-challenges-research-funding-peer-review-process>
- Chudziak, J. (2015). *Digital technology vision 2015 and its human dimension*. The 3rd Scientific Conference Information Science in an Age of Change, 11-12 May 2015. University of Warsaw.
- Cusick, A. (2015). Research training as occupational socialization: Doing research and becoming researchers. *Asian Social Science*, 11(2), 252.
- 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.
- Fransman, J. (2014). *Becoming academic in the digital age: Negotiations of identity in the daily practices of Early Career Researchers*. Connected Communities and Early Career Researchers workshop, City University, May 2014. Available at: https://www.srhe.ac.uk/downloads/FRANSMAN_Final_Report.pdf
- Friesenhahn, I. and Beaudry, C. (2014). *The global state of young scientists – Project report and recommendations*. Berlin: Akademie Verlag.
- Graham, H., Hill, K., Matthews, P., O'Brien, D. and Taylor, M. (2014). *Connecting epistemologies: Methods and early career researchers in the Connected Communities Programme*. Available at: <https://earlycareerresearchers.files.wordpress.com/2014/10/connecting-epistemologies-report.pdf>
- Gu, J., Lin, Y., Vogel, D. and Tian, W. (2011). What are the major impact factors on research performance of young doctorate holders in science in China: a USTC survey. *Higher Education*, 62(4), 483-502.
- Halevi, G., Moed, H. and Bar-Ilan, J. (2015). Accessing, Reading and Interacting with Scientific Literature as a Factor of Academic Role. *Publishing Research Quarterly*, 31(2), 102-121.
- Harley, D., Acord, S.K., Earl-Novell, S., Lawrence, S., and King, C.J. (2010). *Assessing the future landscape of scholarly communication: An exploration of faculty values and needs in seven disciplines*. UC Berkeley: Center for Studies in Higher Education. Available at: <https://escholarship.org/uc/item/15x7385g>
- Housewright, R., Schonfeld, R.C. and Wulfson, K. (2013). *Ithaka S+ R US faculty survey 2012*. Available at: http://lgdata.s3-website-us-east1.amazonaws.com/docs/923/721668/Ithaka_S_R_US_Faculty_Survey_2012_FINAL.pdf
- Horta, H., and Santos, J.M. (2015). The impact of publishing during PhD studies on career research publication, visibility, and collaborations. *Research in Higher Education*, 1-23.

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/20140614204612/http://www.jisc.ac.uk/publications/reports/2009/earlycareerresearchersstudy.aspx>

Jones, P. (2014). Phill Jones on the changing role of the postdoc and why publishers should care. Blog post, October 6, 2014. *The Scholarly Kitchen*, Available at: <https://scholarlykitchen.sspnet.org/2014/10/06/guest-post-phill-jones-on-the-changing-role-of-the-postdoc-and-why-publishers-should-care/>

Laine, H. (2015). [The case against the journal article: The age of publisher authority is going, going, gone — and we'll be just fine](#). Blog post, July 14, 2015. *LSE - London School of Economics and Political Science. The Impact Blog*. Available at: <http://blogs.lse.ac.uk/impactofsocialsciences/2015/07/14/the-case-against-the-journal-article/>

Laudel, G. and Gläser, J. (2008). From apprentice to colleague: The metamorphosis of early career researchers. *Higher Education*, 55(3), 387-406.

Madhusudhan, M. (2015). Use of Mobile Devices for Improving the Research Work by Research Scholars of the University of Delhi and University of Hyderabad: A Study. *World Digital Libraries-An international journal*, 8(2), 127-144.

Merton, R. K. (1968). The Matthew effect in science. *Science*, 159 (3810), 56-63.

Müller, R. (2014a). Racing for what? Anticipation and acceleration in the work and career practices of academic life science postdocs. In: *Forum Qualitative Sozialforschung/Forum Qualitative Social Research*, 15(3).

Müller, R. (2014b). 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.

Mulligan, A. and Mabe, M. (2011). The effect of the internet on researcher motivations, behaviour and attitudes. *Journal of Documentation*, 67(2), 290-311.

Mulligan, A., Hall, L., & Raphael, E. (2013). Peer review in a changing world: An international study measuring the attitudes of researchers. *Journal of the American Society for Information Science and Technology*, 64(1), 132-161.

Nicholas, D. and Herman, E. (2016). Digital networks will transform how academics build reputations. *Research Fortnight*, 11 May 2016, 20-21.

Nicholas D. and Rowlands, I. (2011). Social media use in the research workflow. *Information Services and Use*, 31(1-2), 61-83.

Nicholas, D., Watkinson, A., Volentine, R., Allard, S., Levine, K., Tenopir, C. and Herman, E. (2014). Trust and authority in scholarly communications in the light of the digital transition: Setting the scene for a major study. *Learned Publishing*, 27(2), 121-134.

Nicholas, D., Jamali, H.R., Watkinson, A., Herman, E., Tenopir, C., Volentine, R., Allard, S. and Levine, K. (2015a). Do younger researchers assess trustworthiness differently when deciding what to read and cite and where to publish? *International Journal of Knowledge Content Development and Technology*, 5(2), 46-53.

Nicholas, D., Watkinson, A., Jamali, H.R., Herman, E., Tenopir, C., Volentine, R., Allard, S., & Levine, K. (2015b). Peer review: Still king in the digital age. *Learned Publishing*, 28(1), 15-21.

Nicholas, D., Herman, E. and Jamali, H.R. (2015c). *Emerging reputation mechanisms for scholars: A literature-based theoretical framework of scholarly activities and a state-of-the-art appraisal of*

the social networking services used by scholars, to build, maintain and showcase their reputation. European Commission, Joint Research Centre, Institute for Prospective Technological Studies. Available at: <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC94955/jrc94955.pdf>

Nicholas, D., Herman, E. and Jamali, H.R. (2015d). Analysis of emerging reputation mechanisms for scholars. In: Vuorikari, R. and Punie, Y. (Eds). *Analysis of emerging reputation and funding mechanisms in the context of Open Science 2.0*. Part 1, 3-72. European Commission, Joint Research Centre, Institute for Prospective Technological Studies. Available at:

<http://publications.jrc.ec.europa.eu/repository/bitstream/JRC94952/jrc94952.pdf>. Poli, S. (2016). The annual conference of the German Association for HE Research. Blog post, May 10, 2016. *SRHE - The Society for Research into Higher Education Blog*. Available at: <https://srheblog.com/2016/05/10/the-annual-conference-of-the-german-association-for-he-research/>

Poli, S. (2016). The annual conference of the German Association for HE Research. Blog post, May 10, 2016. *SRHE - The Society for Research into Higher Education Blog*. Available at: <https://srheblog.com/2016/05/10/the-annual-conference-of-the-german-association-for-he-research/>

Procter, R., Williams, R., Stewart, J., Poschen, M., Snee, H., Voss, A. and Asgari-Targhi, M. (2010). "Adoption and Use of Web 2.0 in scholarly communications". *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 368(1926), 4039-4056.

Publishing Research Consortium (2016). Peer review survey 2015. Mark Ware Consulting. Available at: <http://publishingresearchconsortium.com/index.php/prc-projects/peer-review-survey-2015>

RIN (Research Information Network) (2010). *If You Build It, Will They Come? How Researchers Perceive and Use Web 2.0. A Research Information Network Report*. Available at: http://www.rin.ac.uk/system/files/attachments/web_2.0_screen.pdf

Rowlands, I., Nicholas, D., Russell, B., Canty, N. and Watkinson, A. (2011). Social media use in the research workflow. *Learned Publishing*, 24(3), 183-195.

Shin, J. C. and Cummings, W.K. (2013). Teaching and research across higher education systems: Typology and implications. In: Shin, J. C., Arimoto, A., Cummings, W. K., & Teichler, U. (Eds). *Teaching and Research in Contemporary Higher Education: Systems, Activities and Rewards* Vol. 9. Springer Science & Business Media, pp. 381-394.

Shneiderman, B. (2008). Science 2.0. *Science*, 319(5868), 1349-1350.

Sinclair, J., Barnacle, R., & Cuthbert, D. (2014). How the doctorate contributes to the formation of active researchers: What the research tells us. *Studies in Higher Education*, 39(10), 1972-1986.

Sugimoto, C. R., Lariviere, V., Ni, C.Q., Gingras, Y., & Cronin, B. (2013). Global gender disparities in science. *Nature*, 504(7479), 211-213.

Springer Nature Publishing Group (2015). Nature Publishing Group releases landmark White Paper - Turning Point: Chinese Science in Transition. Available at: <http://www.springernature.com/gp/group/media/press-releases/nature-publishing-group-releases-landmark-white-paper/6630926>

Teichler, U. and Cummings, W. K. (2015). Forming, recruiting and managing the academic profession: A varied scene. In: Teichler, U. and Cummings, W.K. (Eds). *Forming, recruiting and managing the academic profession*, 1-10. Springer.

Tennant, J. (2016). *Breaking the traditional mould of peer review: Why we need a more transparent process of research evaluation*. <http://blogs.lse.ac.uk/impactofsocialsciences/2016/02/17/breaking->

the-traditional-mould-of-peer-review/

Tenopir, C., Allard, S., Bates, B., Levine, K., King, D.W., Birch, B., Mays, R. and Caldwell, C. (2010). *Research publication characteristics and their relative values: A report for the Publishing Research Consortium*. Center for Information and Communication Studies, University of Tennessee. Available at: <http://www.publishingresearch.net/>

Tenopir, C., Allard, S., Bates, B., Levine, K., King, D.W., Birch, B., Mays, R. and Caldwell, C. (2011). Perceived value of scholarly articles. *Learned Publishing*, 24(2), 123-132.

Tenopir, C., Volentine, R. and King, D. (2013). Social media and scholarly reading. *Online Information Review*, 37(2), 193-216.

Tenopir, C., Levine, K., Allard, S., Christian, L., Volentine, R., Boehm, R., Nichols, F., Nicholas, D., Jamali, H. R., Herman, E. and Watkinson, A. (2015), Trustworthiness and authority of scholarly information in a digital age: Results of an international questionnaire. *Journal of the Association for Information Science and Technology*. DOI: 10.1002/asi.23598

Van Dalen, H.P. and Henkens, K. (2012). Intended and unintended consequences of a publish-or-perish culture: A worldwide survey. *Journal of the American Society for Information Science and Technology*, 63(7), 1282-1293.

Veletsianos, G. and Kimmons, R. (2012). Assumptions and challenges of Open Scholarship. *The International Review of Research in Open and Distance Learning*, 13(4), 166-189.

Waaiker, C. J., Macaluso, B., Sugimoto, C.R. and Larivière, V. (2016). Stability and longevity in the publication careers of US doctorate recipients. *PloS one*, 11(4), e0154741.

Watkinson, A., Nicholas, D., Thornley, C., Herman, E., Jamali, H.R., Volentine, R. and Tenopir, C. (2016). Changes in the digital scholarly environment and issues of trust: An exploratory, qualitative analysis. *Information Processing & Management*, 52(3), 446-458.

Weir, K. (2011). U.S. Department of Education statistics cited in The new academic job market. *gradPSYCH Magazine*, September. Available at: <http://www.apa.org/gradpsych/2011/09/job-market.aspx>

Williams June, A. (2016). Someday, Altmetrics will no longer need 'Alt'. *The Chronicle of Higher Education*, July 18, 2016. Special Report. Available at: [http://chronicle.com/article/Someday-](http://chronicle.com/article/Someday-Altmetrics-Will-)

[No/237118?cid=at&utm_source=at&utm_medium=en&elqTrackId=b54ac59fb55040ee87830472d3b673ac&elq=50e40719099e4514a7c8f09393c12857&elqaid=9906&elqat=1&elqCampaignId=3641](http://chronicle.com/article/Someday-Altmetrics-Will-No/237118?cid=at&utm_source=at&utm_medium=en&elqTrackId=b54ac59fb55040ee87830472d3b673ac&elq=50e40719099e4514a7c8f09393c12857&elqaid=9906&elqat=1&elqCampaignId=3641)

Appendix 1: Questions for ECR interviews

1. Background information

Hypotheses to test: They do many jobs for short periods of time; they do many things on a project (multi-taskers). The environment in which they are is precarious. There is a big drop-out rate.

Research job/project currently working on:

Q1. What research project(s) are you involved in at the moment? Are they inter/multi-disciplinary?

Q2. What is your role/status in the project?

Q3. Are you part of a research group/centre? If so, is your group working with other groups on this project, if so, what is the role of your own group and the roles of the other groups in the project?

Q4. If, since receiving your doctorate or before you started your doctorate, you have worked in other groups what was your role in those groups? Q5. If your current research is not part of a group, do you still work with other researchers? In what ways?

Q6. How would you describe the current and previous groups you have work(ed) in? Could you characterise them as top international groups, groups of international standing, well thought of groups working mainly at a national level? In what ways has your affiliation with these groups influenced your career?

[Mentoring/training]

Q7. How would you describe the quality of your mentoring? [Who do you turn to for advice and how good are they at answering your questions?]

Q8. Do the organisations you

have worked for make special provisions for ECRs, for example, in respect to training?

2. Career aims

Hypothesis to test: Getting a good job is the major motivation, not changing the world/science.

Q1. Are you aiming to have a career as a university researcher?

Q2. Where are you in your career development/progression?

Q3. Might you consider researching outside the academy, in industry, for example?

Q4. Do you see your research activity ending with your current post or will you continue researching in another post?

Q5. What is your main motivation for doing your current research? For instance, adding to knowledge, having an interesting career or a well-paid career?

3. General (scholarly)

communication

behaviour

Hypotheses to test: Early career researchers adopt the practices of their mentors and heads of the groups to which they belong. New behaviours are not really taking hold, while academics are typically recruited, promoted and obtain funding on the basis of their publication record and citation scores based on accumulated reputation.

Q1. What are your scholarly communications practices in respect to dissemination, citing and reading research? [Go into detail about the three individual activities.] Do they differ from those of your research mentors in current and previous jobs?

[Changes]

Q2. As you have progressed through your academic career have your attitudes towards established scholarly communication behaviour changed? If so, what are the main factors that influenced the change (technologies, policies, peer influence/pressure, etc.)?

[Discovery/usage]

Q3. How do you find the scholarly information you need? Google, library catalogues, online networks, etc.?

Q4. Do you search for and read scholarly papers on your smartphone?

4. Influence of social media and online communities

Hypotheses to test: Early career researchers would like to use social media more, but traditional norms that dominate scholarly behaviour prevent them from doing so. ECRs do not see social media as being scholarly 'noise' but useful for research purposes. Social scientists are more favourable to the scholarly use of social media. Early career researchers are detached from institutions and more closely networked/connected with their peers.

[Social media]

Q1. Do you use social media in your scholarly activities? a) To find out

information and (if so) from what media? b) Do you cite social (new) media in your dissertations, or articles or in blogs? c) To disseminate your research findings/ideas/data? d) To connect/network/collaborate with your peers?

Q2. Are you encouraged to use the social media in your work? If so, by whom (seniors, administrators) and for what purpose? If not, do you still use them? If you do, why? If not, why not?

Q3. Do you find that, thanks to the social media and online community platforms (e.g., ResearchGate), you are: a) detaching from your institutions; b) getting closer to your peers elsewhere? c) both? If so, what are the practical consequences of this?

[Online communities]

Q4. Is it your experience that online communities, such as ResearchGate, give rise to research collaboration? Q5. Is it your experience that online communities help in building/enhancing your reputation? Q6. Are the new virtual groupings, courtesy of online social networks, a different phenomenon from the structured research groups? Has engagement with them enabled you to do more original research?

5. Authorship, publishing and open access

Hypotheses to test: ECRs toe-the line. ECRs not very productive. Not very happy with their lot as research 'apprentices'. Use OA

because they are easier to get into (also see Reputation).

[Authorship]

- Q1. What contributions have you made to the papers which you have co-authored?
- Q2. Does your research team/department/university have an authorship policy?
- Q3. Would you do things differently if you had a say in this? [Award of corresponding author is an important issue; also cronyism - partiality to long-standing friends.]
- Q4. What influence (if any) have you had on the choice of journal?

[Open Access]

- Q5. Does your research team/department/university have a policy in regard to OA publishing? [Probably imposed by their funders.]
- Q6. What do you think are the advantages and disadvantages of OA publishing from the point of view of the author?
- Q7. Do you think OA publishing advances science and research, or are you worried that it will dilute the quality of publications, or do you agree/disagree with both propositions? If so, how?

[Innovating]

- Q8. Do you have a preference for journals with innovative features, such as video articles (e.g., Jove), when placing your research?

[Publishing strategy]

- Q9. Is there pressure on you to publish in particular top-ranked journals and, if so, how do you think this affects scholarly communications, in general, and your career?
- Q10. Do you have a conscious publication strategy relating to your research and is that to do with obtaining a tenured/established position and, if so, please describe?
- Q11. Would you prefer to make

public your research findings in less formal ways, such as blogs, which could make them more visible?

[Data etc.]

- Q12. If you have produced data or software in the course of your work and this has been your main contribution would you like this aspect of what you have done to be recognised and credited and would you like the data itself to be made more visible?

6. Peer review

Hypotheses to test: ECRs feel alienated/locked out by the existing

peer review system, which they think of as a closed gentleman's club. Prefer double blind peer review because it provides fairer appraisal. Early career researchers are worried by too much transparency in peer review because it will make it difficult for them to criticise the submissions of their seniors.

- Q1. Do you have experience in responding to comments from peer reviewers on papers you have written and, if so, how did you find the experience?
- Q2. Have you yourself been a reviewer and, if so, what did you learn from the experience?
- Q3. Do you feel the peer review system in its current form is fair or does it fail you in any way?
- Q4. Do you feel that peer review for most journals is in the hands of established researchers who are not always sympathetic to new ideas? [This is a question about whether innovation is being suppressed by the peer review process.]
- Q5. Do you feel peer review

could be improved, and if so, how?
For example, do you think that double blind peer review is preferable or would you like all peer review to be open?

Q6. Most peer review is organised by publishers. Do you think this is a good idea or do you think it should be done by other entities – for example, learned societies?

7. Employment, reputation and career progression

Hypotheses to test: ECRs have little personal freedom and security. They are ‘slaves’ to a metric-based/journal focussed system, which they have to adhere to in order to climb the academic ladder. ECRs make use of social networking sites in order to build up their own networks, separate from the networks already established by the research groups they work in or the connections of their mentors (see social media questions).

[Employment]

Q1. In your experience, how are young researchers employed/treated? Is the position of young researchers in your present and previous posts the subject of a policy made clear by the institution or department?

Q2. How are young researchers evaluated? What are the criteria and are they objective? What reforms, if any, would you suggest?

[Career progression]

Q3. Have you sufficient freedom to develop your career along the path you would like? For instance, to what extent are you free to choose the area/topics you would like to study?

Q4. To what degree do you agree

with the view that ECRs are ‘slaves’ to a metric-based/journal focussed system to which they have to adhere to in order to climb the academic ladder? If you agree, at least to some extent, have you any ideas on how things can be improved?

[open science]

Q5. Do the technological innovations Science 2.0/Open Science mean anything to you, and if so, do they have any significance for you?

Q6. Would you say that open access publishing or depositing your material in institutional repositories can fast track your career/build your reputation? Do you habitually utilise then these options?

8. Sharing and collaborating

Hypotheses to test: Early career researchers share and collaborate extensively even at the risk of losing their competitive edge.

Q1. In what ways do you share your:

a) ideas and interim research results;

b) research findings, data and publications?

Q2. What kinds of collaboration are you involved with?

Q3. Do you use the social media and online social networks to look for, build and maintain collaboration? Do you go differently about looking for, building and maintaining national, as opposed to international collaboration?

Q4. Is there a risk of losing your competitive edge through sharing and collaborating extensively?

Q5. Is your sharing/collaborating behaviour different from that of your research mentors in current and previous jobs?

Q6. Has your behaviour in respect to sharing/collaborating changed from earlier in your career and in what ways?

9. Metrics

Hypotheses to test: ECRs are interested more in social media and usage metrics because citations take so long to count.

Q1. How, if at all, do you employ citation data, usage data, social media indicators in your daily research work (searching for articles, etc.), in presenting your research, identifying leading researchers, etc. [You might need to break this into three sections, citations, usage, social media indicators]

Q2. How important do you think metric scores are for your reputation? And for your career progress?

10. Unethical behaviours

Hypotheses to test: ECRs are willing to 'bend' the system to progress and get published.

Q1. Do you have a clear understanding of what is generally regarded as ethical and unethical in research and/or publishing practices or are you uncertain about what is meant by these terms?

Q2. Are you aware of any unethical publishing/citing behaviour among your peers or among those higher in academic structure?

Q3. Do you believe there is more scrutiny today which will keep the lid on any problem behaviours?

11. Impact

Hypotheses to test: They see connecting to a wider audience as being an important impact.

Q1. How important is it to you that the research you are involved in should have an impact on your peers, on policy formers, on industry or/and on the general public? Which groups are most important to you?

Q2. What is the best way to influence those groups you think you should be reaching out to?

Q3. If you had the time/opportunity to do more to increase the impact of your research, what would you do?

12. Transformations

Hypotheses to test: The system is unchanging and unbending, but there is little evidence of the desire for change among ECRs.

Q1. Do you agree that a big opportunity for the current generation of researchers is to fundamentally change the way that the scholarly communication system works?

Q2. If so, do you have any overall picture of what form a changed system of scholarly communication might take?

Q3. Do you think that five years from now academics will still be typically recruited, promoted and obtain funding solely on the basis of their publication record and citation scores based on accumulated reputation?

Q4. Do you think journals and libraries will still have a central role five years down the line?

Appendix 2: Coding template for National Reports

	Interview 1	Interview 2
0. Bio & CV		
Gender (M, F)		
Age: under 30 (Y); 30-34 (M); 35 and over (O)		
Doctoral student (D) or PostDoc (PG)		
University rank top (T), medium (M), low (L)		
Subject specialisation (in bullet list)		
Countries in which worked (in bullet list)		
1. Background		
Research projects (current number)		
of which Inter- or multi-disciplinary (number)		
Role and status (number of projects as PI/leader)		
Research group (RG), centre (RC) or none (N)		
Past research groups worked with (number)		
of which the number as PI/leader		
Status of research groups largely international (I), national (N), university (U)		
Those not in groups collaborating (C) or not		
Mentoring – existence & quality. None (N), poor (P), Good (G)		
Mentor/advisor (typically): PI, colleague (C), other (O), various (V)		
ECR special provision. Yes (Y), no (N)		
2. Career		
Want a career as university researcher Y, N, not sure (NS)		
Career progression: progression OK (P), with difficulty (D), still uncertain (U)		
Consider working elsewhere (Y), (N), unsure (UN)		
Main motivation: promotion (P), curiosity or interest (I), other (O)		
3. Scholarly Communication Behaviour		
Dissemination (chief characteristics, provide bullets – max. 5 strongest first)		
Reading (as above)		
Citation (as above)		
Differ from mentors Y, N, no answer (O)		
List chief sources of information (databases, search engines, bibliographic services etc. – max 5 most important first).		
Changes in scholarly behaviour N, Y (In case of latter what were they? List up to 5 bullets)		
Main causes of change. List as bullets.		
Smartphones & Mobile use. Not used (NU), used (U). In used for what?		
4. Social Media		
Finding scholarly info. Y, N.		
Citing social media. Y, N.		
Dissemination. Y, N.		
Connecting with other scholars (e.g. collaborating)		

Encouragement. Y, N.		
If yes, who encouraged. List.		
Does use of social media and online networks result in: a) detachment from your institutions (1); b) getting closer to your peers elsewhere (2); c) both (3)		
Do online scholarly networks lead to greater collaboration/connectivity. Y, N.		
Do online scholarly networks help towards building reputation? Y, N.		
Are new virtual groups different? Y, N.		
5. Authorship		
Number of publications		
Author contribution/role. Position (first etc.); role (wrote articles, did corrections, literature review etc. – list up to three bullets)		
Authorship Policy Y, N, don't know (DK). List policies as short bullets		
Would you do things differently Y, N. If so list as bullets the different things.		
Influence on choice of journals. Y, N. If Y what was the influence? List as bullets, up to 3.		
Policy towards OA. Y, N, don't know (DK). If yes, list policies as up to 3 bullets.		
OA advantages/disadvantages. List up to 3 bullets each		
OA publishing advances science and research (1) or will it dilute quality (2). 1, 2 or disagree with both (3). List any reasons as bullets (max. 3)		
Like innovative features/Videos journals. Yes (Y), no (N), don't know (DK).		
Pressure to publish in top-ranked journals? Y, N.		
If yes, how does this affect scholarly communications and your career? (list up to 3 affects as bullets)		
Conscious publication strategy. Y, N. What is it? List strategies as up to 3 bullets		
Like to make public my research in less formal ways? Y, N.		
Produced data/software. Y, N. if Y Data like credit for it? Y, N.		
If Y, like it to be more visible. Y, N.		
6. Peer Review		
Responding to comments. Y, N. If Y, how did you find the experience? Good (G), bad (B), mixed (M).		
Experience as a reviewer. Y, N.		
Peer review fair? Y, N. if not why not – list up to 3 reasons as bullets		
Peer Review clique? Y, N.		
Improve it? Y, N. If Y, give up to 3 reasons as bullets		
Should publishers do it? Y, N. If N, who else should do it? List up to 3.		
7. Employment, reputation & career progression		
ECR treatment. Fair (F), unfair (U), mixed (M)		
Have ECR policy (Y, N); Clarity. Clear (C), not clear (NC). List as bullets up to 3 policies mentioned		

Have ECR Evaluation (Y, N). List as bullets up to 3 methods mentioned		
Suggested reforms (Y, N) If Y, give max. 3		
Freedom to develop career. Y, N, partly (P)		
Slaves (Y, N).		
Any reforms mentioned, list 3 max.		
Does open science mean anything (Y, N). If Y what is significance for them. Give up to 3 examples.		
Can OA fast track career. Y, N		
Do you publish in OA jnls (Y, N) or deposit in IRs (Y, N)?		
8. Sharing & collaborating		
Ways of sharing ideas (Give up to three ways)		
Ways of sharing results, data, publication (Give up to three ways)		
Collaborations & social media (give up to three examples)		
Use of social networks for building reputation (Y, N)		
Sharing behaviour different from mentors (Y, N)		
Has collaboration changed with experience (Y, N)		
Risk of losing competitive edge through collaboration (Y, N)		
9. Metrics		
Use of metrics (Y, N). If Y, give up to 3 ways)		
Metrics and reputation (Y, N)		
Metrics and career progression; Important (I), not important (NI)		
10. Unethical behaviours		
Ethical understanding. (Y, N). If Y and provide examples give up to 5		
Are they personally aware (Y, N) If Y and provide examples give up to 5		
Scrutiny. Y, N, not sure (NS)		
11. Impact		
Importance for research to have impact (Y, N). List groups.		
Best ways to influence groups. List		
Strategy for impact. List ideas.		
12. Transformations		
ECRs as « change players Y, N.		
Nature of change. Describe change briefly		
Will reputation system be the same in 5 years' time? Y, N, not sure (NS)		
Central role of journal in 5 years Y, N, not sure (NS)		
Central role of libraries in 5 years Y, N, not sure (NS)		

Appendix 3: Detailed subject representation of ECRs

Subject	China	France	Malaysia	Poland	Spain	UK	US	Total
Agriculture and forestry				3	2			5
Anthropology							1	1
Biology		4	1	3	1		2	11
Botany						1		1
Chemistry		2	1		3		1	7
Computer science	4	2	1		2		1	10
Earth/environmental science	1		1		1			3
Economics and business	1		1			1	1	4
Education				1		2		3
Engineering (and Technology)			2	2		2	5	11
Law						1		1
Library and information sciences			2		2			4
Mathematics		2						2
Medicine and health	4				2	2	7	15
Microbiology							1	1
Nutrition/food sciences					1			1
Physics	2	3	1		1		1	8
Physical chemistry						2	1	3
Physiology						3	2	5
Politics	1			1				2
Psychology					1	1	4	6
Social sciences			2					2
Sociology					1	1	1	3
Statistics							1	1
Technology, with social sciences		1						1
Travel and tourism						1		1
Veterinary science					1	1		2
Zoology						2		2
Total	13	14	12	10	18	20	29	116