Nurturing novelty: Toulmin's greenhouse, journal rankings and knowledge evolution

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Nurturing Novelty: Toulmin's greenhouse, journal rankings and knowledge evolution

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Reflecting on Toulmin's 1972 conceptualization of the academic research process, we fast-forward his thinking to the current climate of academic excellence and associated journal ranking lists. We argue that the formal and informal use of such rankings throughout the hierarchy of research institutions creates an artificial environment within which favoured 'branches' of knowledge continue to flourish at the expense of new conceptual saplings. This 'greenhouse' effect might result in the creation of a knowledge tree which is increasingly unfit to the external world for which it is intended. We thus step back and examine wider implications of these factors on the broader evolution of knowledge in the research process. In sum, we argue for a Toulminian explanation of the process by which journal ranking lists reduce academic innovation and creativity, bias academic selection and constrain dissemination processes in the academic community.

Keywords: Journal Ranking; Evolution; Toulmin.

Introduction

Concepts which are ahead of their time in knowledge evolution can, as Toulmin (1972) illustrated, lie dormant or be discussed largely to negate them. His own conceptual evolution is a case in point. Toulmin (1922-2009) was a British philosopher known for his analysis of moral reasoning and in 1972 published *Human Understanding*, where he presented a less-known evolutionary account of conceptual change. In contrast to Kuhn's (1996) seminal work, *The Structure of Scientific Revolutions*, Toulmin argued conceptual change as evolutionary rather than revolutionary. Toulmin presents an insightful way to view the evolution over time of knowledge, and scientific knowledge, a special kind of knowledge (Plotkin, 1994). We argue that a Toulminian approach merits re-visiting, to shed light on the influence of journal ranking systems and research assessment exercises on the academic research process. Of course, while others have commented on such influences too (e.g. Suddaby, Hardy and Huy 2011; Holt and den Hond, 2013), our concern is to deploy them to revisit Toulmin, who argued variation in concepts as subject to selection from both intrinsic (intellectual) and extrinsic (social) factors, acknowledging that the two can sometimes coincide but at other times act in opposition. As he put it:

> A new concept, theory or strategy for example, becomes an effective 'possibility' in a scientific discipline only when it is taken seriously by the influential members of the relevant profession, and it becomes 'established' only when it wins their positive endorsement. Conversely, an innovation which the current reference group declares 'totally unsound' is for the time being as good as dead (Toulmin, 1972, p. 266).

Using such a framework, and drawing from the wider literature evidence surrounding research auditing exercises, this article explores the impact that journal rankings, as measures of research output quality, might have on extrinsic selective pressures at multiple levels in the research process. Following Toulmin, we view science as a multi-level co-evolutionary system in which an ecology of concepts struggle for survival within explanatory frameworks and paradigms alongside the ecology of supporting research institutions. While putting forward the notion that science might be viewed through an evolutionary lens is far from novel (*opera cit*), examining specific literature for evidence of an evolving knowledge ecosystem in this manner can shed light on both the approach in general and a specific system under study. At a time when governments claim research is becoming more world-class (HEFCE, 2014), benefit can be gained from reconsidering this complex evolving system, and of course, the games this system encourages.

Authoritative journals have long had, as Toulmin (1972, p. 270) noted, "a particularly important part to play" in the exchange of results between different scientists". As formal research evaluation increasingly becomes the vehicle by which discretionary funds for research are allocated across Europe, the influence of journals increases (Bence and Oppenheim, 2005), and in recent years the process Toulmin described has become formalised. Various journal ranking lists have become embedded in the managerial discourses and processes of most European business schools, including the British *CABS*, French *CRNS*, German *VHB Journal*, Finnish *Journal Rankings*, Norwegian *Publication Indicator* and Danish *BFI-listen* among others. Here,

we leave readers to judge the degree of conscious agency in such conversations! Regardless of utility, journal lists have replicated with remarkable speed in the HE eco-system, becoming an example of a successful, self-embedding, construct or innovation. Reframing our question, does the use of journal ranking lists inhibit sources of variation within the research process?

We argue that the formal and informal use of journal rankings throughout the hierarchy of research institutions can potentially damage the eventual trajectories taken by the evolution of knowledge, meaning such rankings can result in biased selection processes, which in turn seem to create an artificial environment within which favoured 'trees' and 'branches' of knowledge flourish at the expense of new conceptual saplings. This 'greenhouse' effect might result in the creation of knowledge trees which are increasingly unfit in the external world for which they are intended. In developing the metaphor of a Toulminian greenhouse, we respond to specific literature calls to investigate the effects of research assessments (Broadbent, 2010), such as the RAE/REF (Research Assessment Exercise/Research Excellence Framework) in the UK and Australian ERA (Excellence in Research in Australia), and address the challenges of scoping current and future issues in management research (Cassell and Lee, 2011; Suddaby *et al.*, 2011; Holt and den Hond, 2013). For clarity, we draw the greenhouse metaphor from its original horticultural sense of a protected environment for cultivation, and not its extension to atmospheric changes, and highlight the evolutionary nature of the wider research process Toulmin sets out. First it shows how the research process is shaped by the search for truth through the intrinsic selection and socio-political processes at play within the research community. The latter introduce an artificial selection environment diverting the process of research away from its ultimate end goal, towards meeting community ends. Second, the metaphor highlights the need to nurture novelty, and give prominence to the variation processes alongside those of selective retention. We call for novelty to be given equal billing alongside research outputs and impact, given its importance for future development of the wider research process.

The Toulminian Process of the Evolution of Science

Over the last century some authors have put forward the notion of science as an evolutionary process. Using an analogy with natural selection, Popper (1979) conceptualised a process in which competing theories or interpretations of the world around us struggle for survival against others, in arguing:

> The growth of our knowledge is the result of a process closely resembling what Darwin called natural selection; that is, the natural selection of hypotheses: our knowledge consists at every moment, of those hypotheses which have shown their (comparative) fitness by surviving so far in their struggle for existence; a competitive struggle which eliminates those hypotheses which are unfit (Popper, 1979, p. 261).

Fitness in this view was determined by the ability of theories or conjectures to match observations. Developing the evolutionary narrative, Campbell (1974) viewed the scientific process occurring through variation, selection and retention, where new variations of conceptualisations are put forward, fewer theories are winnowed out through experiment and

qualified prediction processes, and more 'fit' theories are disseminated and retained throughout the scientific community. Thus, science evolves over time through the development of theories and their subsequent testing to see how they match with the experienced world (Plotkin, 1994).

In Toulmin's (1972) seminal work *Human Understandings*, the evolutionary metaphor was expanded beyond the intrinsic factors of Campbell and Popper, to include socio-political, interpretive and extrinsic factors related to the multi-level, institutional nature of the scientific process. As such, new contributions to knowledge are put forward by scholars (variation), selected through peer review, and retained and disseminated within the wider community through publication. Selection thus entails not only the intrinsic power of experiment and empirical investigation, but extrinsic selection processes within the research collective, as the latter interpret knowledge advances and selectively diffuse them within the wider community. The dissemination and retention of conceptual variants seems to be favoured where it builds on an established explanatory procedure, unifies explanatory techniques from separate sciences, or resolves inconsistencies between the concepts of special science and related extra-scientific ones (Toulmin, 1972). Through selective diffusion and retention, some 'fit' intellectual variants become more prominent in certain domains or population niches, meaning an ecology of competing concepts evolves within more or less formally structured theories, alongside evolution of a scientific population of semi-organized institutions (Toulmin, 1972; Hull, 1988: Plotkin, 1994).

Extrinsic selection affects the process of variation and the emergence of novelty within the scientific process as conceptual variants are only considered for selection when there is an agreed collective consensus that they might provide a solution to an agreed set of problems left unresolved within a particular scientific discipline, which tend to occur within the boundaries of the group's discipline and supporting theories (Toulmin, 1972). As Kuhn noted, communities of scholars develop shared paradigms through which they share commitment to the same rules and standards for scientific practice. As Toulmin (1972) argued, the collective professional concerns of a science exert more powerful influence on individual scientists than vice-versa. Indeed, as a paradigm develops within the community, alternatives are seldom explored so long as such paradigm tools are capable of solving the problems they define (Kuhn, 1996). This process results in variation being constrained within the limits of the guiding paradigm, selection processes being dominated by interpretations shaped by it, and diffusion and retention of knowledge being constructed in the language of the existing paradigm. Clearly, the better fit between variations put forward by individuals and those viewed as worth considering by the group, the greater the chance variants progress through the hierarchy of the scientific community. This involves matching the evolution of ideas at the individual level and collective dissatisfaction with existing theories. A subset of better 'fit' possibilities is therefore selected from the wider range of variations produced by individual scholars. While such selective pressures can act to improve the quality of individual contributions made, numerous potentially disruptive selective biases might undermine the wider evolutionary process.

For Toulmin, extrinsic selection is inherently political and ideological, as selection is shaped by influential individuals who won such privilege based on their history of contributing to the field. While these scholars can set benchmarks on quality and direction of research, they also act to

filter variation by giving endorsement selectively to new emerging concepts. Influential individuals are thus not only involved in the selection process, but further form the means by which concepts are disseminated. Influential journal editors can act as 'disciplinary 'filters' sifting out papers which deserve publication in a journal', meaning journals can be very powerful science 'institutions' (Toulmin, 1972). However, given the historic- and discipline-specific nature of these influential figures, such endorsements might reflect the past more than the future. In this manner, entrenched orthodoxies can be extremely effective (though path-dependant) selection filters, with new concepts surviving this selection in turn becoming part of the selection filter for later ideas.

The Toulminian process and greenhouse metaphor

We extend Toulmin's thinking in proposing the greenhouse metaphor to represent evolutionary processes shaping research (see Figure i below), and use it later (below) to show how the advent of research audits, which focus on research outputs and research 'impact', can distort the research eco-system. A metaphor involves transferring information from one domain onto another (Tsoukas, 1991), providing fresh insights (Cornelissen, 2004; Morgan, 1980; Weick, 1989), in both source and target domains (Schoeneborn *et al.,* 2013). We draw on the evolutionary metaphor represented by the greenhouse to sharpen our focus on the core processes shaping wider research development. Following others (e.g. Campbell, 1974; Plotkin, 1994; Popper, 1979; Toulmin, 1972), we argue that at a higher-level of abstraction, key processual characteristics between domains are shared despite clear differences (Authors, 2011; Campbell 1965; Hodgson and Knudsen 2004). Hence while each domain details clearly differ, they share a generic structure (Authors, 2010; Cornelissen, 2004), and use of the metaphor is more powerful when differences between comparison domains are significant, as in the case of the greenhouse and research environment (see Morgan, 1980).

The key goal of the greenhouse eco-system is to produce research outputs that are a good fit with the changing world beyond its shelter, and its primary products constitute different species of plants, or trees of knowledge developed within its controlled environment, and later transplanted to the world beyond. Such knowledge trees differ, in terms of their foundational paradigms and intended end-uses and environments. Here, researchers can be seen as their metaphorical gardeners, tending to the growth of specific tree branches and sub-branches, and experimenting with and sowing the seeds of new variants. As gardeners, research communities shape the evolution of knowledge trees through a) the variation of new species and sub-species, b) the selection of these variants according to certain fitness criteria and c) the retention of selected variants for subsequent experimentation (Campbell, 1974; Plotkin, 1994). Researchers as gardeners thus create an artificial selection environment, as they breed new plant varieties and eliminate perceived 'weeds', where the organization of the wider greenhouse, research community and environment within, represent the institutional arrangements supporting the overall research process.

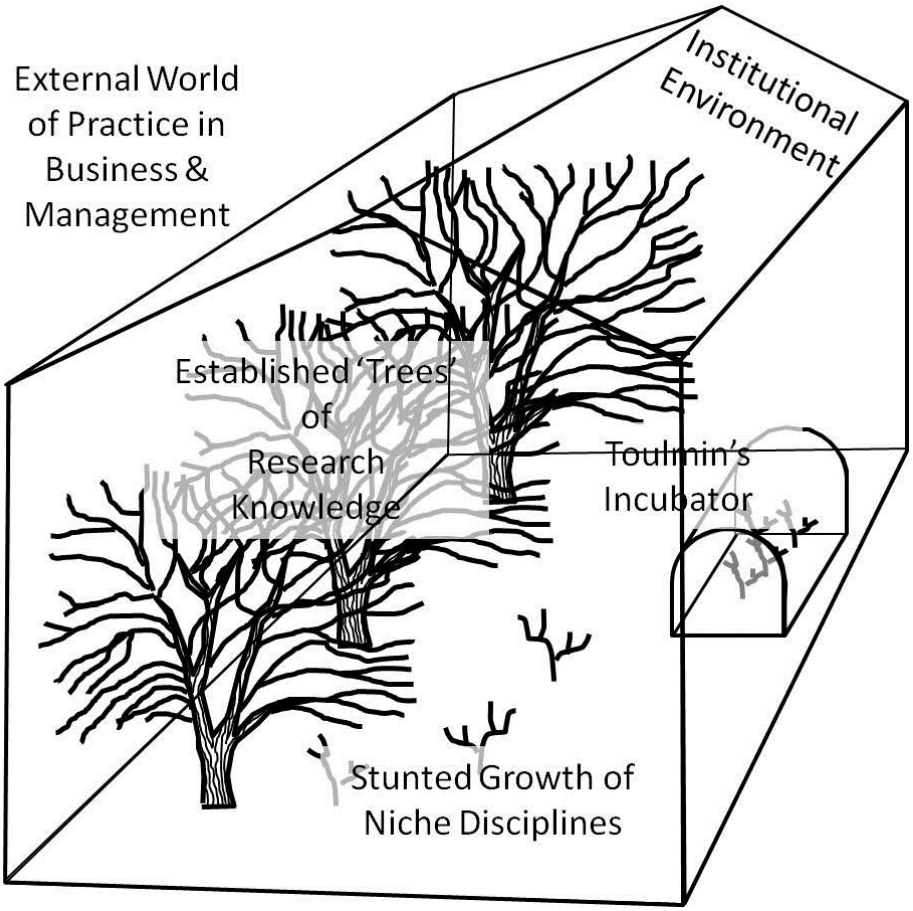

Figure i Nurturing Novelty in Toulmin's Knowledge Greenhouse

Our intrinsic selection metaphor relates to plant variant experimentation under certain conditions, linked to intended uses in the environment beyond the greenhouse. Here, gardeners examine plant performance under specific conditions and select those with better fit over time. The greenhouse offers the research community a controlled environment to conduct this function, and develop and test variants against specific end-use conditions, including those too tender to flourish outside the greenhouse. Briefly, the research community creates a multitude of variant saplings, experimenting with many to find the few optimised for specific uses in the world beyond. Experimentation and variation, alongside careful selective retention, are key elements of this process (Campbell, 1974; Popper, 1979; Toulmin, 1972).

As gardeners know, the process through which cultivated trees emerge from sapling to maturity involves a careful process of nurturing and pruning, meaning institutional factors create and support an eco-system within which trees of knowledge evolve (through the actions of influential scholars, universities, research centres, journals and funding bodies). Branches grow from core tree trunks, as disciplines and sub-disciplines emerge from common theoretical foundations, and as selective forces shift attention between trees, and branches within them, rigor and discipline ensure that growth is built on sound, solid foundations. However, extrinsic biases divert

resources onto existing knowledge domains, starving green shoots of new paradigms and concepts (see Figure i), meaning extrinsic selection refers to the influence gardeners exert on the growth and development of plant variants. As noted above, extrinsic selection creates an artificial environment through artificial selection, where breeders decide which parts to save and prune, as they potentially create 'prize' plants not necessarily well suited to the environment beyond the greenhouse (see below). Further, as gardeners also know, the protected 'greenhouse' environment can be more vulnerable to specific infections.

When we refer to novelty in the metaphorical greenhouse, we mean new saplings or variations which set out new paths beyond the confines of existing trees of knowledge. Variations can of course occur within existing trees, however novelty in the greenhouse sense relates to new directions beyond the confines of one domain, by for instance borrowing theories from other disciplines (Whetten, Felin and King, 2009), combining multiple lenses (Okhuysen and Bonardi, 2011), or conceptual blending between domains (Oswick, Fleming and Hanlon, 2011). Indeed, many of the foundational theories in management were based on a blending of theory fragments from other disciplines (Corbett, Cornelissen, Delios and Harley, 2014), and arguably such approaches are more suited to the complex nature of the organisations we study.

The Toulminian Process and Use of Journal Rankings in Assessing Research Outputs

As already noted, Toulmin saw concepts selected according to both intrinsic and extrinsic factors, and journal ranking usage can be seen to influence these selective processes within this evolutionary ecology, affecting individual scholars, peer review and wider institutional support.

Individual scholarship and institutional support

Variations fuel any evolutionary process. In the research process, individual scholars are the main agents of this variation mechanism, and the arrival and proliferation of journal rankings influence it through interrelationships between individual scholarship and institutional support. The funding and reputational pressures on institutions to return high quality submissions in research quality audits are ultimately transferred onto individual academic staff with increasing need to publish research in high quality journals (Bence and Oppenheim, 2005). In this sense, the narrative of journal rankings as a determinant of quality plays a key role in this process, both formally through staff appraisals and promotions, and informally through research exercises themselves. Such requirements subsequently impact on the assessment and behaviour of individual researchers, with research-active staff ultimately being ranked according to their 'best' articles, and by proxy using journal rankings in staff performance appraisals which partly determine future academic career development (Butler and Spoelstra, 2012). This process can reinforce staff differentiation according to academic performance, where top 'performing' academics receive high retention packages and additional workload allowances (Redman, 2009) plus 'improved career prospects, job mobility and peer esteem' (Butler and Spoelstra, 2012, p. 896), while lower rated staff are given less research time and left feeling demotivated (Stern, 2016), 'very unloved' and 'uncomfortable' (Redman, 2009). Individual researcher 'identities' seem threatened, as Business and Management (B&M) academics may need to regularly publish in 'top' journals to be considered 'good' and 'research active'. Here, possible academic staff

exclusions from research audits potentially produce a divided B&M academy – of research versus teaching-led departments, and within research-led HEIs categories of: first-class citizens or 'research professors', second-class 'research-active' staff and third-class 'research assistants', or casually employed academic labour (Butler and Spoelstra, 2012, p. 893). Although such competition in the sector is not new, it seems increasingly determined by journal rankings leading to an auto-poetic, self-fulfilling or stabilised eco-system.

As noted earlier, Toulmin argued that dominant groups and influential scholars can act as filters on knowledge selection and dissemination, favouring concepts which fit perceived gaps and extant literatures. In the face of challenges for individual scholars, academics may pursue a strategy of relative lower risk, playing safe and focusing on deepening knowledge within established or 'popular' paradigms and traditions rather than challenging them (Alvesson *et al.*, 2017; Suddaby *et al.*, 2011). Journals also become increasingly conservative with rigid standards and styles, adopting the 'adding-to-the-literature' norm, which in turn encourages incremental research within disciplines (Alvesson *et al.*, 2017). Academics may thus be driven "towards safe topics and short-termism, and a reluctance to engage in risky or multidisciplinary projects" (Stern, 2016). Even high-ranking journal articles fail to bring new theoretical insights or advances, as per Bartunek *et al.'s* (2006) call for more "important and interesting" papers in *The Academy of Management Journal (AMJ).* By attempting to reduce risks of rejection by peer-review panels in this way (see below), researchers can seek to increase the chances of having their research selected, and subsequently diffused. However, such moves reinforce existing orthodoxies, and increase potential for the path-dependent biases Toulmin notes. A result is opportunities for innovation and creativity which challenge the status quo are constrained, and instead, top ranking journal calls for novelty result in "infinitesimal contributions in ever narrower areas of research with relatively little concern for the meaning of these contributions or their ramifications" (Alvesson *et al.*, 2017). Hence increasing pressure on academics to meet criteria for acceptance in pre-eminent journals might result in suppressing creativity and innovation in B&M research (Redman, 2009, pp. 176-177).

The peer review process

Socio-political factors lie at the core of the Toulminian view of the research process, a key aspect of which relates to the peer-review cycle which acts to vicariously select knowledge contributions by the wider academic group – vicarious in the sense that it seeks to represent selection by the latter. Additionally, peer review can be viewed as a key gatekeeper in the wider dissemination and retention of knowledge, where editors act as 'disciplinary filters' in 'sifting out papers which deserve publication in his *(sic)* journal' (Toulmin, 1972). Editors make initial judgments of research quality and contribution in light of journal objectives and intended audience. However, contribution is a "subjective notion often described as recognizable when seen but hard to explain", differs between editors and levels of experience (Corley and Schinoff, 2017), and 'open to disagreement' (Mingers *et al.*, 2012, p. 1078, p. 1091). Kuhn (1996) notes that the research tradition to which the editor belongs is a key factor to consider. Given the key role editors play in shaping paper contributions, they are more than gatekeepers, building and shifting consensus around ideas (Corley and Schinoff, 2017; Hollenbeck, 2008).

Journal aims and scope also exert subjective bias, as some define their fields 'quite narrowly' (Otley, 2002, p.401), and seem to reward constricted research streams (Gray and Helliar, 1994, p. 248), while others do not encourage 'submissions from novices or overseas researchers' (Tinker, 2006, p. 707). Some authors also contend that key B&M journals tend to publish positivist-based empirical work appearing in mainly North-Western outlets (Baum, 2007; Cassell and Lee, 2011), e.g. *AMJ,* where previously 'only 11% of all papers published' from 2001-2010 'were based exclusively on qualitative data' (Bansal and Corley, 2011, pp. 233-237), a practice only now seriously debated and tackled (see Bansal and Corley, 2012). A result of the selective positioning of these 'top' journals and use of journal rankings sees many scholars' feeling the need to 'conform' to elite journal standards before even submitting research papers to them for possible publication. Baum (2011) offers empirical support for the resulting skew of journal impact factors by editorial decisions and reification of a select journal list, and the rise in submission rates to this 'elite' club seemingly puts increasing pressure on editors to manage peer-review with many editorial teams increasing in recent years (Corley and Schinoff, 2017). This sheer volume of submissions means that truly original contributions are often not developed, noticed, or acted upon (Alvesson *et al.*, 2017). Even if all such submitted papers were viewed as having appropriate high quality, not all could be published within the production cycle, meaning pressure to manage higher submission rates might further exacerbate key interpretation biases.

Additionally, given the lack of anonymity in the peer-review process, editor decisions may be influenced by assessment of author status and affiliation (Judge, Cable, Colbert, and Rynes, 2007, p. 494-495), and peer-review being far from politically neutral and restricting types of research published (Lee, 1997, p. 14). For instance, in many top B&M journals, editorial board membership seems concentrated in the United States (US) academy (e.g. 2,227 editorships, or 75% of total), meaning US-based B&M scholars define what 'top' level knowledge is (by acting as gatekeepers of it), and aspiring European B&M scholars seem dependent upon their US peers for journal access and possible publication (Burgess and Shaw, 2010, p. 633). Additionally, such board membership 'may facilitate the proliferation of academic patronage', and despite acknowledgement that such matters seem 'complex' (Altman and Laguecir, 2012, pp. 590-592), much evidence points to an Anglo-American academy of editorial board membership and influence overall in B&M (see Adler and Harzing, 2009; Baruch, 2001; Burgess and Shaw, 2010; Judge and Simon, 2007; Marginson, 2006; Murphy and Zhu, 2012). For example, both Africa and Latin America seem 'almost' completely absent from global mapping of author and editorial board membership, meaning they need re-balancing to better represent such 'Southern' scholars, and as a result, initial editorial decisions regarding paper quality and subsequent reviewer selection are influenced by the editor's idiosyncratic interpretations of contribution, thus reinforcing editorial boards as the 'strategic centre' of the journal community (Murphy and Zhu, 2012, pp. 923-924).

Of course, institutions can choose not to use journal ranking lists as proxies for assessing research output quality, and HEFCE have 'ruled out' their use for British research evaluation (REF) purposes (e.g. Fearn, 2010, p. 13), in stating that: 'No sub-panel will make any use of journal impact factors, rankings, lists or the perceived standing of publishers in assessing the quality of research outputs' (HEFCE, 2012). Nonetheless, both B&M academics and decision-

makers in UK research departments still, increasingly, see journal articles as key outputs (Mingers, Watson and Scaparra, 2012, p. 1080), as formally and informally, journal ranking lists like the CABS *Guide* have become definitive proxies for measuring and assessing research quality there (see Adler and Harzing, 2009; Bell, 2009; Butler and Spoelstra, 2012; Harvey *et al.*, 2011; Mingers, Watson and Scaparra, 2009, 2012; Tourish, 2010: Willmott, 2011). Such journal ranking usage seems problematic, as judging articles by their journals, deciding single journal rankings, making hiring and promotion decisions from such rankings, and restricting journals that faculty publish in are all controversial developments (Mingers *et al.*, 2012, p. 1091). Indeed, if academic 'managers' do not fully read these research 'outputs' and instead rely on the journal ranking judgements and scoring, potential exists for some scholars to become unfairly excluded from research audits, even though relevant academic experts have not come to these decisions. Following Decramer (2013, p. 357), such instances may reflect inflexible management decision-making, a less than professional approach to scholarly activities and a lack of 'procedural justice' in European Higher Education Institutions (HEIs).

The effect of output assessment on the greenhouse

The net effect of journal ranking list introduction is to increase the impact of extrinsic selection on the wider research process, which for our greenhouse, shifts gardener efforts towards producing trees for gardeners themselves, as opposed to their intended uses in the world beyond. Additionally, the wider gardening community now develops a view of beauty becoming increasingly focused on fewer tree varieties. As a result, variation happens within existing trees themselves, as new branches are crafted to create new forms, yet still drawing from the same tree core. Experimentation with new species is not encouraged, resulting in stunted growth as less resource is expended on new tree variants (see Figure i). This shifting focus of variation towards existing knowledge trees results in many branches and sub-branches proliferating within a domain of study. A result is many publications within these sub-branches have meaning only to "micro-tribes" of researchers (Alvesson *et al.*, 2017), who increasingly pigeonhole themselves into narrow disciplines to master key literatures and approaches, and thus increase their writing productivity. However, the likelihood of breaking free of conventions in a Kuhnian sense is dramatically reduced by such strategies, as the bigger the tree, and more profuse the branches and sub-branches within it, the more isolated and specialized knowledge niches thus become.

Such variations have two consequences. Firstly, branches and sub-branches within these trees become increasingly specialised and dependant on the key knowledge 'trunk' within that domain. Secondly, it becomes increasingly difficult to find links between branches and other trees beyond, as consensus-challenging work using literatures across disciplines is seen as risky (Alvesson *et al.*, 2017). Interdisciplinarity is a key vehicle to enhancing creativity within academia, and needed to address the complex, intrinsically difficult 'Grand Challenges' of global importance today (Stern, 2016). However, the distinctiveness of different trees prevents species interbreeding, and emergence of new breeds. Interdisciplinary research has been underrepresented in previous research audits, with only 6.4% of such outputs submitted to the British REF 2014 exercise (Stern, 2016), despite 8.4% of UK-based articles on the Scopus bibliographic database belonging to the global top 10% in interdisciplinarity. Building on conceptualisations of one-dimensional academics and monoculture (Mingers and Willmott,

2010), Toulmin's evolutionary account has arguably passed from a natural to an artificial environment, where greenhouse goals have altered from producing goods for a changing world without, to generating products for the gardening community within. Beauty is no longer found in the search for truth (through intrinsic selection), but instead truth has become the search for beauty (through extrinsic selection).

In the absence of safeguards which nurture novelty, extrinsic selective biases can constrain variation mechanisms and the evolutionary paths disciplines follow. Thus, journal rankings might further suppress variation at the level of individual academics (in terms of volume and degree of innovation), biasing the selection and dissemination process (via a more restrictive peer-review), and also in reinforcing retention of existing paradigms within wider academic communities. In our metaphorical greenhouse, the emerging dominance of the journal ranking narrative can channel resources into existing knowledge trees at the expense of new saplings. Fledgling concepts are starved of the resources needed to get a foothold in the broader knowledge ecology, resulting in 'arrested development' for innovative research streams (Butler and Spoelstra, 2012, p. 897). While such knowledge trees can meet the demands and rigours of supporting academic communities, they reflect the past, and may become ill-suited to the world beyond the artificially controlled greenhouse environment. Hence selective biases can result in the peer-review process increasingly failing to represent selective processes within the wider business, or even academic community, environment and stakeholders. While this greenhouse effect might result in beautiful 'prize trees' being grown, the greater isolation of this cultural eco-system, the less likely the resultant product will 'fit' in the world beyond the glass.

The Toulminian Process and Assessment of Research Impact

If the use of journal rankings produces knowledge which becomes increasingly ill-suited to the world beyond the confines of the research environment, surely a renewed focus on relevance should redress this imbalance? As Alvesson *et al.,* (2017) note, many believe that incrementalism in research is unable to address major societal issues. Perhaps by shifting focus onto research "impact", research audits can address this trend, as ecological 'fit' can be understood as i) the selection of knowledge by an academic community (within the ecological greenhouse) and ii) selection of applied knowledge by wider stakeholders through practice and policy (beyond the controlled greenhouse environment). The latter 'selected' body of knowledge may represent only the 'tip of the iceberg' of broader academic knowledge which developed over the years. While it may be recognised that increasing diversity within the former increases the chances of finding applied solutions to the latter, translating and measuring the relevance of applied knowledge to the multitude of incremental steps in advancing knowledge within an academic sub-discipline becomes problematic. For instance, B&M scholars argue that the use of research 'impact' may imply that some existing academic work has little practical or applied value (Otley, 2009, p. 6); is less useful due to management being a field of study and not a discipline (Thorpe, 2009); and may see us 'playing a game in which we do not understand the rules', as there is 'little understanding' about processes leading up to such 'impact' (Howells, 2009).

Moreover, the shift towards 'impact' seems to have encouraged hotly contested debates over whether B&M academics can, should, or do make links to become 'relevant' with businesses,

managers and practitioners (e.g. Amabile *et al.*, 2001; Hodgkinson and Rousseau, 2009; Keiser and Leiner, 2009; McKiernan, 2009; Pfeffer, 2009; Starkey *et al.*, 2009; Wensley, 2011). Further, following Learmonth (2008), by seemingly stressing and rewarding 'what works', shifts toward 'impact' could arguably serve government and industry, and become political, as they may praise managers as 'expert' assessors while appearing 'neutral' in this process. Indeed, as 'impact' seems difficult to reject (which academics do not want to have some type of it?), and if its language seems rational, it could also show a pathway towards 'relevance' that some (but not all) B&M academics may seek. Other concerns include 'impact' as 'un-tried and un-tested', something that may 'penalise basic and curiosity driven research' (UCU, 2009, p. 2), and mean that UK academics may generally become 'behest' to market forces (Fox, 2009, p. 24). An issue emerging is that (as with 'output' targets), use of non-academic 'experts' to partly judge some 'impact' aspects in academic work sees trust in B&M academics instead being replaced by new performance measures (MacDonald and Kam, 2007; Puxty, Sikka and Willmott, 1994). Here, B&M stakeholders seem united in criticising the 'impact' element, as the British Academy of Management (BAM) called for 'reducing' its' weighting (Ghobadian, 2010, p. 2), and problems with its methodology, such as creating possibilities for HEI 'game playing' and 'very creative' case study writing, and that the views of individual panel members might make field comparability 'extremely problematic' (BAM, 2010, p. 1-2). Hence one expert commentator concludes that the British REF's proposed 'impact' element is, generally, a bit of 'a mess' (Neely, 2009, p. 6).

The effect of impact assessment on the greenhouse

The 'measurement' of research impact may a) not apply to most research undertaken within the broader academic community and b) place disproportionate weighting on the value of applied research, as the latter may result in the knock-on consequence of individual scholars and institutions favouring and selecting this impact-led type of 'knowledge'. Longer-term results of such bias may include 'less applied' research being undervalued, whether incremental or ground-breaking. As Newton famously noted, 'if I have seen further, it is by standing on the shoulders of giants' (in Maury, 1992). But by biasing selection processes towards the top end, applied technology of science, 'impact' measurement risks undermining the complexity of the knowledge creation process, and leaving Newton standing unsupported. Essentially, while the rationales for introducing means to assess the 'fit' or 'relevance' of B&M research to key stakeholders may seem reasonable, the process through which it is structured appears problematic.

While assessing publication outputs increases the degree of artificial selection by our gardening research community towards producing prize trees, assessment of impact also shifts emphasis towards the production of environment-ready trees. The creation of trees involves a long process of developing new variants, experimenting under different conditions, and selecting those which will perform better in the environment beyond the greenhouse. Recent calls exist for the transfer of theoretical approaches across disciplines to lead to the cross-fertilisation of new insights and emergence of new theoretical directions. But the early stage development of such new theoretical lenses involves an experimentation process best carried out within the greenhouse environment (Kuhn, 1996; Popper, 1979), as without it, no future super-crops may be produced.

By focusing on the final stages of the process of successfully introducing greenhouse-developed trees into the outside world, the laborious processes which preceded it are ignored. In research terms, increasing focus on 'impact' shifts emphasis towards more applied, non-'blue skies' research. Traditionally universities are seen as homes of early stage research, whereas commercialisation efforts support research at later stages of knowledge development. The shifting agenda on impact pushes attention towards application, away from basic theoretical development and downplays variation at this early stage. While these new saplings could be developed into better fit plants, if the early stage research needed in their growth is constrained, they may never be planted in the first place. Hence while the shifting focus of assessment from publications to impact might be motivated by desires to make research more relevant, by constraining early stage variation it undermines the foundations of the research process.

Addressing Toulmin's Call for Novelty

In light of increasing journal rankings usage, one might question whether Toulmin's solution for nurturing novelty still holds some forty years later. With the arrival of research audits, and increasing prevalence and dominance of journal ranking narratives, the potential for selective biases alluded to by Toulmin are arguably i) exacerbated and ii) more difficult to counteract. Viewing the research process as an evolutionary system highlights the need for variation processes alongside selective retention. The discussion above shows how various assessment exercises have over-emphasised the latter at the expense of the former. We argue that without a rebalance in emphasis towards variation, the future development of research is channelled into ever-narrowing evolutionary paths, ultimately threatening survival of the wider eco-system. Drawing on the greenhouse metaphor, we point to the need for novelty as the engine of any evolutionary system, as "societies which invest in ideas and research are generally more creative, productive, resilient, open, profound and equipped to face and understand challenge" (Stern, 2016, p.6). Using the greenhouse metaphor thus sharpens our understanding of wider eco-system features within which research evolves, and examining them can help address Toulmin's call for novelty.

The call for academics to search for novelty

Given our fast-changing socio-economic landscape, there is now a need to develop new ideas and approaches. While innovative and interdisciplinary research has a key role to play in addressing complex problems, such ventures require fundamental exploration of new conceptual paths, with new strategies and tactics adopted at all levels within the research community. While increasing emphasis on research publications measured through journal rankings constrains novelty beyond existing paradigms, shifts towards 'impact' further downplay the importance of early stage theoretical research. Both forces together constrain novelty in developing new theoretical ideas, and any design process needs a multitude of variations at the top end. Constraining this top end variety limits the future potential of the wider system. In Toulmin's evolutionary terms, by focusing on selective retention at the expense of variation, research proceeds down increasingly narrow evolutionary paths, severely limiting the wider system's ability to deal with changing, unexpected future worlds.

Of course, individual academics themselves cannot be let off the hook regarding the need for novelty, and in many respects are complicit in the extrinsic selection forces at play in the greenhouse. When Alvesson *et al.,* (2017, p.9) proclaimed at a recent international conference that 'never before in the history of humanity have so many written so much while having so little to say to so few', he was met with spontaneous applause. Does such approval reflect collective frustration with the greenhouse, or acknowledgement of academic complicity in accepting it, and in propping it up? Indeed, some gardeners may even be corrupted by the system (MacDonald and Kam, 2007). Individual academics have choices to make about whether to play games aimed at increasing chances of publication, and with this promotion (as noted above), or whether to resist institutional pressures which might force one off a path of enquiry. The latter path is more challenging and fraught with difficulties. Alvesson *et al.,* (2017) suggest that academics adopt polymorphic approaches travelling between disciplines and seeking out academic adventures, to allow ideas to cross-fertilize, and bring novelty to both domains (Schoeneborn *et al.,* 2013). This requires a shift in how individual academics view their role and the careers they follow, and at the same time, institutions need to nurture and develop this process of emergence (see below). As Simsek *et al.*, (2015, p.312) note:

While some opportunities are of the "low-hanging fruit" variety, others call for creative and courageous efforts to explore topics of unknown variety with a substantial risk of dead ends and empty hands but with potential to rejuvenate and enlighten the entire landscape. Without discovery driven explorations, research will likely increasingly travel on narrow roads that can suffocate further social traffic.

Doing so involves a different mindset of prospecting for knowledge rather than mining around niches of existing paradigms, and for individual academics to write less, and read and think more, to set new paths as opposed to spotting gaps in existing domain-specific literatures (Alvesson *et al.*, 2017).

The role played by institutional selective processes in nurturing novelty

Novelty should relate not only to theories being developed, but extrinsic factors acting to constrain them, and institutions play a key role in this process. Journal ranking lists might also include less traditional journals including open-access formats which experiment with different peer review forms to better respond in a timelier manner to complex and fast-evolving global events. Additionally, high ranking academic journals could act to promote innovative and original ideas via relaxing journal or article conventions (Alvesson *et al.,* 2017). Given the key role editors play, regular rotation of editorial board membership would ensure that novel submissions are matched by novel selection frames. Diverse disciplinary backgrounds should be matched by diverse editorial experience, as novice editors bring advantages, in having fewer rigid schemas, flexible thinking, and being more willing to put in extra time to reach out to experienced editors for advice (Corley and Schinoff, 2017).

Universities can also nurture novelty, which in research terms might take the form of discussion teams, special interest groups and specialized journal fora to support new concepts. Individuals could create environmental niches in which new variants are nurtured and have a 'chance to first

demonstrate their merits before being swamped in the larger population' (Toulmin, 1972). Arguably (Authors, 1995) this phenomenon is a direct analogue of peripheral isolation in the evolution of new species, and without it, novel ideas can be lost in 'a welter of speculative debates and polemical objections, in which their characteristic virtues and implications can no longer be identified and explored' (Toulmin, 1972). While Toulmin (1972) argued that the greenhouse manager might create incubators to nurture these saplings, in today's research environment such moves to create and/or publish in new publication spaces might spell the premature end to an academic's career. Here, universities can take a more progressive approach to assessing publications, disregarding journal ranking lists, or the assessment of impact by considering research at all stages of development. Crucially, universities can revise promotion criteria to discourage game-playing and evaluate the value and social meaning of publications rather than the number and journal ranking of outputs (Alvesson *et al.*, 2017). Doing so requires a shift in emphasis from game-playing to game-changing research at all stages of the knowledge development process. Given institutional focus on research outputs as a performance measure, journal editorial and review duties frequently go unrewarded by institutions, resulting in a minority of academics fully engaging in extrinsic selection processes, and further restraining the range of selection frames needed to encourage novel submissions. By rewarding both peer review activity and editorial duties, universities can play a key role in reprioritising these activities (Corley and Schinoff, 2017).

Alongside a realignment of practices at the University level, governments might include a measure of novelty in future research audits to shift the balance of assessment from selective retention to variation at an institutional level. Research assessments should therefore not only measure the beauty of established trees, or the success of environment-ready plants, but the number of saplings and incubators within the wider greenhouse. Essentially, such exercises would measure the full extent of the innovation funnel, giving equal billing to emerging novelty in them, alongside publication outputs and impact, as novelty represents the future health of the eco-system, especially given the changing challenges of the wider environment beyond the greenhouse.

Conclusions

Forty years ago, Toulmin offered an ecological solution to the problems highlighted herein through the institutional equivalent of the incubator (see Figure i), hedging against the risks of established disciplines overly-constraining novelty. While such incubators in current academia may include scholarships such as the Marie Sklodowska-Curie or Leverhulme grants, they do not always work well in practice given the constraints we detail above. While these projects are set up to nurture novelty, given their competitive nature, they ultimately fall into the same trap as journal publications. Indeed, as business and management studies face a number of significant global challenges today, to maximise the opportunity for research in it to offer key insights and solutions to them the full power of knowledge evolution needs to be unleashed in order to exploit the widely diverse ecology of knowledge domains. As discussed above, use of journal rankings and recent shifts towards assessing research impact can act to reduce creativity and innovation, bias selective pressures, and restrict dissemination and retention processes within the wider academic community. As such, the future for some European researchers and HEIs may appear

both frustrating and disappointing. Ultimately the social science community might usefully ask itself, how fit for purpose is the existing academic process? The failure of political and business leaders to fully meet current socio-economic global challenges presents a unique opportunity for research to inform and engage with the multiple end-users of such research. But these challenges are clearly fast moving, requiring an academic process which can quickly react and anticipate possible differing futures. These multi-faceted, hard problems require complex solutions, as knowledge evolves through a co-evolutionary hierarchy of interacting systems. As such, we must arguably stimulate innovative potential within this system by encouraging variation within levels through creativity. Though higher risk, more range and deviancy increases opportunities to find the right and timely solutions for our complicated problems. However, externally imposed selection pressures – through journal rankings – risk cutting off 'paradigm shifts' and the generation of 'grand theory', while also constraining innovation and fragmenting B&M research overall. In doing so, the formal and informal use by internal departmental decision-makers of journal rankings together with research quality audits potentially throttles the progress of increasing both knowledge and relevance of future research in the B&M field. As evidence from mass extinctions shows (Benton, 2003), overly specialized species are most at risk if catastrophe strikes.

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