1. Meta-research as discipline, field, or spectrum

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NEVER EDIT A HANDBOOK DURING A PANDEMIC

When we started this *Handbook*, our time was stretched like that of many members of the academy, but we entered this project with the level of academic hope and enthusiasm that characterised research prior to the pandemic. Not less than six months after the contract was signed, and initial chapters commissioned, the world entered a series of lockdowns and restrictions that influenced how research as a social entity was performed, shared and valued by academics and non-academics alike.

As an editorial team, we have not been immune to the challenges experienced by the academy at large during the pandemic; and by extension, neither have the authors who contributed to this *Handbook*. There has been an interchange of topics, authors, chapters and changes in focus due mainly to the consequences of the pandemic, such as greater time restrictions, re-prioritising time (and energy), secondment to the front lines, long-COVID, bereavements and seemingly never-ending shielding. As an editorial team, we committed to an approach of kindness and flexibility to account for the diverse in nature, and totally understandable, delays experienced by many contributors to this *Handbook*. We also attempted to enable substantive learning from the unfolding processes of change in research ecosystems around the world to be reflected in the content of the chapters. Through interaction with the sheer global reach of the authors who have contributed to this *Handbook*, we are acutely aware of different challenges facing researchers around the world and the challenges facing meta-research itself, as research attempts to recover from the pandemic crisis and to address further and ongoing global challenges. Indeed, it is a testament to the commitment that our authors have to their work, that this *Handbook* exists at all. To that end, we first acknowledge their contribution and collegiality as we constructed this project together during the pandemic crisis. The production of this *Handbook* is an example of how personal and collective efforts have kept the avenues of international research communication and collaboration open throughout exceptionally challenging times.

Whether the COVID-19 pandemic has been the making of, or contributed to the decline of, research cultures is still to be fully understood. International collaborations paused, or never began (Liu et al., 2020; Wagner et al., 2022); gender, racial and career disparities increased (Amano-Patiño et al., 2020; Andersen et al., n.d.); the culture of overwork continued to dominate universities (McGaughey et al., 2021; Watermeyer et al., 2021) and therefore, how research is performed changed (Mahi et al., 2021; Prudêncio and Costa, 2020). In addition, most research evaluations on the macro-, meso- and micro-levels have not fully taken into account the longer-term disruption and human cost to research and researchers caused by the pandemic, which will continue to reveal themselves in years to come. Indeed, despite research playing a larger, publicly prominent role in formulating a way out of the pandemic, by doing

so it has also exposed misalignments of morals and objectives within its own cultures. Indeed, reports of growing gender, racial and discipline-related inequities in science (Bowyer et al., 2022; Davis et al., 2022; Staniscuaski et al., 2021) are continuing, years after the initial lockdowns were implemented. These sustained inequities will present one of the major challenges to meta-researchers, as part of the necessary process, to re-imagine research in the direct and foreseeable aftermath of the initial shock of the pandemic. It is now, more than any time, when the field of meta-research can shed a much-needed light on the process of re-examining the norms that shaped pre-pandemic or 'normal' science. If anything, the pandemic may yet be the making of meta-research.

One of the consequences of meta-research, and being a meta-researcher, is that we are not immune from the drawbacks highlighted by our own research. Meta-researchers, for better or for worse, simultaneously examine and experience research culture. For this reason, among others, the positionality of meta-researchers is never fully independent, nor is it totally objective, in the pursuit of different forms of truth and knowing. This does not, as one might readily assume, diminish the validity, legitimacy or impact of its outcomes. Instead, as we demonstrate in this *Handbook*, it is precisely this variety of perspectives and interpretations offered by its practitioners that makes meta-research so powerful and worthy of a sustained contribution *to* knowledge, as well as to *how* knowledge is produced and then disseminated.

Within this *Handbook*, we bring together key multidisciplinary scholarship into what we see as an integrated, intellectual and methodological project of working towards a characterisation of meta-research as a discipline. Each chapter brings a comparative dimension, internationally and across institutional types, sectors and fields of research. As such, this *Handbook* is a response to the, arguably, recent growth in interdisciplinary meta-research, as well as to its variety of stakeholders who are inextricably invested in its growth and recognition. These stakeholders include, but are not restricted to, research funders, policy organisations, charities, publishers, technology companies, higher education institutions, other research and development organisations, research management and research services organisations, research 'users' and beneficiaries, and independent researchers.

By adopting a multi-layered approach, this *Handbook* considers the following domains: the public value of research; policy and governance of research; knowledge dynamics; and research cultures and careers. The book offers an inclusive perspective on meta-research, by engaging with diverse philosophical, theoretical and methodological approaches; broad notions of research (STEMM, HASS, HE-, practitioner-, industry-based, etc.); dialogue between 'global south' and 'global north' perspectives; and equality, diversity and inclusion across sectors, career stages and geographical regions.

META-RESEARCH OR META-SCIENCE?

Perhaps the most contentious point for this *Handbook* is its adoption of the term 'meta-research' as opposed to 'meta-science'. This is a conscious choice by the editors. When seeking chapter contributions, it did not escape our notice that many authors, especially those not resident in the global north, did not consider their work as meta-research. In fact, on more than one occasion, authors queried the editors as to the meaning of meta-research and, by merit of further explanation, meta-science. In reply we provided only broad definitions to guide contributions, simply due to our objective of demonstrating the diversity of, and facilitating dialogue

between, the ideas present around meta-research. Indeed, as evident in the contributions contained herein, there are differing ideas about what the term meta-research meant relative to the authors' research interests and approaches. Despite this, authors quickly identified with the aims, norms and methods they saw as important to share along the meta-research spectrum. Indeed, it is by first identifying our differences, that we can recognise what values and perspectives we also share.

Perhaps the term 'meta-science' has received more attention of late. The term, while been in circulation since the early 1970s (Benjamin, 1960; Faust and Meehl, 2002), has not been readily used to describe a body of work until relatively recently. It was adopted, in particular, by a collection of defining pieces of work referring to a crisis of reproducibility in science and the rise of the recognition of academic misconduct (Fanelli et al., 2017; Ioannidis, 2018; Ioannidis et al., 2015). Through these pieces, there was a call to improve the 'reliability' and 'efficiency' of scientific research (M. Munafò, 2017; M. R. Munafò et al., 2017). Part of this spike in studies is related to the increased availability of large-scale datasets[1] which, by nature, require the application of different methodological approaches that may be more in line with a positivist paradigm and/or the term 'meta-science'.

For the editors of this *Handbook* the term 'meta-research' comes without the full epistemological undertones of the term 'meta-science'. In fact, in contrast to 'meta-science', we use the term 'meta-research' to refer to a broad landscape of knowledge that encompasses the full spectrum of modes and types of scholarly inquiry. For us, meta-science is only a part of a much broader and valuable landscape of meta-research, which includes contributions from, for example, philosophy (Ballantyne, 2019; Holbrook, 2013), empirical and theoretical sociology (Cole and Zuckerman, 1984; Sandel, 2020; van den Besselaar et al., 2018), higher education research (Henkel, 2000; Oancea, 2019; Shore, 2008), physics (Hirsch, 2005), gender studies (Criado Perez, 2019; Ferber and Loeb, 1997), psychology, labour economics (Bagues et al., 2017; Zinovyeva and Tverdostup, 2021), criminology (Faria, 2018), evaluation (Dahler-Larsen, 2001), areas of medicine (Greenhalgh and Engebretsen, 2022; Lamers et al., 2021) as well as health (Boaz et al., 2019; Nutley et al., 2007; Oliver and Boaz, 2019). This is not to say that many meta-scientists were not approached in the production of this *Handbook*, but those authors who also identified with meta-research as a term were more likely to contribute chapters.

Drawing lines in the sand, such as this *Handbook* appears to do, may be controversial as we seem to aim toward an all-encompassing definition and characterisation of 'meta-research', but the term is inclusive and therefore purposefully does not seek to limit or (de)value different contributions. This term also recognises that the current clashes within meta-science (Peterson and Panofsky, 2020) are unique to this emerging contribution within a broader meta-research spectrum, whereas meta-research is an organic evolution of several fields of research coming together, with common interests and common objectives. With this commonality is the shared ethos of improving the understanding of how knowledge is (co-)constructed, practised, circulated and used within broader society. A shared norm of meta-research is one that is inclusive and embodies the concerns of responsibility in data interpretation, use and dissemination. Manifestos and agreements such as the Agreement on Reforming Research Assessment (CoARA, 2022), the Latin American Forum for Research Assessment Declaration of Principles (FOLEC-CLACSO, 2022), The Cape Town Statement on Fostering Research Integrity through Fairness and Equity (Horn et al., 2022), The Hong Kong Principles for assessing researchers (Moher et al., 2020), the Leiden Manifesto (Hicks

et al., 2015), and DORA (The American Society for Cell Biology, 2012) reflect this in the way that their ethos extends past research priorities surrounding the opportunities available for research that come with increased access to (big) data. Indeed, many such manifestos emerged from multi-disciplinary meta-research collaboratives or conferences and have been so widely embraced beyond meta-research simply because they are, in essence, inclusive and not purely domain specific. Although some of the initial indicator-level innovations from early meta-research that have also been broadly adopted stemmed from more specific fields of research – such as the h-index from physics (Hirsch, 2005) and models of bibliometrics based on epidemiology theories (Cronin and Sugimoto, 2014; Leydesdorff, 1995) – their specific epistemic roots were later obscured as they were widely re-packaged and used across multiple fields and sectors. In this way, all research has a stake in the future of meta-research.

Thus, meta-research is grounded in a strong history of theoretical constructions and the development of understandings that transcend the epistemological barriers characteristic of modern meta-science. These understandings as well, have emerged from an evolution of sophisticated methods and tools. The epistemological groundings of meta-science have developed alongside the more recent availability of large datasets (Evans and Foster, 2011), such as the Web of Science (Clarivate), Elsevier, and others, and yet the maturity of such datasets was developed by many who are considered pioneers of what is now understood as meta-research. Such names as Merton, the Cole brothers, Garfield, Whitely, Zuckermann, Nowotny, Gibbons, are not always readily acknowledged as meta-scientists, but are undoubtedly responsible for the development of norms that underpin the availability of data upon which meta-science depends. In a way, this epistemological diversity is reflected in the authorship of the contributions contained in this *Handbook*. In addition, and in line with the tradition of non-exclusion, we also have contributions from disciplinary experts alongside meta-research stakeholders such as national research councils (Research England, Chapter 9), data-providers (Elsevier, Chapter 14) and research management (Association of Research Managers and Administrators – ARMA, Chapter 26). The diversity of its contributors, together with the shared norms and enthusiasm evident in every chapter, is a value that we, as practitioners in this meta-research space, embrace. It is a pleasure to be able to demonstrate this value within this collection and use these contributions as a starting point towards greater identification of authors as practitioners of meta-research.

META-RESEARCH AS A FIELD OR DISCIPLINE?

Up until here, we have purposefully referred to meta-research as a spectrum and have refrained from labelling it as a field in the absence of further discussion and exploration. There are no predetermined components underpinning the process of defining disciplines and/or fields generally, and the process of demarcation often seems more an exercise in identity than one of epistemological inclusion (and, by implication, exclusion). For members within a field, identity and possessing a sense of belonging are necessary, as they indirectly guide the construction of values and norms of excellence that is used to evaluate research contributions, as well as guide the training and socialisation of new members (Becher and Trowler, 2001).

And yet, despite its age and the longer-term use of the term, meta-research is not (yet) sufficiently institutionalised to be described as a 'discipline'. For the sake of this *Handbook*, we see the definition of 'discipline' as more institutionalised than that of a 'field', often aligned with

formalised university departments or faculties. A lack of such institutionalisation is evident in the affiliations of the authors of this *Handbook* who, despite common interests and shared values, come from a variety of departments such as politics, education, economics, computer science, sociology and health, and yet their identification with the goals of meta-research rises above and beyond traditional subject classifications in universities. For a field, there is a sense of openness of borders, multiplicity, and flows (Guy, 2018), a sense that is common for members of the meta-research field. This results in a separate identification that comes with shared conference spaces and collaborations. Steps to exclude, and measures to define borders in order to traditionally demarcate the field and transform it into a discipline, are in itself controversial for a field that embraces an ethos of inclusivity and multi- or transdisciplinary behaviours. The field may share topics and phenomena of interest; although this does not necessarily extend to shared approaches, theories or methods, neither does it reduce it to just a space of positional struggle, and stop us from working together.

Disciplinisation may not (at least yet) be a fruitful offering for a field that sees its future as building from values of openness, inclusivity and cross-cooperation. Indeed, solidifying its 'topology' (Bourdieu, 1985: 723) and defining its borders too early may result in irreversible consequences for the field. The benefits of how meta-research has developed of late stem exactly from its openness towards cross-field fertilisation, allowing experimentation with new methods, questions and roles that can enhance understandings of our work environment. To cut it off too early would be to restrict its growth, as with other applied fields, close it off to, as yet unforeseen, possibilities and, by extension, limit its impact. This may not, however, be the case for sub-specialities of meta-research, such as meta-science, who see the benefit in establishing epistemological belonging in the early stages. Regardless, whereas meta-research can be defined, not in terms of disciplinarity, but as a set of normative commitments, such as inclusivity, ethical responsibility, openness and application to the nature of research work and the culture that enfolds it, such resistance to disciplinisation comes with its own drawbacks. These are acutely known to those members who study reward systems in science (see 'Reflexivity in meta-research' below), where it is difficult to embody and practice these principles given the way that publishing, reward and evaluation within research are currently conducted. We address these issues in more depth in the following section.

REFLEXIVITY IN META-RESEARCH: CHALLENGES FOR FUTURE NARRATIVES

An inescapable paradox faced by meta-researchers is that we are practitioners in our own research. At the same time, we are also our own stakeholders. This establishes a tension in how our research influences our research practice: how is it possible to sustain rigour in the study of our own lives, practices and culture when we remain personally invested in the outcomes of this research? Similar to other professions that demand constant self-reflection, being meta-researchers also comes with emotional labour to navigate the flux within systems of research. In other fields, this tension may be referred to as arising from 'emic research', in others as typical of 'practitioner research', but for meta-research, these distinctions fall apart in that we simultaneously study and operate as professionals within research. For the pieces contained within this *Handbook*, the assumption of this identity is not necessarily essential, but it is used here as a valuable lens to view research on research.

At the same time, in the move towards disciplinisation there are trade-offs that act to challenge our shared understandings and implications for our own practice. This is in part due to the challenges of continual reflexivity described above, but it is also due to maintaining an understanding of mutual principles beyond disciplinary boundaries. We see the future of the field as interdisciplinary, but through this interdisciplinarity the structures that we critique, and arguably develop, also work against this level of diffuseness in our work. We are inter-disciplined in the sense that we resist both disciplinary boundaries but also come up against being 'disciplined' by evaluation and governance systems in research. This means that we are pressed to submit to demands for competitiveness, performativity and audit, while at the same time treating them as phenomena to research and potentially critique. The difference, we hope, is that the basis, from which we engage in these loci of critique for meta-research, is a formative and deliberative mode of reflection that influences larger national and institutional policies, as well as our own research practices, structures, cultures and immediate environments. We see this in studies about how national audit frameworks influence research behaviour and management practices (Pardo-Guerra, 2022). At times norms that are shaped from within the culture itself, such as when meta-researchers act to manage or facilitate responsible research practices (Derrick et al., 2022), can be more influential on the behaviour of individuals who are also colleagues, than attempts from either external or top-down management policies. In this way, meta-researchers embedded with research institutions can be powerful agents for evidence/data-driven change, one that is arguably overlooked to date. Further, as meta-researchers work within diverse institutional settings, such changes are also widely spread. However, as long as we continue to be diffuse as a discipline and as a dispersed network of peers, it remains difficult to sustain a collective weight sufficient to make and maintain any long-term, or else meaningful, change in research systems as a whole. This again, feeds into the reflexivity-paradox of meta-research that balances the advantages of remaining undisciplined with the frustrations of the difficulties to make any long-term change within our own cultures.

Working directly with stakeholders is a mechanism that minimises the frustrations of the reflexivity-paradox. The stakeholders of our research are also the ones on whom we depend for our livelihood as practising researchers. Stakeholders such as industry, research-enabling professionals,[2] government bodies and funding bodies are vital partners for funding, capacity building and promotion of the outcomes of all research. However, unlike in other research disciplines and fields, these stakeholders remain partners as well as members of the entire meta-research spectrum and it is essential for us to work together in order to initiate change. It is also largely impossible to initiate change in our own environments in the absence of collaboration with these stakeholders. The diffuse nature of meta-research means that efforts to initiate change bottom-up inevitably run afoul of the different logics and cultures within which this work arises, and complicates attempts to apply these initiatives across other research disciplines where they may differ in relevance. How to find and meet on common ground is a continuing challenge.

Therefore, there is substantial benefit to engaging with the overarching perspectives of these stakeholders. An example of this is with academic publishers which are simultaneously:

(1) providers of information as the object of studies in meta-research;
(2) providers of the main source and constructor of the infrastructure of research dissemination;

(3) organisations involved in and influenced by the research on research (publishing) in practices and decision making;
(4) commercial or not-for-profit business organisations relying on knowledge creators and users for the publishing industry to sustain; and finally
(5) recipients of critique by both the wider research community and the meta-researchers in the efforts to improve the system.

In the interactions between meta-research and publishers as stakeholders there is a tension between differing values and interpretations in relation to notions of quality, openness and responsibility, and finding a shared agenda or even a common vocabulary is difficult to resolve. Indeed, whereas meta-researchers may advocate around issues of article processing charges (Montgomery et al., 2021), and definitions of public duty (Watermeyer, 2019), it is also important to consider the perspectives of publishers in order to reach the level of mutual understanding necessary to establish and then maintain a dialogue within the field. Another example is peer review, a topic that enjoys the benefits of interdisciplinary research buy-in, but that without sustainable cooperation from meta-researchers and stakeholders such as funding agencies or publishers, will continue to suffer from data-poverty. Whereas some meta-researchers might critique the governing role that peer review plays in research culture, especially in light of accusations of bias (Lee et al., 2013) and inefficiency (Heyard et al., 2021; Roumbanis, 2019), and call for it to be abolished and replaced by metrics (Bornmann et al., 2008), others may highlight the tensions and problems inherent in metrics-driven performance regimes (Oancea, 2019; Curry, Gadd and Wilsdon, 2022). For stakeholders such as funding agencies the importance of peer review (Derrick, 2018) cannot and should not be overlooked when working towards a better calibrated decision-making process.

For the field, reflexivity is more than just a paradox. Whereas some meta-scientists may subscribe to the idea that good research is objective and independent from the object of investigation, for a large part of meta-research this distance is impossible to maintain, as well as being undesirable in collective moves to change research culture and structure. Holding meta-research to a previously desirable norm of disinterestedness (Merton and Merton, 1968) does not necessarily challenge the legitimacy or veracity of research results, or else the field. Indeed, as we have discussed above, it may be impossible for meta-research to maintain disinterestedness as its researchers belong simultaneously as members of the research community as well as beyond it as a locus of investigation. Acknowledging this, the term meta-research remains open to, if not orientated towards, the benefits that stem from this type of reflexive co-production. This mode of reflexivity adds value to meta-research studies: for this un-disciplined 'discipline', reflexivity is less of a paradox than it is a strength.

FUTURE CHALLENGES FOR META-RESEARCH

For as long as the field remains fractured there will be a necessity for meta-researchers to continually balance the advantages and disadvantages that come with the partial disciplinisation of its research. The future of meta-research therefore faces many challenges as researchers continue to encounter similar challenges to those in other fields. These include the increasing pressure to publish (aka 'publish or perish') in the absence of a clear disciplinary journal membership. The increasing cost to publish means that the choice to maintain a field-wide ethos

towards open access publishing may not be readily available to all researchers, especially to those from minority groups or the majority world. Indeed, despite historical improvements and developments in issues of gender equity across the sciences in the last 50 years (Sugimoto and Larivière, 2023), many equity challenges remain, even to this day, unresolved. These concerns for greater research equity are only compounded as they overlap with how emerging values are established with the field - such as open science, replicability, broader definitions of excellence, team science and the fair evaluation of the variety of scientific contributions to science and society. As noted, the inequity issues are to be addressed not only *by* meta-research, but also *within* the field of meta-research.

Perhaps what is most concerning is the prospect that the proliferation and increased availability of citation-based and other metricised mechanics of excellence will become the sole focus for meta-research. Meta-research, as described above, is data poor and the continual reliance on citations and metricised indicators based on countable characteristics of research outcomes risks further embedding biases towards their use as proxies for research excellence. Indeed, this concern might be more defined for meta-research, as we have described it, than for meta-science. Therefore, moves from stakeholders to increase the availability and access to data can work not only to enhance the field, but to broaden the argument about the definition, characteristics and approaches to (evaluating) research and researchers. For meta-research, a focus on the practice of research – why and how we do it, who is involved and on what terms – and a commitment to methodological and epistemic diversity are far more socially reflexive and responsible guidelines for research excellence, than single, seemingly easily calculable indicators.

However, to achieve this, it is necessary to keep our disciplinary interactions fluid, and to welcome insights from different researchers as intellectuals as well as practitioners of their own craft to have continual input into how we do, reward, disseminate and use our work. Keeping borders fluid allows us to sustain the field in the long term by recognising and centering perspectives from beyond traditional or exclusionary epistemic boundaries, and beyond academia. Understanding the context within context(s) is the best step towards making any meaningful change in research cultures. This remains the challenge and major focus for the future of our field.

NOTES

1. Despite this, meta-research as a field is still data-poor, with the more valuable datasets owned by private companies, or else closely guarded by government departments and funding agencies.
2. Research-enabling professionals, such as research administrators and managers, research impact and communication professionals, or information and data specialists play a vital role in our research culture and therefore would experience the reflexivity paradox similarly to meta-researchers. See Chapter 26 for further discussion.

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