What’s the Point of Authors?

# 1. Introduction

#  How can we work out who should be listed as an author of a paper? This problem is pressing: both co-authorship, the number of co-authors are drastically increasing.[[1]](#footnote-1) In May 2015, a paper giving an improved measurement of the mass of the Higgs Boson bringing together the ATLAS and CMS collaborations in CERN was published by *Physical Review Letters* (Aad et al 2015). This paper listed some 5,154 authors, a significant number of whom were deceased at the time of publication. This list was derived from the members of ATLAS and CMS, many of whom will not have contributed to the research or writing, or have even read the paper. There are a huge number of approaches to co-authorship: Some papers list authors alphabetically, others by order of contribution, others by seniority, while others give special significance to positions (typically first, second, and last positions). Some disciplines (especially in the humanities) typically list only the person who has done most work as an author, whereas others list everyone in the organisation or lab, irrespective of whether they have done any work on the paper. Although some disciplines have clear norms, in many disciplines it is unclear – or simply indeterminate – what the norms for ascribing authorship are.[[2]](#footnote-2)

#  This profusion of approaches stems from the complex history of scientific authorship. One part of the genealogy traces back to legal battles around intellectual property in 17th and 18th Century England (Foucault 1980, Chartier 2003, Johns 2003). These legal arguments lead to a Lockean conception of authorship, whereby a researcher acquired authorship status, and the attendant rights to a piece of writing by mixing her labour with it (Chartier 2003: 17-20, Johns 2003: 82-4). Another thread traces back to the Spanish Inquisition, which in the 16th and 17th Century required books to be published with their authors’ names in order to facilitate the censorship of heretics (Foucault 1980, Chartier 2003: 21). More recently, competition between researchers has lead to a barter economy, where authorship of papers has become a tradable good(Latour and Woolgar 1986, MacFarlane 2015). These historical practices leverage the practice of ascribing authorship to do different things: to control publication, to censor, and to pursue academic advantage. Given this complex genealogy, it is no surprise that it is an ambivalent and contested status.

#  There are several revisionary proposals in the air. Some claim that our traditional notion of authorship has no application to large-scale collaborative work (Kukla 2012, Huebner, Kukla and Winsberg 2018), whereas others argue that we need to recognise a category of collectiveauthor (Wray 2006, 2007, 2018, De Ridder 2014). Alternatively, we might think that the problem is an unclear concept of authorship (Rennie, Yank, and Emmanuel 1997), and there are several proposals to pin down our understanding of this role, including the International Committee of Medical Journal Editors guidelines (ICJME 2018), the proposal to supplement authorship with a number of more fine-grained roles (Mozilla 2018); (CRediT 2018), and the proposal to add contribution statements to the end of papers (theBMJ 2018).

 There are a host of issues with authorship, and we cannot hope to resolve them all at the same time. This paper focuses on the conceptual issues surrounding authorship. First, I distinguish several functions associated with the assignment of authorship, picking out functions from discussions of authorship in philosophy, sociology, and history, as well as explicitly formulated authorship guidelines.[[3]](#footnote-3) These functions give us a job description against which we can assess the adequacy of different practices for assigning authorship. Secondly, I make the case that the different functions of authorship are in tension, meaning that there is no practice that can successfully meet the full job description. Thirdly, I suggest an alternative to the practice of ascribing one unitary status of author. I suggest that we do away with the status of author, replacing it with a number of different roles – Contributor, Writer, Spokesperson, and Guarantor – which play the different roles associated with authorship. I call this proposal the CWSG proposal.

 Before we begin, a couple of clarificatory points.

 I will primarily be interested in authorship for non-fiction papers published by academic journals. Authorship for fiction – especially collaborative fiction – is a fascinating issue, but will not be our primary focus.

 There are two ways we might think about authorship: as an epistemic fact that is determined by facts about the history of a paper, and as a social fact that is determined by journals. According to the epistemic proposal, the byline *describes* authorship status, and we can ask whether all the authors of a paper have been listed on the by-line. According to the social proposal, when the journal puts certain people on the by-line, this is a performative act that *bestows* the status of author, meaning that we cannot coherently ask whether all the authors have been listed. I suspect that in ordinary language, we slip between these ways of talking, without too much thought. Our central concern is with the value of the social practice of ascribing authorship, so for the purposes of this paper, I will assume the social fact view. When we evaluate different practices of ascribing authorship, our question is *who should be an author?,* not *who is an author?.*[[4]](#footnote-4)

 When I talk about the functions of our practice of assigning authorship, I have in mind a broad notion of function. A function of a practice is some good that the practice contributes to. I don’t think that the functions of a practice need be essential it. Our conclusion is that the practice of ascribing authorship is incoherent, not that authorship itself is.

 This paper lies within the scope of its own proposal, and I will apply the CWSG to it at the end. Although the intellectual credit for this paper is distributed, one person [BLANK] has written it. The first-person pronoun will throughout refer to the writer, who is expressing their own beliefs, and takes all relevant intellectual responsibilities (to be discussed in section 2).

# 2. The Functions of Authorship

Let’s start off by considering what a practice of ascribing authorship might be good for. I focus on five functions played by authorship attributions:

1. Allocating intellectual credit;
2. Constructing a speaker;
3. Enabling credibility judgements;
4. Supporting accountability;
5. Creating an intellectual market.[[5]](#footnote-5)

 The evidence for these functions is intentionally diverse, because discussions of authorship have taken place in a fragmented way across different disciplines. In what follows, I will appeal to explicit authorship guidelines, the sociology of science, revisionary proposals, the history of authorship practices, epistemology, and economics. We can see all of these functions in contemporary authorship practices to at least some extent, but in some cases it easier to introduce the functions by starting with normative considerations.

 A connecting theme: many of these functions can be seen as disambiguating the notion of *responsibility* as it applies to authorship (Shoemaker 2011, Dang MS). In particular, the credit function concerns the claims made in a paper being *attributable* to the authors, the speaker function concerns the authors being *answerable* for the claims made, and the accountability function concerns the authors being *accountable* for the claims made, in line with community epistemic standards.

## 2.1. Credit

We care about getting the author list for a paper right. Researchers frequently disagree about who should be an author, and these disagreements seem substantive; they aren’t just about career advantage. We think that something has gone wrong when someone gets left off of a byline, or gets lower billing than they ought. Think of Rosalind Franklin’s work on the double helix structure of DNA (which lead to the famous ‘discovery’ paper authored by Crick and Watson), or Jocelyn Bell Burnell’s work on pulsars (which lead to a paper on which she was second author).[[6]](#footnote-6) In these cases, we might think that the byline communicates something false about the intellectual work that went into the paper. [[7]](#footnote-7)

I suggest that we can capture this idea by connecting authorship with intellectual credit, giving us the following function:

CREDIT: Assigning someone the status of author on a paper is a way to assign either full or partial intellectual credit for the intellectual achievement(s) of that paper.

 The idea here assigning authorship itself constitutes a form of recognition of intellectual achievement. This way of thinking about credit is closely connected to the way epistemologists think about knowledge as a kind of achievement (Greco 2010, Sosa 2007). We might think that just as an individual is creditworthy when they have brought about some valuable end due to their practical skills, so too a researcher is creditworthy when they have made an intellectually valuable contribution in virtue of the exercise of their intellectual capacities.

 Although they typically go together, it is important to bear in mind the differences between i) intellectual credit, ii) praise and blame for intellectual performance, and iii) social recognition. We can think of the intellectual credit function as working like a gold star awarded for athletic achievement. The awarding of the star itself constitutes a kind of recognition of athletic achievement. To play that role, it need not be associated with praise or social recognition. Those that have been awarded the star might be ignored (no praise), or actively shunned (no social recognition), and it would still function as a recognition of athletic achievement. In this section, our focus is on the recognition of achievement, but we will return to praise and blame (2.4.) and to social recognition (2.5).

 Taking this proposal at face value, the idea would be that the byline should list the people whose efforts contributed to the intellectual achievement of the paper. This proposal faces a number of problems in implementation.

 One issue is how to think about the achievement made by an academic paper. It is tempting to say that the intellectually creditworthy achievement is the headline claim: if a paper discovers a new element, then the achievement is finding out that this element exists. This proposal makes authorship too capacious. Intellectual progress is cumulative, meaning that discoveries build on previous work. This means that all the researchers who carried out the background work need to be included in the story about how the discovery was made, meaning that they are also creditworthy for the headline claim. We might think that this kind of intellectual dependence deserves citation, but not inclusion as author (perhaps we might want to say a similar thing about the status of an athlete’s extended team when they win a race).[[8]](#footnote-8) I suggest that the achievement of a paper is the way it extends or systematises social knowledge, meaning that the authors are those responsible for the extension, leaving citation to pick up the work of describing previous work.

 According to CREDIT when people are left off the byline they fail to receive recognition for their creditworthy achievements. Although this may be an accident, exclusions seem to track peoples’ social identities, suggesting that the byline may be a kind of exclusion that qualifies as a species of epistemic injustice (Fricker 2007, Dotson 2014).[[9]](#footnote-9) Let’s call the species of epistemic injustice that involves someone receiving inadequate recognition on the byline due to their social identity *authorial injustice.* Authorial injustice will track social identities which are negatively associated with academia (or particular fields), including being female (especially in stem fields), and being a person of colour, being non-European, and being a member of an indigenous culture.[[10]](#footnote-10) In some cases, whole occupations are systematically excluded from authorial credit: think of the work done by technicians, editors, reviewers and undergraduate students.[[11]](#footnote-11)

 Wholesale exclusion is the simplest case of authorial injustice. Researchers might also be assigned a position on the byline which does not adequately recognize the *degree* of their contribution. Women are proportionately less likely than men to hold the prestigious last and first author positions in many fields (West et al. 2013, Larivière et al 2013).[[12]](#footnote-12) The significance of contributions can also be misconstrued by readers. If it is unclear which practice for assigning positions is being employed in a byline, readers may read their assumptions into their assignment of credit for example, for reading a last author with a non-English name as least creditworthy, rather than as lab leader. It is also plausible that the Matthew effect can be compounded by social identity (Merton 1957, 1968, Zuckerman 1977, Strevens 2003). The Matthew effect occurs when more senior or credible scientists are seen to be more creditworthy for the achievement associated with a paper, even when they are known to have done the same amount of work as their less senior colleagues. When some authors are the target of a social stereotype which systematically downgrades their credibility – meaning that they are a victim of epistemic injustice (Fricker 2007) – their perceived credit may also be downgraded. Lowered credibility breeds lowered credit[[13]](#footnote-13)

 Another important question for CREDIT is whether authorship is a recognition of specifically *intellectual* credit. If so then people who exercised only practical capacities will be excluded from authorship. Historically, authorial practices have often focused on intellectual labour, leading to what Shapin calls ‘invisible technicians’ who are written out of the history. This phenomenon is particularly striking in Robert Boyle’s laboratory (Shapin 1989,1995): Boyle took sole authorship of all papers, despite his ‘laborants’ carrying out almost all of the administrative and experimental work. This injustice is a species of a more general exclusionary deployment of the distinction between practical and theoretical knowledge (Stanley 2012, 2015), (Kremer 2016). This practice seems unjustly exclusionary. A technician’s labour who has put in a massive amount of labour might be written out of the history in favour of a researcher who has put a relatively small amount of labour into conceptualising an experiment. We might also worry that the practical/theoretical distinction will move around in a way that reflects the interests of those with social power.

 Furthermore, as a matter of fact, academic research is at the same time both a practical and an intellectual achievement. Research requires a range of practical skills, from using a word processor to co-ordinating a research group, and keeping lab animals alive. This suggests that any kind of achievement ought to be included, regardless of its significance.[[14]](#footnote-14)

 In multiple authorship, the assignment of authors recognises a team who are collectively creditworthy.[[15]](#footnote-15) Understanding who is responsible in a team achievement is a complex question (van de Poel, Royakkers, Zwart 2015). This issue is often fudged by appealing to significance. This move opens up the possibility of abuse. Independently, it is also not obvious that small contributions are not creditworthy: making a great many small contributions seems just as valuable as making one large contribution. Because of the exclusionary potential of significance, I suggest that an authentic implementation CREDIT would lead to anyone who has contributed in any way being included as an author.

## 2.2. Building a Responsible Speaker

Seeing authorship as an intellectual gold star helps us understand its role in allocating rewards, but we should recognise that authorship comes along with a bundle of epistemic responsibilities (Rennie and Flanigan 1994), (Rennie, Yank, Emmanuel 1997), (Bagnioli 2003). In order to understand the nature and source of these responsibilities, I suggest that we draw an analogy between publishing a paper in an academic journal and asserting a claim in a conversation. In this section, we focus on the way this analogy helps us to understand speaker-side responsibilities, and in the next two sections we will see how focusing on credibility and accountability can help us to understand authorship.

At its core, making an assertion in a conversation simply involves putting forward some claim as true. When I say “this summer was the hottest ever,” I put a claim forward as true, and invite others to believe it. This act comes along with a bundle of responsibilities:

1. *Sincerity norm*: the requirement that the claim expresses the speaker’s belief, and is not intended to mislead her audience.
2. *Consistency and coherence norm*: the requirement that the speaker not assert a claim and its negation, and that the total of her claims in a conversation be coherent.
3. *Defend or retract norm*: the requirement that the speaker either defends that claim as the conversation develops, or retracts it.
4. *The Knowledge norm*: the requirement that the speaker asserts claims only if she knows them to be true.

 Although these norms are not universally accepted, for the purposes of this paper I will take them for granted.[[16]](#footnote-16)

 Our proposed analogy claims that publication is a kind of institutionally authorised assertion. When a paper involving multiple researchers is published in an academic journal, they perform a special act: with the authorisation of the journal they collectively assert all the claims made in the paper. Since assertion in general is subject to these norms, we might think that one of the functions of the byline is to constructa collective agent which can meet these norms.

 This suggests the following function:

SPEAKER: a function of assigning a set of people as the authors of a paper is to create an epistemically responsible speaker.

 This function is simple in the single author case, since the author will take on all of the responsibilities. In the collective case things get messier, since there are a number of ways in which epistemic responsibilities can be divvied up between the different members of a research team. To see how these options work out, focus on the knowledge norm.

 The knowledge norm requires that a speaker backs up their assertions with knowledge (Williamson 2001). Applied to individual assertion, this gives the following norm:

 KNA: A speaker S must: assert that p, only if S knows that p.

 This norm doesn’t require the speaker to assert everything she knows; it requires that *when* she asserts, those assertions express knowledge. If she asserts something false, or for which she does not have justification, then she has done something epistemicallywrong. This failure might be excusable, or justifiable on other grounds – perhaps it contributes to collective inquiry – but there is something wrong with such an assertion. KNA applies to asserted content a hedged claim like *probably* *p* generates the requirement that the speaker know that *it is probable that p.* Note that this is a normative claim, so it says nothing about how often assertions are backed up by knowledge.[[17]](#footnote-17)

 In a case where a group asserts a bunch of connected claims, there are several different ways to distribute the epistemic responsibility. We have the following options (where G is the group consisting of the authors, and {p1, p2, … pn} are the set of claims made in the paper):

KNA-ALL: A group G must: assert that {p1, p2, … pn}, only if every member of G knows every one of {p1, p2, … pn}.

KNA-DISTRIBUTED: A group G must: assert that {p1, p2, … pn}, only if each of the propositions in {p1, p2, … pn} are known by at least one member of G.

KNA-ONE: A group G must: assert that {p1, p2, … pn}, only if one member S1 knows every one of {p1, p2, … pn}

KNA-COLLECTIVE: A group G must: assert that p, only if G *collectively* knows that {p1, p2, … pn}[[18]](#footnote-18)

 Different ways to implement the norm may be appropriate to different disciplines, and to different kinds of research.[[19]](#footnote-19) With highly collaborative research involving a small number of researchers, we may expect all researchers to know all claims made in a paper (KNA-ALL) (perhaps through dependence, see Hardwig 1985, 344-9). This norm seems to be in force in pure maths where all authors are expected to fully understand a proof. With research involves a greater division of labour, we may allow that different researchers know the claims relating to different parts of the paper (KNA-DISTRIBUTED), or require one researcher to have a synoptic overview of the whole piece of work (KNA-ONE). These requirements seem more appropriate to laboratory sciences that involve a clear division of labour. As the size and complexity of research increases reaching the size of a CERN collaboration, we may weaken the expectation of individual knowledge, instead requiring the group to *collectively* know the claims in the paper (Hardwig 1985, Galison 2003 349: 351, Huebner, Kukla, and Winsberg 2018).

 Each of the other norms relating to assertion can be distributed in similar ways, giving us a slightly unwieldy family of norms:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Sincerity** | **Consistency and Coherence** | **Defend or Retract** | **The Knowledge Norm** |
| **All** | All agents must believe all claims | All agents take responsibility for the coherence of the whole | All agents must defend and agree to retract | All agents must know all claims |
| **Distributed** | All agents must believe their allocated claims | All agents take responsibility for the coherence of their allocated parts  | All agents take responsibility for defending their allocated parts | All agents must know their allocated claims  |
| **One** | One agent must believe all claims | One agent takes responsibility for the coherence of the whole | One agent must defend and decide whether to retract | One agent must know all claims |
| **Collective** | The collective must believe all claims | The collective takes responsibility for the coherence of the whole | The collective must defend and decide whether to retract | The collective must know all claims |

 This family of norms help us to think about a swathe of authorial practices.

The sincerity norm helps us to think about what goes wrong in cases of fraud. In fraud, a researcher will have made various claims which they do not believe, and the discovery of a fraud often attracts a moralised reaction. This kind of response is much like the response to the discovery of a lie, which ought to come as no surprise, if both are betrayals of the presumption that speakers will follow the sincerity norm.[[20]](#footnote-20)

This sincerity norm also helps to explain some of the connections between publication and belief. In some cases, context makes clear that all authors are intending to express their belief (either in all claims, or just in the headline claim). Consider the hefty byline of (Benjamin et al 2018), which proposes to change the default p-value threshold for statistical significance from 0.05 to 0.005. This author list is pretty clearly precisely constructed to represent the weight of opinion behind the proposal, so that signing up functions as an expression of belief. In some cases, we might think that the authors of a publication constitute a plural subject (Gilbert 1987, 1989, 2004) meaning that the views expressed in a publication are those of that collective (Wray 2006, 2007, 2018). But clearly authorship does not always express belief. Many of the authors of a CERN paper will not have read the paper, so they cannot reasonably be taken to believe the headline claim.[[21]](#footnote-21) It is pretty plausible to think that how belief is expressed will depend on which version of the sincerity norm the authors abide by.

The consistency and coherence norm helps us to think about the norms of collective writing. Why can’t a team of researchers simply split up the paper into sections, and write those sections separately, in accordance with their own beliefs? At least part of the answer is that authors are under an obligation to ensure that the papers they publish are consistent, and put forward a coherent point of view that is deductively closed (Wray 2014, §3, 2018: 120-1, Bright, Dang and Heesen 2018: 240-1). When researchers get into a disagreement about a question relevant to their paper, they cannot simply report disagreement. They can either take up no position on that question, delay publication, try to reach a consensus position via debate, or concoct a compromise position which they can take as a collective position. Who takes responsibility for dealing with these situations will typically depend on the writing process: if the group is writing together, then they must collectively hash out a position, but if one researcher is writing on behalf of the group, then they need to resolve these situations by themselves.

The defend or retract norm is clear in conversation: when a speaker makes a claim, she must either defend that claim from counterarguments, or take it back. In publication, the two halves of this responsibility play out in slightly different ways. Defence occurs in both informal and formal contexts: an author will be under pressure to defend claims made in her papers in conversations, and will be under some pressure to publish responses to critical papers (although disciplinary norms will massively vary). By contrast retraction only really occurs in the formal context of a retraction notice. The informal responsibility will typically be felt by every author individually, whereas the formal responsibilities seem to only apply collectively. The expectation would be that all authors sign off on any response paper, and especially on a retraction notice.[[22]](#footnote-22)

## 2.3. Credibility Judgements

##  So far, we have been focusing on the analogy between assertion and publication from the speaker’s side, considering the epistemic norms associated with publication. Let’s now change perspective and consider the reader’s perspective. As in testimony in general, the reader of a scientific publication must *trust* the author(s) to be telling the trust.[[23]](#footnote-23) Although the role of credibility judgements is particularly striking for lay readers of scientific papers who may be unable to follow the argument of a paper (Anderson 2011), even specialists must trust some aspects of a paper (such as data collection), and will need to trust outside their specialism.

##  Our central tool for managing the necessity of trust is credibility judgements. When someone asserts some claim that we do not believe, we may consider whether they are being sincere (rather than lying, or telling a joke), whether they are competent at making judgements in the relevant domain, and whether their sincerity is based in their competence. Credibility judgments also help us in making judgements about what to read, helping to reduce down the deluge of papers to those which might be worth reading.

##  This suggests the following function:

CREDIBILITY: the function of assigning a set of people as the authors of the paper is to enable readers to make judgements about how credible the results of the paper are.

As with the different norms distinguished above, we can ask how a reader might reach a credibility judgement on the basis of a byline with multiple authors, and how she should do so. There are various ways to get from a set of authors to a credibility judgement:

1. LEAD: give the paper a credibility rating identical to that of the lead author;
2. AVERAGE: give the paper a credibility rating corresponding to a (weighted or strict) average of the credibility of all authors;
3. HIGHEST: give the paper a credibility rating corresponding to the author with the highest credibility;
4. LOWEST: give the paper a credibility rating corresponding to the author with the lowest credibility.

There will also be various more complex procedures that pay attention to group-level phenomena, such as the reliability of the aggregation procedure used to get from individual views to a collective position (Bright, Dang and Heesen 2018), which will in some cases be higher than the reliability of any individual agent (List 2005).

We might also appeal to factors other than authors to assign credibility:

1. JOURNAL: give the paper a credibility rating corresponding to the reputation of the journal;
2. LAB: give the paper a credibility rating corresponding to the reputation of the lab that produced it.[[24]](#footnote-24)

Besides the credibility of authors, journals and labs, various other phenomena may play a role in determining the credibility-rating for a paper, including whether the authors have pre-registered their paper, the presence of open science badges, the quality of peer review in the field, and what country the authors are working in.

Note that – like credit allocations – judgements about credibility in science will be affected by social power, with some researchers falling victims of credibility deficits, while others benefit from credibility excesses (Fricker 1998, 2007, Rolin 2002). These faulty judgements do not track the trust*worthiness* of researchers, and will be a significant barrier to scientific progress.

## 2.4 Accountability

##  The practice of associating authors with pieces doesn’t just allow us to make judgements about how credible the claims are; it allows us to increase the epistemic standards in our community. Having authors associated with a paper gives us a target for what we might think of as the *intellectual reactive attitudes*. Here we should be thinking of the kinds of attitudes that would be properly expressed in the award of a prize, or in the discovery of shoddy work. Simplifying considerably, we can think of these attitudes as falling into a praise/blame dichotomy.[[25]](#footnote-25) Having a stable practice of praising and blaming gives all researchers social reasons to produce better work.[[26]](#footnote-26) If these community-level policing mechanisms are well-implemented, they may motivate a default of trust in all work, independent of a specific credibility judgement concerning the speaker.

##  This suggests the following function:

ACCOUNTABILITY: the function of assigning a set of people as the authors of a paper is create a target for praise if the paper is epistemically good, and censure if the paper is epistemically bad.

##  As with the norms discussed in 2.2., there are various different ways to implement a practice of accountability. We have the following analogous options:

##  ACC-ALL: hold every author accountable for every claim made in the paper;

##  ACC-ONE: hold one author accountable for every claim made in the paper;

##  ACC-DISTRIBUTED: hold each author accountable for the claims they were responsible for;

##  ACC-COLLECTIVE: hold the authors (or their employer) collectively responsible.

##  These practices incentivise different patterns of epistemic conduct, which come with different patterns of costs and benefits. For example, holding all authors responsible incentivises all authors to double check the whole paper, which will push up the quality of published papers, at the cost of considerable epistemic labour. This is the practice prescribed by the ICJME guidelines (ICJME 2018), although it is unclear whether all authors are really held fully accountable. The labour involved in ACC-ONE and ACC-DISTRIBUTED is somewhat lower, but they also incentivise less thorough checking. A practice of collective accountability incentivises institutions to create internal processes, such as internal peer review and quality control (see Galison 2003: 336-40).

## 2.5. Establishing the Scientific Marketplace

 Although there are centrally planned elements of the scientific community (including government funding, and commercial research), for the most part researchers are free to choose their own projects, and decide how much time to invest in them. In this kind of situation, we might think that it is desirable for a community to implement a system of incentives in order to ensure that researchers efficiently produce socially useful knowledge. It is natural to think that market-style mechanisms will ensure desirable outcomes, incentivising individuals to work hard (Zollman 2018), and leading to an efficient division of labour across projects (Kitcher 1990, Strevens 2001). By itself, inquiry is poorly suited to market mechanisms, since the good produced by inquiry — knowledge — is public, although it requires the investment of private goods (such as time, and loss of leisure). A set of scientists motivated only by truth would be subject to the public goods problem, leading to each individual defecting from the optimal distribution of labour (Dasgupta and David 1993, Stephan 1996, Zollman 2018).

To address this problem, we need to introduce a private good into the system. We could just pay researchers money when they make discoveries,[[27]](#footnote-27) but it would be cheaper (as well as according better with researchers’ self-conception) to create a parallel economy of social credit consisting in social recognition.[[28]](#footnote-28) When a researcher publishes a paper, as well as contributing to public knowledge, they get allocated social recognition based on having a publication.[[29]](#footnote-29) This private good can then be used to leverage other goods, such as promotions.[[30]](#footnote-30)

This suggests the following function for authorship attributions:

MARKET: a function of assigning a set of people as the authors of a paper is to create a system of private goods which are apt for market mechanisms.

MARKET draws our attention to the way social credit can create an incentive structure for academic research, but it does not by itself say anything about how this social credit is awarded. This is a big and vexed question. If joint-authored publications receive in total less social prestige than single-authored publications, researchers will be motivated to work by themselves (or at least to keep collaborations below disciplinary thresholds for co-authorship). If lead authorship is given more prestige than non-lead authorship, scientists will be less motivated to put in work to papers to receive a non-lead author credit. In general, researchers will also be motivated to manipulate the system to receive maximum recognition for minimal outlay (Kwok 2005, McElreath 2016, Heesen 2018).

# 3. Who Should be an Author?

#  Our discussion has isolated a plausible family of functions for our practices of ascribing authorship: CREDIT, SPEAKER, CREDIBILITY, ACCOUNTABILITY, and MARKET. The ideal would be to find a practice of ascribing authorship which could simultaneously play all of these roles. In this section, I argue that this aspiration is misguided. The different functions suggests different answers to several questions:

1. Should researchers be authors on papers whose results they don’t believe?
2. Can the author list of a paper be manipulated to boost its credibility?
3. Should invisible technicians and ghost authors be included as authors?
4. Can we assign authors for massively collaborative work?

 Let’s take these questions in order

## 3.1. Credit and Belief

##  Consider the following situation: a large group of researchers has put a considerable amount of work into an experiment, producing a large data-set which has potential to be used for many different purposes (think of a longitudinal population study, or experimental work in high-energy physics). A large group of the researchers draws on this work to support a surprising and controversial claim, which many of the researchers believe to be false. Who should be listed as an author on the paper detailing these controversial results?

##  According to CREDIT, author attributions are answerable to the labour which went into the production of the paper. From this perspective, all the researchers who have put in intellectual or practical work should be listed as authors. The disbelieving authors would be disgruntled by this proposal, since being listed as an author communicates that they believe the controversial result and that they are willing to put their reputation behind this result. In this situation, the disbelieving researchers might leverage SPEAKER (focusing on the sincerity norm applied as ALL) or CREDIBILITY to make the case that they should not be authors. This kind of situation is presumably part of the reason why journals require all authors to authorise a paper before publication, giving researchers an opportunity to bail on papers that they don’t believe the results of (see ICJME 2018).

##  In this situation, CREDIT makes one prediction about who ought to be an author, and SPEAKER and CREDIBILITY make an opposing prediction.[[31]](#footnote-31)

## 3.2. Manipulating Credibility

Consider the following dilemma, identified by a Nobel prize winner interviewed by Harriet Zuckerman:

You have a student; should you put your name on that paper or not? You’ve contributed to it, but is it better that you shouldn’t or should? There are two sides to it. If you don’t [and here comes the decisive point on visibility], if you don’t , there’s the possibility that the paper may go quite unrecognised. Nobody reads it. If you do, it might be recognised, but then the student doesn’t get enough credit. (Zukerman 1977, quoted in Merton 1968: 5)

Here we find a tension between the desire to ensure that all contributors get adequate credit – filtered through the Matthew effect – and the desire that the paper be widely read and taken seriously. From the perspective of CREDIBILITY, including the senior scientist looks like a good idea. Including the better-known researcher will boost the perceived credibility of the paper, meaning that it is read by more people. But from the perspective of CREDIT, things are much murkier: a senior scientist might worry that her inclusion will lead to her student getting insufficient credit for her work.

Let’s focus on cases of pure credibility-motivated inclusion and exclusion. In a pure boosting case, a highly-regarded researcher is parachuted in at the last moment on a paper that they have done no work on to boost its credibility. From the perspective of CREDIBILITY, this is a potentially helpful practice that ensures that good work by unknown authors is read. However, from the perspective of CREDIT, this is a perversion of authorship: the bloat of the byline improperly represents the creditworthy parties. [[32]](#footnote-32) In a case of credibility-boosting exclusion, the byline of a paper is pared down to ensure that only credible researchers are left. This practice will be particularly prevalent in conditions of widespread testimonial injustice.

For example, we might think that the authorship practices of Robert Boyle and his contemporaries were in part a response to the cult of gentlemanly trustworthiness (Shapin 1994: C2). The cult of the gentleman made credibility the sole preserve of upper-class men. This meant that for Boyle’s papers to function in the credibility economy of seventeenth-century England, they needed to be associated with a gentleman. The fact that his many laborants – who did the difficult experimental work – were left off is just a function of the practice of credibility of the time. This practice of exclusion might be perfectly respectable from the perspective of CREDIBILITY, but from the point of view of CREDIT it unfairly excludes creditworthy parties.

In these cases, CREDIT and CREDIBILITY pull in different directions, as do considerations about the epistemic health of a community versus adequate representation of individual labour.

## 3.3. Invisible Technicians

##  A related tension between CREDIT and SPEAKER shows up in cases where lots of people have contributed significant practical labour into an intellectual process which they do not fully understand. Consider Gaspard De Prony’s tables project, which employed mathematically illiterate people performing simple operations of addition and subtraction as part of a project to calculate the values for trigonometric and logarithmic tables.[[33]](#footnote-33) These human computers are clearly creditworthy but Huebner, Kukla, and Winsberg (HKB) claim that only De Prony – perhaps together with the mathematicians who assisted him in setting the calculations – deserves the be an author:

[Only De Prony and the Mathematicians] could vouch for the results of this massive collaboration; they were the ones who were epistemically accountable for producing accurate tables, defending them if challenges, and revising them if necessary. […] In effect, the text was still single-authored […] because one person retained centralised control over the research process, including its methodological standards and implementation. While many people participated in the production of knowledge, only one person has the status of the author of the document communicating that knowledge. (HKW 2018: 98-99).

##  Here HKB deploy several of the norms associated with SPEAKER, including the sincerity norm, the defend or retract norm, and the knowledge norm. They point out that because of the unequal nature of the collaboration, belief in the reliability of results, discursive responsibilities, and knowledge are all centralised, leading to a centralisation of authorship. Whereas CREDIT offers an inclusive and meritocratic picture of authorship for collaborative work, SPEAKER offers an exclusionary picture, associating authorship with epistemic features which only the managers of a project have.

##  This case, and the phenomenon of credit-boosting exclusion from 3.2. make clear that authorial injustice is not just a matter of false views about credit. Given the non-credit related work which we want authorship to do in the practice of collaborative science, it is easy to use the concept of authorship itself as an tool to exclude researchers from having their achievements recognised.

## 3.4. Radically Collaborative Research

##  The final dilemma concerns cases of *Radically Collaborative Research,* which HKW argue cause the very notion of authorship to break down (Kukla 2012, Winsberg, Huebner and Kukla 2014, Huebner, Kukla and Winsberg 2018, Winsberg 2018: C13).[[34]](#footnote-34) Radically collaborative research involves a high degree of specialisation and division of labour, a large number of collaborators working in different institutions around the world and no centralised perspective that can synthesise the work of all of the researchers. Their paradigm examples of this kind of work are multi-site biomedical trials, high-energy physics, and atmospheric climate modelling. HKW argue that these cases pose a fundamental challenge to our conception of authorship, because the lack of a centralised perspective means that there is no individual who can take responsibility for the whole. Hence, on their view, no individual or group can claim authorship.

##  I think that HKW are only half right. By the lights of CREDIT, the question of authorship is straightforward: the researchers simply list everyone who contributed to the project. The problems arise with SPEAKER and ACCOUNTABILITY. The difficult issue it trying to find someone who might fulfil the knowledge-norm, who might ensure consistency, who might defend the research, and who might be accountable. This suggests that SPEAKER and ACCOUNATBILITY are in tension with CREDIT. There are two lessons one might draw: that we should focus exclusively on CREDIT for radically collaborative work, or that radically collaborative research ought to be organised such that SPEAKER-related functions are properly addressed.

# 4. The Death of the Author

If no practice of ascribing authorship can play all of these roles, we have a number of ways in which we might try to move forwards:

1. Pick a set of coherent functions (such as CREDIT and MARKET) and design a practice for ascribing authorship that matches up with those functions;
2. Accept the inconsistency, but allow researchers to continue to pick and chose which functions they want authorship to play, accepting that authorship will therefore fail to have a general significance;
3. Try to design a new practice which addresses all of the functions while addressing their inconsistency.

 The goal of the rest of the paper is to develop a version of the third strategy. I take it that each of the functions are important, making the first strategy unappealing. And the profusion of meanings of authorship allowed by the second strategy would do nothing to address the unclarity around what significance to attach to being listed as an author. [[35]](#footnote-35) At present, authorship is both confusing and inconsistent, and it would be nice to design a practice which can deal with both issues at once.

How can we pull off the balancing act required by the third strategy. I suggest that we employ a divide and rule strategy that does away with the status of authorship, replacing it with a raft of different statuses that are tailor made for the various functions associated with authorship.[[36]](#footnote-36) This revisionary response has precedent. Rennie, Yank, and Emmanuel propose to replace the author attributions with two statuses that of the *contributor* (someone who has done relevant work), and the *guarantor* (someone who takes responsibility for the integrity of the whole) (1997: 582-3).[[37]](#footnote-37) I want to take things further, replacing authorship with four roles. Let’s call this revisionary proposal the CWSG proposal:

 **The CWSG proposal**:

 Papers should no longer be associated with authors, instead they must be associated with four distinct roles:

*Contributor:* someone who has contributes labour to the project, making them either fully or partially creditworthy for the achievement associated with the project.

*Writer:*someone who contributes to the writing of the project

*Spokesperson:*someone who takes responsibility for co-ordinating responses to criticisms of the paper, and retraction decisions.

*Guarantor***:** someone who give their word that *all* the claims made in the paper are true.

 These roles are designed to meet the different functions discussed in section 2:

 The CREDIT function concerns the role played by authorship in the recognition of creditworthy work, and will be associated with the contributor role. This role is backward-looking: we can determine who should be a contributor by considering who put their labour in to the collective intellectual achievement of the paper. This role bundles together the byline and the acknowledgements of a paper, giving a full picture of the people who contributed to the paper. If CWSG were implemented honestly, it would be extremely unusual to see just one person listed as a contributor. It might be helpful to distinguish the credit associated with the research process from the credit deserved for writing and guaranteeing the paper. This allows us to more easily represent cases in which someone has come in after the research has been done to act as writer or guarantor. Such a person would be a guarantor or writer, but not a contributor.

 The SPEAKER function concerns the epistemic norms associated with publication: sincerity, consistency and coherence, the knowledge norm, and the defend or retract norm. Unlike CREDIT, this function is forward-looking, and cannot be answered just by looking at who contributed what to the research. I propose that we split these norms in two. Sincerity, consistency and the knowledge norm are associated with the writing process: the researcher(s) who have taken a lead on pulling together individual contributions to yield a coherent whole are best placed to fulfil these norms. By contrast, the defend or retract norm concerns the life of the paper post-publication, and is associated with long term responsibilities. I propose that we associate the role of *writer* with the norms of sincerity, consistency and coherence, and the knowledge-norm, and the role of *spokesperson* with the defend or retract norm. These roles may – but need not – be played by the same individual or group.[[38]](#footnote-38)

 The CREDIBILITY function concerns whose credibility is associated with a paper. Here the proposal gets a little more complex. Following Rennie, Yank, and Emmanuel, I propose a *guarantor* role: someone who guarantees the integrity of the whole piece of work. We can think of a guarantor functioning a little like the endorsements printed on the back of a book. The guarantor(s)’ credibility gives us a single agent’s credibility to associate with the paper, but we might want to allow for more complex credibility assignments that also look to the credibility of the contributors concerning their portions of the research (this might be relevant if one of the contributors has a history of fraud). Perhaps the default should be that the primary credibility for entirety of the paper is given by the guarantor’s credibility, but the secondary credibility for the parts of the paper is given by the credibility of contributors. That said, there are a huge number of ways to get from a set of authors and a journal to a credibility rating, as observed above.

 The ACCOUNTABILITY function concerns the targeting of reactive attitudes to motivate epistemically high-quality research. Above, we saw that there were a number of different ways to hold researchers responsible. I propose a similar division of labour to that we saw with CREDIBILITY. The *guarantors* of the paper should be held accountability for the entirety of the paper (this is a version of ACC-ONE), and the *contributors* to the paper should be held accountable for their contributions (following ACC-DISTRIBUTRED). If one contributor has done poor work, or lied, both they and the Guarantor(s) are to be held accountable for the failing (although perhaps to different degrees). This gives us a parallel distinction between primary and secondary accountability for a paper. (See Rennie, Yank, and Emmanuel 1997: 582-3 for a similar idea).

 The last function – MARKET – is the most complex. Recall that it was a response to the need for private goods associated with research. What the CWSG proposal gives us is a family of statuses which are apt to be treated as private goods. All we need to get the benefit of market mechanisms is one status that is associated with social credit, which means that associating social credit with the Contributor role is enough to get market mechanisms up and going. However, we might think that a more complex system that assigns differential recognition to the different roles might have its virtues. To motivate careful checking, the Guarantor role needs to carry the possibility of substantial social blame, and we might think that this risk needs to be offset by the social recognition associated with the role.

|  |  |  |
| --- | --- | --- |
|  |  | **Function** |
| **Role** |  | ***Credit*** | ***Accountability*** | ***Credibility*** | ***Speaker norms*** | ***Market*** |
| ***Contributor*** | Primary | Secondary | Secondary |  | Primary |
| ***Writer*** | Secondary |  |  | - Sincerity - Consistency and Coherence- Knowledge | Secondary |
| ***Spokesperson*** | Secondary |  |  | - Defend or Retract | Secondary |
| ***Guarantor*** |  | Primary | Primary |  | Secondary |

 A point about typesetting. It would be unfortunate if this epistemically significant information were relegated to the end of a paper (see footnote 36). In the interests of communicating that contributors, writers, spokespeople, and guarantors are intended as *replacements* for authors, I suggest that these roles be listed in exactly the same place as authors are currently listed. In very large collaborations this might a couple of pages of contributors at the beginning of a paper.

 Having distinguished these four roles, it becomes fairly easy to resolve the puzzles from section 3.

 The first issue was how to deal with researchers who have put valuable labour into a project whose results they do not believe. Such individuals can be listed as contributors to the paper, in order to recognise their contributions, but left off of the lists of writers and guarantors, to represent the fact that they do not want to be bound by the sincerity norm, or to put their credibility behind the result.

 The second issue concerned credibility manipulation. Bracketing whether these practices should be permissible, they can be easily represented in this framework, without confusing questions of credibility and credit.[[39]](#footnote-39) If researchers wanted to parachute in a senior researcher, they could list them as a guarantor for the paper without including them on the list of contributors. And if researchers wanted to avoid associating the paper with the credibility of some members, they could be excluded from the guarantors without being excluded from the contributors.

 The third issue concerned how to represent the work of researchers who have contributed significant labour to a project, without being in a position to fulfil the norms associated with SPEAKER. This is again easy to deal with: these researchers should be listed as contributors, but not as Writers, Spokespeople, or Guarantors.

 The final issue concerned radically collaborative work, in which no individual can claim to know the results of the research. The list of contributors for such research is unproblematic: we can simply list everyone who was involved in the research. The problem is that no-one seems in a good position to be listed as Writer or Guarantor. Here we have two options: we could simply include a list of contributors associated with the paper (perhaps distinguished by role, a la CRediT), or we could require the researchers to do more work until some of them are able to act as writers and guarantors.

 Another virtue of the proposal is that it locates the epistemically central features of publication practices, meaning that it lends itself to an open-ended pluralism that can represent diverse research cultures without leaning too heavily on implicit discipline-specific practices. This point is easiest to see by running through some examples of how this proposal can be applied to different disciplines:

*Humanities:* we can represent the fact that one individual has done most of the work of reading and constructing an argument by listing them as sole Writer, Spokesperson, and Guarantor, whilst recognising others’ contributions – which would normally be listed as acknowledgements – by including them as contributors.

*Laboratory science:* we can include everyone who has put labour into the project as contributors, while the researchers who have done the work of pulling the paper together can be listed as a writer, and the laboratory head can be listed as a Guarantor for the whole project (ACC-ONE).

*High-energy physics:* we can represent the membership list approach to authorship by including everyone who has contributed to the collaboration as an author. In addition, we would want to have information about who did the work of writing, who will act as spokesperson, and who should be held accountable. In this case, it may be that we want to hold the collaboration itself accountable (ACC-COLLECTIVE) to ensure that it has good institutional practices.[[40]](#footnote-40)

*Crowdsourced/co-produced research:* we can recognise the labour of a large group of people by including them as contributors, without assigning the epistemic responsibilities associated with Writer, Spokesperson, and Guarantor, which will presumably be associated with the researchers who designed and implemented the project.

 It is worth highlighting the differences between the CWSG proposal, the ICJME guidelines for authorship, and the CRediT system.

 The ICJME guidelines presents four individually necessary and jointly sufficient conditions for authorship:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work;
2. Drafting the work or revising it critically for important intellectual content;
3. Final approval of the version to be published;
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.[[41]](#footnote-41)

 The idea behind these conditions is that we can extend the properties associated with single authorship to all co-authors of a collaboratively produced work (Moffatt 2013, Wray 2018). The requirements to qualify as an author are the same in both cases. In our terminology, these properties are 1) ‘substantial’ credit, 2) input into the writing process, 3) abiding by the sincerity norm, and 4) being held individually accountable for the whole of the work. While the CWSG proposal would allow for an assignment of roles that approximated this arrangement – where all contributors are also writers, and guarantors – it allows for many different divisions of these roles. The ICJME proposal forces a particular model of collaborative research, where all contributors are also writers are guarantors, whereas the CWSG proposal allows these roles to be distributed in a number of different ways.

 Another salient point of difference is the requirement for ‘significant’ contributions. The CWSG proposal is compatible with various different accounts of the Contributor role, However, a in the interests of not proposing a system which is potentially exclusionary, I suggest that we should include anyone who has contributed at all to a paper as a contributor.

 The CRediT proposal is to distinguish the different authors of a paper by slotting them into a ‘controlled vocabulary’ of roles. These roles distinguish different kinds of contribution, and are designed to reduce conflicts about byline position, while displaying important information about who did what.[[42]](#footnote-42) This proposal focuses on the allocation of credit. It doesn’t have a great deal to say about responsibilities, although it would allow the different contributors to be held accountable for their assigned roles, and its motivations engage principally with CREDIT. Although contribution statements may be valuable for readers, these potential gains need to be weighed against the costs of gathering this information. In small-scale cases this cost may be negligible, but with institutional collaborations like CERN collaborations, it may be simply impractical to gather this information (recall that CERN doesn’t even gather information about who worked on particular paper). Perhaps contribution statements can be decided on a case-by-case basis.[[43]](#footnote-43)

**5. Conclusion**

 Discussions of authorship often note how confusing the practices for assigning are. In this paper I have made the case that the problem is not just that these practices are confusing: they are incoherent. If we want authorship to play all of the functions associated with it, then we will get inconsistent predictions about who to assign as an author. We can either do away with these functions, or do away with authorship. I have suggested that we take the second option, and have offered a revisionary proposal – the CWSG proposal – which replaces authorship with the roles of contributor, writer, spokesperson, and guarantor, dividing up these functions between the different roles.

 It is important to own the limitations of this proposal. It is aimed at the conceptual problems with authorial practices, and it does not address many of the practical problems, such as conflicts about authorial status, or problematic incentive structures. That said, I have stressed the flexibility of the CWSG proposal. My sense is that this proposal also helps to sharpen up and distinguish the different issues which are faced by authorship practices. We should understand the CWSG proposal as a conceptual tool for dividing up the epistemic properties associated with authorship; it is certainly not a recipe for determining who goes where on a byline.

 Ultimately what we should want is a non-exclusionary practice that is easy to use without disagreement, fairly allocates credit, properly distributes epistemic responsibilities, enables credibility judgements, facilitates practices of accountability, and creates a market that incentivises good research. The best – and perhaps only – way to design a practice that fulfils these desiderata is to have an open and interdisciplinary conversation between researchers from different disciplines. My hope is that this paper lays some of the groundwork for that conversation.

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1. (Cronin 2001), (Wuchty, Jones, Uzzi 2007), (West et al. 2013), (Sonnenwald 2007), Sooryamoorthy 2009), Morrison et al 2003), (Larivivière et al 2006), (Mallapaty 2018) Ioannidis, Klavans, Boyack 2018). [↑](#footnote-ref-1)
2. Researchers have identified a number of problems caused by this situation: i) confusion around disciplinary norms (Street et al 2010), (Mitcheson 2011), (Macfarlane 2017), ii) deliberate flouting of disciplinary norms (Martinson et al 2005) (Pignatelli et al 2005), (Rohwer et al. 2017), including ghost authorship (Flanagin et al. 1998), (Mowatt et al. 2002), (Wislar et al. 2011), iii) a lack of consensus about how to resolve tricky cases (Macfarlane 2017), iv) disagreements about authorship (Mitcheson et al. 2011), and problems in reading a byline (Shaw 2016) [↑](#footnote-ref-2)
3. For overviews, see (Rennie and Flanigan 1994), (Cronin 2001),(Marusic et al 2011) [↑](#footnote-ref-3)
4. This choice has some costs – in particular meaning that ‘ghost authors’ are not authors (Rennie, and Flanagin 1994, Flagagin et al 1998, Mowatt et al 2002, Moffatt and Elliott 2007, Wislar et al 2011, Moffatt 2013). [↑](#footnote-ref-4)
5. I set to one side issues around authorship and copyright (Biagioli 2003), although these questions were incredibly important in the formation of contemporary authorship practices (Chartier 2003, Johns 2003). [↑](#footnote-ref-5)
6. Both of these cases are more complicated than they first seem. Franklin co-authored another paper in the same issue of *Nature* as Crick and Watson’s famous paper reporting her results (Franklin and Gosling 1953), and Bell Burnell has stated that her second author position was in line with the norms of authorship in astrophysics at the time (Bell Burnell 1977). [↑](#footnote-ref-6)
7. Bylines are typically sentence fragments, consisting of a name or names without a verb or adjective. Presumably they communicate ‘X is an author’, either via syntactic ellipsis or implicature. [↑](#footnote-ref-7)
8. Citation practices are just as complex and murky as authorship practices, and I don’t want to suggest that the only function of citation is to acknowledge intellectual debt. For a discussion of the functions of citation, focusing on exclusion, see (Ahmed 2013, 2017: 15-17, 148-58) [↑](#footnote-ref-8)
9. For discussion of a number of other kinds of epistemic injustice in science, see (Grasswick 2017) [↑](#footnote-ref-9)
10. On the way authorship practices exclude indigenous knowledges, see (Jaszi and Woodmansee 2003). [↑](#footnote-ref-10)
11. Interestingly, in Germany in the 18th century writers, paper makers, typesetters, printers, proof readers, publishers and book binders were all listed, and seen as equally creditworthy. (Jackson 2003: 122). [↑](#footnote-ref-11)
12. See also (O’Connor and Rubin 2018, Bruner and O’Connor 2018) for a model that explains how unequal bargaining practices in negotiating author positions between majority and minority groups might develop without any explicit prejudice. [↑](#footnote-ref-12)
13. A related form of epistemic injustice can occur in decisions about whether to publish papers (Tanswell, Rittberg, and Bendegem 2018). [↑](#footnote-ref-13)
14. The appeal to significance is also potentially exclusionary. ‘Significant’ is a context-sensitive term, and its meaning may be modulated by powerful researchers in a way that reflects their interests. When a senior researcher receives help from another lab, the bar for significance may be much higher than it would be when collaborating with their own lab. It is also not obvious that credit should be only assigned to human researchers. (Savage-Rumbaugh, Wamba, Wamba and Wamba, 2010) interviews several bonobos, who are listed as authors. [↑](#footnote-ref-14)
15. On collective achievement in testimony, see (Green 2012, 2014a, 2014b). [↑](#footnote-ref-15)
16. There is a debate about whether the condition required for epistemic appropriateness is really knowledge, rather than truth, justification, belief, or some other condition. I think that the case for the knowledge norm here is as good as anywhere (see Weiner 2017 for an overview). Note that one might think that the epistemic standard for scientific publication is *higher* than knowledge (de Ridder 2014) (but see (Gerken 2015 for an argument that the standard is justification). [↑](#footnote-ref-16)
17. In science, we might think that the answer is: *not very often* (Ioaniddis 1995). [↑](#footnote-ref-17)
18. These options could also be implemented by considering different understandings of group knowledge. See (Bird 2010, 2014), (Lackey 2014), (AUTHOR). [↑](#footnote-ref-18)
19. Another possibility is that different norms relate to different kinds of collective assertion (Lackey 2018). When a spokesperson asserts on behalf a group, we might get KNA-ONE (with the spokesperson being the appointed member), when the group engages in co-ordinated assertion, we get KNA-DISTRIBUTED, and when the group makes an assertion by means of all members making an assertion (think of the way that a collective assertion at a protest is constituted by many individual assertions with the same content) we get KNA-ALL. [↑](#footnote-ref-19)
20. The lie need not be the headline claim: a researcher might create fraudulent data to support a plausible claim in the hope that others will replicate (Hardwig 1991: 703). This is the pattern we find in the Schön case (Reich 2009). [↑](#footnote-ref-20)
21. That said, when researchers in CERN disbelieve a claim made by a paper, they can ask to be taken off the author list. [↑](#footnote-ref-21)
22. Here we are setting editorial retractions to one side (Wray 2018: 122). In a survey of retractions from *Science,* Wray and Andersen discovered that the majority of retractions (both in cases of mistake and fraud) are signed by the all authors, suggesting that authors typically form a cohesive collective body (Wray and Andersen MS-a, MS-b). [↑](#footnote-ref-22)
23. (Hardwig 1985, 1991), (Adler 1994), (Fricker 2002), (Wilholt 2009), (Wagenknecht 2014) [↑](#footnote-ref-23)
24. One might wonder whether we can replace trust in individual researchers with trust in the collective processes of science (Kukla 2012). For arguments for the centrality of trutst in individuals, see (Hardwig 1991: 704-9), (Frost-Arnold 2014), (Wagenknecht 2014). [↑](#footnote-ref-24)
25. Here ‘good’ encompasses epistemic virtues, and social usefulness. [↑](#footnote-ref-25)
26. This passage builds on Reynolds’ view of the point of the norm of assertion. (Reynolds 2002, 2008, 2017). See also (Bruner 2013). [↑](#footnote-ref-26)
27. In fact, this practice is fairly widespread. Universities in China pay from $30,000 to $165,000 for publication in Web of Science indexed journals (Quan, Chen, Shu 2017), and an informal study by retraction watch found rewards in Universities in gulf states, South Africa, East Asia, Australia, and in the UK and US (Abritis, McCook, Retraction Watch 2017) [↑](#footnote-ref-27)
28. There are various other private goods in play in academic research, such as patents. [↑](#footnote-ref-28)
29. Incentivisation via credit is often associated with the priority rule (i.e. the first researcher to make a discovery receives full credit for it). However, not all disciplines implement this rule so following Zollman I stick with a more general notion of credit. [↑](#footnote-ref-29)
30. This perspective on authorship offers an interesting perspective on joining a laboratory that includes all members as authors. Alongside the productivity benefits, we might think of this kind of scheme as risk-pooling device: one puts one’s intellectual labour into a common pool, and receives a share of the social credit back in return. [↑](#footnote-ref-30)
31. A workaround is to use footnotes to give further information on the authors’ beliefs. If the aim of the practice is to give full information about who believes what it will be unmanageable. If the footnote indicates that authorship doesn’t entail belief in the conclusions, authorship loses any connection to SPEAKER. [↑](#footnote-ref-31)
32. (Strevens 2006) suggests a potential resolution to the credibility-boosting case. We might think that putting one’s credibility behind a paper is itself a creditworthy move, meaning that the senior scientist who is included at the last moment is in fact creditworthy. If we buy this idea, we might think that credibility-boosting inclusion might be justifiable by CREDIT. This idea doesn’t fully resolve the puzzle, because it fails to address credibility-motivated exclusion. Not being credible does not decrease one’s creditworthiness. [↑](#footnote-ref-32)
33. Although these computers were mathematically illiterate, many people employed as computers others were sophisticated researchers in their own right. For discussion of the computers at the Harvard College Observatory, see (Grier 2005 C4-5), (Sobel 2017) [↑](#footnote-ref-33)
34. According to a social facts view of authorship, the problem isn’t that the notion of authorship breaks down (an author is just anyone listed on the byline), rather the *norms* governing author assignments get into trouble. [↑](#footnote-ref-34)
35. See (Biagioli 2003), (Rennie, Yank and Emmanuel 1997). [↑](#footnote-ref-35)
36. For a related response to incoherence, see (Scharp 2013). This proposal is rather different than proposals for anonymous (Hanel 2015), or pseudonymous (Minerva 2014a, 2014b) authorship practices. [↑](#footnote-ref-36)
37. Unfortunately, this radical promise is dulled in implementation (see Rennie, Yank and Emmanuel 1997: 583). The response from biomedicial journals has been to leave the byline as it is as an indication of authorship (typically regulated by the ICJME guidelines), and to include contribution statements and a guarantor at the end of the paper (see BMJ 2018). Although this practice is halfway to the CWSG proposal, it leaves in place the ambiguous notion of author, and relegates contributors and guarantors to the small print at the end of the paper. [↑](#footnote-ref-37)
38. This is a place where journals, disciplines, or the authors themselves might develop policies about which versions of the speaker norms they want to implement. [↑](#footnote-ref-38)
39. We might be skeptical about credibility-boosting exclusion, but following (Strevens 2006) we might think that there is something valuable about a credible researcher putting their reputation behind a paper to give it more credibility. [↑](#footnote-ref-39)
40. There is a case to be made that all these roles can be played by groups: massively collaborative work might use a collective as a contributor without worrying too much about membership conditions, crowd-written papers might have a collective writer, and papers produced by a large and established lab might have a corporate spokesperson, and hold the lab collectively accountable. [↑](#footnote-ref-40)
41. (ICJME 2018) [↑](#footnote-ref-41)
42. The full list is: Conceptualization, Data curation, Formal analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, and Writing – editing and reviewing (CRediT 2018) MozillaScience has a nice badge system for displaying these different roles (MozillaScience 2018). [↑](#footnote-ref-42)
43. There will also be a related question about how to order contributors (i.e. by amount of contribution, seniority, alphabetically, randomly or by some other rule). [↑](#footnote-ref-43)