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Thinking together, Learning together, Writing together: Synergies and challenges in the collaborative supervisory relationship

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THINKING TOGETHER, LEARNING TOGETHER, WRITING TOGETHER: SYNERGIES AND CHALLENGES IN THE COLLABORATIVE SUPERVISORY RELATIONSHIP

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ABSTRACT

This article explores the value and potential challenges of supervisor-student co-writing during a research degree programme. The article comprises of (i) a text prepared by a faculty research supervisor (KST) arguing the case for encouraging co-writing between supervisors and their research students as part of a research degree, and especially doctoral, programme, along with two comments (ii, iii) on that text contributed by current doctoral students (RB, GMS) offering reflections from student perspectives, and (iv) a synoptic response to those comments. It is argued that writing for publication during doctoral study is a core part of research training and induction into the research community, as well as being important for future career prospects. Seeking to publish from the doctoral project offers the student valuable critical feedback as well as experience in defending aspects of the research thesis.

The text raises the issue of authorship of such work, given the possible level of supervisor input in supporting the research student, in relation to the understanding of academic authorship adopted in the Academy. Co-publication between student and supervisor may be seen as beneficial to both parties, but there are clearly some potential risks to having any formal expectation that the student will co-author papers with their supervisor as a matter of course. Students may rightly feel concerned about issues of ownership of the thesis project; of having to negotiate the inherently uneven power relationship between faculty staff and students; and potential implications for external perceptions (e.g. of future employers or funders) of the student as a fully independent researcher.

I: THE SUPERVISOR'S ARGUMENT

Keith S. Taber

Introduction

This paper explores the theme of co-writing between registered research students and their supervisors, and in particular makes the case that supervisor-student co-writing for publication should be seen as not only desirable but a normal part of the graduate student experience, especially at doctoral level. The paper presents an ethical and educational case for such co-writing, and considers both the advantages of such writing enterprises, and potential complications. The paper focuses in particular on issues around co-writing related to the supervised thesis project, but also acknowledges the possibility of wider opportunities for supervised co-writing during the graduate programme. The argument draws upon some relevant scholarship relating to doctoral education, but is not intended to provide a comprehensive review of this literature: rather to inform a conversation about student writing for publication as a part of higher degree studies.

A starting point is the contrast between (a) the normal understanding of authorship of a student thesis in the English system, and (b) the common ethical expectations in the scholarly community with regard to academic authorship - such as those principles commonly espoused by journals. This leads to the suggestion that the way in which thesis authorship is normally discussed within the discourse of the English higher education system is inconsistent with the usual understanding of academic authorship in the Academy that graduate students are being prepared to enter. The kind of declaration of independent work expected in an English thesis is also somewhat out of line with practice in many other educational systems. We therefore argue that the discourse around thesis authorship in the English context is anachronistic and unhelpful as it may present a perceived barrier to supervisor-student co-writing during the preparation of the thesis. Rather, it is suggested that the supervised research project should be understood as in principle (and usually, in practice) a collaborative venture, where the nominal single author status of the research thesis is a convention that is out of step with general academic practice. This leads to the conclusion that work submitted for publication from a student project should *normally* be identified as co-authored by the student and her or his supervisor(s) even though such articles may be very similar to parts of the 'single authored' thesis.

Having presented the case for this position, the desirability of co-writing of academic papers by the student and supervisor(s) is examined from the perspective of both (but see parts (ii) and (iii) for students' own perspectives), and the limits and potential complications of including a programme of co-writing within the graduate student's project. This paper will primarily focus on doctoral students as they have an extended relationship with their supervisor(s) over three or more years. However, key parts of the arguments made here also apply to supervised masters' projects, and these will also be considered in the paper.

The student thesis as a single authored work

Within the English higher education system, a research thesis is normally considered the work of the student who submits it for examination. Often students are expected to make a declaration

along the lines that the submitted thesis is 'all their own work' except where the contributions of others are acknowledged. For example, a Cambridge research degree candidate is required to declare that "this dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text" (University of Cambridge, 2015). In fields such as education acknowledgements are typically at the level of a friend who may have coded some data to check inter-rater reliability and someone who carefully proof read the final thesis. Examination candidates normally do thank their supervisor(s) for their support and advice - sometimes in extremely generous terms - but usually this is seen as parallel to thanking a partner for moral support and perhaps their parents for bringing them into the world (and possibly helping finance the opportunity to study). Friends and family, research participants, funding agencies, college tutorial staff, and perhaps others, alongside the research supervisors and academic advisors, are thanked for supporting the process - the process by which the student undertook *their* research and wrote *their* thesis. That is, there is a clearly distinction between *supporting* the student and actually *undertaking and writing-up* the research.

In some subject areas matters are less straight-forward. In some science disciplines the nature of cutting edge research usually requires research to be undertaken in the context of a group working together in a lab with specialist equipment such that the student project is necessarily a sub-project of a larger on-going project within the lab. In these situations the student will probably be working on and contributing to the larger project (Lee, 2008), and likely some aspects of the thesis project (perhaps any of conceptualisation, instrument development, data collection, analysis...) will be, at least in part, work of other members of the team. Indeed the major thrust of the project conceptualisation and research design may be determined *before* the individual student is appointed to the project.

Such student experiences may more easily reflect the apprenticeship flavour of legitimate peripheral participation in the work of an established community of practice (Lave & Wenger, 1991) than is the case in some other disciplines: as the student will be a junior member of a team slowly inducted into more independent professional work within the lab. A student working in this kind of context could expect to be a junior author on team papers whilst working on aspects of the wider project and still building up to the main thesis work, and may well expect their thesis results to be included (perhaps alongside other sub-project results) in team authored papers. The student often experiences being part of an author team well before having to write-up their own thesis.

It is then in the nature of 'big science' that a potential research student does not apply to the university proposing their own novel and individually moulded research project (as commonly happens in academic areas such as education for example) as a viable research project often depends upon expensive specialist equipment well beyond the funding available for a stand-alone studentship. Rather, generally, the head of group or lab acquires funding for post-graduate studentships and advertises posts to follow specific lines of work within the group research programme (Humphrey, Marshall, & Leonardo, 2012). By comparison, applicants in subjects such as education may get more flexibility in devising their own project ideas (something generally, but not universally, appreciated by potential students) but may find funding awards less widely available.

The student thesis as containing co-authored work

The nature of the doctoral process and thesis in some other countries is quite different to that usually expected in the English context (Sadlak, 2004). The English thesis in most subject areas is indeed usually expected to be a single coherent 'thesis' - an argument for certain knowledge claims built up through the successive chapters of a single work, and which is considered to be original, scholarly, technically competent, and of publishable standard.

However, in some other countries a PhD thesis structure may looks quite different to this, and will in effect be a set of papers (Powell, 2004). Typically the thesis may consist of something like four papers that are bookended by an introduction and conclusion - or a summary 'kappa' chapter (Lundahl, 2010) - which shows how the separate studies reported in the discrete papers are part of a coherent programme of work. The expectation is that the papers, or most of them, have already been subject to peer review and published in some form - thus demonstrating directly that the thesis contains work of publishable quality.

Significantly, it is quite usual for some, if not all, of the papers contained within the thesis to be co-authored by the student with others - usually members of the supervisory team, but possibly also others working in the group. This is not considered to be an impediment to producing a thesis designated to the student: but rather is seen as evidence that the supervisory process is acting as effective academic apprenticeship.

There is an interesting question regarding which approach is better at training future independent researchers. The English system offers an opportunity to write a full book length manuscript, a kind of journeyman piece (undoubtedly excellent preparation for academic work in some disciplines), where the alternative 'continental' system provides more scaffolding and the chance to develop a programme of presenting and publishing a series of articles of the kind that are the core type of recognised research output in many academic disciplines. One approach allows (or at least gives the appearance of allowing) the candidate to demonstrate mastery of all aspects of the research process from conceptualisation to dissemination, whereas the other approach allows (or, at least, seems to suggest) involvement in a cycle of related studies which in principle allows increasing involvement in and leadership of the research.

Whilst the composite form of thesis is common in many countries outside the UK, it is not unknown in England. Although the standard means of obtaining a PhD is though the production of a single thesis, Universities often also award PhD degrees to those who can, i.e. retrospectively (Davies & Rolfe, 2009), show they have been involved in leading a research programme that produces a set of linked published papers - the 'PhD by publication'. Cambridge seems to have been the first UK University to adopt this route (in 1966), initially for alumni, and was found to offer the highest number of awards by publication in the UK in surveys carried out in 1996 and 2004 (Powell, 2004). Often the publications concerned are co-authored, and the candidate is expected to declare their own contributions - and may need to provide statements by co-authors to support this.

The alternative model based on publications is increasingly being considered as a format for the thesis of doctoral students (rather than just for those seeking retrospective recognition) in more Anglophone countries such as the UK (Park, 2005) and Australia (Kemp, Newnham, & Chapman, 2012). Whilst the options presented here appear to be dichotomous (a unitary thesis, reporting a single coherent study; a set of published papers compiled into a dissertation with some topping

and tailing, initially intended as a retrospective recognition of scholarship) the thesis by publication as a deliberate PhD route is best seen as a hybrid that incorporates publications planned as part of a coherent programme of post-graduate research and which can be structured at various points on the continuum between the research monograph reporting a single study and the compilation of previously published works.

Moreover, there are some differences across subject disciplines. Over some decades there has been in a shift in the expected structure of theses in economics, from the book length treatise towards a set of (typically) three essays or papers prepared for publication, sometimes seeking to address the same general research focus through different methodological approaches (Stock & Siegfried, 2013). There is some evidence that female doctoral students in economics are more likely to complete when the PhD dissertation takes the form of a set of essays than in the more traditional form (Stock & Siegfried, 2014). It has been suggested that the PhD by publication model offers particular attractions when the research focus is potentially cross-disciplinary (Dowling, Gorman-Murray, Power, & Luzia, 2012).

Is a student thesis ever really single-authored?

Authorship in academic writing

This analysis so far leads to the conclusion that although in the English system it is normal to consider, and indeed expect, a thesis to be 'single-authored' by the candidate, this is not a universal expectation in some other educational contexts, where it is often recognised that the students' thesis project is not only supported by others, but may in a real sense be collaborative work. This raises the issue of the distinction between a sole authored work and a writing collaboration. In this regard it is useful to consider how authorship is generally understood in the Academy.

There are general guidelines for what counts as authorship in academic work (American Psychological Association, 2009) and many journals make explicit or implicit the expectation that authorship of submitted articles should be denoted in a way that follows academic conventions (Taber, 2013b). One of the key points is that academic authorship is not simply about who does the writing. There are many research projects where one person takes lead (or sole) responsibility for writing up for some outlet (such as a research journal), but where the work reported depends upon substantial intellectual inputs from other collaborators who are part of the project team. These other contributions may involve conceptualisation (of the conceptual framework informing the work, of the discussion of the results in relation to prior research and/or in terms of possible implications for practice or further research), research design, development of instrumentation, designing analytical tools, and interpretation of results.

In some research traditions, decisions made by researchers during data collection and analysis are central to the intellectual value of the research (rather than being largely pre-determined during the planning of the research and its instrumentation). For example, effective interviewing in some kinds of study requires an interviewer to have a good understanding of the project rationale and conceptual background, and to work flexibly within an overall interview guide to take informed on-line decisions interactively during the interview process (to follow-up an unexpected comment, to seek further clarification, to change the sequence of topics or omit material because it seen to be inappropriate for this respondent given what they have already said, etc.) Whilst, in contrast,

much survey interviewing can be carried out by trained research assistants without special knowledge and skills, the interviewer in more 'qualitative' forms of research has a major role in determining the quality and insightfulness of the data collected. Parallel points can be made, for example, about research observation. Research assistants carrying out structured observations may need special training, but once trained are working at a 'technical' level (Taber, 2013a, p. 43). A very different level of preparation and skills is involved in observing to produce ethnographic field notes suitable for interpretive research studies. Similar issues arise during data analysis.

If a paper is submitted as single-authored to a research journal, then this is understood to imply that the work reported was carried out by a single lead researcher, who may have had support at various points during the work: but support at a technical level. If a paper is submitted to a research journal as multiply authored, then this is understood to imply that the work is collaborative, in that more than one person has made substantive intellectual contributions to the study reported. Journals expect that all named authors of a multiply authored study have seen and approved the submitted version of the manuscript - but there is no expectation that they have all been actively involved in the writing process itself (although they might well have been). Papers have been published in some areas of science with thousands of named authors. A paper reporting observations consistent with the existence of the Higgs boson (Aad et al., 2012) has nearly three thousand authors (which had they all contributed to writing the paper would have led to an average contribution of about five to six words each).

It is generally considered unethical to either exclude from denoted authorship someone who has made a substantial intellectual contribution to the study (for example if they moved on from the research group before the work was written up), or to name as an author someone who has not made a direct and significant intellectual contribution to the work (for example a head of institution who offers overall leadership and ensures material support, but is not involved directly in the specific study reported).

These guidelines, whilst clear in themselves, rely upon professional judgements of just what counts as a sufficient input into a study to be worthy of authorship rather than just an acknowledgement. In more innocent days, the physicists Alpher and Gamow invited Bethe to join their authorship on one paper (Alpher, Bethe, & Gamow, 1948) simply to be able to publish a paper by Alphe, Bethe and Gamow (sic, like alpha, beta & gamma). More recently, such loose approaches to authorship have been considered unprofessional. The *Journal of Experimental Medicine* was reportedly unimpressed when it was revealed that Galadriel Mirkwood, one of the authors of a paper it published (Matzinger & Mirkwood, 1978), was an Afghan hound. This did not however stop Galadriel's co-author, Polly Matzinger, taking up a post-doc position in Cambridge soon after the paper's publication.

More seriously, there are sometimes disputes over authorship where collaborators disagree on who has made major contributions to a publication. One of the present authors (KST) when acting as an editor has experience of inviting a scholar to peer-review a single authored manuscript, only to have the reviewer respond that she considered several unacknowledged colleagues, including herself, were additional, but uncredited, authors of the paper. That is, she considered that she had a moral right to be named as an author of the submitted manuscript, but this had not been recognised by the submitting author. As editors do not normally invite close colleagues of authors to act as peer reviewers of their work, and as the two scholars concerned were based on different continents, it was fortuitous that this issue was identified at that point rather than leading to a challenge over authorship after possible publication. When this was queried, the submitting

author acknowledged the work of his co-researchers, but took the view, quite sincerely it seemed, that as his collaborators had not contributed to the actual writing of the paper, he should be credited as the only author. This position was rejected by the journal concerned, and the author was told his work could only be considered further when there was agreement on authorship among the research team.

The role of the research supervisor

This leads us to consider the role played by the research supervisor of a student thesis project. It is important here not to over-generalise as each student-supervisor relationship is likely to be somewhat idiosyncratic, and there is some merit in the precise relationship being allowed to evolve according to the unique circumstances of the student's project and needs, and its embeddedness within the context of the supervisor's and academic group's ongoing research projects. Despite this proviso, the supervisor is clearly expected to offer expert guidance and academic support and to have been appointed due to an interest in, and knowledge of, the area of the student's project. Sometimes the student project will (by design or not) fit as a sub-project within the research supervisor's ongoing personal research programme - but sometimes the supervisor is just someone with some knowledge and experience in the topic of, and/or methodological approach being taken in, the project.

At the very least the supervisor offers guidance during supervision and feedback on written drafts of the student's work. The supervisor may also help develop the conceptualisation underpinning the project, perhaps recommending and elaborating a particular theoretical perspective. She or he may help frame research questions. They may suggest elements of the research design and instrumentation or offer feedback and suggest modifications to instruments. They may make suggestions about sampling or about identifying and selecting participants. They may guide on feasible and relevant analytical categories. They may input into interpretation of results. They may spot links or possible implications missed by the student. They will likely suggest modifications and improvements to aspects of the draft written thesis chapters. In many (surely, most) cases *the level of input into the student project would clearly count as co-authorship for the purposes of a submission to a research journal*, even if in the context of a single-authored research thesis it must be seen as support rather than collaboration.

In effect the discourse of the examination of the student thesis (one person's work, without substantive collaboration) would be more in line with a process where the degree candidate was locked away in a room to do their research and write their up thesis alone, when the actual process of research supervision is expected to provide genuinely supervised work: The supervisor is the PI (principal investigator) and the student is the RA (research assistant). Of course, the occasional research student is an exception and seeks and requires minimal supervisory input: but this is certainly not the norm.

The thesis project as a collaborative enterprise

This suggests that it would often be more valid to see a thesis project as a collaboration between student and supervisor(s) than as a (supported) single researcher project. This makes sense from an educational perspective, as becoming a researcher is a major intellectual journey that requires developing a wide range of skills and often needs strong scaffolding from others who are more

experienced. The metaphor of cognitive apprenticeship (Hennessy, 1993) seems apt here. Scaffolding requires putting in place structures to support learning that are faded as the learner acquires more independent competence (and confidence). To do this well certainly shifts beyond advising on, to collaborating in, the student's work.

The extent to which supervisors see (or wish to see) their role as collaborator, rather more as than advisor and critical friend is an interesting question. However, two factors that would encourage this stance are (a) a strong match between the student thesis project and the supervisor's own personal research programme (something already encouraged as much as is feasible within many institutions - certainly in the Faculty of Education at Cambridge - but depending upon enough quality applicants wishing to explore the relevant topics); and (b) the process of collaborative research writing for publication. One major way in which academics are judged is in terms of their research output - largely seen as publications in peer-reviewed journals, academic books and the like - so where a student research project is a likely source of co-authored research publications it inherently becomes more than a teaching commitment for the academic. Teaching in a research-intensive university is expected to involve synergies between the two key responsibilities of the academic: teaching and research/scholarship. Ideally, research supervision offers a major opportunity for such synergy.

There are clearly also potential risks here. The imperative for the research student is to complete a high quality research thesis, and the supervisor's primary concern must certainly be to support that process. It would clearly be inappropriate for research supervisors to see research students as primarily sources of publications and to prioritise writing for publication over completing the thesis.

Publication from master's projects

This is likely to be an issue with many master's theses. The time scale of a master's project generally does not allow scope for co-writing along the way to the thesis. Moreover the level and extent of supervisor input into a master's thesis project may be considerably less than in the case of doctoral projects. Most likely, in the case of a master's thesis, the focus should be on successful completion on time. Many master's thesis projects produce material suitable for publication. Where this is the case the supervisor should encourage the student (or perhaps, by this point, the former student) to consider writing up for publication. Hopefully the student will want to see their work published so it can influence practitioners and/or other researchers, and will see being a published researcher as a worthwhile personal and professional target.

However, the process of writing for publication, submitting, likely revising, perhaps resubmitting, and so forth, requires commitment and time, and continued access to academic literature - and where students have finished their studies and moved on to the next professional challenge they may not consider this viable, or indeed a high priority. There is perhaps an ethical issue here (British Educational Research Association, 2011) - many master's students are funded or subsidised by public funds or educational or charitable institutions, if not by the course cost structure of the university attended (i.e. whether student fees fully cover the real costs of the course). Nearly all such theses depend upon the gift of data from project participants (Limerick, Burgess-Limerick, & Grace, 1996), often responding to a research student's claim to be undertaking a project of potential benefit to others in the future. Where a master's project

uncovers something of interest there should be *an expectation* of putting this in the public domain.

Given the points made about the role of the research supervisor above, it will often be the case that the supervisor should be recognised as a co-author of publications deriving from the master's project. However this has implications for the supervisor who will want to assure the quality of (and stance adopted in) any writing submitted with their name attached. So there will need to be some input of time and effort from the, usually now former, supervisor.

There are some real challenges here, which perhaps deserve consideration within institutions at faculty or course programme level. If a university department wishes to encourage and facilitate its master's research students to publish from their theses, and often this will necessarily involve faculty staff as co-authors, then perhaps there needs to be consideration in setting up course structures and schedules to ease this process. One suggestion might be to have a more formal expectation (i.e., requirement) that all students submit a full draft thesis to their supervisor some considerable time before the final deadline. This will give the supervisor more time to respond with support for weak thesis drafts, and give space for planing and preparing a submission for publication alongside revisions of stronger work. To do more than pay lip service to such a scheme will be difficult within the already very tight timescale of a master's programme. However, it could be argued that a master's degree designated as a research degree is falling short if it does not effectively give most of its students an authentic taste of preparing work for publication - something that is generally seen as an essential part of the full research process.

A compromise might to offer some form of less onerous means of publication along the lines of the *Journal of Trainee Teacher Educational Research* (which publishes formatted and corrected versions of PGCE student research assignments, with a light-touch peer review process, http://jotter.educ.cam.ac.uk/), for those who are unable or unwilling to engage in the process of submitting to external journals. Yet where the students' work is of high originality and quality, and where students aspire to doctoral study or an academic career, there should be the means to support them in getting their work considered by mainline research journals or other outlets of similar standing (such as in edited academic books).

Writing during the doctoral programme

With doctoral students there may usually also be potential for publishing co-authored work after submission and examination of the thesis. However, the doctoral programme timescale of 3-4 years to examination, or 5-7 years in the case of a part-time students, gives much more opportunity to consider writing for publication as a major ongoing target. Given that doctoral study is seen as a means of admission to the academic community, and that publication is seen as a core aspect of academic research, learning to write for publication needs to be a core part of the doctoral study experience (Kamler, 2008; McAlpine & Amundsen, 2011). Some student theses support writing much earlier than the results stage - for example writing may be related to the literature review, the research design, or the analytical tools as well as the findings and their possible implications. In some types of studies different layers of analysis might be worth reporting in their own stead, or individual cases (that will later be subjected to cross-case analysis) may be worth reporting. There are judgements to be made here, of course, and the supervisor and/or other advisors may be well placed to give guidance.

Writing takes time, but as most research theses pass through various drafts, and are often subject to ongoing reconceptualisation at some level, during the doctoral process, writing for publication that is part of an overall thesis writing plan need not be a distraction from the thesis itself. Writing perhaps for conference presentation initially, and then for journal publication, can be seen as setting out staging posts - intermediate targets - on the way to the final thesis.

As well as forming part of an authentic apprenticeship into academic life, there are at least two major advantages to the student of going through this process. Whatever the outcomes, preparing for publication offers free feedback. In an age where education is often seen as a commodity and where students are encouraged to think about their education in value-for-money terms, journals are still offering free evaluations of submitted work, valuations that often including suggestion for improvement that may be relevant to the final thesis. That these evaluations may not always align with the supervisor's own view may initially perplex some students, but can itself be a useful outcome. A supervisor may get too close to a thesis project to be its best critic. When a supervisor has been involved in many conversations about the student's ideas, and has read several versions of their writing, the supervisor may 'go native' in the sense that assumptions and definitions taken for granted by the student may become taken for granted by the supervisor too. Fresh eyes and minds often spot things that are too familiar to be critically judged by their authors. It is also a good lesson in itself that not all colleagues will agree with the supervisor - a point to be borne in mind when facing the examiners of the thesis. Responding to questions at conference presentations, and to editors' and reviewers' requests for manuscript revisions, is excellent preparation for the eventual examination of the thesis *viva voce* - as well as essential preparation for a career in Academia.

Hopefully submission for publication will not only lead to free critique, but also to some published work. This is increasingly important for those hoping to move into academic careers. Getting the doctorate may seem the critical step, but in reality universities are increasingly looking for publications, rather than just potential to publish, when appointing new staff. Starting the publications list whilst a research student may be increasingly necessary for getting on the academic career 'ladder' in more competitive contexts.

Getting published in respected journals during the process also helps with confidence during the doctoral examination itself. Whilst providing no grounds for arrogance, knowing that parts of the thesis are already published (or in press) suggests that whatever criticisms the examiners may have, they should not reasonably claim that the work overall does not include anything of publishable standard (a key criterion for evaluating a doctoral thesis) when peer review has already judged aspects of the work to be of high enough quality and originality to become part of the published literature.

Opportunities and challenges

At one level what is being suggested here as good practice seems to be a win-win situation. The research student is supported by an experienced co-author to prepare publications that will support the development of the thesis and enhance the resumé, and perhaps enhance their reputation by publishing with someone already well established in the field. Perhaps the work will be read more (and so cited more) because the known name attracts readers. The supervisor also enhances their own publications list with work from the thesis project. The student gets writing support: the supervisor has (in effect) an unpaid research assistant who does all the hard work of

the research and drafts papers for the supervisor to critique, edit and improve. The host department also gains in having more publications naming it as an affiliation, and improving its research environment for students in a way that will attract other high quality research students. Co-authored publications of this kind suggest to potential research students that this faculty does not just get you a degree, but publications in decent outlets.

Yet clearly there are challenges. One of the key ones is the issue discussed above of determining authorship. Students may be used to seeing the thesis project as 'their' work (see (ii) and (iii) below), and may have bought into the single-authored convention that pays lip-service to the notions of examined work being down to one person. They wonder how examiners will judge a thesis from which co-authored articles have appeared. They may also feel that sharing authorship is akin to loosing ownership of 'their' work.

Then there is the issue of author name order. Likely most co-authored papers from a student project should name the student first - but perhaps occasionally the major intellectual contributions to a paper might be that of the supervisor, if a student is following up on something suggested and conceptualised for them by their supervisor (see also (iv) below). Clearly the supervisor should not get first billing simply through seniority. (To confuse matters, in some educational contexts the senior author by convention is *last* named and it is expected to be understood that they led on the study. However, the most common convention is to list names in order of contribution to the work.)

Yet it is also inappropriate to simply assume that the supervisor should *always* be an author on a student's paper from the thesis project: there may be aspects of the work where realistically the supervisor should receive some acknowledgement but not authorship - as the student has undertaken the work without substantial intellectual input from others (again, see (iv) below). For example, a review article based on the student's literature review and conceptualisation - with guidance, comment and critique, but without substantive direct contributions, from a supervisor - may be best understood as a single authored work. After all, none of our thinking and writing goes uninformed or uninfluenced by teachers, mentors, advisors, and others who we have talked to, heard speak, or read, yet that does not mean we should consider all these people co-authors of our writing - even if some perspectives on social cognition (Collins, 2010) might seem to imply this.

What has to be decided is when supervisory input moves beyond advice and support to collaboration in the creative process sufficient to count as co-authorship. This issue is complicated further when there is co-supervision (perhaps with supervisors offering complementary expertise and input), or where other members of the supervisory team or academic group offer major inputs into the student's project. The line between support and co-authorship is always a matter of interpretation (and sometimes differential recall!) and when these decisions have to be made in a relationship with an inbuilt power imbalance there is the potential for perceived duress, as well as for excessive diffidence in the face of an authority figure, and - in extreme cases - abuse of position. Here factors such as the perceived standing of the supervisor, and the personality and cultural background of the student, may come into play. A part-time student who is a local school headteacher may be naturally more assertive than a young student who is studying overseas for the first time and has been brought up in culture where it is normal and expected to defer to your professors.

It should however be the professional responsibility of the supervisor to take a lead in making sure there is proper balanced consideration of the contributions of the potential authors, and to be

sure the student (a) understands what academic authorship entails; (b) is able to take a view without feeling unduly pressured; and (c) is confident in, and satisfied with, a decision to name a supervisor as a co-author. Where the supervisor is not confident about these points there may be a case of inviting a third party, such as the advisor or another member of the academic group, to consider whether the supervisor's input is of a type and degree to amount to authorship. The student should always have access to a knowledgable third party to discuss matters with if they wish, and this should be made clear to them. Co-authorship is an issue that need addressing in course handbooks as well as in research training programmes.

A problem that may remain however, is that the very nature of supervisory dialogue (often taking place iteratively through formal and informal conversations, through email, through comments on drafts, and over extended periods) may make it very difficult after the event to unpick the precise extent to which the supervisor is making substantive intellectual inputs into what the student thinks and writes. There is no simple solution to this problem, but clearly it should be less extreme when the supervisory relationship is considered as a research collaboration from the outset by both parties - a collaboration that will involve thinking together, learning together, and writing together.

Writing together within the supervisor's research programme

The focus of much of this paper has been writing from the student's thesis project. However, if we accept the notion of research supervision as a form of apprenticeship into academic work, that will be supported best by collaborative work, then this model may be seen to need to be extended beyond the thesis project. Perhaps a student may be involved in working with the supervisor on aspects of their own research - where this is justified as educative for the student. This might mean activity which directly contributes in developing key research skills needed for the thesis work. Again there are risks here: the research student should not become an unpaid research assistant who acts as a kind of intern to build up some kind of credit with their supervisor. Rather there must be genuine mutuality in any such arrangement. Again this is an area where traditions are different in different national contexts. Colleagues in some countries are given funding to employ doctoral students - i.e. being a doctoral student is a kind of paid job - and it is the norm to involve them in carrying out some low level tasks to support their professor's own research. In the English system, however, students are funded (or pay from their own resources) to be supervised towards a thesis.

Guidelines here might include the expectation that the tasks assigned to a research student (a) need to be consensually agreed as part of the student's learning/development programme and (b) need to be of sufficient intellectual level such that the student's input goes beyond the technical level. Criterion (a) is again open to potential abuse and needs sensitive management, but criterion (b) should not only ensure that the work taken on is educative for the student, but also that it entitles them to be an author of any resulting publication. Supervisors should certainly also be entitled to ask their research students to take on a limited amount (subject to student regulations) of lower level (technical) research assistance that does not fit these criteria - but then only on the basis of paying them at the appropriate research assistant rate.

To what extent should research student project be aligned with the supervisor's own research programme?

As suggested above, ideally the student's research project will have strong links to the research programme of the supervisor. Yet not all academics are in the position of receiving applications from a constant stream of promising aspiring researchers keen to build upon and develop that academic's own research. The extent to which it is sensible for supervisors to take on students with projects less strongly linked to their own research (certainly at doctoral level) is another matter for careful judgement. Recognising highly talented students with original and promising ideas may sometimes compensate for a lack of close linkage. More pragmatically, issues of enrolment numbers, and the need for institutions to meet financial targets, may be a source of pressure to find supervision for well qualified, capable, and - perhaps in particular - funded candidates.

Academics often inherently value working with bright young minds, and enjoy teaching through supervision, and may put a high premium on their own learning from supervising a diverse range of research students. Yet there is an issue here on the extent to which supervisors may welcome a role of developing a programme of collaborative writing when the student's project is (or over time becomes) less well aligned with their own core research interests. This may be exacerbated further when the student's own limited English skills make writing for publication more difficult. (A student may be happy to pay for proof reading for their thesis - but not for a potential publication being co-authored with their supervisor.) Research students are often told it is not their supervisor's job to proof read or copy edit their writing: but that position is more difficult to maintain when the supervisor is being named as an author of that writing.

In conclusion

The theme explored in this paper is problematic in a number of senses. There are potential issues of coercion or misuse of power - but this has always been a potential in the student-supervisor relationship. Institutions need to offer supervisors sufficient training to understand their professional role and responsibilities, and to be able to respond to potential problems sensitively, and pro-actively, and to exercise the appropriate duty of care. Students should always know they have access to advisors, academic group heads, programme managers, or college tutorial staff, if they ever feel the student-supervisory relationship is not working properly. (This does not however necessarily respond to the cultural values held by some students such that they would feel it shameful to publicly question their supervisor.) Each supervisor and student are different. Each student project is unique. The degree of fit of a student project to a supervisor's core research interests vary greatly, and this mitigates against developing any detailed procedures or guidelines that can fit all cases. Rather, key principles and professional judgement have to suffice.

Despite these challenges, there are two core considerations at the heart of this argument which should not be ignored. Firstly, publications are valuable to students (as well as their supervisors), and are an ethically necessary outcome of quality research - i.e. there is an ethical imperative to report the outcomes of high quality research to stakeholders, including the scholarly community (British Educational Research Association, 2000); and are to be expected from a doctoral thesis project that is required to report original work of publishable quality. This suggests that a programme of writing for publication should be part of the normal doctoral journey. Secondly, learning to write for publication will generally require close collaboration with experienced

scholars, and indeed the process of research supervision is already often a form of collaboration that already justifies published outputs to be considered as co-authored in terms of normal academic conventions. Therefore, research supervisors are already often co-authoring student work even when this is not acknowledged.

There are certainly challenges in having a normal expectation that *doctoral supervision is a form of collaborative research apprenticeship that will include an explicit programme of co-writing towards publication, usually largely centred around the development of the student's thesis*. However, given the educational case for such an expectation, these are challenges which need to be faced.

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Comments on the argument

II: CO-WRITING: A STUDENT PERSPECTIVE

Richard Brock *

When I began my studies, it seemed natural to refer to 'my' PhD: the ideas and arguments produced appeared to be the result of the solitary time spent reading and writing. A PhD felt a necessarily individual endeavour therefore the first person possessive pronoun felt appropriate: this is 'my' PhD. During the course of my studies, however, my understanding of the locus of ownership has shifted through reflections on two processes: my observations of students' changing conceptualisations of physics and the experience of co-writing.

My research focuses on tracking students' understandings in physics and attempts to describe the manner in which coherent organisations of ideas form and disperse as I talked to the students over many weeks. In analysing the data, the challenges of understanding students' organisation of ideas have become apparent. The process of moving towards coherence is a messy one, but does not occur in insolation from the interview process. The students' understandings are scaffolded and challenged by the interviewer and the resulting arguments exist only as a result of the interaction between the context, student and interviewer: the research experience might be considered a process of co-thinking. Supervision would seem to be a similar process, and the products of the interaction between a supervisor and a student are therefore co-constructions.

The process of developing an article with my supervisor, based on ideas concerning the data collection method in my PhD, lead me to think about the collaborative nature of the PhD process. The paper began as a series of rough ideas that have been refined through discussions, comments on drafts and rewritings. Looking at a close to final draft of the paper, it would be impossible to assign the arguments in the paper to an individual. In this case the paper could well be described as emergent, that is, the ideas in the paper are not reducible to the contributions of either of the authors alone (Sawyer, 2005, p4). Piaget (1970/1997) described 'his' research as genetic epistemology, that is exploring the genesis of knowledge. If a genetic epistemologist were to observe the supervision process, they would struggle to define the ownership of ideas that have been redrafted many times from their original form. The paradox of Theseus' ship (Sainsbury, 2005, p64) questions whether the identity of a ship becomes ambiguous as planks are replaced. Similarly, arguments that have been refined and modified through discussions between individuals cannot be considered as the product of a single author.

These reflections on the origin of the ideas in 'my' research led me to question the use of the first person possessive pronoun to describe 'my' work. The arguments that I am developing have been guided by many influences: discussions with peers, questions at

presentations I have given, reviewer feedback on submitted papers and the input of my advisor and examiner during the upgrade process. However the most extended and significant influence is the collaboration with my supervisor. It has, at times, felt difficult to relinquish the notion of 'my' PhD, the demands and exertions of the process feel personal and 'my' PhD seemed like an adequate reward for the effort. However, the transition to a model of the thesis as co-authored, closer to 'our' PhD is a more realistic representation of the processes that have led to the production of the ideas and arguments in the work.

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III: CO-WRITING WITH YOUR SUPERVISOR: THE GOOD, THE BAD, AND THE UGLY FROM THE STUDENT'S PERSPECTIVE

Gabriela Martínez Sainz **

During a doctoral research project, you think together with your supervisor, and it is likely that both sides learn together as part of the process. However, writing together about and as a result of the research project adds to the complexity of the relationship between supervisor and graduate student. I consider three aspects of co-writing that can be particularly challenging from the student perspective: distinguishing between contribution and attribution of the arguments and ideas of the publication, the identity of the student as an independent researcher, and finally the impact of the power relationship in the co-writing process.

As suggested in the paper (i), there are different ways in which supervisors make a substantial contribution to students' work, from input in the conceptual framework, recommendations for the design, to suggestions during the data analysis or interpretation of the findings. Ultimately, in the case of doctoral research projects, supervisors are teaching students how to design, conduct, and publish research of the highest scholarly standards. Their contributions to the overall research and, in

particular, the publications that derive from it should be fully acknowledged. However, these might not necessarily imply attribution or ownership of the ideas argued when published, which is what authorship implies.

The authorship of the publication not only reflects a substantial contribution but also denotes responsibility for the argument and conclusions presented making the author accountable for them. It is difficult to draw a clear line between a contribution and a substantial contribution to a piece of work; even more problematic is to distinguish between contribution to the publication and attribution of its ideas. In a co-writing process, particularly the cases when the writing is done exclusively by the student, this makes a difference and puts in perspective the work by the supervisor of critiquing and improving of the argument in the publication and the work of the student of developing the argument in the first place.

The matter of responsibility and accountability of the published ideas matters not only as good professional practice but also in pragmatic terms. Getting your work published during your graduate programme would definitely help with your confidence during the examination but doing so as the co-author of your supervisor does not necessarily help with your identity as an independent researcher. Even if you may enhance your publications list, how serious co-authored publication are taken into account is also a matter of discussion (Fine & Kurdek, 1993), specially when applying for a job when you need to prove your ability to work independently and develop your own research agenda. Thus, even when writing together with your supervisor could be a win-win situation for both sides, relying on co-authored publications may be counterproductive for the student's academic career.

Supervision as a form of mentoring (Manathunga, 2007) implies guidance to facilitate the career development of the graduate student in becoming an independent researcher by teaching the appropriate disciplinary-based standards, including scholarly publications. Regardless of efforts and intentions on both sides, the relationship between supervisors and graduate students is unbalanced in terms of power, knowledge, skills, and impact in the field of research. It is taken for granted that whereas the supervisors, as established researchers in the field, have an in-depth knowledge of the subject and expertise conducting scholarly research on it; the student lacks this and is just a novice learning from them. The assumption makes the relationship unequal by emphasising the idea that the student, regardless of her background, experience or previous career development, lacks the necessary knowledge and skills to be considered an independent researcher in the field. This assumption is not necessarily a negative aspect the relationship between supervisor and student but it reflects the imbalance in that relationship that is present when thinking, learning, and writing together.

Whereas the doctoral thesis as a publication recognises the expertise of the supervisor guiding the development of the student, for other publications like journal articles the implications of the imbalance of power and knowledge are less clear. Co-writing allows the supervisor to initiate the student into the norms and rituals of academic publications and teach her 'by-doing' about the scholarly standards expected for her work. However, because co-writing becomes a learning process, the student is not recognised as an independent researcher in her own right on the basis of her lack of

knowledge and expertise, so she is not in the best position to disagree or challenge the ideas or suggestions of her supervisor. Thus, the unbalanced power can encourage students to agree with or support their supervisors' views, implicitly and unintentionally perhaps, not only for the sake of their learning process but also for their career development. The supervisor acts as gatekeeper of the broader academic community not only by introducing the student to the customs of the discipline including publication, but also by helping to establish professional contacts and ultimately by endorsing or not the student's professional abilities and recognising her valuable contributor to the field.

For a student interested in an academic career, the endorsement and recognition of her supervisor is as essential as publications beyond the doctoral thesis in the current state of the job market (Dickey, 2014; Schuman, 2014). Publications are not only desirable but a necessary condition in order to be considered for academic and research positions. Taking such requirements into account, the possibility of turning into publishable pieces of work some of the progress you have already made is more than appealing for both students and supervisors. The idea of developing stand-alone articles along the way to your doctorate thesis is perhaps an ideal situation for most graduate students aspiring to an academic career. Whereas the doctoral thesis as a publication recognises the expertise of the supervisor guiding the development of the student, for other publications like journal articles the implications of the imbalance of power and knowledge are less clear.

From the student's perspective, the learning opportunities and pragmatic advantages of writing together with your supervisor or supervisors will vary depending on the very individual relationship you forge with them, the overlap of their research agendas with your interests and project, and the commitment both sides are willing to make towards the publication. In any case, the ownership of the ideas and arguments presented should be discussed and agreed throughout the process, acknowledging the power imbalance between supervisor and student, and creating spaces for a dialogue that recognises and values the latter as an independent researcher, at least in the making. Co-writing then could be an experience from which students benefit significantly, but clear guidelines –institutional or not – are needed regarding expectations on both sides and levels of collaboration, and kinds of contribution that could and should be made.

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(IV) SYNOPTIC RESPONSE TO COMMENTS

Keith S. Taber

I thank Richard and Gaby for sharing their responses to the main text in such an honest way. As is to be expected, research students will rightly feel highly possessive of their research, their project, their thesis - something that may feel "a necessarily individual endeavour" (ii, Richard). This is to be welcomed, and respected. Clearly it is important that any formal institutional adoption of expectations about co-writing during a doctoral project - and indeed any supervisory encouragement to engage in co-writing about the thesis project - needs to recognise and not undermine that sense of identify and ownership that a student has for *their* work. As pointed out in the main argument (i), the supervisor-student relationship is inherently asymmetrical, and there is a need to protect against the potential for the imbalance of power to (whether deliberately or not) lead to students feeling pressured to grant co-authorship to a supervisor where they may not feel it is merited. Gaby (iii) also raises the related point of how that imbalance may work out in a co-written paper in terms of a student possibly feeling pressured to accept the ideas, emphasis, phrasing etc. of a supervisor when the student does not feel empowered to argue for their own ideas and formulation. This is an area where factors such as the student's cultural background and personality traits could well lead to this situation in some cases. There is certainly a basis for potential concern in that regard.

In his comment (ii), Richard reflects on how he came to see that an article he was drafting to submit for publication should be seen as co-authored. Richard relates this to a well recognised dilemma in research into people's ideas. As was long ago recognised by Piaget (1959/2002), naturalistic observation can be a very inefficient way of eliciting children's thinking on any topic. So we commonly probe by using such techniques as interview questioning or talk-aloud tasks - and these are necessarily interventions. The more deeply we wish to explore thinking, the more we intervene in the natural course of the very thinking that we are studying. Richard recognises that his data from students is co-constructed, and is the product of an interaction, an 'interView' (Kvale, 1996). Richard also recognises an analogy between his participants thinking about physics *in the context of the data collection opportunities he sets up* and his own thinking about his research *in the context of the extended dialogic of doctoral supervision*. If Richard had studied in another institution, within a different academic group, with different a supervisor and advisors, had a different student peer group, etc, then 'his' project would be different, just as it would had been he collected his data from different learners in a different institutional context. Just how different, is of course, a moot point.

Gaby raises a similar issue (iii), but from a different standpoint. Where Richard acknowledges that his ideas may be reasonably considered to be not fully independently his own in terms of their origins, Gaby focuses on the question of the author's responsibility for ideas in published work. An author has to take responsibility for their published writing. If the initial argument above (i) raises the ethical issue of

how authorship in academic journals is widely understood in terms of making a substantial contribution to intellectual work, then Gaby highlights the converse side of that coin: the moral obligation on an author to be responsible for what is published under her or his name.

This is of course an issue that applies whenever work is co-authored, as many studies in education and many other academic disciplines are. There can be a difficult tension here when a team member who has made a substantive contribution to a project does not feel they can stand by an account to be published that other members of the same team can commit to. This can lead to declining to be named as an author on publications about work one has committed considerable time and effort towards, if ultimately one feels that one cannot take responsibility for what is to be published. Here the imperative not to sign up to something one does not fully agree with may need to trump the usual rule about naming all significant contributors to the work. A related issue increasingly arises when work on a study is divided among a multi-skilled or interdisciplinary team according to specialist input (e.g. one person applies a particular analytical technique): as some authors may just have to trust their colleagues in their own areas of specialism. Some journals now expect authors to each declare what their role in the reported work was, but this is not the norm in many outlets.

To some extent, were it to become the norm, that level of reporting of individual contributions could be a useful response to another of Gaby's points. As Gaby rightly suggests (iii), doctoral training and the award of the PhD should provide evidence that the PhD candidate is a competent independent researcher, ready to take on responsibility for leading research in their future career. If the student's only published work is co-written with the supervisor then this might be seen to cast doubt upon that capability. As suggested in the main argument (i), norms and expectations vary widely. In many continental countries the normal expectation at completion of a PhD is that several (usually co-authored) papers have been published - but as Gaby points out this very much leaves open to question the extent to which the doctoral candidate is ready to undertake independent research.

Such a concern needs to be taken seriously. In the main text (i), I reported an anecdote about the name of the famous physicist being included in the authorship of a 1948 paper by Alpher and Gamow for whimsical reasons. The work reported derived from Alpher's ongoing PhD project. The decision to invite Bethe (a world famous physicist and fiend of Gamow) to add his name was that of Gamow (another world famous physicist) who was the research supervisor. Alpher felt that his own major contribution would be overshadowed, as most physicists reading the paper would assume Bethe and Gamow had made the most significant contributions - something that according to Singh (2004) did indeed occur.

The argument made in the main text (i) does not suggest that all writing arising from the doctoral project and submitted for publication should be co-written. Ideally the doctoral journey will include various writing, generally focused around the thesis project and related areas. This should give scope for co-writing (where the supervisor's input amounts to a substantive enough intellectual input to justify, and indeed require, co-authorship) and single authored writing. This was the experience during the lead author's own PhD studies, publishing both with the supervisor, and independently. In

that case the name order of material deriving from the thesis project and drawing primarily on the student's thinking reflected that (Taber & Watts), but one paper was initiated by the supervisor and drew on evidence from the thesis data alongside material brought by the supervisor, and there the order of names (Watts & Taber) reflected the greater contribution of the supervisor to initiating the thinking about, and planning the programme of, that publication.

Most doctoral students do not start the process as ready-made independent researchers, so in many cases progression in their learning would benefit from scaffolding through co-writing to later writing as a sole author. In his commentary (ii) Richard refers to how in an article he was developing from his thesis project "it would be impossible to assign the arguments in the paper to an individual", leading him to accept that this should be submitted as a co-authored paper. He does not mention that he has recently published another article from his research (Brock, 2015) where the issue of co-authorship was discussed, but where on balance it was decided that it was appropriate for the article to be considered as having a single author (with acknowledgement for the supervisor's support). In both cases the articles report on work that was clearly primarily undertaken by the student (i.e. Richard), but with advice, guidance, critique, etc. from the supervisor both at the stage of writing, and earlier whilst Richard undertook the work being reported. In one case it was felt that the supervisory input comprised support but not authorship; in the other that it amounted to a level of thinking together that implied co-authorship. Of course, these writings actually fell at different points on an independent-collaborative working dimension, and did not readily fit into a simple dichotomy. There are nuanced decisions to be made when deciding if a supervisor *should* be considered a co-author - but of course they are precisely the kinds of nuanced decisions that are being made concerning authorship all the time in Academia, and which research students need to learn to engage in.

Gaby and Richard's insightful comments (ii, iii) highlight just how much is at stake for the student when they publish their work and share authorship, and how strongly students feel ownership of their projects. We all agree that student publications are important, and that the supervisor has a major role in mentoring, and modelling, and inducting the research student into the publication rituals of the Academy. Students writing for publication are subject to the same ethical requirements as other authors in terms of ensuring they acknowledge the substantial contributions of their collaborators though co-authorship. When fully justified, supervisor co-authorship is not a gift from the student, but an enactment of the student's ethical and scholarly responsibilities. When not justified, there is an ethical and professional responsibility on the supervisor to decline any such offer of co-authorship. However, such distinctions are not always obvious and clear-cut and there are clearly many challenges for students, supervisors and their institutions in ensuring a process that is fair and educative to students, and which properly supports their development towards fully independent researcher status.

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