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# The how and why of academic collaboration: disciplinary differences and policy implications

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**Abstract** This paper examines how and why academics in different parts of the academy collaborate. In this paper we argue that: (1) There is a useful analytical distinction to be made between collaboration (fluid and expressive) and Collaboration (concrete and instrumental); (2) These two are not mutually exclusive and their use varies between disciplines; and (3) This distinction is an informative one for policy making that aims to encourage collaboration. Two interview based studies were used to explore the differences in collaborative practices across disciplines. The first was small and confined to a single university ( $n = 36$ ) and the second was a larger study conducted in three countries ( $n = 274$ ). Cross tabulations and analysis of open ended questions demonstrated many differences across the humanities, sciences and social sciences in collaboration. The C/collaboration distinction proves useful in understanding different disciplinary approaches to research, and in pointing to implications for research policy and funding. Attempts to increase collaborative research through Collaboration only, may well have deleterious effects on both collaboration and Collaboration. Research policy and funding should bear these differences in mind when seeking to stimulate collaborative research, so as to gain better outcomes across a range of disciplines.

**Keywords** Collaboration · Research policy · Humanities · Sciences · Social sciences

## Introduction

While working in a team is the generally accepted mode in which many biological and physical scientists do research, this is not the case in all parts of the academy (Farber 2005; Meadows 1997; Melin 2000). In disciplines such as history and literature, for example, the

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tendency is to research alone and produce sole authored publications. This reflects how academics in these disciplines were taught to do research, suits the methods that they use, and fits their disciplines' values.

Such heterogeneity in research practices poses a problem for policy: National policy frameworks tend to have a one-size-fits-all approach to funding research, and the default position often seems to reflect the conflation in much of the literature on research policy between *academic* research and *scientific* research (Donovan 2005). Thus, reviews of research systems in countries such as the United Kingdom (UK) have led to claims that some disciplines are being privileged, because performance monitoring and funding systems work to a formula that is more congruent with the biological and physical sciences than the social sciences and the humanities (Donovan 2005; Hicks 2004). These systems are seen as valorising research conducted by teams that get grants together, do projects together, and produce publications together. This is consistent with a policy emphasis on supporting research that generates relatively direct and quantifiable economic pay offs, typically in scientific and technological disciplines. It is also linked to an increased emphasis on funding collaboration.

Scientific research productivity has been closely linked to high levels of collaboration (Lee and Bozeman 2005; de Solla Price and Beaver 1966), and consequently many developed countries seek to stimulate collaboration through a mix of research grant schemes and grant criteria. (AHRC 2009, p. 13; DAAD 2010; ERA-Can 2010; Lee and Bozeman 2005; RCUK 2010; Thorsteinsdóttir 2000). Such measures are designed to fund collaborative research based on particular models of collaboration.

Yet, as we note above, it is in the differing patterns of collaboration, including forms of publication authorship, that much of the disciplinary heterogeneity in research practices seems to reside. The tensions between uniform research policy settings and heterogeneous research practices are obvious. However, we should resist the temptation of adopting stereotypical depictions that contrast the monkish habits of sole-author book-publishing humanities scholars with the assumed sociability of multi-authored article-publishing scientists. Not only are there variations within these different disciplinary traditions (Fry 2006), but the apparent clarity provided by measures of sole versus multi-authored publications (e.g. Rigby and Edler 2005; Wagner and Leydesdorff 2005) can obscure the social interactions that occur as part of the process of research even amongst academics who never co-publish.

Profound differences exist in collaborative practices, evolving from the socialisation of academics into disciplinary cultures, and from the national research systems and the individual universities that they are located in. Lewis and Ross (2011) have shown that the depth of national system differences tends to transcend other factors influencing research practices stemming from disciplinary differences. Katz (2000) demonstrated that the size of academic communities within and across countries, the number of different types of collaboration, and the size of individual institutions, all affect research performance. However, the organisational structure of departments based on different research traditions also affects how academics work (Del Favero 2005). There is a reasonably large literature examining patterns of collaborative working in (biological and physical) science. The literature examining collaboration in the humanities (particularly), but also in many of the social sciences, is much smaller and often predicated simply on showing how little of it there is in comparison with science. Knowledge about the forms of and extent to which academics other than biological and physical scientists do engage in collaboration is scarce. Further, there is almost no comparative research on disciplinary differences.

This paper aims to examine empirically how and why academics in different disciplinary areas collaborate. The vigorous debates and criticisms over research policy suggest the need for a more thorough understanding of the meanings of collaboration, and an improved analysis of the extent to which a variety of collaboration types vary across disciplines. In this paper we argue that:

1. There is a useful analytical distinction to be made between collaboration (expressive) and Collaboration (instrumental);
2. Collaboration and collaboration are not mutually exclusive concepts, and the extent of their use varies between disciplines (here defined as three broad categories—humanities, sciences and social sciences); and
3. This distinction is an informative one for policy making that aims to stimulate collaborative research for a broad range of disciplines.

### The meanings of collaboration

The concept of research collaboration is, as Katz and Martin (1997) point out, far from a straightforward concept. Much of the literature on research collaboration tends to assume that the best measure of collaboration is through examination of co-authored papers (Frame and Carpenter 1979; Meadows 1974; Newman 2001). Some use authorship and citation records to construct collaborative authorship networks (e.g. Newman 2001), taking advantage of large databases, and large numbers of multi-authored publications to generate their studies. However, the literature on collaboration has increasingly acknowledged problems with reliance on publication data as a measure of collaborative activity. For instance, Katz and Martin (1997) criticised this approach due to the risks of misallocating names and incorrectly identifying the location and geographic interactions of co-authors with multiple institutional affiliations (Katz and Martin 1997).

There are also deeper limits to using publication data—at best, a ‘partial indicator’ of collaboration (Katz and Martin 1997). Thorsteinsdóttir (2000) emphasised the importance of micro level examination of collaboration through interviews to supplement her use of publication data. Melin (2000) also used a questionnaire and a small number (7) of academic interviews. Similarly Maglaughlin and Sonnenwald (2005) used a mix of interviews and observations to explore what was happening with interdisciplinary scientific collaboration. Research on collaboration can clearly benefit from an expansion in methodologies.

Collaboration is better understood as a social activity that takes place within institutional contexts, rather than as a purely rational actor strategy to maximise productivity (Bozeman et al. 2001). Collaborating relies on interpersonal networks—sets of interactions between individuals—which can take many forms. The ties between individual academics may be narrowly instrumental and purely a means of doing research in the short term. Alternatively, they may be friendships linked to long-term working relationships, based on shared intellectual interests. In whatever form they take, academic networks can provide us with useful information about the shape of research collaboration (Lewis 2010).

There is some literature bringing together notions of collaboration and the idea of networking as the basis for developing social and human capital in research (Bozeman et al. 2001; Bozeman and Corley 2004; Jha and Welch 2010; Newman 2001; Rigby and Edler 2005; Rothstein and Davey 1995). More recently, van Rijnssoever and Hessels (2011) found that various personal characteristics of scientists, such as gender and years of work experience, are correlated with levels of disciplinary and interdisciplinary collaboration,

suggesting that such attributes are important to understanding how and why academics collaborate.

There have been important acknowledgements of disciplinary differences in collaboration. Newman (2001) distinguished carefully between different science disciplines in his study, and Bozeman and Corley (2004) used a questionnaire survey to delve into motivations behind collaboration, and controlled for discipline field. However the concept of collaboration they used was explicitly focused on the building of 'science and technology human capital'. Melin (2000) asserts that there are important collaborative differences between medical sciences almost always done in teams, and the humanities where there are 'basically no teams and collaborations are not very common' (p. 38).

Just as publication data can only give a partial picture of collaboration, so too, studies of science disciplines alone give a partial picture of academic research and collaborative activity. This has led to an unduly narrow conceptualisation of the meaning of collaboration in both academic studies and in policy making. Our approach seeks to overcome these limitations by adopting an approach which enables comparisons across disciplines, beyond the biological and physical sciences.

Academics across all disciplines undertake collaborative activity, but not all collaboration has the same level of visibility. To address the problems posed by a tendency for analysis to be biased towards the more visible (and easily measurable) forms of collaboration we propose an analytical distinction between (capital C) *Collaboration* and (small c) *collaboration*. *Collaboration* is where researchers work together on a research project, designing it and/or undertaking the project together, and publishing on its results together. *Collaboration* is a concrete form of networking that is readily observable to research funding and performance systems. In contrast, *collaboration* involves discussion of research and ideas, feedback and commentary on research work and draft papers (Meadows 1974). These two types of collaborative working are not mutually exclusive. All, or almost all, academics are engaged in *collaboration*; fewer engage in *Collaboration*.

This distinction is necessarily an analytical simplification of a complex concept, but it is a helpful one for this paper: It highlights that collaboration has multiple meanings, which is especially important in considering research policy and its effects on different disciplines. We also acknowledge that the relationship between collaboration and Collaboration is not straightforward. For example, Collaboration certainly implies collaboration, and either can be construed as causing the other. However, we maintain that the distinction is analytically clear and contributes to an improved analysis, because it does not obscure the many cases where collaboration occurs without Collaboration.

The complex array of discipline fields and sub-fields/sub-disciplines in academia poses a further analytical problem. To advance the argument about this analytical distinction between *Collaboration* and *collaboration*, we have adopted three 'discipline areas'—science, humanities, and social science. This typology is used in preference to the four-way discipline classification system distinguishing soft from hard and pure from applied disciplines (Biglan 1973; Del Favero 2005). These three discipline areas cannot fully capture the complex array of discipline fields and sub-fields/sub-disciplines within academia. However, it enables comparisons across disciplinary areas in line with the criticisms of research policy in many countries, which is seen to privilege sciences over humanities and social sciences (see: Lewis and Ross 2011). In addition, these categories were meaningful to the academics interviewed, who were asked to (and were able to) identify which of these they belong to.

Clearly, C/collaboration is driven by myriad factors. As noted above, it has been an implicit or explicit focus of government policies on research evaluation and funding in

many developed countries. National institutional frameworks certainly shape public science systems (Whitley 2003). As Jeffrey (2003) argues, trends towards increasing interdisciplinary research reflect not only the complexity of modern problems, but also how funding bodies wish to see these problems tackled. The impacts of policy and institutions are certainly important in encouraging particular research practices, but disciplines, with different fields of inquiry and methods, are also crucial in shaping how and why academics collaborate. These are the focus of this paper.

## The two studies

Two studies were used to explore how academics in different discipline areas work together to do research, and why they work this way. The first study was conducted at the University of Melbourne, Australia in 2007. The second, larger study conducted in 2008–2009 involved the universities of Auckland (New Zealand), Birmingham (United Kingdom) and Melbourne.

In the first study, publications data from the University of Melbourne for 2001–2005 were analysed to determine the predominant forms of publishing in the Faculty of Arts (humanities, languages and social sciences),<sup>1</sup> and the Faculty of Science, and to examine the extent of co-publication. This demonstrated major disparities in publication patterns, not only between these two faculties, but also within them. In the sciences, 96 per cent of articles published had two or more authors, compared with just 14 per cent for Arts. Further, the most common number of co-authors within Arts was two or three, while in Science this was much larger (Lewis 2010). Semi-structured interviews conducted with 36 academics from the Faculty of Arts investigated the extent to which they work with others, and their motivations for doing so. Many of the questions were open ended in this initial exploratory study (Lewis 2007).

The second study involved structured interviews with 274 academics drawn from disciplines across the humanities, sciences, and social sciences working at the Universities of Auckland, Birmingham and Melbourne. The interviews were conducted between May 2008 and February 2009. Many of the same questions were used as in the Melbourne study, with the responses in the first study used to create a set of closed responses in the second study. Table 1 summarises the two studies.

Participants in the first study were chosen through purposive sampling to ensure that both men and women, in junior (Lecturer) and senior (Associate Professor) positions, were included. Contact with participants was initiated via an email invitation, followed up with a further email or telephone call to arrange a time for interview. In total, 43 per cent of those contacted agreed to participate. 36 people (20 men and 16 women) were interviewed, 23 of whom were lecturers and 13 associate professors. Interviews were conducted face-to-face and lasted approximately 1 h, and responses were recorded as hand-written notes.

The sample process in the larger study was similarly purposive, with the aim of balancing gender, seniority and discipline area amongst the sample. Contact with participants was initiated via an email invitation, followed up with a further email or telephone call to arrange a time for interview. The participation rate for the second study was 38 percent. Interviews were conducted face-to-face by local interviewers and lasted approximately 1 h. Responses were recorded as hand written notes, or on an e-version of the schedule using a

<sup>1</sup> This Faculty does not include two large social science disciplines—behavioural science and economics.



**Table 1** Information on the two studies

	Melbourne study 2007	Three university study 2008–2009
Sample size	n = 36	n = 274
Institutions	University of Melbourne, Australia	University of Birmingham, UK University of Auckland, NZ University of Melbourne, Australia
Faculties and discipline areas	Publications data—Faculties of Arts and Sciences Interviews—Faculty of Arts (humanities, social sciences)	Interviews—Faculties of Arts and Sciences (and equivalents) (humanities, social science and science)
Questions in interviews	Extent to which work with other people (research, publishing, grant applications, teaching, supervision)  Membership and purposes of research groups  Details of collaborative practices, why they are used and how they can be supported. Identification of discussion networks	Extent to which work with other people (research, publishing, grant applications, teaching, supervision), why work in this pattern  Membership and purposes of research groups and what supports them  Perceptions of policy impacts on research work Identification of discussion networks

**Table 2** Characteristics of respondents for the three university study (% by university)

		Birmingham (n = 90)	Auckland (n = 93)	Melbourne (n = 91)	Total (n = 274)
Gender (%)	Male	46.7	47.3	51.6	48.5
	Female	53.3	52.7	48.4	51.5
Discipline area (%)	Humanities	30	37.6	37.4	35
	Social science	41.1	35.5	29.7	35.4
	Science	28.9	26.9	33	29.6
Seniority (%)	Lecturer/Res Fellow	38.9	23.7	26.4	29.6
	Snr Lecturer/Snr Res Fellow	26.7	31.2	28.6	28.8
	Assoc Professor/Reader	10	29	12.1	17.2
	Professor	23.3	15.1	30.8	23
	Other	1.1	1.1	2.2	1.4

laptop computer. Table 2 provides information on the respondents in the three university study.

The open-ended comments from the first study were submitted to a latent thematic analysis following the procedure outlined in Hayes (2000). The identification of themes involved reviewing the qualitative data a number of times to obtain a 'sense' of the data and to note repetitions of ideas and concepts which could provide the foundation for the development of 'proto-themes'. Once a proto-theme had been developed the data set was revisited to locate examples supporting and contradicting the theme which was then refined further and the process repeated until the point of 'saturation' where the last reading of the data provided no new insights. Rather than being theory-led, themes were allowed to arise organically from the data.



Cross tabulations and Chi-squared tests were used to test for significant differences on the quantitative data from the second study, where the data set was large enough to be able to undertake such analyses across the three (approximately equal in size) discipline groups. In addition, open-ended comments from these interviews were analysed using a similar process to that utilised for the first study, but with a focus upon manifest or 'surface' data as opposed to latent content. This reflects the thinner content from answers which were briefer in general in the second study because of the more closed nature of many of the questions. Furthermore, in order to enable straightforward comparisons of how the salience of themes varied across the three major discipline areas (humanities, sciences and social sciences), the final analysis presents the themes in the form of frequency counts rather than in qualitative terms.

## Results

### The Melbourne study

Analysis of the interview responses revealed two major themes, which can be characterised as follows:

The natural order:

- (a) collaboration is impractical given that the cultural traditions of humanities and social sciences (HASS) disciplines tend to favour solitary scholarship; and,
- (b) HASS models of research are distinct from the model of research in the 'hard' sciences, which not only lends itself to collaborative research, and is favoured by schemes that seek to quantify academic output.

Intellectuals without borders:

- (a) Research performance frameworks which emphasise 'research clusters' (see Graham and Ravnat 2005 for an example from Canada) might push academics back into the confines of their discipline, with various undesirable effects; and,
- (b) Some forms of community engagement outside of the university are not recognised as collaboration, but should be.

Most quotations in the following discussion are from humanities academics, and this study only involved social scientists within the Faculty of Arts. Individual participants' disciplines are indicated in brackets after quotations from the interviews.

### The natural order

...difficult to see how I could publish very much [with others]...if you did publish with someone else you need to agree on absolutely everything. ...[Also, H]istory has a literary dimension to it – I have my own style [and adopting someone else's] would be uncomfortable. [participant 3; history]

This theme was evident in two areas of concern for participants in our study. First, the co-authoring of publications is a practice that stands in contrast to established orthodoxies of research practices in the HASS. Some participants indicated they preferred publishing alone simply because writing alone is "[m]ore efficient...co-authoring takes two times as long [and you receive] half the credit" [participant 34; political science]. Other comments

indicated that, more than practical objections, a culture and practice of sole-scholarship are deeply ingrained in some disciplines—as one respondent commented, co-authoring publications is “just not the done thing in humanities” [participant 22; German studies].

Second, many respondents believe there is a problematic move to favour a ‘science model’ of research based on quantification of academic work outcomes, and emphasising the easy to quantify co-authorship forms of collaboration. This fails to acknowledge different forms of research practice and collaboration within the HASS. For example, a number of respondents pointed out these traditions contrasted with the sciences:

The way we work in humanities...We don't have [the] culture science do of publishing with students...I come from a culture which values single author work. [participant 5; literary studies]

How much [is] done in philosophy [is that it involves] kind of thinking; no lab, fieldwork, nothing that needs [more than] reading and thinking...so although [publications can happen] jointly, by and large most [are] individual. [participant 31; philosophy]

Not all participants expressing such views were averse to the idea of collaboration. For some, the challenge was finding collaborative partners within their school or department because “On a practical level [you] tend to work with people you share common ground with” [participant 8; publishing], but finding an intellectual ally is not always straightforward:

[Anthropology is a] Fractious discipline and getting agreement is difficult. Certainly [I] see collaboration in a school like this as virtually impossible... [participant 10; anthropology]

Interestingly, here a number of participants evoked the idea of the ‘two cultures’ (Snow, 1959), and contrasted their own research practices with the ‘hard’ sciences:

“...the other faculties [e.g. medicine, sciences] always do collaborate in their work, less so in the Arts” [participant 2; political science]

Narrow view tipped towards sciences. Tipped towards research teams, problem solving teams...expensive research [in sciences] lends itself to teamwork... [whereas in humanities research tends to be] solitary. [participant 18; art history]

This ‘science model’ was also seen as advantaged in policy terms:

...science [is] more suited to government models...Government model much more well-suited to science [and] social sciences model than history. [participant 26; history]

### Intellectuals without borders

This theme relates to concern that research performance frameworks and the funding linked to them might limit opportunities for interdisciplinary collaboration by labelling and aligning academics into clusters according to their discipline. Several respondents with strong interdisciplinary interests expressed concern that they might stuff them back into their disciplinary ‘pigeon holes’ for the purpose of measuring a cluster’s output, preventing them from exploring their intellectual curiosity to its natural limits.

Participants argued that research groups or clusters should not be enforced from ‘the-top down’ or limited by disciplines:

For clusters to have natural boundaries and to be aware these natural boundaries may take us beyond the Arts Faculty and [the discipline]...try and respect what is going on and not impose an alien structure on top of it which erases what is there... [participant 27; philosophy]

They also described collaborative activities with a range of non-academic partners, from public lectures to arts performances, as legitimate but unrecognised collaborative activities:

The university is kind of driven by traditional notions of research in terms of qualitative and quantitative...the best way is not always articles in elitist journals. Make statement about collaborative research, statement on value of working with communities, shared publications can be just as consuming as single authored publications. [participant 30; theatre history]

These comments resonate with the different meanings of collaborative work in the HASS disciplines, and highlight the usefulness of distinguishing between *collaboration* and *Collaboration*. We turn now to the results from the second study, which further elucidate the experiences and practices of academics in relation to *C/collaboration* in academic research.

### Three university study

In this study, respondents were asked to nominate which of the three discipline areas they saw themselves belonging to, as well as their discipline(s). Consistent with the fuzzy boundaries between discipline areas (Meadows, 1997), 15 respondents (5.5 per cent) nominated more than one discipline area, however most respondents were comfortable with identifying themselves as being in either the humanities, the sciences, or the social sciences. Discipline area differences consistently transcended national differences, so the results for the three universities have been combined throughout this paper.

There were statistically significant differences in patterns of doing research across the different discipline areas, consistent with the way they are usually distinguished in the literature. As Table 3 shows, science academics rarely do research alone, humanities academics mainly research alone, and social scientists do an approximately even mixture of working alone and with others.

Science academics' publishing patterns reflected their reported research habits, with almost none publishing alone, a few in a mixed pattern, but the vast majority only ever publishing with others. The picture for humanities academics, while clear in relation to the way research is done, becomes slightly murkier when looking at publication patterns, although the differences remain and are statistically significant (see Table 4). For the

**Table 3** Do research mainly alone/with others/mixture of both

	Humanities	Science	Social science	Total
Alone	63 (66 %)	6 (7 %)	29 (30 %)	98
With others	13 (14 %)	61 (75 %)	34 (35 %)	108
Mixed	20 (21 %)	14 (17 %)	34 (35 %)	68
Total	96 (100 %)	81 (100 %)	97 (100 %)	274

Percentages may not total exactly due to rounding

**Table 4** Publish alone/with others/mixture

	Humanities	Science	Social science	Total
Alone	53 (56 %)	2 (3 %)	33 (34 %)	88
With others	4 (4 %)	65 (80 %)	25 (26 %)	94
Mixed	38 (40 %)	14 (17 %)	38 (40 %)	90
Total	95 (100 %)	81 (100 %)	96 (100 %)	272

$\chi^2$ , significant at  $p < .05$

**Table 5** Why publish alone/with others/mixture? (most frequent reasons)

Themes	Overall	Discipline area		
		Humanities	Sciences	Social sciences
Easier	30 (100 %)	12 (40 %)	6 (20 %)	12 (40 %)
Discipline tradition	33 (100 %)	23 (70 %)	7 (21 %)	3 (9 %)
Depends on project	37 (100 %)	12 (32 %)	7 (19 %)	18 (49 %)
Nature of the research	92 (100 %)	24 (26 %)	39 (42 %)	29 (32 %)

humanities more than half of respondents claim that they mainly publish alone. Those in the sciences claim to publish with others almost all the time, and social scientists remain the most spread and in this case some 40 per cent claim to publish in a mixed pattern.

Participants were asked why they published in the patterns they reported. The four main reasons given were: (a) that it is simply 'easier' to publish their chosen way (e.g. 'more efficient to pool ideas together' and 'more productive for the same time in team'); (b) 'disciplinary traditions' promoting either sole or joint scholarship; (c) that it 'depends on the project' at hand and whether it lends itself to collaboration or not; and (d) the 'nature of the research', in that publication patterns reflect how the associated research was undertaken (e.g. 'nature of experimental work—a lot done with students', and 'I research alone, so publish alone [too]'). Table 5 shows only the most frequently cited reasons (mentioned in at least ten per cent of codeable responses).

As Table 5 shows, compared to scientists, twice as many humanities and social science respondents indicated their publication patterns were influenced by their feelings about whether it is easier to publish alone or with others. Humanities scholars tended to dominate amongst those citing disciplinary traditions, while almost half the respondents indicating their publishing approach varied according to the project were social scientists. There was a fairly even distribution in the percentage of respondents in each discipline area who indicated that their authorship decisions reflected the nature of the research, though of the three responses it was the most heavily favoured by scientists.

Table 6 presents the extent of collaboration in applying for grants by discipline area. As could be expected, humanities academics say they apply for grants alone most often, scientists mainly apply with others, and social scientists do a mixture of applications alone and with others.

In the 2007 study, many respondents commented on the increasing importance of research grants in academic research,

Grants [are] important [because it] is one of the ways we're measured. For that reason...a lot of research [is] with grants. [participant 20; criminology].

**Table 6** Apply for grants alone/with others/mixture

	Humanities	Science	Social science	Total
Alone	46 (50 %)	10 (13 %)	19 (20 %)	75
With others	22 (24 %)	50 (65 %)	36 (39 %)	108
Mixed	24 (26 %)	17 (22 %)	38 (41 %)	79
Total	92 (100 %)	77 (100 %)	93 (100 %)	262

$\chi^2$ , significant at  $p < .05$

**Table 7** Why apply for grants alone/with others/mixture? (most frequent reasons)

Themes	Overall	Discipline area		
		Humanities	Sciences	Social sciences
Depends on project	35 (100 %)	5 (14 %)	7 (20 %)	23 (66 %)
Successful strategy	46 (100 %)	13 (28 %)	20 (43 %)	13 (28 %)
Nature of research	48 (100 %)	22 (46 %)	14 (29 %)	12 (25 %)

Amongst the respondents in the first study, there were some indications that the pressure to obtain grants might drive future collaborations; several participants reported that they planned to submit collaborative grants applications in the future, in part because they believed joint applications were more likely to be successful.

This notion of collaboration as an effective grant seeking strategy also emerged as a common reason for applying for grants with others in the larger study. Table 7 highlights the most frequent reasons given for submitting sole or joint grant applications, or using a mixture of approaches. These reasons include: (a) it ‘depends on the project’ at hand, and whether it is best conducted alone or with others (e.g. small studies pursuing personal interests versus large collaborative projects conducted across disciplinary or international boundaries); (b) the continuation of a previously ‘successful strategy’ or adopting a strategy they believed would bear fruit in the future; and (c) the ‘nature of the research’, in that grant application patterns reflect habits and conventions relating to the way scholarship is conducted and is ‘just the way things are done’.

The responses showed clear differences between discipline areas in the reasons given by respondents for collaboration in applying for grants. For example, 23 social scientists compared to 7 scientists and 5 humanities academics stated that their approach to grant applications at least in part depended upon the project at hand. On the other hand, humanities scholars more frequently stated that the ‘nature of the research’ guided their decisions on grants. Participants in all three discipline areas noted that pursuing what they believed was a successful grant winning strategy was an important aspect of whether they chose to submit grants alone or with others.

Interviewees were asked about participation in research groups within their university. Such groups were defined broadly as formal or informal (including reading or discussion groups). Table 8 shows the key activities undertaken within such (‘internal’) research groups which again were significantly different across disciplines. Here the distinction between *Collaboration* and *collaboration* is useful. The results show that forms of *collaboration* such as ‘having discussions’, and ‘organising and attending seminars’ (including reading groups, seminars, workshops and conferences) was a key activity in

**Table 8** Internal group activities (most frequent)

Themes	Overall	Discipline area		
		Humanities	Sciences	Social sciences
Socialise	25 (100 %)	11 (44 %)	12 (48 %)	2 (8 %)
Teach and supervise	36 (100 %)	8 (22 %)	15 (42 %)	13 (36 %)
Group meetings	44 (100 %)	13 (30 %)	20 (45 %)	11 (25 %)
Grant applications	47 (100 %)	10 (21 %)	14 (30 %)	23 (49 %)
Plan and conduct research	59 (100 %)	7 (12 %)	27 (46 %)	25 (42 %)
Have discussions	67 (100 %)	23 (34 %)	21 (31 %)	23 (34 %)
Prepare publications	72 (100 %)	21 (29 %)	23 (32 %)	28 (39 %)
Organise and attend seminars	92 (100 %)	34 (37 %)	22 (24 %)	36 (39 %)

Not all percentages across discipline areas add up to 100 due to rounding

**Table 9** What sustains internal groups? (most frequent reasons)

Themes	Overall	Discipline area		
		Humanities	Science	Social science
Productive outcomes	25 (100 %)	6 (24 %)	11 (44 %)	8 (32 %)
Funding	47 (100 %)	13 (28 %)	23 (49 %)	11 (23 %)
Good relations	38 (100 %)	12 (32 %)	9 (24 %)	17 (45 %)
Shared goals and interests	92 (100 %)	24 (26 %)	31 (34 %)	37 (40 %)

groups across all three discipline areas, as was 'preparing publications'. Fewer social scientists reported 'socialising' (e.g. having 'lunch') than humanities scholars and scientists. However, *Collaboration*, including attending 'group meetings' (e.g. to organise lab work) were more often cited by scientists. Teaching and supervising, planning and executing grant applications, and planning and conducting research were more common for both scientists and social scientists than for humanities academics.

Respondents were also asked what sustains the internal group they identified with. Frequency distributions for the four most common responses across the disciplines are presented in Table 9. That internal groups produced some 'productive outcomes' or benefits for members, whether instrumental (e.g. 'increasing the efficiency of research) or affective (e.g. 'mutual need to share and discuss' ideas), was important to respondents across the three discipline areas. 'Funding', in the form of grants, was mentioned more often by scientists than those in the other discipline areas. 'Good relations' amongst members, from a positive group 'dynamic', including mutual respect and trust, through to an appreciation for other's skills and personal qualities (e.g. their 'good humour' or 'reliability') was cited by more social scientists than humanities and science academics. 'Shared goals and interests' in a professional area (whether it be research, teaching, administration or public issues) was the most frequently cited reason helping sustain internal research groups across all three discipline areas.

Finally, respondents were asked to provide the names (and other information) of up to ten people with whom they most often talk about their research. This generated information on 2,190 alters (people that those interviewed nominated as discussion partners). They were also asked to indicate whether they regarded each of these people as a

colleague, or as a friend as well as a colleague. This distinction was made in order to examine personal closeness in these networks. We postulate that having more friends as alters might indicate collaboration, based on shared interests and ongoing relationships. Alternatively, having colleagues who are not friends as well as colleagues might indicate more concrete, instrumental forms of Collaboration.

The mean number of tie nominations per interviewee was 8.21 ( $n = 268$ ), and there were no significant differences in numbers of ties nominated by discipline area. This indicates no substantial differences in network size across disciplines, although this is likely related to limiting the number of alters they could name to ten. More interesting is the personal closeness of the ties, which were statistically significantly different by discipline area (see Table 10). Scientists were more likely to rate the ties they nominated as colleagues only, while humanities and social science academics tended to rate them as friends as well as colleagues. This points to differences between discipline areas in relation to collaboration, and suggests that there may be greater overlap between the more expressive and the more instrumental networks of those in science disciplines.

## Discussion and conclusion

Our first claim in this paper was that there is a useful analytical distinction to be made between *collaboration* (expressive) and *Collaboration* (instrumental), both for academic and policy purposes. There is a widespread belief that (capital C) Collaboration enhances research productivity, that research policy can use funding to stimulate this, and that such policy will enhance research productivity. This belief allocates an instrumental role to collaborative activities, and appears to ignore all indications that research is also a social and relational activity. Much collaborative work derives its value from not being overtly instrumental. At its best, it happens organically, arising from disciplinary norms built around the sharing of ideas, and mutual interest in intellectual problems, where academics have sufficient time, space and resources to allow it to emerge. As Melin puts it,

Contacts and communication with peers is one form of interaction that might not lead to co-authored texts but can provide a vast intellectual exchange which is sufficient for the development of new ideas. This is therefore a kind of interaction that should be just as carefully facilitated... (Melin 2000, p. 39).

Our second claim was that *Collaboration* and *collaboration* are not mutually exclusive, and that their use varies between the three discipline areas included in this study. It is important to acknowledge that the two concepts are interrelated, and either can be seen as potentially leading to the other. However, the distinction is required in order to overcome the problematic use of a single concept of collaboration. It is clear from our research that

**Table 10** Personal closeness of discussion ties

	Humanities	Science	Social science	Total
Colleague	325 (43 %)	377 (56.5 %)	344 (45 %)	1,046
Friend and colleague	428 (57 %)	290 (43.5 %)	426 (55 %)	1,144
Total	753 (100 %)	667 (100 %)	770 (100 %)	2,190

$\chi^2$ , significant at  $p < .05$



*collaboration* is widespread amongst researchers in all discipline areas, but perhaps more in the humanities and social sciences, where *Collaboration* is less so. Further research is needed to tease out the relationships between the two forms of collaboration. Our findings also confirm the significance of disciplinary differences: Humanities, science and social science academics all have distinct collaborative practices. However, the policies established by governments, institutions and granting bodies generally privilege *Collaboration*, producing uneven impacts on different disciplinary areas. The unintended consequences of such policies can vary from a suspicion of academic irrelevance, to a lack of opportunities to secure funding, to concerns about being forced into counterproductive *Collaborations*.

Finally, our third claim was that the distinction between *Collaboration* and *collaboration* is an informative one for policy making that aims to encourage collaborative work. Intellectual stimulation, the exchange of ideas, and development of skills and knowledge through interactions (*collaboration*), is easy to overlook when the emphasis is on measuring outputs and impacts. Melin makes a case against the analytical relevance of this when he comments that a published outcome is 'a more substantial indicator than just communication in one way or another. There has to be a distinction between fruitful chats over coffee and systematized collaboration with publications as one result' (2000, p. 33). Nevertheless, policy aimed at increasing collaborative research which is focused only on *Collaboration* may well have deleterious effects on collaborative working overall, if it comes at the expense of the more fluid and expressive forms that underpin much research and innovation. The effects will be more severe for those disciplines that rely more heavily on expressive than instrumental collaborative forms. Research funding and evaluation systems that ignore these differences risk penalising some disciplines.

The importance of *collaboration*, which appears to be significant for all disciplines, needs greater recognition in policy making. In the context of scarce resources, a corollary of providing incentives for *Collaboration* is the implicit creation of disincentives for other collaborative work. As soon as *Collaboration* is mandated by policy, it can start to impede either or both, but especially *collaboration*. Understanding the nuances of collaborative practices is valuable for avoiding the undesirable consequences that might flow from research policy directed at stimulating a narrow view of collaboration, which crowds out other forms. Policy and funding should instead recognise the importance of the more expressive forms of collaboration for all disciplines, and the link between this and *Collaboration*, which appears to be stronger for sciences than for humanities and social sciences. In doing so, policy would be not only more inclusive of a broader range of disciplines, but also more able to stimulate the desired research outcomes from a broader range of fields.

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