Discipline, Change and Gender in the Academic Workforce

A report from the Work and Careers in Australian Universities Project

David Peetz, Glenda Strachan & Carolyn Troup

Griffith University

Paper presented to 28th AIRAANZ conference, Association of Industrial Relations Academics of Australia and New Zealand, Melbourne, 7-9 February 2014.

A number of writers and researchers have demonstrated interest in the question of gender among academic staff at universities and sought to map or explain patterns of distinction. We add to this research by jointly addressing aspects of the matter that have only been considered in isolation or on a small scale, making use of one of the largest ever surveys of work, gender and careers in universities. Those matters are discipline, type of work and the interaction between the two. Our research questions are as follows:

- How do gender, discipline and type of work (that is, whether an academic is 'research-intensive', 'research and teaching' or 'teaching-intensive') interact?
- How is gender-related disadvantage, if it exists, manifested amongst academics?
- Do the above interactions help explain any disadvantage in academic labour markets?

Our research examines academic employment by discipline and role specialisation by level and gender. Role specialisation, or 'type' of work, refers to whether an academic is 'research-intensive', 'research and teaching' or 'teaching-intensive'. (The category 'research-intensive' encompasses 'research-only' staff, who have no teaching responsibilities). This role specialisation (sometimes known as 'academic profiling') is a recently codified feature of academic work. For most of the last century, most teaching academic positions involved a combination, in theory approximately equal, between teaching and research. Sometimes these were given specific proportions of total time, and typically 40 per cent of time was to be spent in teaching duties, 40 per cent in research duties, and 20 per cent in external or internal service or administrative duties (also known as a '40/40/20' academic profile). As well, in some disciplines, typically those that relied on grants and tended to be associated with the sciences, a portion of staff worked full-time on research. More recently, a growing number of universities have moved to create a greater diversity of academic profiles. Many have been weighted towards research, or teaching, in 60/20/20 profiles, though some have used other variations. A more recent development has been a move towards 70/20/10 teaching-intensive profiles, attractive to some Australian universities because many staff on such profiles who meet certain criteria can be removed from the denominator for

government accounting purposes when calculating the average research productivity of staff, an indicator of status amongst research-based universities.

Ours is the first study to examine academic employment across role specialisations and disciplines, with a particular focus on gender. Most research has either ignored the distinction or, where is relates to role specialisation, the study has been confined to just one role specialisation, such as research-intensive staff or the newer teaching-intensive staff (Probert 2013).

There is a great deal of literature that examines the dearth of women academics in senior positions either in the academic ranks as professors or in university management positions. The majority of this literature is based on qualitative studies and does not disaggregate by discipline. A large body of literature has sought to untangle what assists or hinders women moving higher in their academic careers. The issues are seen to be numerous and inter-related. Small advantages that favour men, and inequities that disadvantage women – but many of them over time – accumulate to create large differences (Valian, 1998; see also Pyke 2009). Issues identified include the lack of role models, mentors and supporters for women, compared with men (Baker 2009), and the difficulties of building social capital through informal networks (Pritchard 2010). Gendered patterns of career confidence (Baker 2010; Chesterman, Ross-Smith and Peters 2005) have been seen to play a part as has the traditional masculine models of management (Özkanlı and White 2009; Chesterman, Ross-Smith and Peters 2005). The gendered micropolitics of universities, that is the subtle and complex ways in which discrimination takes place (Morley 2006) and other organisational cultural barriers (Özkanlı and White 2008; Chesterman, Ross-Smith and Peters 2003), including a 'boys' club' culture (Diezmann and Grieshaber 2009) have also been implicated. The role of family commitments and women's greater role in family care has been seen as another factor in women's career progress (Bardoel et al 2011; Waters and Bardoel 2006; Probert 2005), with a study of astronomers showing women more likely than men to report having limited their career options because of another family member (Anderson and Ivie 2013).

Specific features of academic work have been seen to influence women's slower progress, including the long working hours culture (Currie, Theile and Harris 2002). Notions of merit and success in academic work can have gender implications (Morley 1999; Knights and Richards 2003) including the model of 'merit' which elevates research over teaching or systematic bias against female researchers (North-Samardzic and Gregson 2011). Less access and support for women in the research environment (Bell and Bentley, 2005) has also been an issue.

Features of the appointment, promotion and reclassification processes have been seen to disadvantage women (Probert 2005; Vu and Doughney 2006; Chesterman, Ross-Smith and Peters 2003). However recent studies using Australian data have shown that women are competing equally for promotion (Strachan et al 2012; Winchester, et al. 2006). Kahn's (2012) study of a single Australian university found that women were less likely than men to be promoted from the lecturer level, but women Associate Professors were more likely than men to be promoted to Professor.

Bell and Bentley (2005) examined women in research and found that it was in the immediate post-PhD period that marked differences in male versus female participation appeared. Women were largely absent from research leadership positions. Critical factors influencing women's patterns of participation were 'the "horizontal" disciplinary distribution of women and the lack of congruity between this distribution and the concentration of research by discipline; the organizational culture of universities; and competing priorities (some life cycle driven) at the individual decision making level' (Bell and Bentley 2005: 19). They concluded that 'the completion of the PhD may be a "tipping point" – where women are pressed by the combination of an increasingly competitive system and low self-value attached to their own credentials, to take the option of the most junior "level A" appointments or "flexible" research assistant positions, consequently deferring serious engagement with national competitive funding schemes and a clear research oriented career trajectory' (Bell and Bentley 2005: 19). Dever et al (2006: 13), in an examination of one Australian University, found that 'successful women researchers often had at least one key *mentor* or role model….who encouraged them and believed in them, worked closely with them, and actively "cared" for their career.'

This paper works from the idea that different disciplines present as different labour markets, at least through the academic research and teaching positions and management positions such as Department Head. Once through these ranks the senior management positions present as one labour market, not reliant on disciplinary skills, although that group is outside the scope of this particular study. There have been few studies that have looked to specific groups within academic staff. In a study of a Business School in New Zealand, Jones et al (2012: 12) found that some women saw themselves as more over-worked than male colleagues and women felt 'excluded from networks that ensure men are supported by colleagues, and aided in promotions and other HR processes'. In one Commerce Faculty, the women felt the male 'clubbiness' of the workplace culture and the male approach to leadership was fundamentally adversarial in nature (Kloot 2004).

There have been few individual discipline case studies. Stevens-Kalceff et al (2007) focused on the physics discipline and examined the formal career progress and the factors that (negatively) affected career progress and research output. They noted that the formal pattern was from a doctorate of philosophy (PhD) through full- or part-time work as a tutor or research assistant, to a level B academic with a teaching focus (what we would call a 40/40/20 profile) and promotion to a level C academic, also with a teaching focus. But, they said, a number of factors, many of which were gender-related, could interrupt this formal progress. Academics with breaks in their careers due to primary care responsibilities, financial requirements or their partner's career (these things most commonly occurred to women) may lose post-doctoral study opportunities, be seen as primarily a teacher and/or be assigned a teaching load that was inconsistent with research, and therefore fail to obtain an established grant, research and publication profile. This created a cycle of low research resources and time and low research output that precluded promotion. This was in no small part because teaching and service have historically not been perceived to have the same recognition in the promotion process as research (Stevens-Kalceff et al 2007). Another study in evolutionary biology found that

women were less likely than men to be invited as keynote speakers, and less likely to accept, leading to 'low exposure at international meetings' of 'high-quality science by women' (Schroeder et al 2013). A recent editorial in a special edition of *Nature* (2013) bemoaned 'the dismaying extent to which sexism still exists in science.' It noted that 'progress now seems to have stalled' and attributed the problems partly to childcare problems but also to 'overt or unconscious gender bias'. Attrition of female scientists is observed at early and later career stages, and hence there are substantial pay gaps between male and female scientists (Shen 2013).

To anticipate our findings, our analysis reveals three aspects of gender inequities amongst salaried academic staff, sometimes but not necessarily reinforcing each other. These are: first, insecurity, arising from differential access to continuing jobs; second, marginalised entry, through differential tendencies for new fixed term teaching appointees to be put into teaching-intensive jobs; and third, career funnelling, that is the vertical narrowing of career paths. We also find important differences between types of disciplines. But first we explain our methods.

Method

Data are drawn from the Work and Careers in Australian Universities (WCAU) survey of the university workforce. The study surveyed three groups of university workers separately (academic, professional/ general staff and sessional teaching staff) to examine the specific nature of jobs, careers and related issues. Data collection was undertaken between August 2011 and January 2012 at 19 universities across Australia.

The data collection was undertaken by the Institute of Social Science Research at the University of Queensland. Participating universities provided a sample data file containing contact details of employees for each of three staff groups to the data collection agency. From the contactable sample a random sample of target employees from the academic staff (n=250) at each of the participating universities was selected. Target respondents were sent a hard copy survey as well as having the option to complete the survey online. Initial contact was made with employees with a link to the online survey. One week after the initial invitation target respondents were sent a hard copy questionnaire. Target respondents also received a follow-up mail reminder and two email reminders at four and six weeks after the start of the survey. Non-target respondents received two email reminders. The total number of contactable academic employees was 24,165. Of these 8737 replied, indicating an overall response rate of 37 per cent. Our academic staff sample was fairly evenly divided between women (51.3 per cent) and men (48.7 per cent). More details are provided in the summary report (Strachan, Peetz, Whitehouse, Broadbent and Bailey 2012).

Amongst our respondents, 27 per cent of academic respondents came from the long-established and wealthier "group of eight" (Go8) universities, 29 per cent from universities affiliated with the Innovative Research Universities (IRU) network, 22 per cent from the Australian Technology Network (ATN), and 8 per cent from unaligned (mainly regional) universities.

The majority of questions were closed-choice but there were some open-ended questions. All groups of staff were asked a broad range of questions on work life including: demographic questions such as country of birth; educational qualifications; job details and classification; income; working hours; job satisfaction and security; details about career history, assistance with career, and future intentions; promotion or reclassification; work and family issues including parental leave and flexible work; and retirement income. On the discipline in which they worked, respondents were shown a listing of twelve aggregations of discipline that broadly but not entirely corresponded to groupings used elsewhere, plus an "other" category. Where they had an "other" response we sought to recode it drawing on the description they gave in "other" plus, if appropriate, the title they provided of the name of their work unit (school, department or institute). Where they chose more than one (this was possible), we also referred to the work unit, but ultimately a small proportion of respondents were coded either as "multi-disciplinary" or uncategorisable.

Some key concepts and additional descriptives

In this paper we refer to a number of key concepts, so these are defined here. Their explanation also provides some additional descriptions of the sample.

The status of an academic job may be either *fixed term*, that is, their positions would expire after a predetermined period (44 per cent of respondents were in this category) or *continuing*, referred to as 'tenure track' in some countries (56 per cent). In this paper the *continuation rate* is the ration of continuing jobs to all jobs which is, as shown above, 56 per cent. Conversely the *fixed-term rate* is 44 per cent.

Academic *job types* may be either *teaching positions* (where a significant portion of the job involves teaching) or *research positions* (where little or no teaching is undertaken). If a job involves neither teaching nor research then it is not an academic position. Some 34 per cent of our sample were in research positions – technically, research-intensive (RI) positions. Of the remaining two thirds who were in teaching positions, the majority – five sixths of this group, and 55 per cent of the sample) were in 'teaching and research' (TR) positions. Only 11 per cent of our sample were in teaching-intensive positions (TI). This three-way categorisation into RI, TR and TI we refer to as *role specialisations.* We defined someone as having a TR position if over 20 per cent of their responsibilities were in teaching and over 20 per cent were in research. Thus a teaching-intensive person was meant to do no more than 20 per cent research, and a research-intensive person was meant to do no more than 20 per cent teaching.

On average, our RT staff were meant to do 39 per cent teaching, 38 per cent research and 23 per cent service/administration. For teaching-intensive staff, the averages were 62 per cent teaching, 15 per cent research, and 24 per cent service/administration. For research-intensive staff, the averages were 4 per cent teaching, 85 per cent research and 11 per cent service/administration. This does not mean that these percentages signified what people *actually* did in their job. People in all roles spent less time on research than they were expected to spend (by 7-11 percentage points across the three groups) and spent more time on service/administration than they were 'expected' to (by 6-7

percentage points). Research-intensive and RT staff also spent more time teaching than expected, but the numbers were smaller and this did not apply to teaching-intensive staff. These patterns of discrepancy were similar between men and women.

Just as individuals may have role specialisations, so too *disciplines* have characteristics that focus on teaching and research. We defined the teaching or research component of a discipline according to the work of the people within it. While on the surface it may seem unnecessary to consider such aggregations when individual-level data are available, we indeed found important separate effects for discipline that were not just the effects arising from individuals' job types. We defined a *research-heavy* discipline as one in which 40 per cent or more of the jobs were research-intensive. Conversely, we defined a *teaching-heavy* discipline as one where less than 40 per cent of jobs were research-intensive. We use the nouns 'heavy' rather than 'intensive' to avoid argument over terminology and to minimise confusion between individuals and disciplines.

By these definitions the research-heavy disciplines comprised most (but not all) of the sciences (that is, the biological, behavioural and cognitive, medical and health, and physical, chemical mathematical and earth sciences), plus engineering and technology and environmental studies (agricultural, urban and building studies). The teaching-heavy disciplines comprised information, computing & communication sciences, business, law, humanities, social sciences, education and performing and visual arts. Overall, amongst the research-heavy disciplines, 46 per cent of academic staff were research-intensive, but in teaching-heavy disciplines, only 18 per cent of staff were research-intensive. (On average, across the research-heavy disciplines staff reported spending 49 per cent of their time on research, and 27 per cent on teaching; across the teaching-heavy disciplines, they averaged 32 per cent of their time on research and 39 per cent of their time on teaching.)

As can be seen in Figure 1, there is quite a stark distinction between the shares of research-intensive staff in the two categories. The distribution looks more like a clustered, bimodal distribution than a normal distribution, so there is little arbitrary about the 40 per cent cut-off, which none of the teaching-heavy disciplines approach. Only the placement of Social Sciences (33 per cent) required some judgement: if we made the threshold 30 per cent rather than 40 per cent, this discipline would go into the research-heavy category. However, 40 per cent seemed from our experience in the field, to be a valid threshold and, broadly speaking, similar patterns or comparison between discipline types arose regardless of which categorisation was chosen. Indeed, social sciences seemed overall to have a more in common with teaching-heavy than research-heavy disciplines, and so categorising it as we did permits a slightly clearer story to be told.

In tables involving discipline, those employees categorised as multidisciplinary were excluded as they were too heterogeneous in the disciplines they cut across. As it was, they appeared to sit in the middle anyway (some 37 per cent of them were research-intensive).

Figure 1: Proportions of academic staff in research-intensive jobs, grouped by Research-heavy and Teaching-heavy disciplines

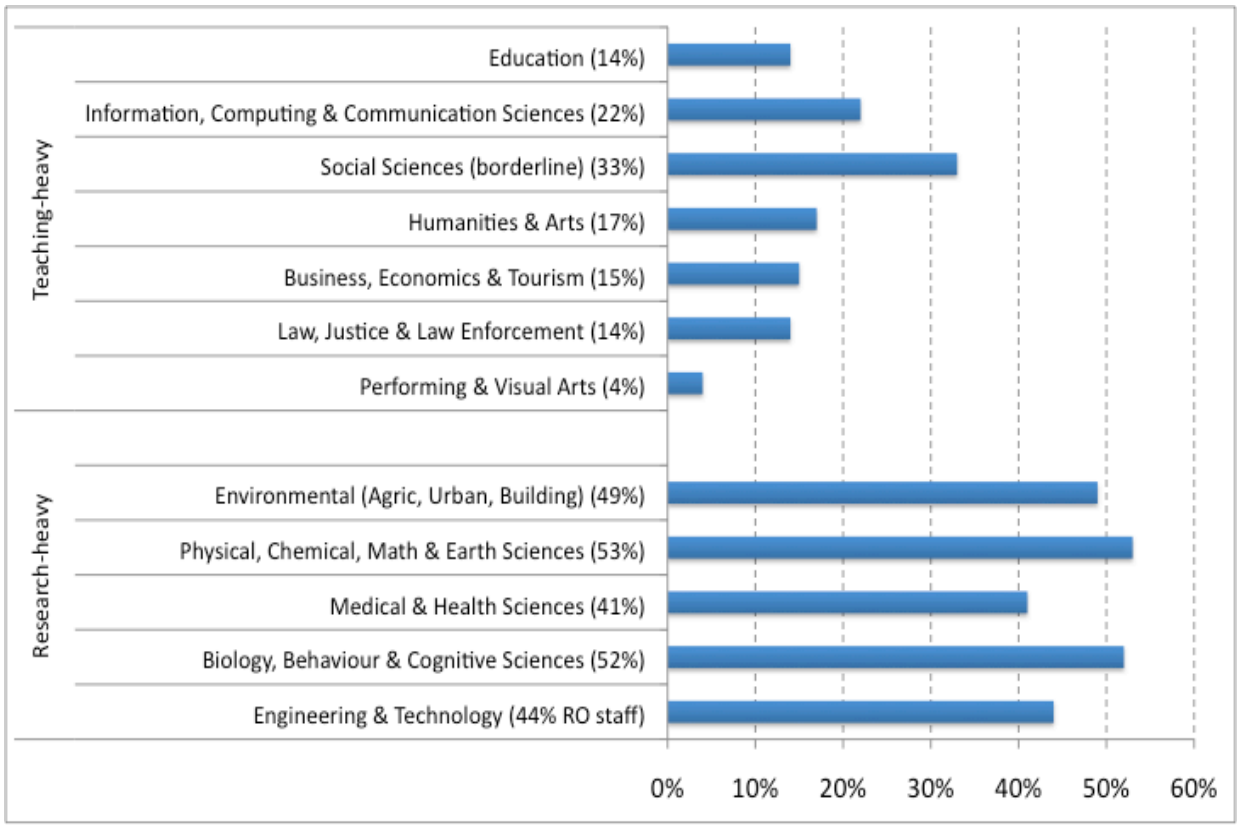
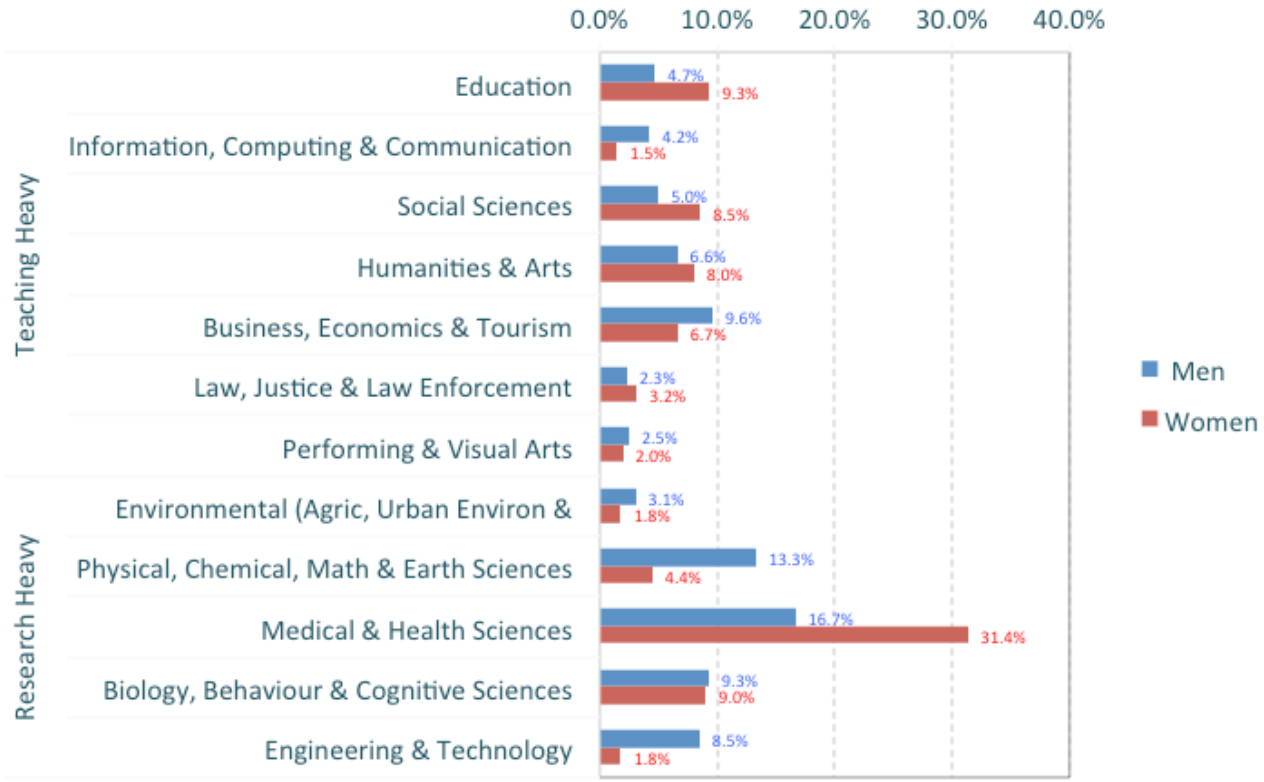


Figure 2 below shows the distribution of male and female academics between the various disciplines. It shows that medical and health sciences is the largest single discipline group amongst both men and women, accounting for around a quarter of all academic staff. The smallest disciplines are performing and visual arts and environmental disciplines, both less than a tenth the size of medical and health sciences. There are also some notable gender differences between the disciplines. Medical and health sciences is almost two-thirds female, as is education. Several disciplines are very male-dominated, including physical, chemical and mathematical sciences, information, computing and communication and engineering and technology.

Finally, a concept we use in this paper is that of *funnelling*. This refers to the reductions in the proportions of women as one moves into higher academic levels. This may reflect two things. The first factor is the fact that women were largely excluded from academia in early years, when social norms dictated that female labour force participation was low and academia was a largely male preserve. So, as women as a group enter academia they will tend to do so commencing at lower levels, and so women's share of employment at higher levels would be below that at lower levels while this transition occurs. The second factor is barriers to career advancement encountered by women already in the system, disproportionately more than by men in the system. In any cross-sectional study it is difficult to empirically separate these two factors. However, as time

progresses, and more women enter academia, the first factor becomes relatively less important and the second factor becomes relatively more important.

Figure 2: Distribution of men and of women across disciplines



We measure the degree of funnelling through two *funnelling ratios.* These are different ways of measuring the same concept: the chances of an occupant of a higher level position being a women, divided by the chances of an occupant of a lower level position being a woman. In effect it indicates the strength of hindrances to female progression in a discipline *distinct from* both the barriers to women entering the discipline in the first place (as would be indicated by, for example, the proportion of women in lower level positions) and the barriers to any employees of either gender from advancing within the discipline (as would be indicated by, for example, the ratio of the number of higher level positions to the number of lower level positions). A funnelling ratio indicates the equity of treatment of women in advancing within a discipline.

The two funnelling rations we use are the 'simple funnelling ratio' and the 'extended funnelling ratio'. The simple funnelling ratio is the proportion of women at Level E (the highest academic level) divided by the proportion of women at level A (the lowest academic level). The extended funnelling ratio is the proportion of women at Levels D and E (the highest two academic level) divided by the proportion of women at levels A and B (the lowest two academic levels). A higher funnelling ratio indicates better relative outcomes for women; a lower funnelling ratio indicates worse relative outcomes for women, compared to men's ability to progress within a discipline.

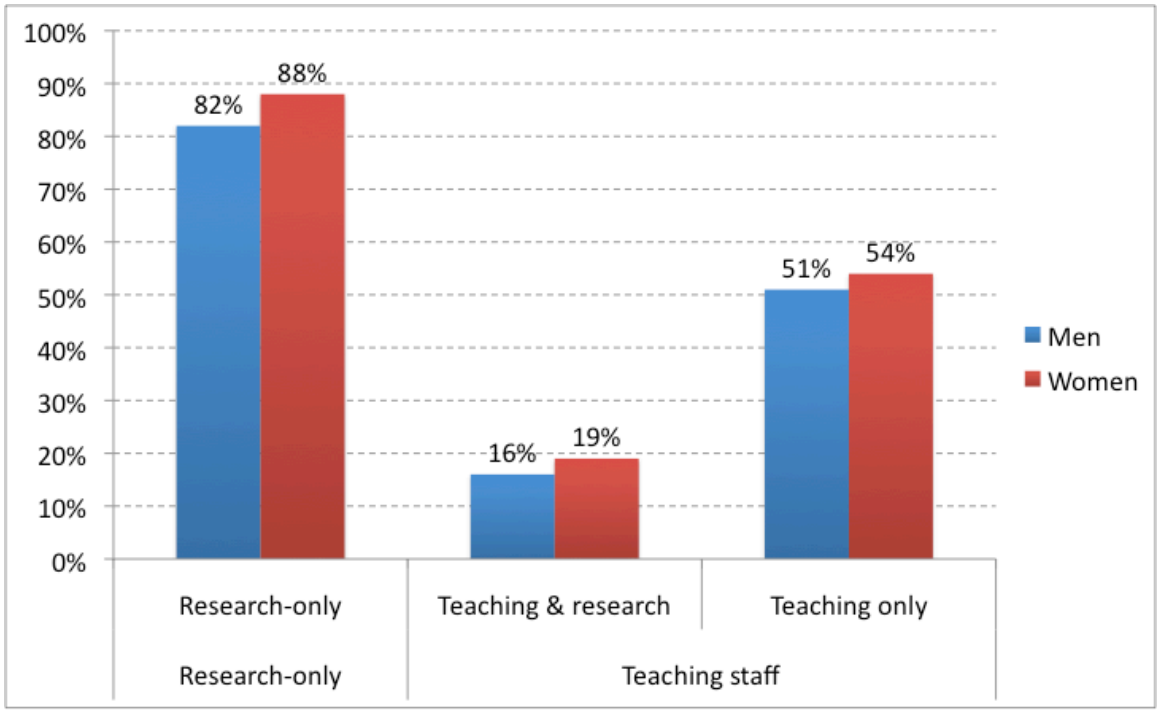
Broadly speaking, the distribution of our sample by gender and level was similar to that in the academic population at large, with the possible exception that our sample may over-represent women in higher-level positions. If that is the case, then our funnelling ratios may understate slightly the disadvantage facing women in advancing their academic careers. However, using weights to take account of this would not fundamentally alter our comparisons between disciplines, below, as we do not have population benchmark data that incorporate discipline as well as gender and level.

Insecurity

The first issue to consider is insecurity. Our key indicator of insecurity here is whether or not an academic is in a fixed-term job or a continuing job.

One of the starkest patterns to emerge from the data – albeit apparent from casual observation to any participant in university life – is the huge differences in insecurity between different role specialisations, and the part played by role specialisation in determining continuation rates. In short, research work is far more insecure than teaching work, but teaching-intensive work is itself less secure than combined TR work. Thus most research-intensive staff were fixed term – 88 per cent of research-intensive women, and 82 per cent of RI men, were fixed term. At the other extreme, most TR staff were continuing (81 per cent of TR women, and 84 per cent of TR men, were continuing). A slight majority of teaching-intensive staff (54 per cent of TI women and 51 per cent of TI men) were in fixed-term positions. These data are shown in Figure 3.

Figure 3: Fixed-term rates by gender by role specialisation



However, one thing that is also apparent from the above data is that, within each role specialisation, women were overall were more likely than men to be in fixed term than continuing jobs.

Yet, overall, women were no more likely to be in a research-intensive job than men – for both the proportion was around 34 per cent. So we cannot explain women's greater insecurity amongst salaried academics simply through the representation they have amongst research-intensive jobs.

A second, and important, explanation of continuation rates was whether the discipline was research-heavy. This effect existed *in addition* to the effect of the research-intensity of the individuals comprising that discipline. Thus research-heavy disciplines had lower continuation rates than teaching heavy disciplines *for both research-intensive and RT jobs*.

Amongst research-heavy disciplines, women accounted for 50.1 per cent of academic staff. In teaching-heavy disciplines they represented 54.1 per cent of staff. (Although women were a majority in the numerically largest health and medical sciences, they were minorities in the other four research-heavy disciplines.) This difference was statistically significant (p=.000). So, we cannot say that the greater insecurity of women reflects any disproportionate role in research-heavy disciplines; the reverse is the case. If we treat the discipline as the unit of analysis (rather then the individual, as is the case for most of this paper), the average differences across disciplines were more extreme: women averaged 40 per cent of staff amongst the research-heavy disciplines, whereas women averaged 52 per cent of staff amongst teaching-heavy disciplines. This is because, when the discipline is the unit of analysis, small disciplines weight as highly as large disciplines.

Something appears to be going on within the research-heavy disciplines in particular. Within the teaching-heavy disciplines, gender differences in role specialisation are only weakly significant (i.e. at the 10 per cent level). But in the research-heavy disciplines, gender differences are strongly significant (p=.000), and this cannot be explained simply by differences in sample size. Women are three percentage points more likely than men in the research-heavy disciplines to be in a research-intensive position, which have low continuation rates, and they are eight percentage points less likely than men to be in a combined RT position, the positions with the highest continuation rates. Thus in research-heavy disciplines in particular, men are dominating the role specialisations that are most likely to have continuing status. The findings also point to the potential importance of teaching-intensive positions, something we return to in the next section.

Overall, research-intensive role specialisations and research-heavy disciplines were more important than gender itself in explaining individual differences in continuation rates. In addition, some of the gender difference in continuation rates was in turn due to differences in age and length of time since individuals obtained their PhD. We ran regressions predicting continuation rates for several groups that combined job type and discipline type (research staff in teaching-heavy disciplines, etc), to assess the separate impact of gender and other factors. In several of those groups, the above factors made

gender non-significant in explaining differences in continuation rates. That is, for a large part of our sample, women had lower security of employment because they were younger and had been in academia for less time than men since they had obtained their PhD.

Table 1: Distribution of role specialisation by gender by discipline type

	Women	Men	gender difference
Research-heavy disciplines			
Research-intensive	47.0%	44.4%	2.6%
RT combined	39.7%	47.8%	-8.1%
Teaching-intensive	13.2%	7.8%	5.4%
Total	100.0%	100.0%	
Teaching-heavy disciplines			
Research-intensive	19.1%	17.4%	1.7%
RT combined	69.9%	73.6%	-3.7%
Teaching-intensive	10.9%	9.0%	1.9%
Total	100.0%	100.0%	
All disciplines			
RT combined	53.2%	58.3%	-5.1%
Research-intensive	34.6%	33.4%	1.2%
Teaching-intensive	12.2%	8.3%	3.9%
Total	100.0%	100.0%	

N=7627 (4361 in research-heavy disciplines, 3266 in teaching-heavy disciplines; 3950 females and 3677 males). Excludes people for whom discipline could not be coded or was multidisciplinary.

However, *for research-intensive jobs in research-heavy disciplines*, gender was still a factor even after these other factors are controlled (as shown in Table 2). That is, gender differences between continuation rates *amongst* research-intensive staff in research-heavy disciplines cannot be explained by differences in age and tenure.

So we are seeing here an effect that goes beyond the tendency shown in Table 1 for women in research-heavy disciplines to miss out on the role types that are associated with continuing jobs. Even within a role type (research-intensive jobs), in research-heavy disciplines women are less like to be in a continuing job and this cannot be explained by their age and tenure.

It is also interesting that there is a gender difference in the continuation rate amongst TR staff in research-heavy disciplines that is higher than that in teaching-heavy disciplines. However, that difference is not significant in regressions after controlling for age, PhD date and related factors.

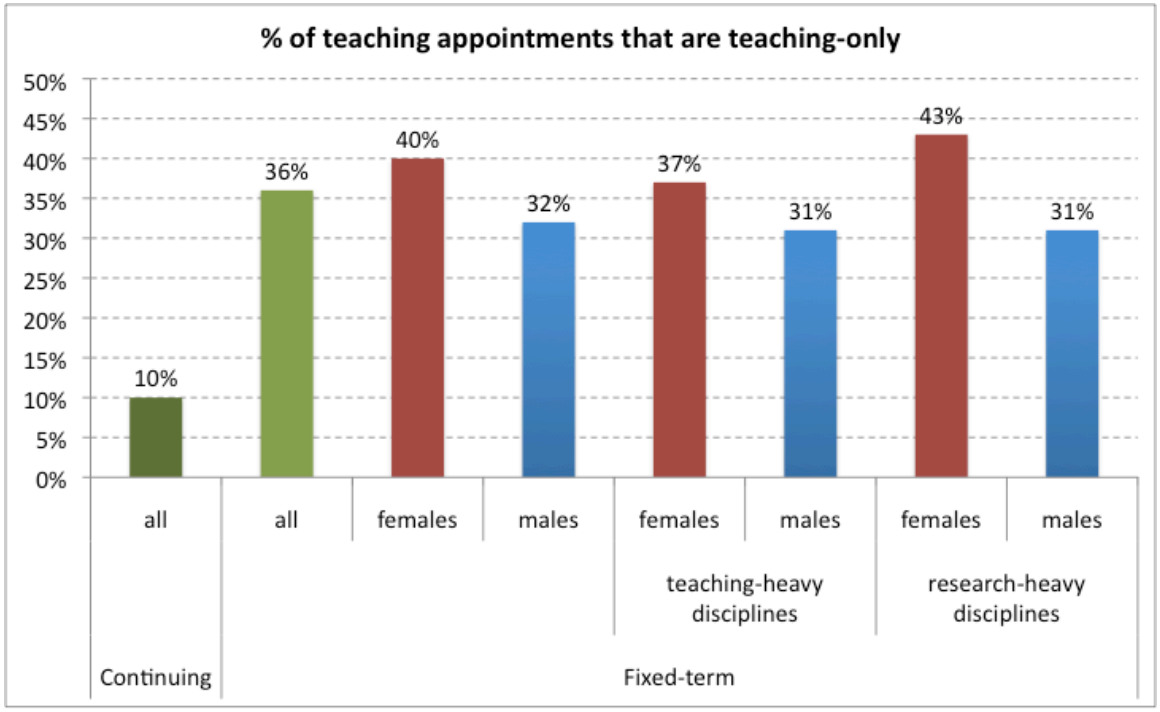
Finally, it is noteworthy that there is no difference between the proportion of total academic jobs that are *continuing research-intensive* jobs between research-heavy disciplines (4.9 per cent of all jobs), and teaching heavy disciplines (5.0 per cent). It appears then that continuing research-intensive jobs are only held by a privileged few, regardless of whether it is a research-heavy or teaching-heavy discipline.

Overall, we see that disciplines demonstrate different patterns of insecurity, that these are gendered, and that insecurity is worst and most gendered in the research-heavy disciplines.

Marginalised entry

An increasing proportion of new contracts are teaching-intensive positions, some of them teaching-only positions. Teaching-intensive appointments are widely seen as lacking the career opportunities that are available to more balanced TR positions. We looked at all teaching positions (i.e. those positions that involved over 20 per cent of time meant to be spent on teaching, either as TR positions or teaching-intensive positions. Our dependent variable was the proportion of teaching positions that were teaching-intensive. Key findings are illustrated in Figure 4.

Figure 4: Proportion of teaching appointments that are teaching-intensive



In WCAU, only 10 per cent of continuing teaching appointments are teaching-intensive. However, 36 per cent of fixed-term teaching appointments are teaching-intensive. Newer appointments tend to fixed-term, particularly at entry levels. Thus teaching-

intensive positions not only had weaker career opportunities they were also on average more insecure. There were also notable gender differences. Amongst men, 32 per cent of teaching fixed-term contracts were teaching-intensive, but amongst women the proportion was 40 per cent.

Again, discipline mattered, and the differential was worse in research-heavy disciplines than in teaching-heavy fields. In teaching-heavy disciplines, the gap was small at 6 percentage points (37 per cent for women, compared to 31 per cent for men, p=.180, not significant). However, in research-heavy disciplines, the gap was double at 12 percentage points (43 per cent for women, compared to 31 per cent for men; p=.002).

Again, we see that disciplines demonstrate different patterns of marginalisation, that these are gendered, and that marginalisation of new entrants into teaching is worst and most gendered in the research-heavy disciplines.

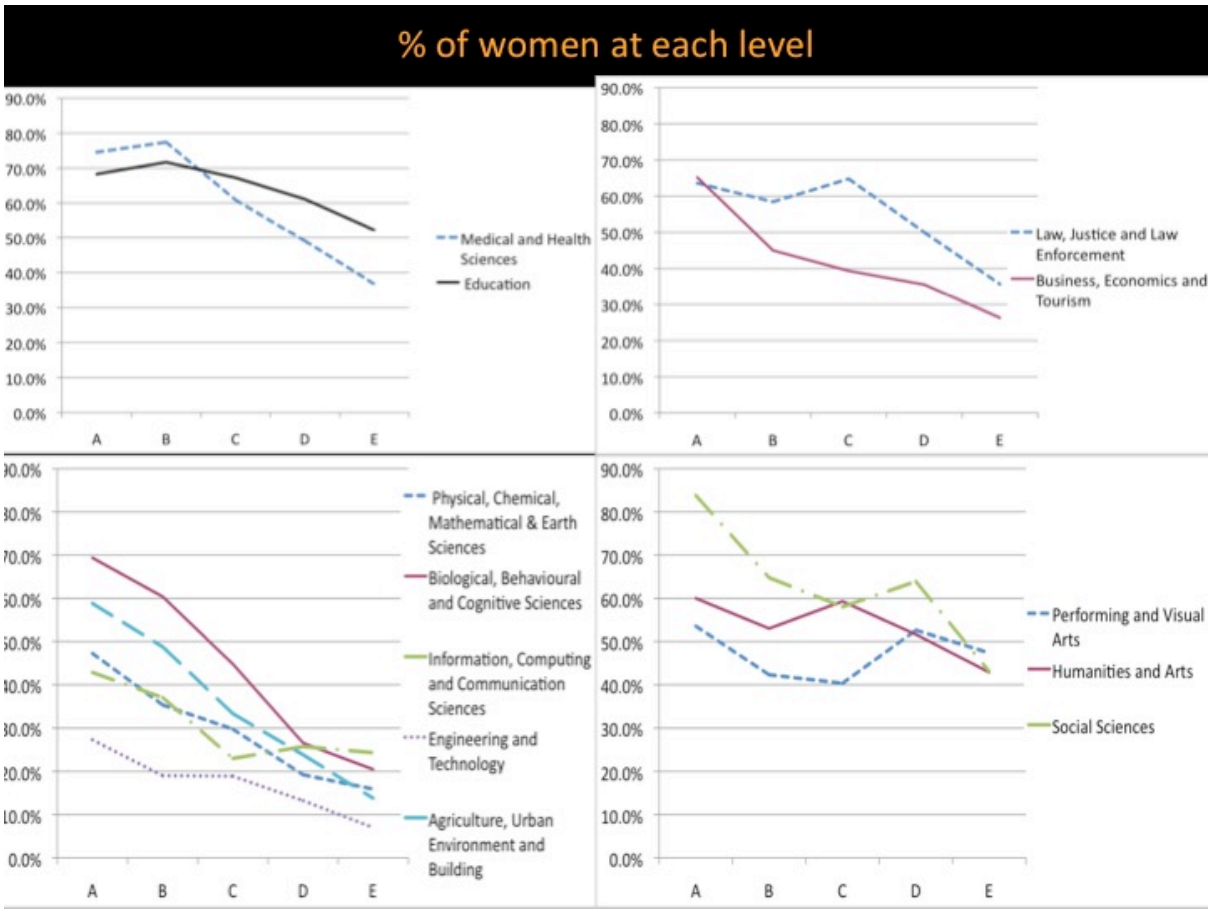
Career funnelling

Career paths for women 'vertically narrow' – that is, they show funnelling – in almost all disciplines in aggregate. In our sample, women made up 60.1 per cent of level A jobs but only 30.5 per cent of level E jobs. Hence the 'simple funnelling ratio' – the ratio of the proportion of women in level E to the proportion of women in level A – across the sample was 51 per cent.

Similarly, women made up 59.2 per cent of level A and B jobs, but only 35.8 per cent of level D & E jobs in our sample. Therefore the 'extended funnelling ratio' – the ratio of women in levels D and E to the proportion of women in levels A and B – across the sample was 60 per cent

Notably these funnelling ratios differ by discipline. Funnelling curves (lines indicating the proportion of women at each level) by individual discipline groups are shown in Figure 5. The notable pattern is that funnelling is on average worse in research-heavy disciplines.

Figure 5: Funnelling patterns (the declining proportion of women as levels rise) within discipline groups

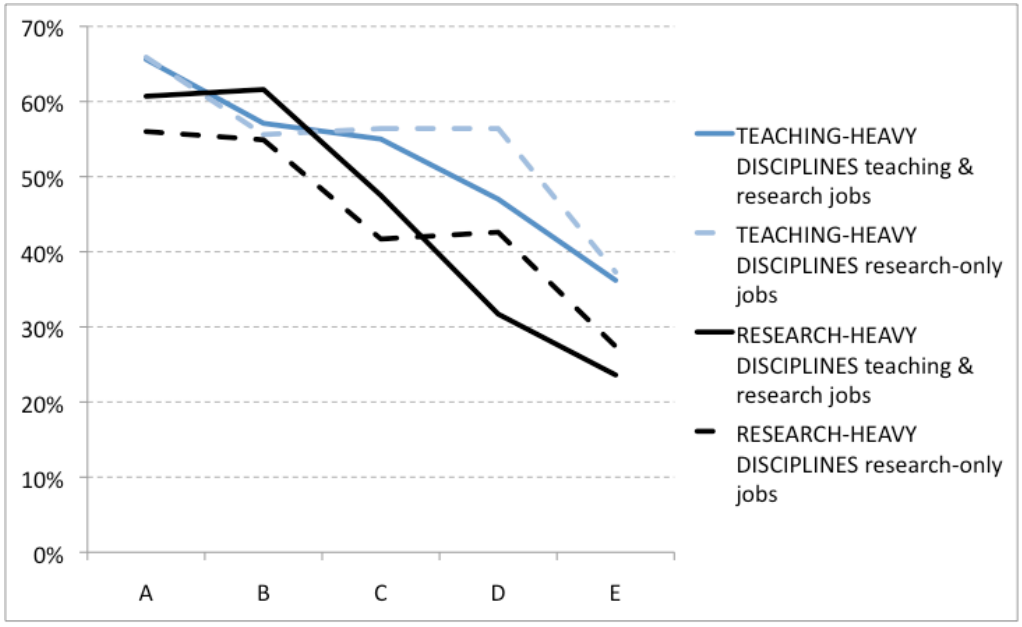


In particular, in teaching-heavy disciplines, the simple funnelling ratio is 56 per cent, but in research-heavy disciplines it is only 43 per cent. The discipline gap is even worse for the extended funnelling ratio. In teaching-heavy disciplines, the extended funnelling ratio is 71 per cent, but in research-heavy disciplines it is only 51 per cent. The funnelling curves aggregated by discipline type and role specialisation are shown in Figure 6.

The problem here is not so much that *research* is a dead-end career. In fact, the extended funnelling ratios for research staff overall (58 per cent) are slightly better than those for staff in 'teaching positions' (either teaching-intensive or teaching-and-research positions) (65 per cent). Moreover, the extended funnelling ratio for research staff within research heavy disciplines (61 per cent) is not much lower than that for research staff within teaching-heavy disciplines (68 per cent).

Rather, the problem is that funnelling is a major problem for women in teaching positions in research-heavy fields. The extended funnelling ratio for women in teaching positions in research-heavy disciplines is 45 per cent, compared to 72 per cent in teaching positions in teaching-heavy disciplines.

Figure 6: Funnelling patterns by discipline type and role specialisation



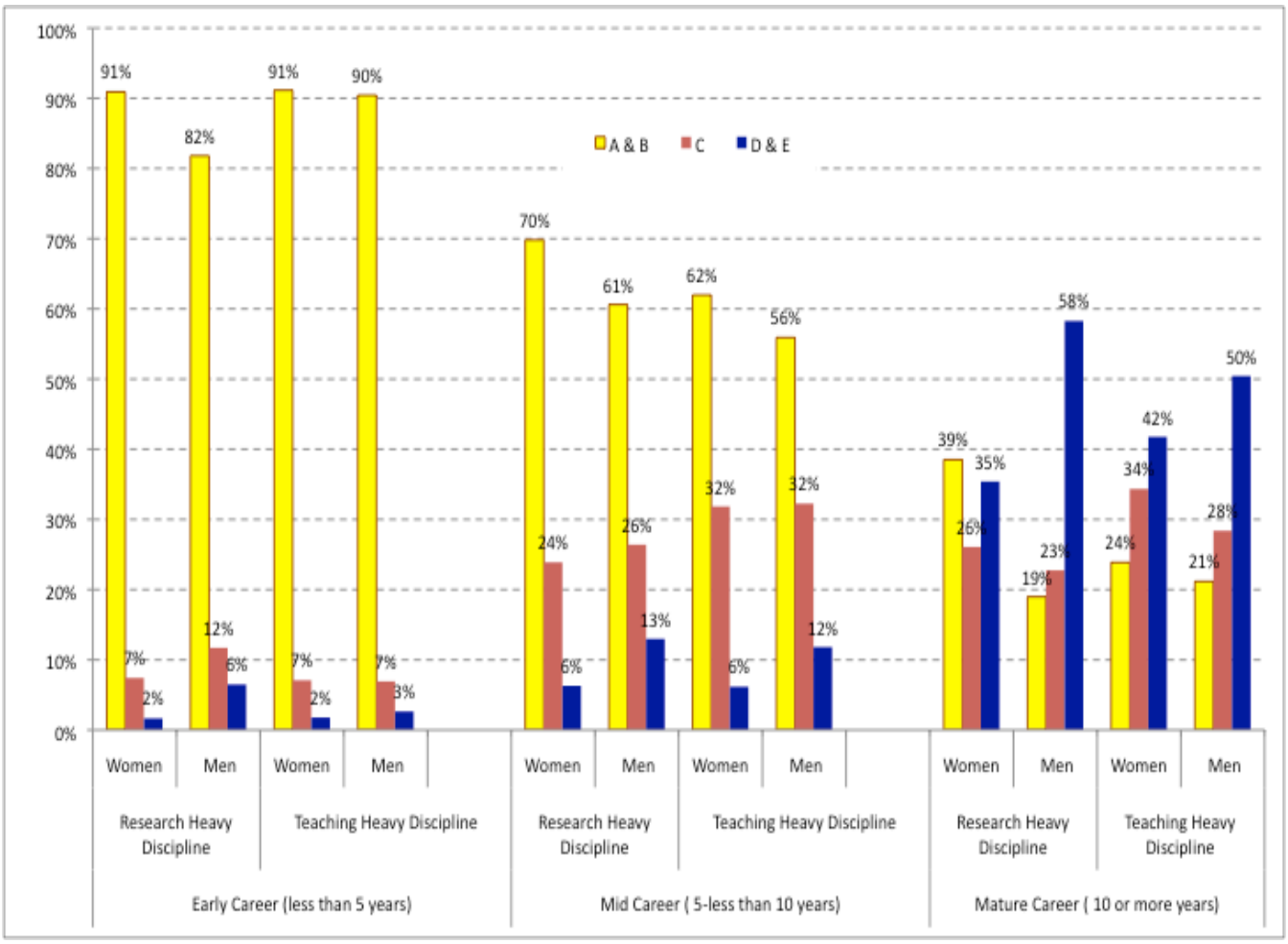
One way to interrogate this pattern further is to consider male and female distributions across levels within different career stages. This comparison – between the distributions of women and en across levels at early career stage (under 5 years in academia), mid career stage (5 to 10 years) and mature career stage (over 10 years) – is shown in Figure 7. (These definitions are not intended to align with those used by the Australian Research Council, but to the distribution of the data.) We do not call these 'funnelling ratios' as funnelling is a process that occurs over a substantial period of time, cutting across career stages, and the purpose of Figure 7 is to see something about the forces underlying funnelling (to be precise, those behind the extended funnelling ratios, since Figure 8 aggregates levels A and B, and aggregates levels D and E).

In the panel that comprises the left hand third of Figure 7, we see that the vast majority of early career staff are in levels A and B. In teaching-heavy disciplines, the distributions of early career males and early-career females between levels are quite similar. In research-heavy disciplines, early career men are three times more likely than early career women to be at Levels D or E – though even there, only 6 per cent of males are in Levels D or E, so this does not do enough on its own to explain the funnelling in research-heavy disciplines.

In the middle panel of Figure 7, depicting mid-career (5-10 year) staff, inequalities in the distributions across levels can be seen in both teaching-heavy and research-heavy disciplines. These inequalities are a bit greater in the research-heavy disciplines, where there is a 9 percentage point gap between the proportions of men (61 per cent) and women (70 per cent) who are at levels A and B. Men are 2 percentage points more likely to be at level C than women and 7 percentage points more likely to be at levels D

or E. In teaching-heavy disciplines, women are 6 percentage points more likely to be level A or B than men. (For both men and women, the research-heavy disciplines are more likely to host level A or B staff than the teaching-heavy disciplines.)

Figure 7: Distribution of men and women across levels by career stage



In the right hand panel of figure 7, however, comprising the mature-career stage staff, very large differences in the distribution of men and women across levels. In the teaching-heavy disciplines, mature-career men are 8 percentage points more likely than women to be at levels D or E. In the research-heavy disciplines, mature-career men are 23 percentage points more likely than women to be at levels D or E. In the research-heavy disciplines, mature-career women are twice as likely than men to be at levels A or B; in the teaching-heavy disciplines, the gap is small, and about one seventh the size of the gap in the research-heavy disciplines.

In sum, the data in Figure 7 suggest that the forces creating funnelling occur at all stages of a career, but appear to be worse in the research-heavy disciplines and to intensify amongst mature-career researchers, at which time the difference between research-heavy and teaching-heavy disciplines worsens.

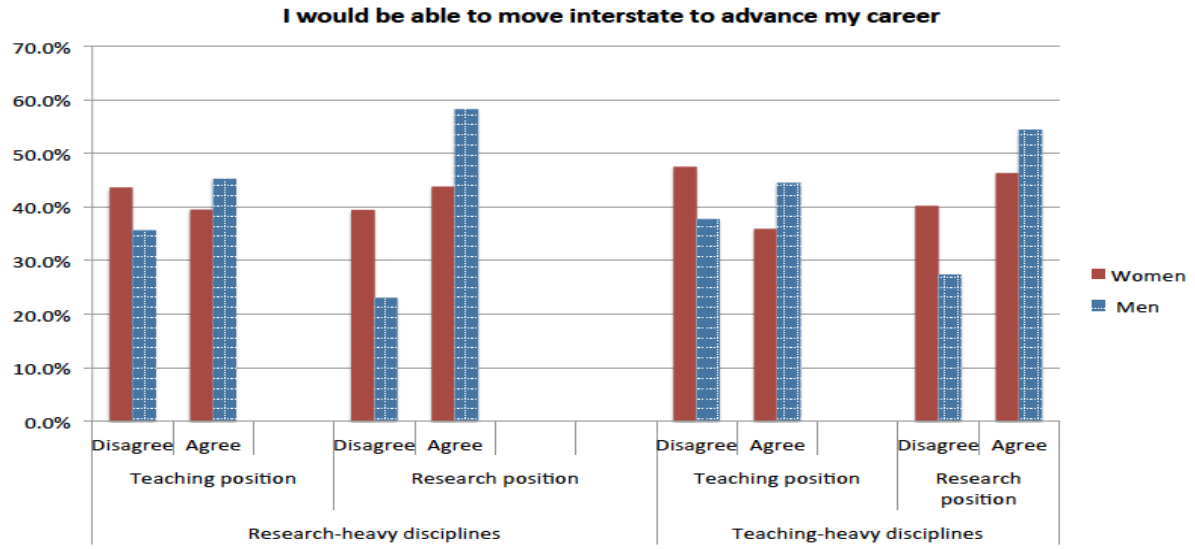
Career attitudes

The effects of these and other factors on career attitudes are shown in Figure 8. We see in Panel 1 that women universally report lower ability to move interstate than men in similar discipline types and job type. However, the smallest gap between male and female geographic mobility is shown amongst teaching jobs in research-heavy positions. In panel 2, we see small differences between men and women in terms of lateral mobility – how much they perceive they are able to move between universities and other sectors. Again, women in teaching-intensive positions in research heavy-disciplines appear to be in the best position – this is the only grouping where women appear more likely than men to agree with the idea that they could move between sectors. Disciplines have distinct labour markets and these have differing degrees of interaction with external labour markets.

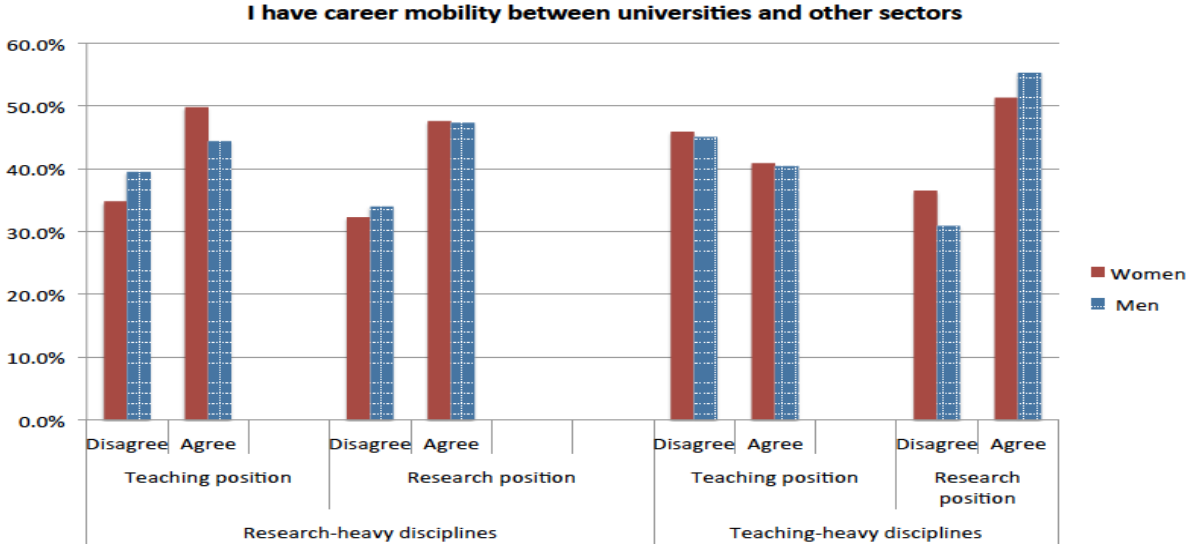
Yet when it comes to career satisfaction, the patterns are reversed. Inconsistent with the above findings on geographic and lateral mobility, but consistent with the earlier findings on funnelling, insecurity and marginalised entry, women in teaching-intensive positions in research-heavy disciplines are less likely than there male counterparts to be satisfied with their career prospects within their own university. Yet in teaching-heavy disciplines, or in research positions, the male-female differences are much smaller and sometimes non-significant. For both sexes within the research-heavy disciplines, being in a teaching position provides for greater career prospect satisfaction than being in a research position, there being a large number of the latter with low job security. But for those within teaching positions in those research-heavy disciplines, men are more satisfied with their career prospects within their university than are women. The data presented earlier on marginalised entry, insecurity and funnelling suggest that women there have a reasonable basis on which to feel less satisfied with their career prospects.

Figure 8 Career attitudes by discipline type and role specialisation

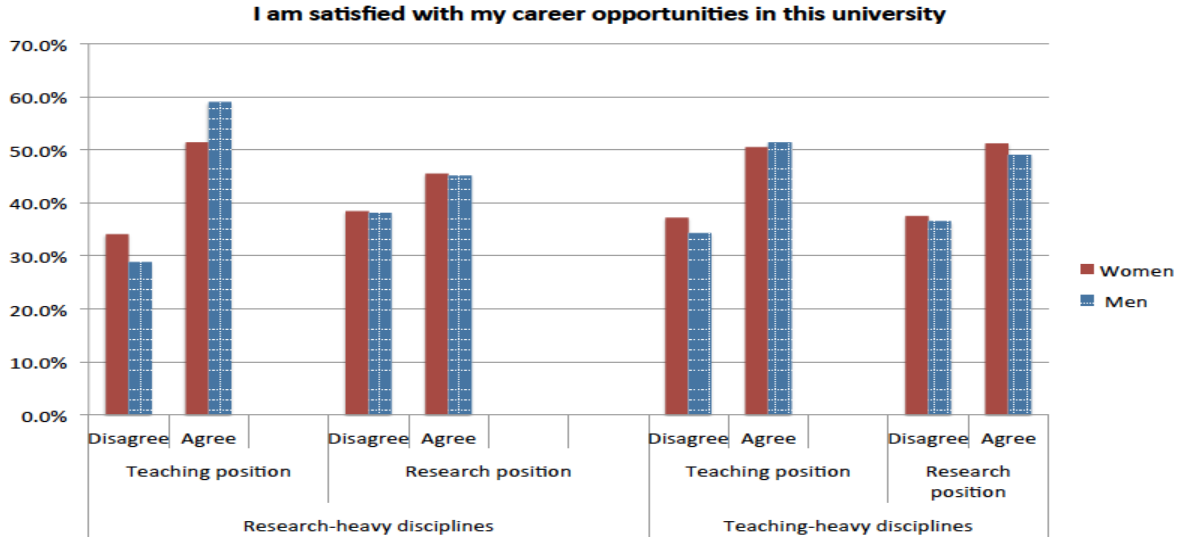
Panel 1



Panel 2



Panel 3



Conclusions

There are three main ways in which gender disadvantage is manifested in relation to discipline and type of work: marginalisation; insecurity; and funnelling. It is apparent that insecurity is significant in academia but it is rife in the research-heavy disciplines. The implications of this for science and higher education in Australia are beyond the scope of this paper. But what we do observe is that there is a strong gendered aspect to this insecurity. Women are more likely to be in insecure positions and more likely to end up in insecure pathways.

Academic disciplines are a basis for segmented labour markets with different career paths, external transferability, and different patterns of insecurity and marginalisation. This has already been observed in relation to casual academic staff (May, Peetz and Strachan 2013), but we also see aspects of it amongst salaried academic staff. In particular, gender and discipline interact in ways that appear to give disadvantage to women in several respects, but which intensify those disadvantages most in the research-heavy disciplines, and particularly for women who enter the 'secure' part of those disciplines, that is the teaching positions within those disciplines. Thus despite what might seem to be some structural advantages for women in teaching positions in the research-heavy disciplines (greater geographic and lateral mobility, relative to men, than is experienced by women in teaching-heavy disciplines or research positions), women in teaching positions in research-heavy disciplines were less satisfied than their male counterparts with their career prospects within their university and they showed the greatest gender gap in this measure of career satisfaction. Our findings reinforce and draw together evidence that has so far been gathered only in relation to single disciplines within the research-heavy disciplines, such as physics, evolutionary biology and astronomy.

While each of insecurity, marginalised entry and funnelling create disadvantage in discipline-specific ways, of the three funnelling seems to be the most deleterious factor. Funnelling is worse in research-heavy disciplines, especially in teaching jobs in research-heavy disciplines. Yet it is only through access to teaching positions that most academics are able to obtain job security. So funnelling women out of higher level teaching jobs in research-heavy disciplines essentially means that women are being funnelled out of secure employment in the research-heavy disciplines. Funnelling is evident to some degree in all career stages but it appears to be most intensely manifested in more mature career stages. Finally, while it might be tempting to predict that funnelling would disappear over time as women secure greater numbers within the profession, we are not so sanguine. Gendered differences in insecurity and marginalisation suggest that, even if the effects of funnelling reduce over time, career disadvantage is unlikely to disappear unless more positive steps are taken to address it.

References

Anderson, G, and Ivie, R , 2013, *Demographics Survey of 2013 US AAS Members Summary Results*, Statistical Research Center of the American Institute of Physics.

Baker, M. 2010. Career confidence and gendered expectations of academic promotion. *Journal of Sociology*, 46(3): 317-334.

Baker, M. 2009. Gender, academia and the managerial university. *New Zealand Sociology*, 24(1): 24-48.

Bardoel, E., Drago, R., Cooper, B. and Colbeck, C. 2011. Bias avoidance: Cross-cultural differences in the US and Australian academies. *Gender, Work and Organization*, 18 (Supplement s1), e157-e179.

Bell, S. and Bentley, R. 2005. Women in Research. Prepared for the AVCC National Colloquium of Senior Women Executives, Griffith University, Office of the Pro Vice Chancellor, Equity and Community Partnerships, Griffith University.

Chesterman, C., Ross-Smith, A. and Peters, M. 2005. 'Not doable jobs!' Exploring senior women's attitudes to academic leadership roles. *Women's Studies International Forum*, 28(2-3): 163-180.

Chesterman, C., Ross-Smith, A. and Peters, M. 2003. Changing the landscape? Women in academic leadership in Australia. *McGill Journal of Education*, 38(3): 421-435.

Currie, J., Thiele, B. and Harris, P. 2002. *Gendered universities in globalized economies: Power, careers and sacrifices*. Lexington Books: MA.

Dever, M., Morrison, Z., Dalton, B. and Tayton, S. 2006. When research works for women: Project report, Monash University, Melbourne.
http://monash.edu/equity-diversity/women/when-research-works.pdf

Diezmann, C. and Grieshaber, S. 2009. Understanding the Achievements and Aspirations of New Women Professors: A Report to Universities Australia. Brisbane, Queensland University of Technology.

Jones, D., Reilly, A., Krisjanous, J. and Vasquez, C. 2012. Women staff in business schools: An exploratory study. Victoria Management School, Victoria University of Wellington, Wellington, NZ.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1979806

Kahn, S. 2012. Gender differences in academic promotion and mobility at a major Australian university. *Economic Record*, 88(282): 407-424.

Kloot, L. 2004. Women and leadership in universities: a case study of women academic managers. *The International Journal of Public Sector Management*, 17(6/7): 470-485.

Knights, D. and Richards, W. 2003. Sex discrimination in UK academia. *Gender, Work and Organization*, 10(2), 213-238.

May, R., Peetz, D. and Strachan, G. 2013. The casual academic workforce and labour market segmentation in Australia. *Labour and Industry*, 23(3): 258-275.

Morley, L. 2006. Hidden transcripts: The micropolitics of gender in Commonwealth universities. *Women's Studies International Forum*, 29(6), 543-551.

Morley, L. 1999. *Organising feminisms: The micro-politics of the academy*. Macmillan: London.

Nature. 2013. 'Science for all: editorial', *Nature*, 495, 5, 7 March, doi:10.1038/495005a.

North-Samardzic, A. and Gregson, S. 2011. Commitment or even compliance? A Australian University's approach to equal employment opportunity. *Relations Industrielles*, 66 (2): 279-301.

Özkanlı, Ö. and White, K. 2008. Leadership and strategic choices: female professors in Australia and Turkey. *Journal of Higher Education Policy and Management*, 30(1): 53-63.

Özkanlı, Ö. and White, K. 2009. Gender and leadership in Turkish and Australian universities. *Equal Opportunities International*, 28(4): 324-335.
Pritchard, R. 2010. Gender inequalities among staff in British and German universities: a qualitative study. *Compare*, 40(4): 515-532.
Probert, B. 2013. *Teaching-focused academic appointments in Australian universities: recognition, specialisation, or stratification?* Office for Learning and Teaching, Australian Government, Discussion Paper 1. file:///C:/Documents%20and%20Settings/s965404/My%20Documents/Downloads/Teaching-focused_academic_appointments.pdf
Probert, B. 2005. 'I Just Couldn't Fit It In': Gender and Unequal Outcomes in Academic Careers. *Gender Work and Organization*, 12(1): 50-72.
Pyke, J. 2009. Perspectives from below the ceiling: Academic women and the transition from Senior Lecturer to the Professoriate – a case study, PhD thesis, School of Economics and Finance, Victoria University, Melbourne.
Schroeder, J, H. L. Dugdale, R. Radersma, M. Hinsch, D. M. Buehler, J. Saul, L. Porter, A. Liker, I. De Cauwer, P. J. Johnson, A. W. Santure, A. S. Griffin, E. Bolund, L. Ross, T. J. Webb, P. G. D. Feulner, I. Winney, M. Szulkin, J. Komdeur, M. A. Versteegh, C. K. Hemelrijk, E. I. Svensson, H. Edwards, M. Karlsson, S. A. West, E. L. B. Barrett, D. S. Richardson, V. van den Brink, J. H. Wimpenny, S. A. Ellwood, M. Rees, K. D. Matson, A. Charmantier, N. dos Remedios, N. A. Schneider, C. Teplitsky, W. F. Laurance, R. K. Butlin and N. P. C. Horrocks. 2013. 'Fewer invited talks by women in evolutionary biology symposia', *Journal of Evolutionary Biology*, 26(9), 2063–2069, September 2013.
Shen, H. 2013. Inequality quantified: Mind the gender gap. *Nature*, 495, 22–24, 7 March 2013, doi:10.1038/495022a
Stevens-Kalceff, M., Hagon, S., Cunningham, M. and Woo, A. 2007. Maximising Potential in Physics: Investigation of the Academic Profile of the School of Physics at the University of New South Wales. School of Physics, University of New South Wales. https://phys.unsw.edu.au/phys_about/EQUITY/Maximising%20Potential%20in%20Physics.pdf
Strachan, G., Troup, C., Peetz, D., Whitehouse, G., Broadbent, K. and Bailey, J. 2012. *Work and Careers in Australian Universities: Report on Employee Survey*, Centre for Work, Organisation and Wellbeing, Griffith University, Brisbane. http://www.griffith.edu.au/business-government/centre-work-organisation-wellbeing/research/regulation-institutions/projects/work-careers-australian-universities
Valian, V. 1998. *Why so few? The advancement of women*. MIT Press: Cambridge, MA.
Vu, C. and Doughney, J. 2007. Unequal outcomes for women academics in Australian Universities: Reflections on Belinda Probert's 'I just couldn't fit in'. *Journal of Business Systems, Governance and Ethics*, 2(4), 55-65.
Waters, M. and Bardoel, E. 2006. Work–family policies in the context of higher education: Useful or symbolic? *Asia Pacific Journal of Human Resources*, 44(1): 67-82.
Winchester, H., Lorenzo, S., Browning, L. and Chesterman, C. 2006. Academic women's promotions in Australian universities. *Employee Relations*, 28(6): 505-522.