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**SUPERVISION OF RESEARCH STUDENTS:
THREE PAPERS**

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The three papers were presented at a workshop for thesis supervisors on Supervising Research Students. Held on 13 March 1996 the workshop was organised jointly by the Centre for Educational Development and Academic Methods and the Graduate School.

A Short Thesis on Supervision

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University staff now supervise and doctoral students are supervised in a system changing in mass, nature and direction.

The PhD is a new degree. No Australian university had regulations for the award of the PhD until after 1945, and in the first postwar years the numbers of doctoral students were small. Many distinguished members of University staff who taught into the 1970s, such as Manning Clark and Charles Rowley, did not have doctorates.

The numbers of doctoral students in Australia have been increasing rapidly:

1988	8563 doctoral students
1990	9298
1992	13623
1994	18783
1995	21037 (12674 males and 8363 females)

The number has nearly doubled since 1991, and tripled in the last ten years. There were twice as many doctoral students in Australia in 1995 as there were undergraduates in 1939.

Doctoral students do much of the original research carried out in Australian universities. There are now about 300 doctoral students working in, or administered from, the Coombs Building at the Australian National University. Calculated by head per hectare, the Coombs Building has one of the highest densities of doctoral students in Australia - and the world. The PhD students in the Coombs write about 6,000,000 words a year in final form. This is a system of high productivity, high quality, high pressure, high density, and high national value.

The students now entering doctoral studies straight from fourth-year honours are vastly different from those early doctoral students, many of them part-time university teachers who already held masters degrees. The students out of large honours classes may have had little contact with research or researchers. They can come innocently to a culture of research.

The Australian National University has recently changed the administrative structure within which doctoral students work: they are supervised by panels rather than individual members of staff and they are gathered within disciplinary programs that cut across the divide between Institute and Faculties and across other departmental borders. Coursework - up to a year in duration - has been introduced into some courses, and

some students work through a sequence of coursework diploma and masterate before progressing to the doctorate.

Early Australian doctoral students came from a low birth-rate and low immigration era and they serviced a high birth-rate and high immigration period. The current doctoral students do not have such advantages of time and demography. Increasing numbers of doctoral students will not find jobs in universities or in research outside universities. But in spite of changes in some disciplines, all doctoral students write theses designed to test their capacity 'to carry out independent research' - and many of them will not be in jobs where they will be attempting independent research.

If we put all this together we have a new degree, and it is quickly becoming a mass degree. The doctoral students are valuable in current research and of critical potential value to the nation. The administrative structure of all courses and the content of some doctoral courses have been changing, but most of all the students have been changing - by the fact that they are members of a numerous student group and not part-time staff members, and by the diversity of directions they take when they graduate. In this changing system experienced supervisors have accumulated knowledge and random misconceptions, and they can have few fixed solutions. Perhaps there are none. What works now may not be appropriate in 2006. It may be by then that some members of teaching departments will have responsibility for 25 doctoral students, and that will be a full teaching load. But now supervision is conducted in addition to primary tasks of teaching and research - and is difficult to calibrate in the total work load.

The following observations should be seen against that changing background.

- Supervisors may be guilty of various violations of a position of authority and influence, but the most common sin that I have observed is that of doing too much. The second page of a thesis must contain a statement in which the student states 'the extent to which the thesis is his or her own original work'. Sometimes this is a bland statement that is misleading: the student has failed to acknowledge the work of a generous supervisor who was co-author - from the conception to the writing of the final copy of the thesis. No one complains about an excess of help. No one polices it. And it is easy to see why it can happen. After working together for three or four years the supervisor and student may have a close relationship, and some sense of mutual obligation. In any case no supervisor wants a student to fail: students who pass are sometimes listed on CVs; those who fail never appear. So for reasons of self-interest and out of personal considerations for the student, and because of the good teacherly tradition that pits student and teacher against external examiners, the supervisor does too much. The student passes, and the supervisor, perhaps alone, knows that the student's work did not justify the award of the degree. Supervisors (again alone) must guard against giving too much help. At the mid-term review they must be in a position to make a realistic assessment, for from that time on they may feel committed to seeing that the student passes.

- Students vary greatly in personality, in preparation to undertake prolonged research, and in the sorts of problems that they confront. Some students arrive with a strong theoretical background and need to start work on collecting and exploiting empirical evidence; some know all about gathering evidence and are bereft of theory; some write better than their supervisor and others can scarcely put a sentence together; and some respond to a regulated environment of planned meetings and specific tasks, while others are more content if they set their own goals and consult the supervisor when they feel the need. It is probably best to start with a formal system and then change when student and supervisor have more knowledge of each other.
- In history, and presumably in related disciplines, it is best not to have students working on subjects closely related to the supervisor's own. Within six months or a year the student should be out working on frontiers unknown to the supervisor. This is important if the student is going to do 'independent research', for the student's own self-confidence, and to prevent the supervisor having a too proprietorial concern about the direction and results of the research. The supervisor should be in a position to give sensible guidance, ask intelligent questions, see potential difficulties and assess written work - but not to know the answers in advance.
- Problems sometimes arise because of differences between supervisor and student over method and ideological commitment. The supervisor may have a deserved reputation as a historian of the media in Australia. She has written extensively on radio and is set to supervise a student who wants to write about television. It seems appropriate. But the student is a Trotskyite, or a post-postmodernist or a neoderridaist and the supervisor is a new right empiricist. It is in these circumstances that the supervisor has to tolerate difference and concentrate on quality. It is the task of the supervisor to make sure that method and ideology do not obscure or distort enquiry, to see that the student's approach leads to new and worthwhile insights, and to check that the student has been exposed to other possible ways of proceeding. Once this has been done, then it should be possible for a supervisor to have students working from a range of assumptions: ideological cloning is not necessary.
- There are two points where the supervisor is likely to be most useful. The first is in defining the topic and scope of the thesis. It is obviously essential for the student to have a topic that is of the appropriate size and significance, one where it is possible to gather and evaluate sufficient evidence within three years. The second is during the final writing of the thesis. It may well be that a supervisor will give a week during which the main task will be the reading of, and commenting on, drafts of chapters.
- Get the student to write early. It may be chapter four, rather than chapter one that is written first. The early commitment to print is important both for the student and for the supervisor. Until the student has done some writing all data tends to be relevant and the frontier of what is relevant keeps expanding. Once the student has written up a section then research should become much more efficient: the direction of the thesis should be clearer and it is easier to decide what material is of greatest relevance; the level of detail that needs to be gathered should be apparent; and obvious gaps in the data should be recognised. Once the supervisor

has read a substantial piece from the student, then advice on a whole range of issues from the theoretical to the most practical should be more precise. The supervisor should then have a fair idea of the highest quality thesis that the student can aim to produce.

- While doing a doctorate a student should be encouraged to publish something in a refereed journal. This tells the student the depth of research and the level of accuracy and lucidity of presentation required for publication, it associates the name of the student with the topic across the discipline, and it will assist the student when applying for a job. The supervisor should resist the temptation to do a joint article.
- Supervisors should be aware that a critical time for many students is about six or nine months from the scheduled end of the scholarship, when the deadline is rushing at the student, there is no satisfactory alternative source of income, it is impossible to complete the thesis in time, over two years of data painstakingly gathered stare accusingly at the student, and a career - a whole planned future - is collapsing. A paralysis of all productive work may result. One thing that a supervisor may be able to do is to set short-term goals - get the student to write 3000 words (or less) within ten days. That is manageable, and work may start again. But 30,000 words in 100 days may seem to demand the impossible.

This is not intended to be a comprehensive guide for supervisors or the supervised. The points listed arise out of experience as a supervisor and as a prescribed authority. They should be read in conjunction with the formal statements in the Graduate School Handbook on Supervision, Grievance Procedures for Graduate Students, Guidelines for the Responsible Practice of Research, etc. Some Schools also have written guides for staff and students, eg Supervision in RSPAS: A guide for students and their supervisory panels.

Supervision of Research Students in Biological Science

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I wish to present some information and ideas about two separate topics concerning research student supervision in biological science. First, I will give an overview of the results of a pilot project that the Graduate Program in Ecology, Evolution & Systematics commenced in mid-1995. This project was one of several financed through the Graduate School from 1995 Quality Funds and aimed to enhance the quality of the PhD supervisory process at the ANU. Second, I will present a more personal view of the nature of PhD supervision.

1. A survey of student-supervisor relationships and the process of PhD supervision in the Graduate program in Ecology, Evolution & Systematics

This project was undertaken by six PhD students (Geoff Cary, Jacqui de Chazal, Rochelle Christian, Kendi Davies, Elsie Krebs and Brett Melbourne) and two supervisors (Penny Gullan and Rod Peakall) (Cary *et al.* 1996). The primary aim was to produce a booklet, for both students and supervisors, containing guidelines for establishing an effective student-supervisor relationship. Information for the booklet was gathered via written and verbal surveys of most PhD students and supervisors in the Program, as explained in Cary *et al.* (1996). The survey forms were largely designed, and the interviews were conducted, by the above PhD students. The survey design and many of the questions were based on previous studies on PhD supervision, especially by Phillips and Pugh (1987) and Cullen *et al.* (1994). Our surveys asked the same or similar questions of both students and supervisors so that their answers could be compared as far as possible.

Some Results of the Written Surveys

There was concordance between the requirements and expectations of students and supervisors on some matters, for example, the basis for co-authorship of papers, and the importance of attending formal and informal seminars/discussions, both within and outside the Department and Program.

More students than supervisors rated their relationship as highly satisfactory, but there was a greater spread in student responses with more students than supervisors believing that their relationship with their supervisor(s) had scope for improvement or was poor.

Basically, the survey highlighted the requirement for better communication concerning the needs and expectations of both students and supervisors.

Some Pertinent Discrepancies

- Students perceived that their work was more closely related to that of their supervisors than supervisors did.
- Supervisors thought that they initiated about half of all formal meetings, whereas students thought that they initiated nearly all formal meetings.
- Supervisors perceived that they met formally with their students more often than students perceived that they did.
- Most students thought that they met with their supervisors on a needs basis, whereas most supervisors thought that they met with their students both on a needs basis and by regular appointment.

Roles of supervisors and advisers

Supervisors were asked to what degree they played certain roles. Students were asked: (i) to what degree their supervisor(s) played certain roles and (ii) to what degree they would like their supervisor(s) to play these roles.

There was disagreement between students and supervisors over the level of involvement required of supervisors in many roles. Here I will summarise the results for just three of the 11 roles that we canvassed.

DIRECTOR - determines topic, methods and ideas; provides initiative for research

MANAGER - plans work, suggests critical path for data collection; suggests timetable for writing up

- Students generally felt the roles of both director and manager were mostly theirs, whereas supervisors generally felt that they played the role of director to some extent and also had a much greater role as manager than perceived by the students.

FACILITATOR - facilitates access to resources and expertise that cannot be provided by supervisor

- Supervisors and students agreed that supervisors should act as a facilitator to some or a large extent, but many students felt that their supervisor(s) did not do so.

Major Conclusion Drawn from the Research Results

Supervisors need to discuss supervision issues openly with each research student at the beginning of candidature and at intervals thereafter.

Consider both your and the student's needs or expectations of:

- Nature of supervision
- Roles and responsibilities
- Regularity and formality of meetings
- Formal requirements (e.g. mid-term report, departmental seminars, nature of thesis)
- Resource issues
- Assistance with design, analysis and writing
- Attendance at workshops and conferences
- Authorship of any papers

2. A PhD in the biological sciences

There is a broad spectrum of PhD supervision needs and styles in biological science, as in most disciplines. The nature of supervision in biological areas appears to be determined partly or largely by any or all of the following issues:

Relatedness of the supervisor's and student's research

A PhD research topic may be part of a larger project being undertaken in the supervisor's laboratory. This is often the case in fields such as molecular biology. At the other extreme, the PhD student may be researching a topic that is totally independent of the supervisor's own research project, although perhaps in the same broad research field. Independent research projects are reasonably common in the disciplines of ecology and systematics. The advantages that a research student gains in working as an integral part of a team (i.e., collaborative interactions that may lead to more rapid progress and assured results) must be balanced against the problems that can arise from sharing intellectual property, whereas students with "stand-alone" projects may gain academic independence by forfeiting close collaboration. Such issues need to be considered carefully by both supervisors and students.

Funding source

PhD students whose studies are financed by an Australian Postgraduate Award (APA), an Australian Development Co-operation Scholarship (ADCOS) Scholarship, or an Overseas Postgraduate Research Scholarship (OPRS) and an ANU Scholarship usually have reasonable academic freedom (within the limits of what the supervisor will supervise) concerning choice of project and subsequent research emphasis. In contrast, students with industry-based PhD funding (e.g., from a Co-operative Research Centre) may be expected to achieve certain specified outcomes. Research flexibility or lack of it may influence, sometimes strongly, the nature of the supervision provided.

Student's background

Most academics are aware that research students from non-English-speaking backgrounds and/or those unfamiliar with Australian academic culture may have very different supervision expectations and needs compared with local students. However, even Australian-born and educated students vary substantially in their previous research experience, depending upon where they did their undergraduate (including honours) degree. Undergraduate courses in biological science at the ANU offer a substantial amount of project-style practical work which provides a strong foundation for students who later embark on a research MSc or PhD. This is not true in many of the larger or newer Australian universities where the pressure of student numbers or teaching loads make intensive project-style teaching impractical or impossible. So it must not be assumed that all honours graduates from Australian universities have had similar exposure to research activities.

Each supervisory relationship is different and it is essential that supervisors maintain flexibility in their approach to supervising their research students.

A philosophy of supervision

In a recent article, Higley and Stanley-Samuelson (1995, p. 209), associate professors of entomology at the University of Nebraska, make the following points:

Their major professors “emphasized education over training and mentoring over supervision.”

“Using graduate students as the mainstay of academic research or as the foundation of large research programs undermines the purpose of graduate education.”

I strongly support the philosophy behind the above quotes and suggest that, as supervisors, we should aim to foster professional growth and development of our research students, rather than to create skilled technicians or clones of ourselves.

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Supervision: A Student Perspective

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My views on the supervisory relationship and process arise from my own experiences, those of my friends and colleagues and insights gained during my involvement in student representation. However, I am a science student. Some of the things I saw may have an implicit bias towards supervision as it occurs, or does not, in the sciences. For science students, for example, it is unusual *not* to see one's supervisor on a daily, if not a more frequent, basis. My comments are intended to be general enough not to be restricted in any way to the sciences.

Research by the Council of Australian Postgraduate Associations' (CAPA), the national peak body of postgraduate students and their representative associations, indicates that 50% of Australian research output is due to the labours of postgraduate students. Hence, students are not just the recipients of education and supervision. They are an important part of the research output process, and are thus a significant stakeholder in many debates in higher education. My experience has been that students want to get on and get the work done, and take their part of the process. Often it is not clear, however, what their role is or is expected to be. I suggest that it is the responsibility of the supervisor, in the first instance, to make that role clear.

A question which is only raised infrequently, if at all, is the role of the research (PhD) degree *vis à vis* a general degree. Is the PhD a union ticket to academic career paths, or to what extent does it represent a highly advanced generalist education? Lee White, the Dean Of The University Of Melbourne Graduate School, in his ANU PhD thesis, referred to his doctoral thesis as "*that most tedious of union tickets, the PhD degree*", as well as "*the traditional kilogram of bound A4*". It must be noted that things have changed since the early to mid 1970's when he was here.

The numbers of students, some 20,000 doctoral students enrolled in Australian universities *at present*, mean that a significant proportion (and number) of students will not have the chance to become involved in academic research in their chosen discipline, or even involved in research in a discipline not related to their own initial field. They will just not have the opportunity. Thus, for a number of people, the PhD *will* be a general degree. It is of increasing importance for supervisors to realise this fact and encourage students to broaden their educational background and experience. "Broaden" here must refer to gaining experience outside the strict area of academic research pursuit. It can be experience in teaching and demonstrating, computing, communication, report writing, public speaking, committee work, and, at the risk of appearing biased, student representative experience. At present, it is still the norm for students to have to fight to be "permitted" to be involved. It is now time to go further and have supervisors be willing to encourage such involvement, not merely permit it grudgingly to occur.

Students are all too aware that they tend to experience what can be called "the biscuit cutter" effect: they will normally inherit either the exact same, or exact opposite, attitudes of their supervisor to any number of things involved in their work and work environment. This includes attitudes to work, including how it is done and how one feels about it; colleagues and superiors, such as who is an idiot, who is bright, and who steals who's results; administration and The Administration; and University structures, such as the Graduate School and Graduate Programs. As a supervisor, particularly in view of the general education that the PhD is becoming, you will need to be mindful of whether you are encouraging your students to broaden their education other than in a purely academic way. Are you giving them the opportunity to make their own decisions about their Graduate Program and its activities, for example, allowing them to get involved if they see it as valuable? Or have you convinced them, from day one, that it is all just (dirty) administration and time wasting?

One of the three big issues relating to the PhD is the three-year limit on PhD scholarships. Scholarships (for those privileged enough to receive them) are awarded for three years. However, many, particularly in my own area, believe and will not change their belief, that the PhD is immutably a four-year degree. It is interesting to note that the PhD at ANU has been specified as a three-year degree for approximately eight years now, or the full course lengths of over two student generations, and a scholarship reality for about four years. *The PhD at ANU is now no longer a four-year degree.*

Despite this, the *average* course length of students at ANU is significantly above 3 years (more like 3 years 9 months). Research and anecdotal experience in the area has demonstrated a strong correlation between effective and adequate supervision in the first six-to-nine months of the project and the student's capacity to complete a three-year PhD degree; the same is true of the supervisor's commitment to the notion of the three-year degree. It is highly unlikely your students will come to you with any notion of how many years a PhD degree requires. What will you tell them? What outcomes will your action, or inaction, lead to?

It is not responsible just to allow students to take more than three years and see it as the students' problem. It is less responsible to require them to take four or more years and ignore the consequences on the students' financial and emotional state. If you believe a PhD is a four-year degree, then there is a clear and present responsibility (i) to make this clear and ensure the student understands what you are telling them, and (ii) to ensure that financial support is available to the student. It is likely to be at least partially due to the supervisor if a student does not complete in the time specified by the university statutes, but the student is the one who no longer eats.

The supervisor is someone whom the student will forever be associated with and who never leaves the student's life. This truth was brought home to me by my experience of being introduced at a conference as "Atkins out of Pashley out of Kitchener, so the lineage is good". I then realised that if someone did not like or felt aggrieved by either Kitchener or Pashley, I might be in trouble before I had even begun in the area! Students find out all too soon that they will be forever associated as "one of X's students". X is often asked,

unofficially, to comment on their suitability for positions, research grant support, etc. Thus, the supervisor becomes a *de facto* judge, jury and executioner for each student, particularly as regards references, career networking, etc. This breeds fear and paranoia of giving the wrong impression. Students realise very quickly that the supervisor is a significant figure in their career path and life for good, for better or for worse. Supervision, in some senses, does not stop for students when their thesis is submitted.

I wish to turn now to what can be termed the "Top Gun" attitude. By this, I refer to the B-grade movie about a naval flying academy, starring Tom Cruise. This is particularly relevant to fourth-year honours student entry into a PhD course. The "Top Gun" syndrome is that the students are seen, largely by themselves, as the best and brightest. Significant academic achievement has led them to their current place. They are thus unable to admit fault, or shortcomings, for fear of "showing themselves up" in their new academic community. It becomes better to struggle on with barely a clue about what is going on than to admit to a supervisor, in particular, that one does not know what is happening.

Students all too often see it as unwise to admit fault: what if you are remembered as being not so good? This is one reason students are reticent to push their supervisors and heads of departments on matters such as three-year limits. They are often extremely concerned with the next 30 years, and balance this up against the factors affecting them for the next one or two years, such as adequate resource allocation and three-year scholarship limits.

It is much easier for you as supervisors, in the first few meetings and months, to take the initiative to help the student open up to you about how they really are going, how advanced they really feel they are, whether they really do have sufficient theoretical background in the area, and so forth. I encourage supervisors to take the challenge of making it clear to students that they will not be judged, and possibly written off, immediately after those first few meetings.