41. VPSEC, op. cit., Appendix B.

42. Northcott, op. cit., pp. 32-3.

43. VPSEC, op. cit., Appendix B.

44. Northcott, op. cit., pp. 32-3.

45. op. cit., pp. 11-12.

46. CTEC, 1984, op. cit., Vol 1, para 2.38; Summary, pp. 4, 13.

47. VPSEC, op. cit., p. 18.

48. op. cit., pp. 1-2.

49. F.R. Jevons, 'Possibilities for Collaboration', in *Open Campus*, 1, 1, 1979, p. 27.

50. L. Moran, 'Co-operation in, and Development of Distance Education in Australia,' ASPESA Conference Paper, Toowoomba, 1983, pp. 4-5.

51. L. Moran and M. Charlesworth, Position Paper on Distance Education, Distance Education Unit, Deakin University, 1980, p. 1.

52. White, 1975, op. cit., p. 43.

53. K. Smith, 'A Proposal for the Establishment of a National Resource Centre for External Studies', in *ASPESA Newsletter*, 4, 1, 1978.

54. Pritchard and Jones, op. cit., pp. 4-5.

55. Op. cit., Recommendation 17.35.

56. J. Laverty, 'Aspects of co-operation between the University of Queensland and the Darwin Community College,' in *ASPESA Newsletter, 2, 2, 1975.*

57. *M. Neil, 'Collaboration in Distance Teaching,' in M. Pentz and M. Neil, Education of Adults at a Distance*, Kogan/Page, London, 1981, pp. 172-3, 179.

58. Op. cit., p. 159.

59. Jevons, 1979, op. cit., p. 28.

60. Jevons, 1979, op. cit., p. 29. Others echo Jevons' ideas, for instance, Pritchard and Jones, discussing government intervention suggest that rationalization is a road 'most safely travelled by volunteers', although they also query how durable voluntary arrangements may be (op. cit., pp. 2, 14).

61. Parry, discussing the co-ordination of tertiary education in general, pointed to the vast problem of co-ordinating TAFE and CAEs in fields such as adult education. See R. Parry, Co-ordination of Tertiary Education in Australia in *Vestes*, 22, 1, 1979, p. 13.

62. F.R. Jevons, 1984, op. cit., p. 8. See J. Blackburn, *Ministerial Review of Post-compulsory Schooling*, Melbourne, 1984.

63. VPSEC, op. cit., p. 9.

64. Op. cit., pp. 10, 14, 19, 36.

65. Op. cit., p. 31.

66. Op. cit., pp. 34-5.

67. Op. cit., pp. 44-6.

68. For instance, see Smith op. cit; Jevons 1979 op. cit., 1984 op. cit; D. Holmes, 'Some Organisational Issues for Distance Education in Australia, in *Epistolodidaktika*, 8, 1, 1977; Moran and Charlesworth, op. cit.

69. M. Shott, 'External Studies in Australia at the Crossroads?' in *ASPESA Newsletter*, 9, 2, 1983, pp. 2, 5-8.

70. Moran, op. cit., pp. 9-10.

71. Pritchard and Jones, op. cit., pp. 13-14.

72. Neil, op. cit; Moran and Charlesworth, op. cit.

73. FAUSA memorandum 90/1: 1016V on the 1985-7 Guidelines, 1984. Other commentators share this suspicion, for instance, Anwyl who asks whether external education might not be an equal opportunity for those who don't have an equal opportunity; op. cit., p. 9.

74. Moran, op. cit., pp. 1-2.

75. Moran and Charlesworth, op. cit., p.2.

76. Jevons, 1984, op. cit., pp. 1-3.

77. White, 1982, op. cit., p. 266.

78. Moran, op. cit., p. 2.

79. Moran, op. cit., pp. 12, 19.

PURSUING PRODUCTIVITY, EXCELLENCE AND OTHER RESEARCH SNARKS: A Critique of Current Attitudes

DARYL LE GREW
Department of Architecture and Building
University of Melbourne

Universities are ultimately responsible to the societies that sustain them for the quality of their research product. The ideas, explanations, theorems, prescriptions, criticisms and reflections that collectively comprise this product form an important facet of cultural development and, naturally, productivity of this kind is commended and encouraged. Commendation and encouragement are, however, no substitute for firmly grounded policy about the nurture of research. At present, research policy formulation in Australian universities seems to revolve around interlocking national research objectives, categorization and priority determination for bureaucratic ends, and exhortations to maximize productivity — with precious little policy development that has its roots in an understanding of the complex ecology of the university itself and the attitudes, values, and mythologies that pervade the research realm. A contextual view, that includes an understanding of the rich and varied nature of research itself and the personal, professional and social realms that sustain it, is fundamental to informed policy making.

The Pursuit of Productivity

Who, in recent years, has not felt and resented the sense of urgency and promotion that surrounds any discussion or pronouncement about rates of research productivity. Under the guise of social accountability and utility researchers are exhorted to produce more and more. The imperatives of a recessionary economy, a conservative ethos and contracting funds may fill many researchers with trepidation about the levels of competition induced within and between disciplines and research programmes. In such a highly competitive environment there is a danger that normal expectations of productivity in research will be pushed towards limits beyond which a self-reinforcing whirlwind of research activity is established and productivity becomes an end in itself. In this event the real purposes of research, to create knowledge, cultural development and social utility, are lost and researchers are sucked into an upward spiral of productivity and reward, reflected as a larger slice of the research pie, status and kudos.

Ironically, the exhortation to maximise productivity reflects a misconception about the nature of research itself and the way in which it is deeply rooted in, and dependent upon, the strength and rich variety of function in the university, of which research is but part. The basic misconception is that research can somehow be understood and practiced in a common way among the various disciplines of the university. The reality is that there are significant, often fundamental differences about what comprises research. Different modes and processes of research, within and between the disciplines, bring different potentials for productivity. Creativity and discovery are not necessarily linked to high rates of productivity and, despite popular belief, productivity does not decline with age. To complete the heresy it has to be said that there are fundamental problems in measuring the real level of productivity anyway.

It is worth exploring some of these considerations further.

Productivity, Creativity and Discovery

In the context of research, creativity at an individual and team level is reflected in innovation and discovery. If new knowledge is established as a result of research then the people, processes and product involved may be labelled creative. It is often assumed that a high level of productivity is a necessary precondition for creative achievement, but as Pelz and Andrews demonstrate there is no general rule that abundant producers are creative thinkers.[1] Some are, and rely on their abundant product to provide the ground for real breakthrough events; others use their abundant product to compensate for, or even to mask, a lack of such breakthroughs. Conversely, there is no general rule that researchers who apparently produce little in the way of published product lack creativity; indeed a career marked by few but brilliant achievements is not unknown at the very top of the research world. It is not so much a matter of indolence or wasted opportunity as it is a matter of cognitive style. For some researchers their most innovative work is clustered at critical times in their professional and personal development. These sudden outpourings, especially in the theoretical development of the discipline involved, often become bench marks for personal development, they occasionally progress the knowledge base of the discipline and, even more occasionally, the culture. Einstein's suite of pivotal papers in 1905 is a prime example of this clustering of product. Hardin refers to J.J. Thompson's insight that, in the quest for excellence, results do not often come regularly and that considerable interludes may separate creative research events.[2] These interludes are critical to a realistic analysis of research productivity in the university; there being a tendency to see this research style in terms of periodic clusterings interspersed in a general milieu of inactivity: this perception of research is anathema to those who have a more obsessive view about ordered, regular thinking and production processes. In fact, of

course, the perceived inactivity in the interlude is an illusion; these periods being most valuable for the intensive investigation, reformulation and pondering which is the basis for the next round of intense and innovative activity.

These interludes may be necessary gaps in a research project and it is vital not to misinterpret them as signs of inactivity, uninterest or as evidence of a failing talent. Indeed, rejection by peers and funding agencies during such periods may be disastrous to the ultimate productivity resulting from a successful breakthrough in the project.

Hidden Productivity
Of course, there are often good reasons why researchers cannot appear to be constant producers. A lack of public pronouncement does not necessarily imply a lack of productive work; indeed, there is a considerable amount of research work that is highly productive but remains temporarily hidden from the wider research and general communities.

When researchers are preparing the ground for a particular project, for example, there is a period of working through the existing literature, establishing information systems and designing experimental methods. These are all essential preparatory activities which are creative and productive. As is the building of working relationships with colleagues in the research team and generally becoming attuned to the balance between personal initiative and collective wisdom. These preliminaries rarely produce publication, except in the rare case of post-hoc reporting of the sociology of the research event. However, there is often a wide array of internal working and discussion papers produced that add to the ultimate bank of publications flowing from the project.

From time to time, there is also a need to shield partially validated, sensitive or confidential research from pronouncement to the academic and wider communities. It may be more important to engage with intensive, but private dialogue and circulation before establishing an appropriate basis for more public communication.

Age and Productivity
Among the most prevalent misconceptions in the university research community is the supposed connection between the advancing age of the researcher and decline in personal research productivity.

Lehman's proposition that researchers and other people who are creatively productive, reach a peak of achievement at around 35-40 years of age seems to have become part of the mythology of research management.[3] Despite refutations of Lehman's work by Butler, Stern and Knorr et al (1969 p. 61) the image of the young researcher as the fountainhead of productivity is hard to break.[4] Indeed, a research generation ago Pelz and Andrews indicated that productivity and creativity typically peak twice in the career of professional researchers.[5] The first peak occurs at 35-40 years, supprting Lehman's analysis, then another peak later, at 50-60 years of age. It is the perceived trough in research productivity at mid-40 years of age that is critical.

For the university to embrace research priorities and funding policies which, directly or indirectly, tell older colleagues that it is all downhill after 40 years of age, is an effective means of predetermining their decline. Sudden fund chopping and other seemingly arbitrary decision-making affecting the trough age group of the mid 40s, produces the caution and lack of confidence sometimes associated with older researchers. The university needs policies that are sensitive to the vast potential of maturity: helping mid-career researchers to revitalise themselves; having faith and patience in older colleagues, encouraging them to speak out, to speculate and to offer perspectival views to younger colleagues.

Research Modes and Productivity
Productivity also varies with the mode of research involved; the split between pure or fundamental research and problem or mission-oriented research being critical. Problem-oriented research is usually characterised by a careful delimitation of objectives to suit the resources available; it is usually short term, targetted and pragmatic. Objectives set within research contracts by funding organisations and sponsors who work on the basis of short term targets, provide a strong imperative for systematic and frequent productivity in this research mode.

On the other hand, however, pure research tends to be longer term, operationally, with high levels of speculation, and consequent high risk of failure; it is theoretical, even ethereal, often cross-disciplinary and tends to expand beyond its funding base. The pure research mode may not be highly productive but it always holds the potential for the kind of profound shifts and developments in knowledge that are of great cultural value in the longer term; it may also spin off problem-oriented research products with more immediate social utility. It is reasonable, therefore, that researchers engaged in pure research work may resist calls to maximize productivity when such pressure runs counter to the very nature of their work.

Publication and Productivity in Research
Productivity in university research is usually measured by numbers of significant publications and occasionally by citation rates. Whilst there is no doubt that research is about the creation and communication of new knowledge and that publication is a key factor in this, there are important qualifications that need to be made about the value of publication rates as a relevant measure of productivity.

There are many excellent researchers who, in the course of their careers, who cannot point to a massive inventory of publications. They simply refuse to be drawn into the publish or perish syndrome currently prevalent in the academic world, believing in the adage that it is important to have something of significance to contribute before publishing. As Knorr et al indicate, multiple authorship, length of articles, failure to distinguish the highly original from the repetitious, reprinting and barefaced plagiarism are complicating factors in establishing the real level of productivity of researchers from their banks of publications.[6]

Whilst there is no disputing the value of genuine publication as a means of disseminating ideas, stimulating intra-disciplinary critique and dialectic and as a developing record of the knowledge base, is important not to overplay an image that high publication levels, productivity and the worth of the researcher are necessarily mutually interdependent.

The central argument here is that productivity levels in university research are variable. The complex weave of social structures, conceptual processes, diverse personal attributes and other characteristics of the research community discussed above produce an irregular series of peaks, plateaux and troughs in productivity that complicate its use as a gauge of the worth of particular researchers and projects.

The Pursuit of Excellence in Research
Whilst no one would seriously argue against the idea of encouraging excellence in university research, there are problems in deciding what comprises an excellent piece of research, in recognising it when it occurs and in providing an environment conducive to its occurrence. These are complex factors that deny simplistic expectations about performance in the university community.

In research, excellence is ascribed to an event of the highest quality — when qualities of mind and environment combine in a product of exemplary quality that surpasses its predecessors (though they may have contributed to its creation) and allows new perspectives and perceptions that ultimately lead to further theoretical development. Shedding further light on the idea of excellence requires an analytique beyond that of an intuitive and simply comparative nature. Where excellence is ascribed in the public domain, usually by peer group review of colleagues, referees, reviewers and critics, a more rigorous analysis is evident, hopefully.

Indeed, to say that a research event is excellent is to find in it, among other dimensions, great utility, great integrity and great beauty.

Utility and Excellence
The research event of great utility better explains the pattern of phenomena being investigated. It is powerful in prediction and is highly generative; it spins off as many questions as answers and it opens avenues for development and discovery that may have been unimagined previously. On a pragmatic level such an event may be directly and immediately useful within society or it may serve to remove conceptual or technical blocks to the creation of socially useful products.

Internal Integrity and Excellence
The research event of great integrity has a sense of entirety and close adherence to the precepts of its paradigmatic environment. It may even be so powerful as to forge its own paradigm. It must demonstrate great consistency with the conceptual structure, the perceptions and the methods of the paradigm. Delimitation is critical and clear distinction is made between those aspects of the phenomenon investigated that are to be included and those to be excluded, those assumed as given, constant and those designated dependent and independent. Integrity also depends on the quality of preinvestigation and hypothetical model construction, the accuracy and structural necessities of data bases and the depth and appropriateness of the analytical methods used. The coherence and consistency of inference and interpretation, pattern recognition and theoretical model construction are vital, together with the care and rigour of the validation procedures.

The Aesthetic and Excellence
The myth of an objective, value free, unemotional base to research has little to say about beauty; yet the literature of research and discovery is alive with reference to aesthetic preferences. Dirac's assertion that a mathematically beautiful theoretical explanation is more likely to prove correct than an ugly one,[7] and references to Einstein's suite of papers in 1905 as paralyzingly beautiful,[8] underline the day-to-day use of aesthetic terminology among researchers. Some prize elegance and economy wedded with simplicity, purity of form and compositional symmetry. Others see beauty in an obverse way — revering aesthetic complexity, indeterminancy, and compositional asymmetry.

Excellence and research mode
Even these somewhat crude attempts to define and explore the concept of excellence underline its complexity and variability. Just as productivity in research fluctuates with research mode, cognitive style and the social mores and world views of the researchers, so too the achievement of excellence fluctuates, especially with research mode and the changing balance between success and failure in research work.

Consider the difference between research events which are Medawarian increments — logical deve-

lopments aggregating in a particular field of knowledge, compared with other events which are more overarching and embrace wider theoretical development.[9] The Medawarian increments often follow a regular pattern of development and communication — they are available at regular intervals for evaluation. More expansive and speculative research events produce more infrequently, even unpredictably, and there may be long time intervals in which there is little to evaluate except a developing idea. The point here is that, in both research modes, excellence is possible. It may be seen in a build up of significant single events that meet predetermined deadlines, or it may be seen in the relatively infrequent leap-forward event.

The Role of Failure in Success

Success and excellence are never guaranteed in any research programme. Indeed, highly successful research events cannot be separated from the wider realm of investigation, in which, as Rescher asserts, unsuccessful events are regarded as an integral and vital part of the research venture; a continuum of success and failure.[10] Lord Russell argued that in science, at least, the researcher conceives something that might be true — then looks to see if it is, and generally finds that it isn't. However, the public documentation of research is dominated by reporting of the achievements only, whilst the ideas and investigations that were shelved or dropped along the way as being wrong, inconclusive or misleading are underemphasized.[11] Naess remonstrates with the editors of scientific journals for not adequately reporting the history of unsuccessful experimentation and conceptual research that often underlies an ultimately successful research event.[12]

What is missed here is that failure often creates an imperative for success. The agony of the struggle out of confusion and failure, towards understanding and success, so superbly represented in Plancks ... 'physics of despair' and Bohr's notion that 'truth lies in the abyss' underlines the intuition that success is somehow more profound when it triumphs over adversity.

Failure then, is often a precondition of success and its significance must be integrated with current attitudes to planning and funding of research in the university community. Researchers expect and receive support when success is close at hand; but may need it more when success seems far off. The university community that can offer this broad band of support requires policy makers and administrators who possess the vision and the faith necessary to understand the potential of the highs and lows in the life of all its researchers. Expectations of excellence must be qualified by sensitivity to the natural and significant variation in type, profoundity, degree of difficulty and frequency of occurrence of research events in that community.

Conclusion

Arguing for the view of the university as a learning community, and for a contextural attitude to the pursuit of productivity and excellence in its research, touches on the complex ecology that is the modern university. The most strongly made point in support of a contextual view is the realisation that any research event is a product of the intersection of the personal, social and professional realms of the individual researcher and the sense of collective responsibility throughout the institution.

The complexity of the research realm penetrates deeply into the university. The multiplicity of roles, with theorem and hypothesis producers, social argument producers and the plethora of auxillary and facilitative roles provides the mix necessary for an equally varied and complex research product.[14] As if this is not enough, the diversity of models of the research process and method evident within and between the disciplines of the university, adds another level of complexity. Weimer stresses that there is no single logic or algorithm for scientific discovery and that research processes are rarely smooth and sequential.[15] Even in research dominated by the rigours of scientific and taxonomic method progress is often stuttering, with asides, delays, mistakes, iterations and leaps of insight, that disturb any notions of flow from problem definition to discovery. La Tour found that, even in apparently straightforward and mechanical research experimentation there is ample evidence of a more turbulent intellectual environment than that suggested by formal reporting of the research work.[16] There are indeed chaotic, illogical, opportunistic and contextual forces at work in parallel with the rational ordering forces of research.

The diversity arising from these differences is, paradoxically, a source of unity for the university — a unity based on respect for, and identification with, the richness of the learning field that it provides, together with the potential for collaboration and critique between the various disciplines. Management of this diversity requires great sensitivity, adaptability and faith. Research managers must realize that, unlike the business organisation, the university research complex has a wide variety of units of production and its decision-making is devolved in almost autonomous groupings; individual growth and difference is encouraged, external direction is generally not well tolerated and self-regulation among its various groups, institutes and individuals is desirable — a different environment entirely to the normal hierarchical systems of public and private bureaucracies. It requires a different management strategy.

The integrity of the university research community is gauged by the degree to which researchers can feel self-expression and self-determination to be their natural due, wedded with their sense of the wider community from which extends the exchange, critique, facilitation and moral support so necessary for research performance. As Johnson asserts, the preconditions for excellence in any tertiary education institution revolve, naturally enough, around the academic staff — its self-image and its morale.[17] He cites the importance of a strong collective image, highly developed internal communication, freedom of expression, equality of status and an adequate resource base as fundamental pre-requisites. To this may be added the value of role interchange in research, tolerance of alternate academic viewpoints and the support of researchers during times of both high and low levels of achievement. If such a community is to be established, or re-established as the case may be, then university management must come to terms with the complexity of the organisation that it is managing, rejecting any downhill slide into the simplistic world of other public and private sector bureaucratic models. University management that is sensitive to the need for diversity, that encourages autonomy among its various researchers, than can communicate across the developing gap between itself and its researchers, and that encourages both central, established research projects and more peripheral, exploratory ones is desperately needed.

References

1. D.C. Pelz and F.M. Andrews, *Scientists in Organizations*, John Wiley and Sons, 1966, p. 155.
2. G. Hardin, *Nature and Man's Fate*, Mentor, New York, 1961, p. 295.
3. Lehman, *Age and Achievement*, Princeton University Press, 1953, p. 309.
4. See R.N. Butler, 'Creativity in Later Life' in S. Levin and R.J. Kahana (eds.), *Psychodynamic Studies on Aging*, International University Press, 1969, p. 37; N. Stern, 'Age and Achievement in Mathematics: A Case-study in the Sociology of Science', in *Social Studies in Science*, 8, 1, 1978, pp. 127-140; and K.D. Knorr, R. Millermeir, G. Aichholzer and G. Walker, 'Publications and Supervising Position', in F.M. Andrews, *Scientific Productivity*, Cambridge University Press, 1979, p. 61.
5. op. cit., p. 177.
6. op. cit., p. 59.
7. G. Holton, 'Finding Favour with the Angel or the Lord: Notes Towards the Psychobiographical Study of Scientific Genius', in Y. Elkanan, *The Interaction Between Science and Philosophy*, Humanities Press, New Jersey, 1974, p. 359.
8. J.R. Oppenheimer, 'Einstein's Presence', in B.M. Crook, *Science and Synthesis*, Unesco Publications, 1967, p. 11.
9. See R. Dubos, 'Future-oriented Science', in Jantsch (ed.), *Perspective of Planning*, OECD, Paris, 1969.
10. N. Rescher, *Scientific Progress*, Blackwell, Oxford, 1978, p. 109.
11. B. Russell, *Bertrand Russell Speaks His Mind*, Barker, London, 1960, p. 13.
12. A. Naess, *The Pluralist and Possibilist Aspects of the Scientific Enterprise*, Allan and Unwin, London, 1972, p. 88.
13. G. Holton, *The Scientific Imagination: Case Studies*, Cambridge University Press, 1978, p. 233.
14. Naess, op. cit., p. 37.
15. W.B. Weimer, *Notes on the Methodology of Scientific Research*, Laurence Erlbaum, New Jersey, 1979, p. 175.
16. B. La Tour, 'Is it Possible to Reconstruct the Research Process? Sociology of a Brain Peptide', in K.D. Knorr, R. Krohn and R. Whitely (eds.), *The Social Process of Scientific Investigation*, Sociology of the Sciences, Vol IV, Reidel, 1980, p. 70.
17. R. St.C. Johnson, 'The Case for Excellence in University Education', in P. Chippendale and R. Wilkes (eds.), *Excellence or Equality: Dilemmas for Policy and Planning in Australian Education*, Higher Education Policy Research and Evaluation Unit, Darling Downs Institute of Advanced Education, 1978, p. 159.