

Good ideas: the limiting factor in research

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**Library Research Week
1 August 2017**

Introductory comments

Heart of research is about the growth of **knowledge**.

As a researcher you are in the **knowledge business**.

Research-based knowledge is an attempt to search for the **truth** about something.

Special type of knowledge - **evidence** based. Different from unsubstantiated **opinion**.

Science is **evidence-based knowledge** (includes humanities).

We can have theories, hypotheses, questions etc., but for it to be 'scientific' it must be supported by evidence. That evidence is gained through research.

Difference between 'science' and 'non-science'

Scientific method exists partly to remove human 'brokenness' from knowledge generation – prejudice, culture bias, subjectivity, ethics etc. **To take knowledge beyond opinion** to something objective.

Put numbers to things - argue applies to almost all research.

Peer-review by specialists in one's field.

Becoming an academic or professional researcher

humanities, arts,
law, theology,
commerce

research ideas

students/researchers

recruitment
supervision
group meetings
journal clubs
student seminars

space
purchases
maintenance
inventory/asset records
collaboration -
special equipment

facilities/equipment

funding/grants

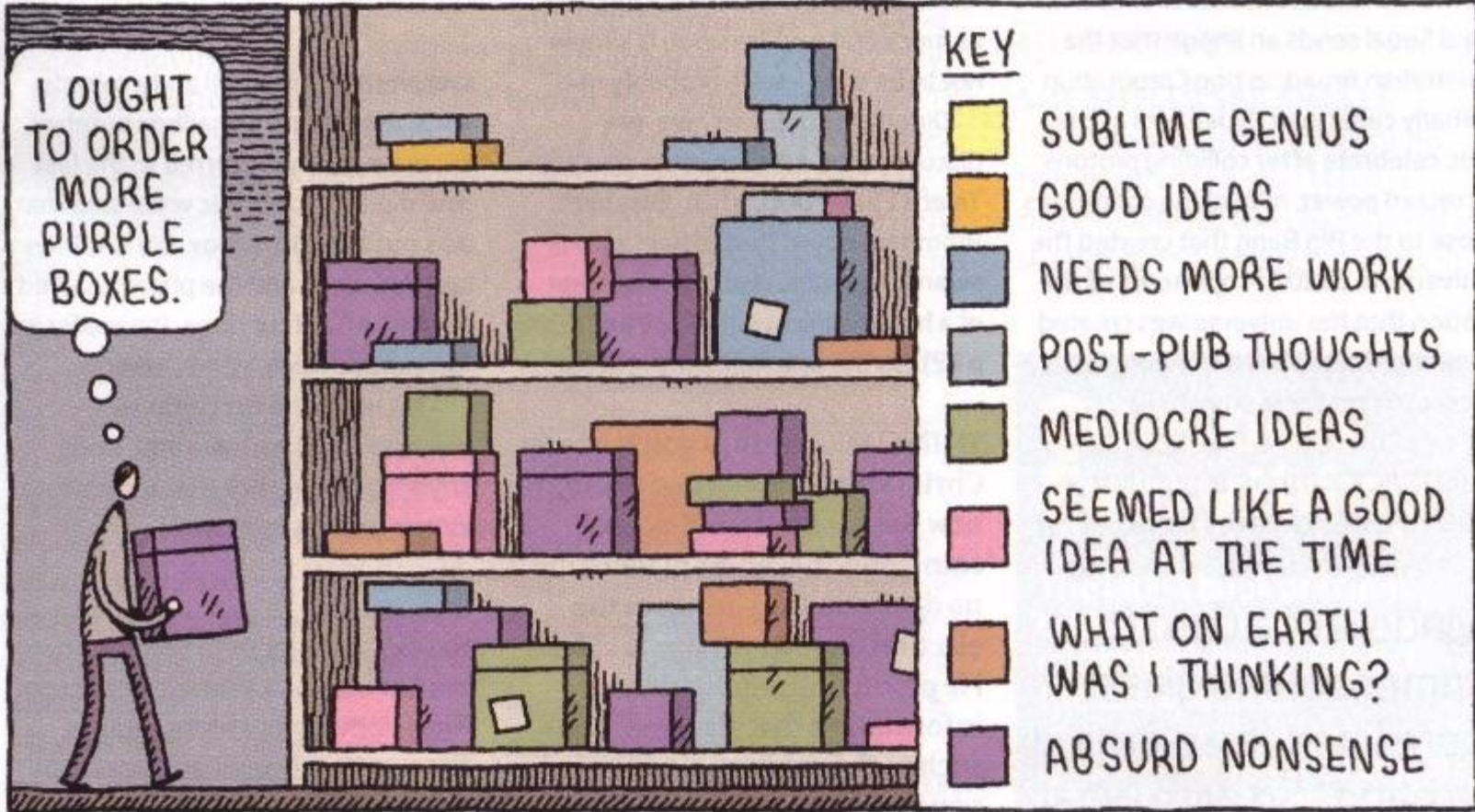
bursaries/running/travel
funding sources -state/company/international
grant writing
NRF-rating

Choice of a Research Topic (good ideas)

The most challenging part of a research career!!

Good original research ideas - very difficult to come by.*

THE PROFESSOR'S NOTES ARE CATALOGUED FOR FUTURE REFERENCE



Choice of a Research Topic

The most challenging part of a research career!!

Good original research ideas - very difficult to come by.*

Good ideas - attract funding; students; result in good publications; invitations to attend meetings, write reviews etc.

Good ideas can be academic (fundamental) or applied.

Finding good ideas

Activity: may need to simply begin with something. Own experience.

Read literature in and around the field, takes work. J. Club value.
Social sciences - read books, newspapers, get involved in society,
look for gaps in knowledge.

Attend national, international meetings, listen to lectures. Keep your
mind open, look for controversy.

Once going and established, things tend to come your way -
especially if some applied aspect but also fundamental (if respected).

Where to find a Research Topic?

PhD or post-doctoral experience - starting point.

Applied projects - local activity. Local problems and issues.

Own case where does my field interact with SA's major industry?

Number of low risk projects at low cost (mining, brewery, AECl, pharmaceutical manufacturer).

Mathematics - besides 'pure maths', financial industry, SKA, big data, AI and robotics, modelling (neural networks), coding, fluid flow, material stress, biomaths, etc.

Other suggestions/comments?

No good ideas (yet). Collaborate with or join a leading researcher.

Types of research (strategy)

Pick a topic and follow wherever it leads. Use literature, collaborators, networks to provide suitable techniques and approaches to address the next phase of research into the topic.

Specialize in a technique or set of techniques. Look for topics to which you can apply the techniques - people come to you for collaboration. Analytical (chemistry), statistical, instrumentation, programming.

Combination of both.

Need to be strategic with respect to publication, funding, students, facilities, timing of when to move into a new field or to retool. Attend new conferences.

Types of research (continued)

Good original theory based research - as said, difficult to come by.

Investigative research, not really original thought. What is the active ingredient in this plant, ozone layer depletion, clinical trials etc?
Why is violence increasing, what is the effect of poverty on society?
Involves gathering data, analyzing and reporting on it.

Comparative research. Someone found something in that river, what about this river, that society, what about this society etc. History.

Controversy research. Two or more opinions on something, gather evidence or data to support or refute one or the other.

Research into new technologies, drug delivery, logistics, teaching, quantum computing, biotechnology, space, effects of internet on humanity, transport, encryption of data?

Using a mentor

Specific to you, your circumstances, your research career.

This has been a significant part of my own career, not recognized at the time. Informal.

Now a widely recognized need, formal programs with funding etc.

Used throughout ones life in all areas. Living mentors or people who have passed-on through their writings, local or international. In field or out of field.

Difference between a mentor and the author of any book that you read?

Own experience of the influence of a mentor

Enthusiasm for research and experimental work was special. He could not mask it, it was infectious and highly motivating. We did not have lab meetings, visited people individually every day or at least twice a week.

Made sure that students received academic stimulation beyond their own project. 'Chatties' (I did it differently). As HOD, research weekends, national conferences. Why important? - Hons to MSc transition = from broader to narrower hence need for stimulation.

How to cope with reviews that were critical of one's work. Devastating for young person. Distinguish between comments and comments. Furthermore, do not fear good reviewers or good journals. They are your tutors. The best journals have the best reviewers.

Postdoctoral period - what you should be doing

Developing competence as a researcher. Typically working with a host, usually as part of a research program.

Focus should be primarily on yourself - upskilling, learning to be a self-initiator of ideas, to supervise, becoming an independent scientist - demonstrating research productivity - publications.

Acquiring new practical skills that you may need later - time constraints when an academic.

Possibly a limited amount of voluntary teaching with the aim of gaining experience. You are not allowed to be paid if you are getting a tax-free post-doctoral fellowship/scholarship.

Invest in yourself - intellectually, scholarship, leadership, being human.

Read, read, read, read - in your field and possibly periphery fields, become more deeply educated. (reverse the "PhD fraud")

Expose yourself to new ideas - attend talks, internet Ted talks, conferences, do a relevant on-line course or two.

May begin to review papers, grants, books, become involved with your discipline (locally - internationally) and life in general.

This may appear to be a self-centred way of living - it is needed. You are becoming an educator, a mentor and will pass it on.

Talk to yourself honestly - recognize your strengths and weaknesses.

Other things you should be doing

Forming your opinion on supervision style, how you like/do not like being treated, how to conduct research meetings, seminars, journal clubs, looking after equipment, research methodology, communication within a research group, social activities.

You will have received informal, if not formal, mentorship on: attitude to research, to students, ethics, etc. You could begin gaining exposure to some of the full suite of activities of being a career researcher - e.g. grant writing, equipment purchase/access, approach to international meetings, local conferences, response to reviewers comments, reviewing of papers and grants.

What you should not be doing.

Spending excessive time on something that does not develop you to become a more competent researcher.

You are not there primarily to provide a service to either the host or institution. You are not an employee. Strive for a win-win situation from which both your host and you benefit.

Spend too much time and effort on something that you will not be able to publish in some significant form.

Teaching and marking under duress such that it detracts from your research development.

Concluding remarks

There are some things we cannot do for each other - do for oneself.

Choice of a career (or life's mission) - one of these.

Stimulate personal self reflection.

Lot of noise in life - learn to cut through the noise to heart of the matter.

Attempt to do this with research as a career.

Why do...

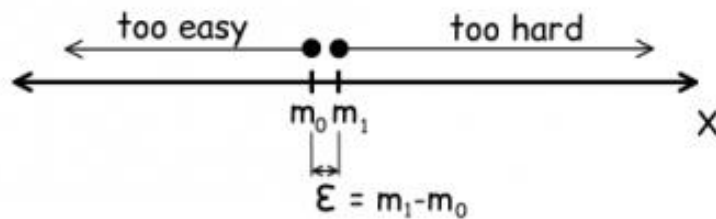
post-grads have supervisors?

Let X denote the set of possible tasks arranged by difficulty.

All tasks easier than m_0 are too easy to be of academic worth.

All tasks harder than m_1 are too hard to be solved by a post-grad.

All valid dissertation projects lie in between.



ϵ is very small, it takes decades in a field to determine.

Guidance

supervisors have post-grads?

You appear to be assuming ϵ is positive.



Entertainment

Charles Bradshaw

Thank you/Dankie/Enkosi