

Taking a PhD in AI

empirical notes

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who am I?

- PhD, 1995 in behaviour based robotics - UNL
- 2 PhD students advised (1 waiting for exam)
 - 3 PhD students in progress
- 11 MSc students advised
 - 2 MSc students in progress
- organiser of the two PhD in informatics seminars of UNL, in 1999 and 2000
- currently coordinator of the PhD program in informatics at UL

PhD in AI – talk overview

- PhD in general
 - the student's point of view
 - the supervisor's point of view
- PhD in AI
 - institutional environment
 - the thesis

the student's side



It all depends on the advisor

the advisor's side

that's student's work



a compromise ?

- **Yes**

(the politically correct answer)

- depends on the advisor
- depends on the student
- depends on the institution
- depends on the context
- ...

bottom line

- committing to one single cause

student's motivation

motivated type



mathematical formulation

- “Newton's” 2nd law of graduation

$$age_{PhD} = \frac{flexibility}{motivation}$$

- *the age of a doctoral process is directly proportional to the flexibility given by the advisor and inversely proportional to the student's motivation*

singularity at $m=0$

the other 2 laws (for completeness sake)

- 1st
 - *a PhD student in procrastination tends to stay in procrastination unless an external force is applied to it*

- 3rd
 - *for every action towards PhD there is an equal and opposite distraction*

student's helpers

1.work discipline

- regular working periods
- plus some extras, when needed
- self-control time **really** dedicated to research

2.accept criticism

3.research bibliography

- **a lot!**

4.use advisor as such

student's dismay

- it has been done before
 - helper 3
- lack of ideas
 - helpers 1 and 3
- paper rejection
 - helpers 2 and 4
- is it enough?
 - helper 4

advisor's role

- form student
 - searching & reading refs.
 - conducting research – ask the important questions
 - reviewer activity
- advise
 - help to establish milestones & deadlines
 - support when needed
 - pressure when needed
 - hold back when needed

advisor's helpers

- keep contact
 - meetings (weekly), e-mail
 - quickly answer requests
- maintain a group
 - progress meetings
 - journal club
 - news
- promote external contacts

what is an AI thesis?

- original work
 - capable of synthesising into a journal paper in the end of the PhD work or after

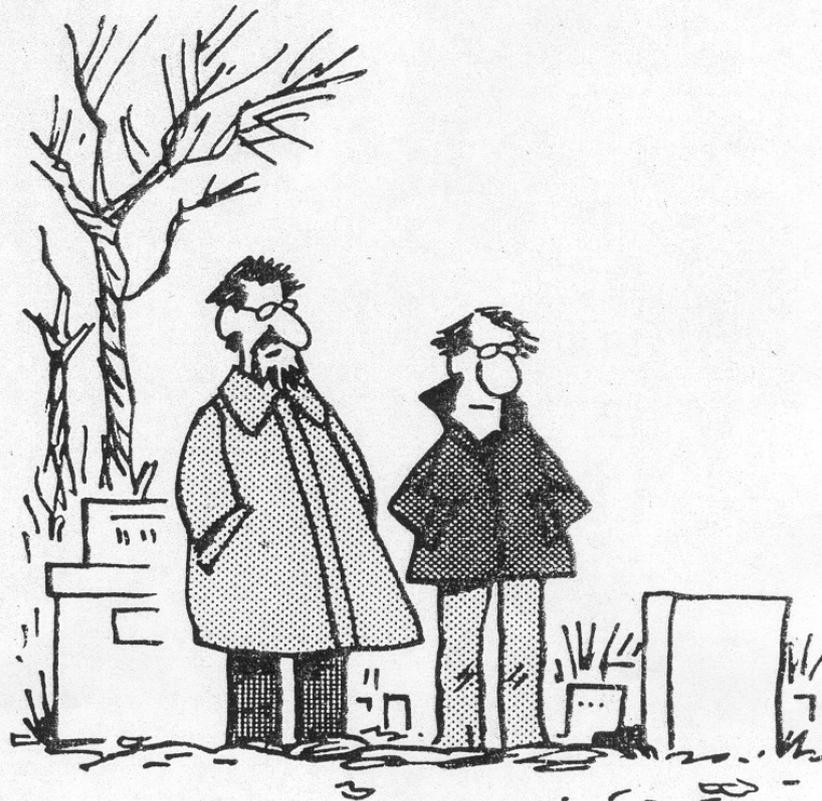
in the meantime...

→ publish ideas in workshops

→ publish intermediate results in conferences

publish or... perish

Berry's World



Jim Berry

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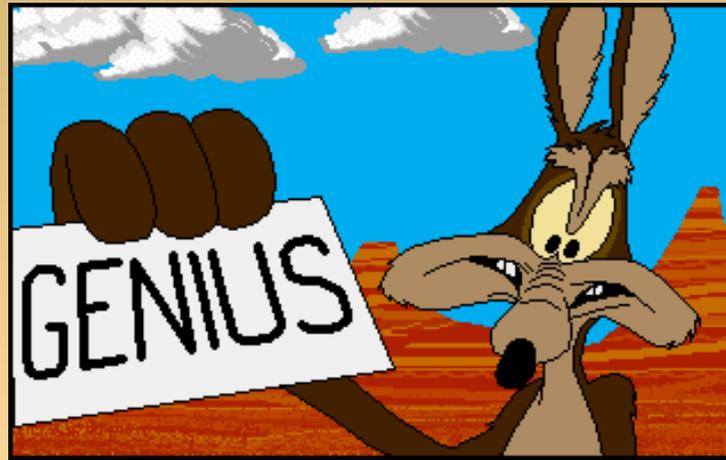
"He didn't publish, so he perished."

PhD in AI

- AI is a scientific area
 - requires scientific approach

problem
hypothesis
validation

how to succeed?



genius is

1% inspiration and

99% perspiration

Thomas Edison

institutional integration

- AI is not a core subject in computer science
 - in some institutions is regarded as **marginal**
 - *fundamentalists* may look down on it
 - good support from the group is important

AI vs. CS et al.

- AI has invaded some research in CS and other domains
 - A* vs. Dijkstra's algorithm
 - optimization and decision vs. Operations Research

inside AI

- hélas! *fundamentalism* exists also in AI
 - areas new to AI took time to get accepted
 - GOFAI acronym may have helped...
 - may not be blocking but increases difficulties

institutional helpers I

- maintain a PhD program
 - similar requirements for all areas
 - AI being one of them
 - tends to smooth things
- PhD students' seminars
 - students presence mandatory
 - significant faculty presence
 - promote discussion

institutional helpers II

- yearly open progress evaluation
 - by faculty
- with specific recommendations
 - for students
- assessment of advisor's activity
 - low requirements (publications)?
 - long duration of PhDs?
 - restrictions in case of bad results

institutional helpers III

- advisory committee
 - to approve PhD proposal
 - to follow an advise at least on a yearly basis
- committee assessment
 - thesis should list the committee members
 - public responsibility towards community

AI work

- theoretical – mathematics, natural sciences
 - prove some new theoretical results
 - produce a new model / theory (tested with data)
- technique - engineering
 - new / improved / applied to new type of problems
 - results of its application better than previous

experiences supported by sound statistics

AI work – getting fishy...

- framework
 - combination of techniques (?)
 - more a subject of MSc thesis
- methodology
 - this is really fishy stuff...
 - are there others to compare?
 - does it provide an advancement in solving some problem?
 - how to measure?

student & advisor

- **student**

- search literature

- produce /explore ideas

- ask questions

- be bold

- be (very) proactive

- build usable prototypes

- if needed

- **advisor**

- suggest sources

- guide student exploring
his ideas

- avoid “work for the next
paper”

- in favour of continuous
solid work

research report

- write down all your research
 - in one single document – **research report**
 - it may become your PhD dissertation
 - even if not:
several papers will spin off from it

publishing - where?

- avoid scientific tourism
- publish in the really important conferences
 - IJCAI, AAAI, ECAI, or more specific ones, ICANN,...
 - it's harder, but better return/€
- publish in EPIA
 - and other specific Portuguese conferences
 - it's important to place yourself in the community

PhD student requirements

- must be able to carry independent in-depth research
 - critical analysis capability
 - look for additional refs.
 - contact other researchers
 - **& motivation**
- in the absence of these, should not continue with PhD



bad modelling happens...



the true (motivated) PhD student

- defends his work!
 - because he has built it in a solid way
 - knowing its limitations
- always tries to overcome hurdles!
 - a paper was rejected?
get your act together and then...
use reviews to improve your paper and resubmit it!

PhD in the end

- is hardly an historical break-through
 - Q-learning comes close in AI
- student should be a world class expert on his subject
- and he must be able to put his work in perspective

advisor's check-list

- can student be a good reviewer?
- can student supervise post-graduate students?
- would I like to have him as a colleague?
- would I like to have him as advisor?

- *break the mediocrity cycle:
mediocre PhD students will produce even more
mediocre PhD students*

Michael Athans

some references

- Alan Bundy – Univ. Edinburgh
<http://homepages.inf.ed.ac.uk/bundy/>
- Manuel Bloom
<http://www.cs.cmu.edu/~mblum/research/pdf/grad.html>
- How to do Research at the MIT AI Lab
<http://www.cs.indiana.edu/mit.research.how.to/mit.research.how.to.html>
- Michael Athans, Reflections on Doctoral Research, 2000, SPDDI, UNL

keep up the good work!