

# Twelve maxims and guides for doctoral researchers – ramblings of a computer scientist

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Maxim: Never over trust a maxim

# 1: Practice the art of asking research questions

Vale RD. The value of asking questions. *Molecular biology of the cell*. 2013 Mar 15;24(6):680-2.



[https://en.wikipedia.org/wiki/Marathon#/media/File:Berlin\\_marathon.jpg](https://en.wikipedia.org/wiki/Marathon#/media/File:Berlin_marathon.jpg)

“The man who asks a question is a fool for a minute, the man who does not ask is a fool for life.”

— Confucius

“It is easier to judge the mind of a man by his questions rather than his answers.”

—Pierre-Marc-Gaston de Lévis (1764–1830)



2. Know the limitations of your research

# Can science prove anything?

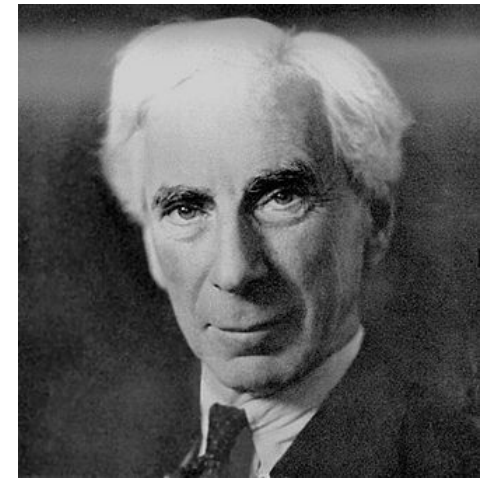
“No amount of experimentation can ever prove me right; a single experiment can prove me wrong.”

[Albert Einstein](#) (1923). "Geometry and Experience". *Sidelights on relativity*. Courier Dover Publications. p. 27. Reprinted by Dover (2010), [ISBN 978-0-486-24511-9](#).



# The inductivist Turkey

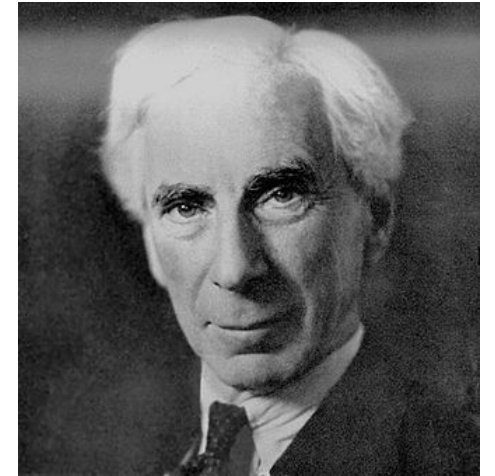
“The turkey found that, on his first morning at the turkey farm, he was fed at 9 a.m. Being a good inductivist turkey he did not jump to conclusions...



1872 - 1970

# The inductivist Turkey

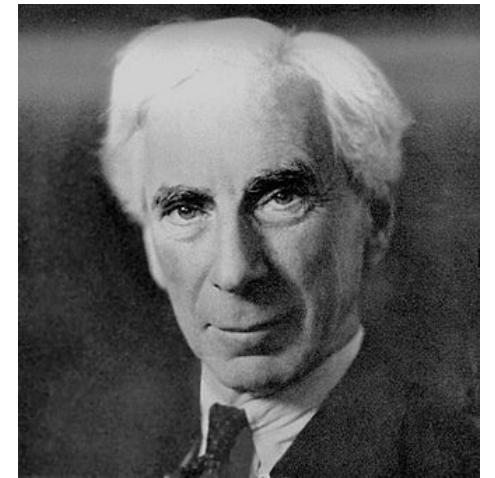
“... He waited until he collected a large number of observations that he was fed at 9 a.m. and made these observations under a wide range of circumstances, on Wednesdays, on Thursdays, on cold days, on warm days. Each day he added another observation statement to his list...”



1872 - 1970

# The inductivist Turkey

“...Finally he was satisfied that he had collected a number of observation statements to inductively infer that **“I am always fed at 9 a.m.** However on the morning of Christmas eve he was not fed but instead had his throat cut”



1872 - 1970

### 3. Understand bias in research



4. Know the landscape before  
deciding where to plant a tree

[https://en.wikipedia.org/wiki/Landscape#/media/File:Picea\\_glauca\\_taiga.jpg](https://en.wikipedia.org/wiki/Landscape#/media/File:Picea_glauca_taiga.jpg)



“Can’t see the wood for the trees”

– Someone in Bath, UK

5. Don't be afraid to be a polymath

“A Jack of all trades and a  
master of **none**”

Ben Franklin



“A Jack of all trades and a  
master of **one**”

Ben Franklin

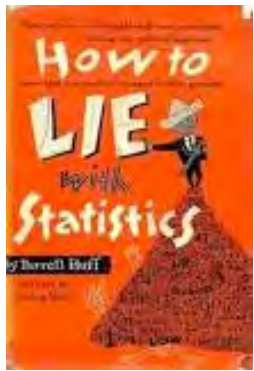
**T**

“If being a generalist was the path to mediocrity, why did the most comprehensive study of the most significant scientists in all of history uncover that 15 of the 20 were polymaths? Newton. Galileo. Aristotle. Kepler. Descartes. Huygens. Laplace. Faraday. Pasteur. Ptolemy. Hooke. Leibniz. Euler. Darwin. Maxwell — all polymaths.”

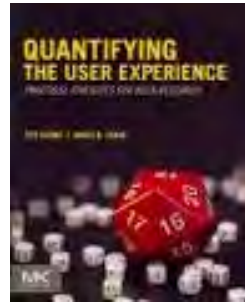
“The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.”

— Alvin Toffler

6. I hope you love learning – be a philomath



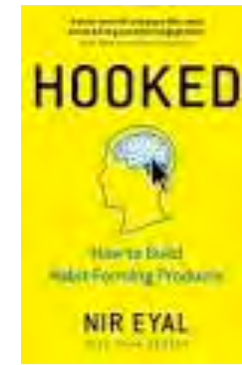
Statistics



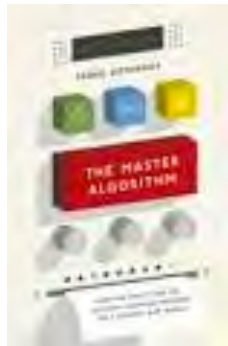
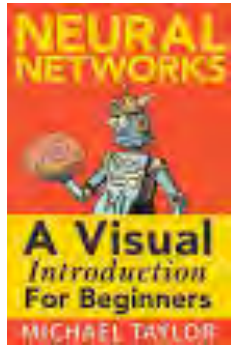
UX



People



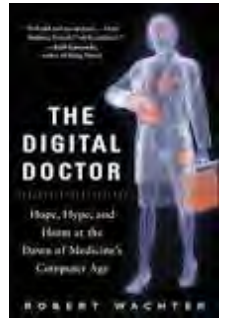
Cognitive science



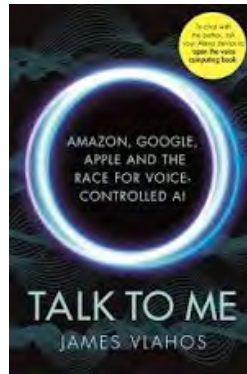
Machine learning



Computing



Digital Health



Chatbots



Philosophy of Science

7. Research something you are naturally interested in

It is a question  
worth answering

There are clear  
implications that would  
inform products, policy,  
tech, understanding etc.

You are excited  
about it

Your Ideal research

It is reasonably  
challenging to you

You have the ability



8. Everyone has something to teach you – but learn to spit out the bones

## 9. Benchmark yourself against yourself yesterday

*“Anyone who isn’t embarrassed of who they were last year probably isn’t learning enough”*

- Alain de Botton.

“Do what you can, with what you have, where you are.”

Theodore Roosevelt

10. Don't be too precious, work with others and share your ideas



11. Think for yourself - don't be afraid to define new concepts, neologisms and theories

12. Manage yourself for progress

“Perfection is the enemy of progress”

- Winston Churchill



Eisenhower matrix

	URGENT	NOT URGENT
IMPORTANT	<p><u>Quadrant I</u> <i>urgent and important</i> <b>DO</b></p>	<p><u>Quadrant II</u> <i>not urgent but important</i> <b>PLAN</b></p>
NOT IMPORTANT	<p><u>Quadrant III</u> <i>urgent but not important</i> <b>DELEGATE</b></p>	<p><u>Quadrant IV</u> <i>not urgent and not important</i> <b>ELIMINATE</b></p>

Learn how to be resilient

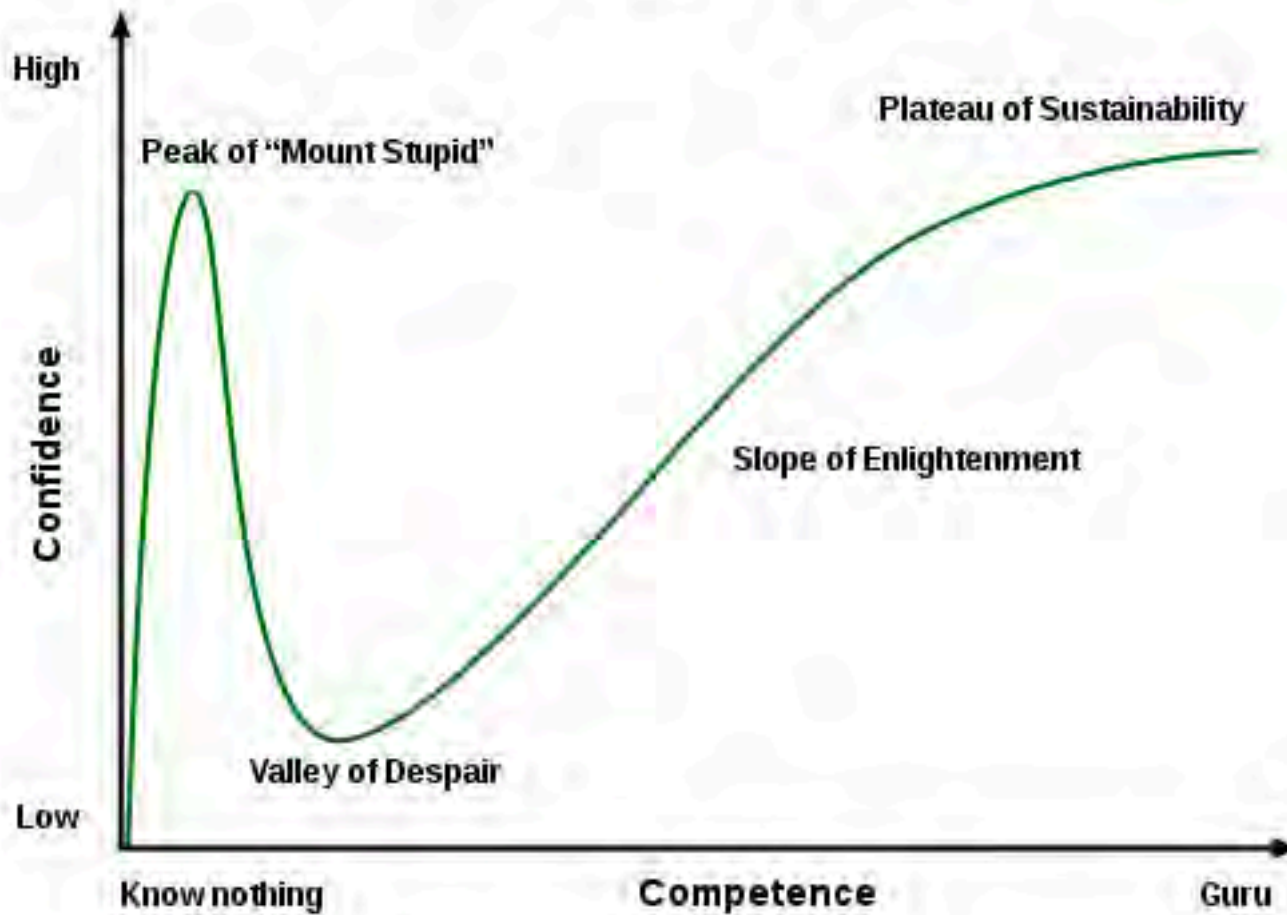
*“Any fool can ask a question that a wise man can’t answer”*

- anonymous

Be kind, bring positivity, stay humble and don't be stubborn... none of us know that much.

Oh... and beware of the Dunning-Kruger effect and imposter syndrome

## Dunning-Kruger Effect



[https://commons.wikimedia.org/wiki/File:Dunning%E2%80%93Kruger\\_Effect\\_01.svg](https://commons.wikimedia.org/wiki/File:Dunning%E2%80%93Kruger_Effect_01.svg)

# Maxims for doctoral students and researchers – or the ramblings of a computer scientist

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# Other things you all should do to be a good researcher

- Master a range of research methods and experimental designs
- Be competent in statistics
- Use your imagination
- Identify moments that fulfil you
- Co-author – life is about people
- Transend disciplines