Find Yourself
A Research Direction

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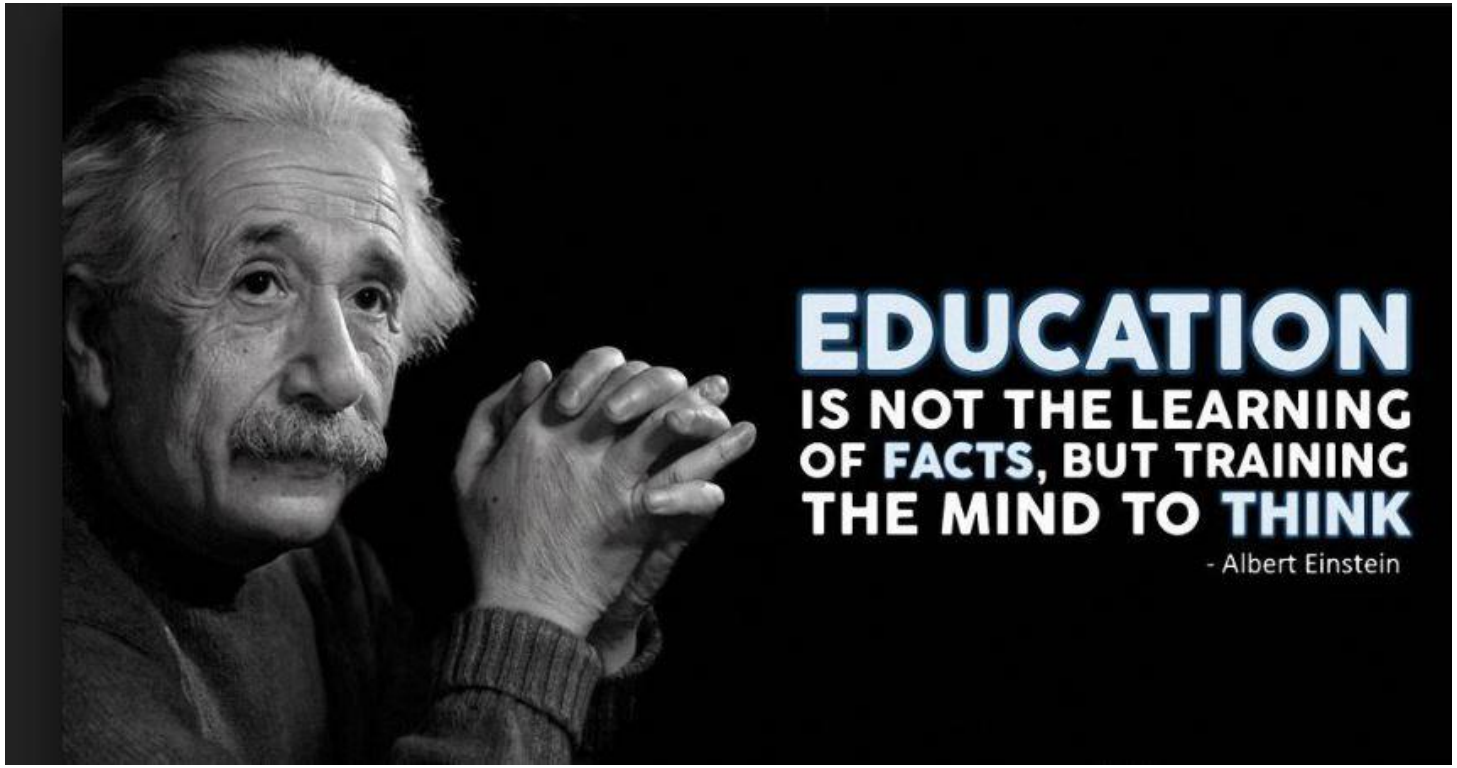


Q: To think about what?

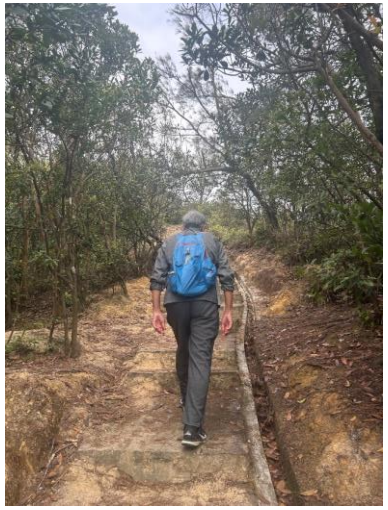
A: To think about finding
a research direction today

“A journey of a thousand miles begins with the first step”

— Lao Tzu（老子, 5th Century BC)

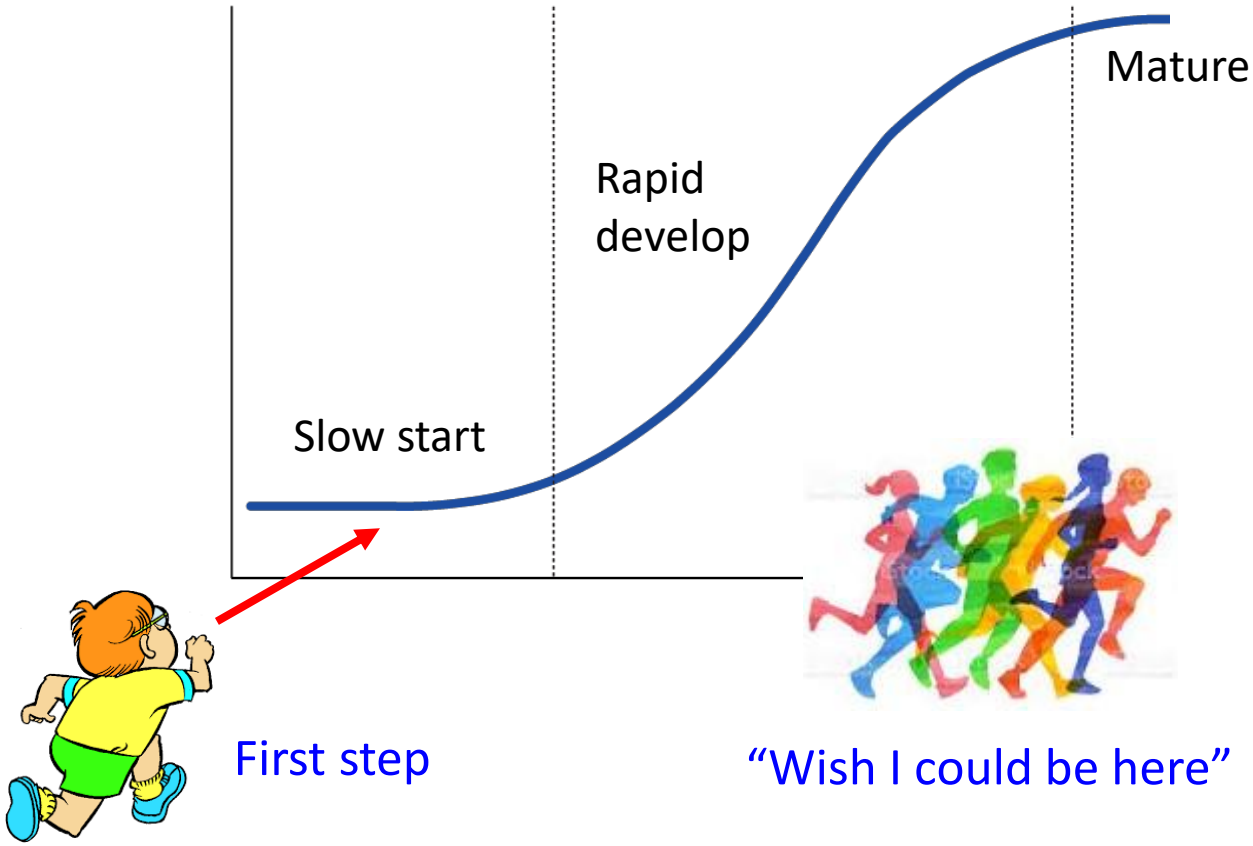
For a postgraduate student:

find a **research direction** to begin



Be patient at the start …

A typical 3-phase curve



Be confident about yourself

Examples:

Charles Hermite (1822-1901)

André-Marie Ampère (1775-1836)

Michael Faraday (1791-1867)

George Green (1793-1841)

James Joule (1818-1889)

Be confident about yourself

You can do it
if you believe you can

“Your success will be determined by your own confidence and fortitude.”

— Michelle Obama

A Great Scientific Achievement May Not Be Very Difficult

Isaac Newton (1642-1726) considered

light to be consisting of particles

Some Doubt by

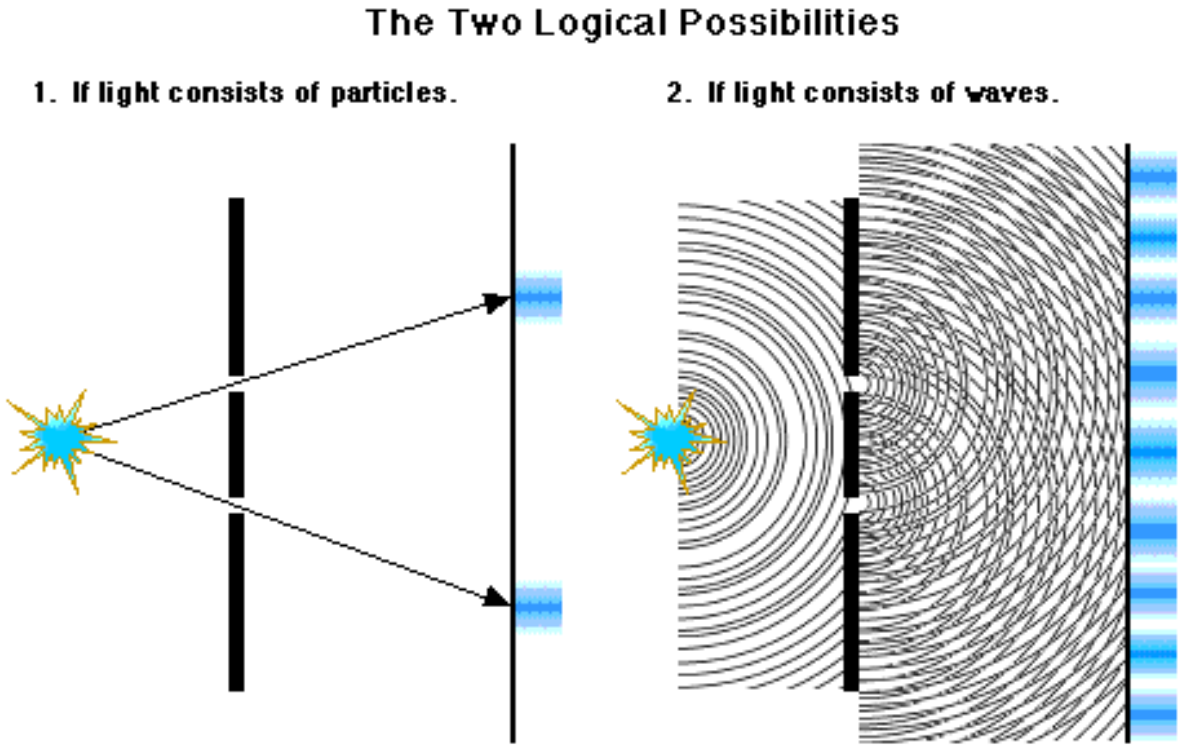
Christiaan Huygens (1629-1695)

Robert Hooke (1635-1703)

In 1801, the 28-year old Thomas Young (1773-1829) performed a now-famous Double-slit Experiment

T. Young, “Experiments and Calculations Relative to Physical Optics”

Thomas Young



A simple experiment demonstrated that light consists of waves

Always have a **strong desire** to do **new** research

Examples:

Literature — Novelist has strong desire to write new stories

Music — Composer has strong desire to write new songs

Painting — Artist has strong desire to pain new portraits

Be sensitive to
new ideas and emerging trends

Literature Review

– To know the state of the art and get inspirations

Especially recent publications of research papers, news reports, public science articles

Listening to Seminars and Visionary Talks

– If the topics interest you

Learn new developments within your scope

Be **realistic** to select and decide

Very often, you have
choices to select
a research topic

You need to decide
where to invest your
time and energy

A Few Things to Do

Think about your background and ability

Ask your advisor for suggestions

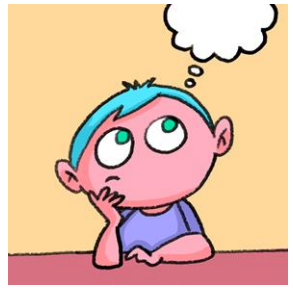
Discuss your plan with peers

Be persistent and determined

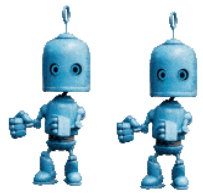
Words rarely are enough

Example is better than precept

How I Started Complex Networks Research

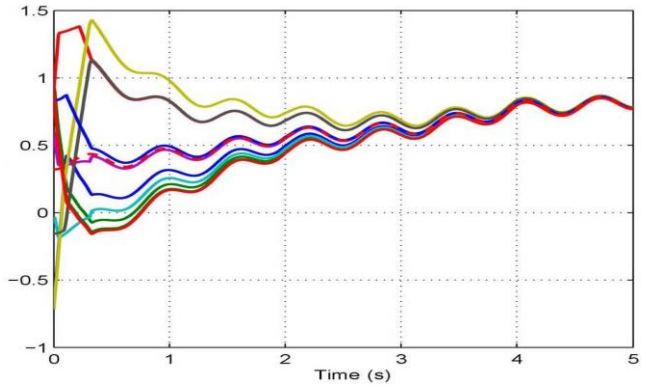


Once I was looking for a research direction



1990s: Synchronization of two oscillators

2000: Synchronization of many oscillators



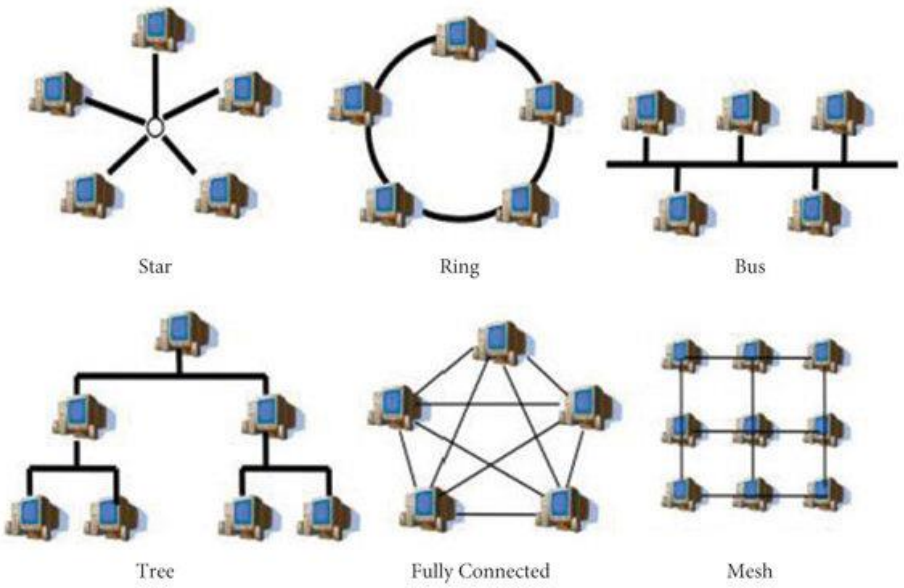
Thinking … When there are many oscillators, there is a connectivity issue: How are they coupled together?

This is a networking problem: What kind of networks?

Regular Networks:

tree (chain, star),
ring, lattice,
fully-connected,
……

More generally?



Literature Review

– To know the state of the art and get inspiration

Especially recent publications of research papers, news reports, public science articles

nature

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nature › letters › article

Letter | Published: 04 June 1998

Collective dynamics of 'small-world' networks

Small-World Networks

Duncan J. Watts & Steven H. Strogatz

Nature **393**, 440–442 (1998) | Cite this article

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REPORTS

Emergence of Scaling in Random Networks

Scale-Free Networks

ALBERT-LÁSZLÓ BARABÁSI AND RÉKA ALBERT Authors Info & Affiliations

SCIENCE · 15 Oct 1999 · Vol 286, Issue 5439 · pp. 509-512 · DOI: 10.1126/science.286.5439.509

Earliest Papers on Synchronization in Complex Networks

X. F. Wang and G. R. Chen, "Synchronization in small-world dynamical networks," Int. J. of Bifur. Chaos, 12(1): 187-192, Jan. 2002.

X. F. Wang and G. R. Chen, "Synchronization in scale-free dynamical networks: Robustness and fragility," IEEE Trans. on Circ. Syst.-I, 49(1), 54-62, Jan. 2002.

Opened Up a New Research Direction on Complex Networks in China

1st Chinese Conference on Complex Networks (2005)

……

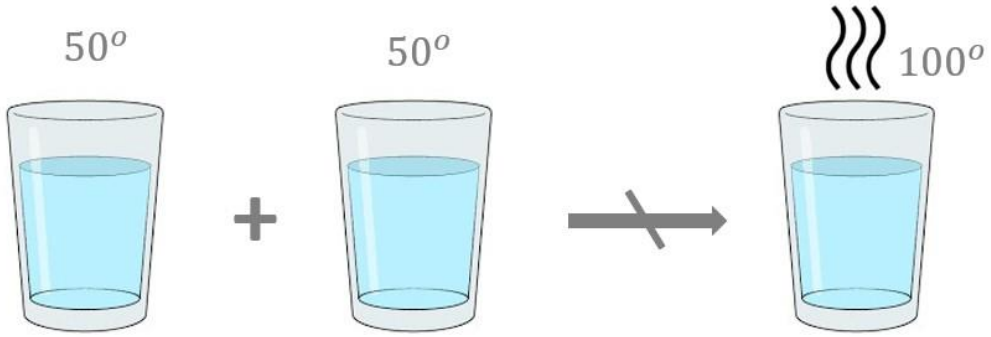
20th Chinese Conference on Complex Networks (2024)

“A good decision is based on knowledge, not on numbers.”

Plato (428-348 BC)

Plant a new tree, not simply trim the leaves

- Try to be innovative and creative
- Try to develop original work, not simply modified
- Try to do sustainable research, not just publishable



Quality, not just quantity

Wish You Good Luck !