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Being a researcher

The researcher's progress

Outline

- What does a typical progress through research look like?
 - as an (under)graduate student
 - as a PhD student
 - as a starting independent researcher
 - as a mature researcher
 - *multiple exit points: at any step, don't get trapped if you don't want. If you discover that research is not what suits you, leave without any sense of self-reproach or misdirection*
- Practical advices

Why should one try to do research?

- Quite uncommon to have aspire to research autonomously — society does not make it visible
- Other researchers must proactively proselytize
- Raising interest in research must be viewed as one the researchers' main tasks
- E.g., solicit undergraduate students' participation in summer research camps, research internship, ...
 - *having a taste of research may make one hungry*

Master thesis

- In many institutions/countries (typically, in Europe) you are admitted in the PhD program only after completing a Master program
- A Master thesis very often offers a chance to do research, although Master theses do not have necessarily the goal of going beyond the state of the art in a given area

Misleading preconceptions

- The scientist is this...
 - *many kinds: collectors, classifiers, compulsive tidiers-up; many are detectives by temperament and many are explorers: some are artists and others are artisans. There are post-scientists and philosopher scientists and even a few mystics. ...Obligative scientists must be very rare, and most people who are in fact scientists could easily have done something else instead.*

P.B Medawar, Advice to a young scientist

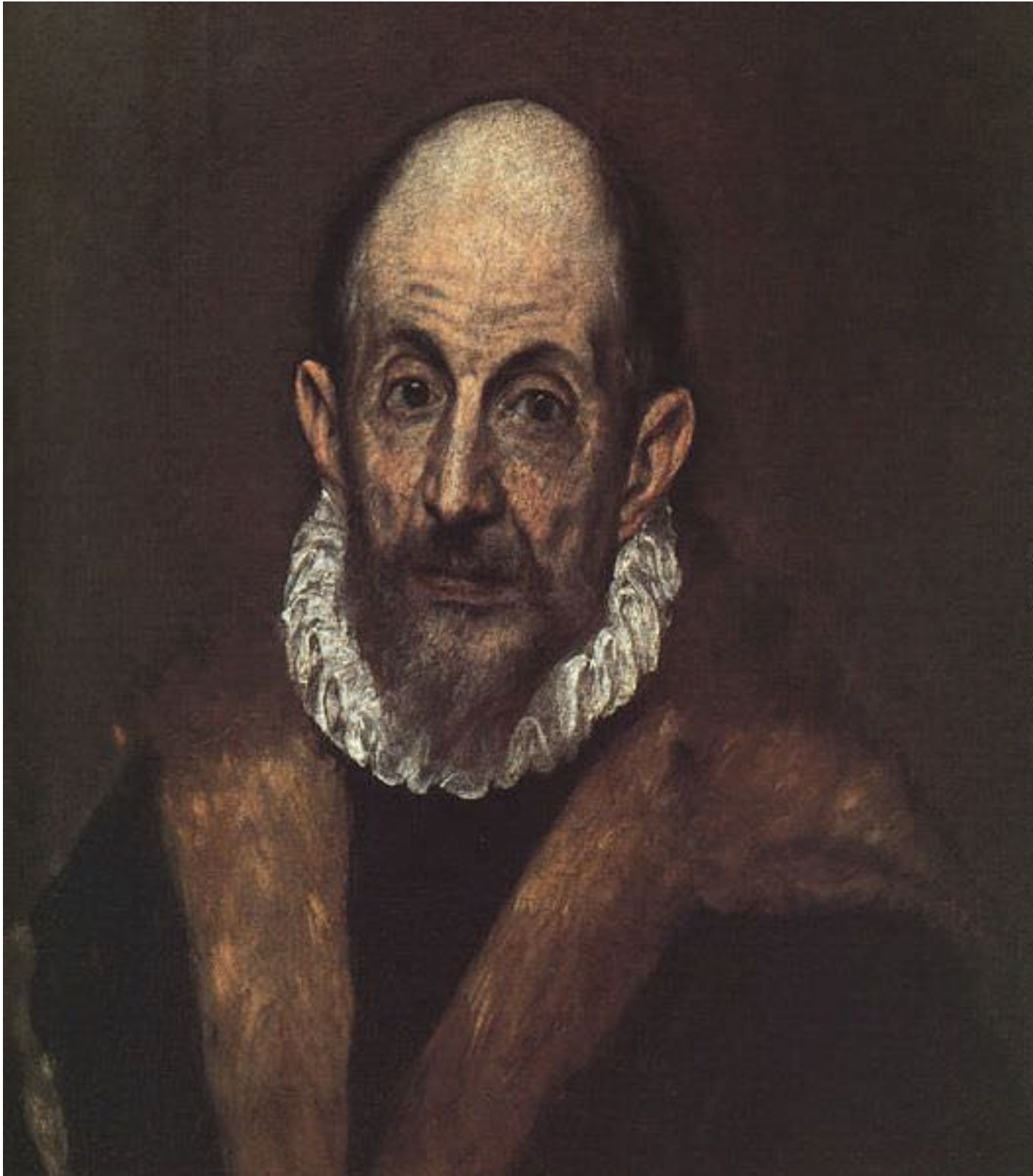
Misleading perceptions

- Don't be fooled by old-fashioned misinterpretations about scientific life (the mad scientist disconnected from reality)
- In reality, it is an exciting life, rather passionate, with very flexible time (although often very demanding and sometimes exhausting)
- You will have a lot of freedom, but this also asks for self-management and determination

Am I fit for scientific research?

- Is an excellent student with excellent grades a potential good researcher?
 - *this is often only a good indicator*
- Am I curious, attracted by non-trivial problem solving? Am I obsessed until I find a solution? Am I thinking about the problems, and hopefully have new ideas while taking the shower
- Do I master/am I attracted by abstract reasoning/rational argumentations?

The "El Greco" test



How can you explain what might be reason why his figures seem unnaturally tall and thin?

It has been argued that El Greco suffered from a defect of vision

Selecting a potential young researcher

- Creativity, ability to think out of the box
- Willingness to know more
- Attitude to abstract reasoning
- Attitude to "building", trying out ideas in practice
- Willingness to put hard work when necessary

PhD: the initial crucial choices

- Selection of the department, thesis advisor and topic
- Often the order is (1) department, (2) general topic and advisor, (3) refinement of topic, but you may choose first the person you wish to work with and then apply for admission in his/her department
- Attach yourself to a department doing work that has aroused your enthusiasm, admiration or respect; no good will come of merely going wherever you get an offer
- Look for departments where you will not put to work in complete isolation: isolation is disagreeable and bad
- Beware of fashion: look for reputable departments and for challenging topics

The thesis advisor

- Is the person who supervises your research, and perhaps the choice you make is even more important than the thesis topic
- Research has a large component of "learning by apprenticeship": a lot of informal knowledge both about the specific field and the research process in general will emerge in your relation with the advisor
- Personal interaction and good feeling with your advisor is key
- Advisors have different personalities and different styles

Typical issues

- How much direction/independence do you want? Some advisors will offer you well defined and thesis-size problems.
- How much contact do you want? Some advisors will meet with you often and regularly for progress reports.
- How much pressure do you want?
- How much personal/emotional support do you want?
- What kind of research group/environment does the advisor provide?
- Do you want to be part of a larger project?
- Do you want co-supervision?
- Is the advisor scientifically well connected and supporting you in networking?
- Is the advisor willing to fight the system for you, if necessary?

How to deal with them?

- Read group's research summaries, recent papers and look at past theses
- Talk to other PhD students, post-docs, and other members of the research group

Useful tips:

[https://homes.cs.washington.edu/~mernst/advice/
find-research-advisor.html](https://homes.cs.washington.edu/~mernst/advice/find-research-advisor.html)

During PhD

- Refine your critical thinking skills
- Refine your ability to work independently or on a team
- Increase your understanding of how to use research tools
- Refine your oral and written presentation skills
- Understand ethical issues
- Develop an autonomous approach to research
- Learn how to write and present
- Learn how to review
- Engage with your advisor if you feel that something does not work

The topic

- It should express your personal vision and it should be clearly understandable to the research community working in the area
- You must be passionate about your topic. Nothing good will come out of something that doesn't challenge you. In the end you will need to "defend" your work
- You must be able to break down your overall work into pieces that make sense and can be presented separately
- As you progress, keep a log of new ideas, potential further developments, and prioritize
 - interaction with your advisor fundamental here

The thesis

- Your thesis is the main outcome
- But before you write the thesis you have to do the work
- And the thesis in general puts together with a coherent story results that are published in the process
- Some institutions have more or less explicit expectations that X publications are produced before writing and defending your thesis
- In general, it takes 2 to 3 years to do a PhD thesis

What happens after your PhD?

Being a post-doc

- This is not just the state "after you get the PhD", but it has become a clearly identified stage/position
- It is common to spend a few years as a post-doc before looking for more permanent types of positions
- Post-docs are often hired by senior researchers (supervisors) who manage significantly large research groups as intermediaries between them and students
- A post-doc often has supervising tasks
- A post-doc learns how to advise students and publishes
- This gives him/her useful experience and enriches his/her CV

Relation with your supervisor

- Discuss with your supervisor what supervision and work schedule is good for you and for those you are supervising
- Discuss the topic and the agenda with the supervisor
- Report any problem and ask advice on supervision: your advisor is a source of past experience
- Keep systematic records of work, especially log ideas for future work
- Submit written material with enough time for the supervisor to read it, coordinate fine-grain activities with your supervised students
- Remember you are the main driver of the relation with the supervised students

Useful tips: How to apply for a post-graduate fellowship?

<https://homes.cs.washington.edu/~mernst/advice/fellowship.html>

What happens next?

Looking for a (permanent) position

- Common scheme in academia: from untenured (Assistant Professor) to tenured (Associate/Full Professor)
- You need to develop your independent growth
 - a teaching plan
 - a research plan, including a plan to get funding to support your research, and to become a supervisor of future researchers
- You need to continuously update your own research agenda and skill set
- Be connected: develop and nurture your connections with the research community

Useful tips: Writing a research statement

[https://homes.cs.washington.edu/~mernst/advice/
research-statement.html](https://homes.cs.washington.edu/~mernst/advice/research-statement.html)

Research funding

- You need to understand what are the funding opportunities and how to compete for them
- For example, in EU there are
 - national programs run by national research agencies
 - EU programs run by the EU Commission
- Research funding schemes may have different objectives and may require participating in larger (trans-national) consortia

Teaching

- Unless you will work in pure research organization, teaching will take a lot of your time
- You probably have done some teaching experience before, as a PhD student or a post-doc
- But here you will have full responsibility, and often you will need to conceive and develop new courses, possibly based on advances of research
- Teaching is strongly connected to research, and this is why research universities are so valuable in the modern society

Service

- As you move on, besides teaching and research, you will be spending a lot of time on service
- Service can be internal to your academic institution, from sitting on certain committees to chairing the department
- Service can also be related with research

Research-related service

- Peer review activities (journals, conferences, researchers, institutions)
- Editor service for journals
- Conference organization services
 - PC member
 - PC chair, General chair, ...
- Service in professional societies

Your tenure/probation case

- Understand exactly what you are expected to show when your probation case will come
- Prepare for it, building your portfolio (research, teaching, service), including a set of external reviewers who might support you

Useful tips:

Requesting a letter of recommendation

<https://homes.cs.washington.edu/~mernst/advice/request-recommendation.html>

Writing a letter of recommendation

<https://homes.cs.washington.edu/~mernst/advice/write-recommendation.html>

Moving on through evaluations and promotions

Summary

- Which are the main steps in a researcher's progress
- The role of evaluation throughout the progress