

From PhD Student to Full Professor: Lessons Learned in the Trenches

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Disclaimer

Me \neq You

\neq Me'

Overview

- **Research topics**
- **Hands-on vs. delegation**
- **Funding**
- **Teaching**
- **Time management**

Overview

- Research topics ←
- Hands-on vs. delegation
- Funding
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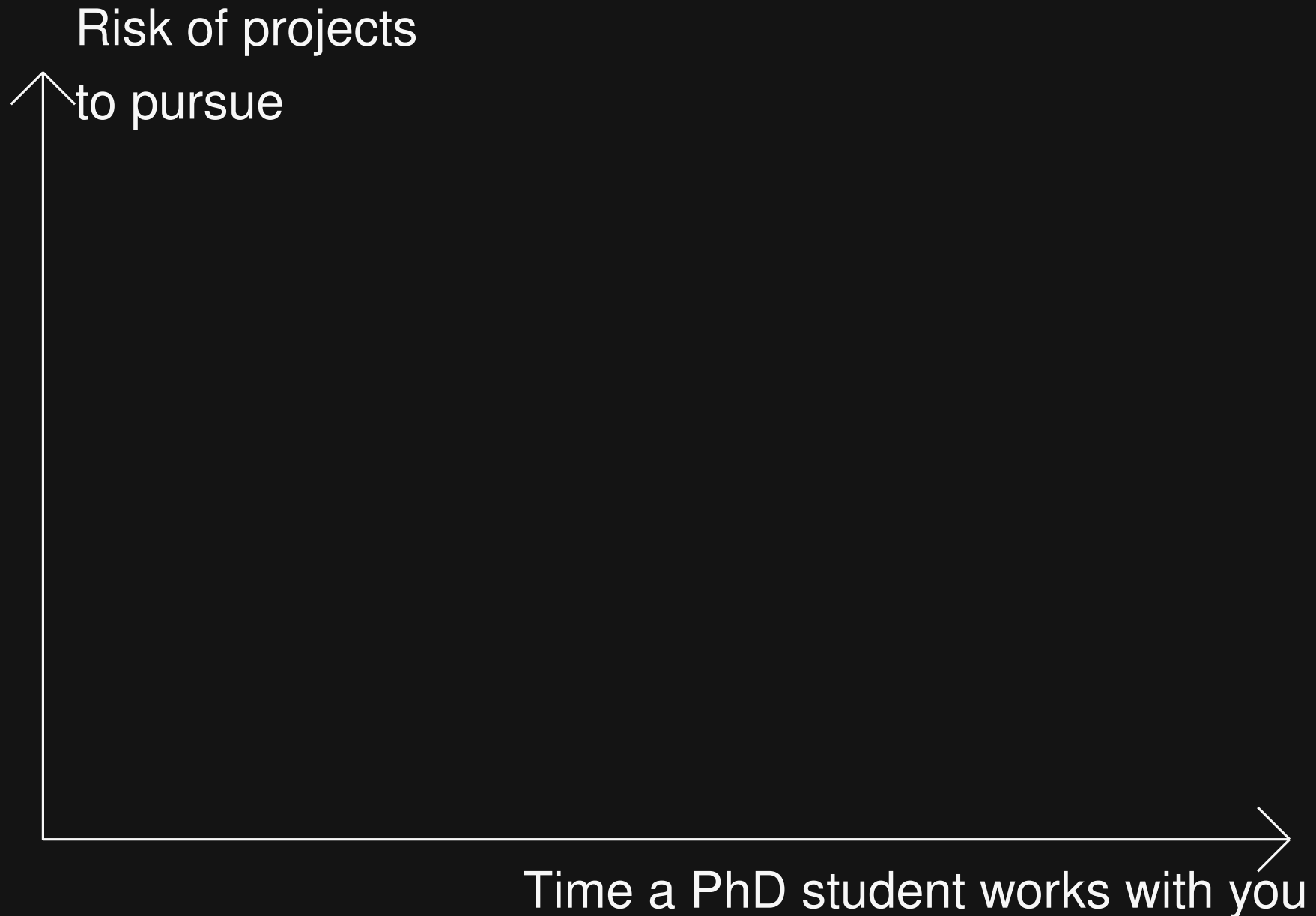
Research Topics

How to pick what to work on?

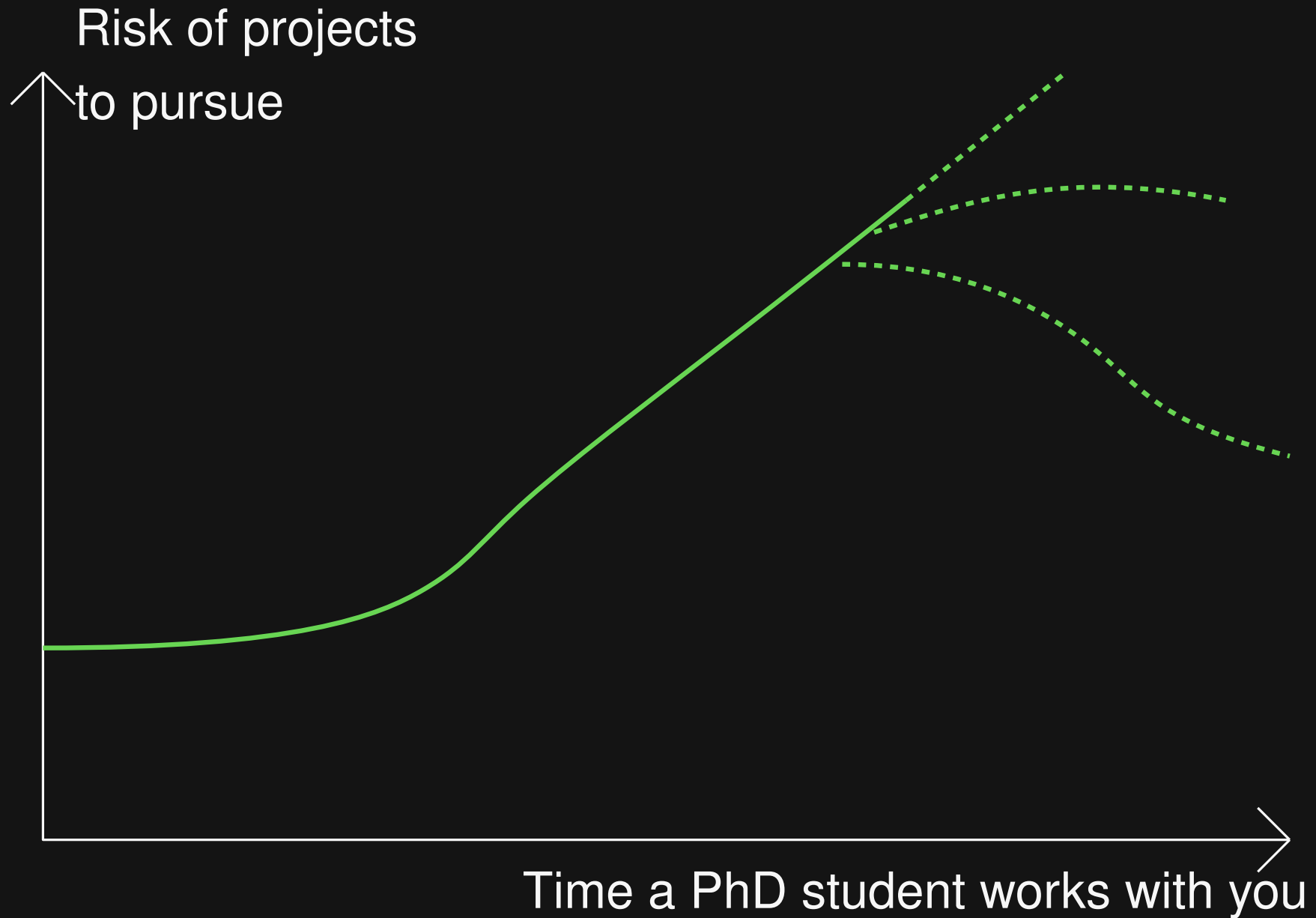
To consider:

- **Risk**
- **Impact**
- **Skills and abilities**

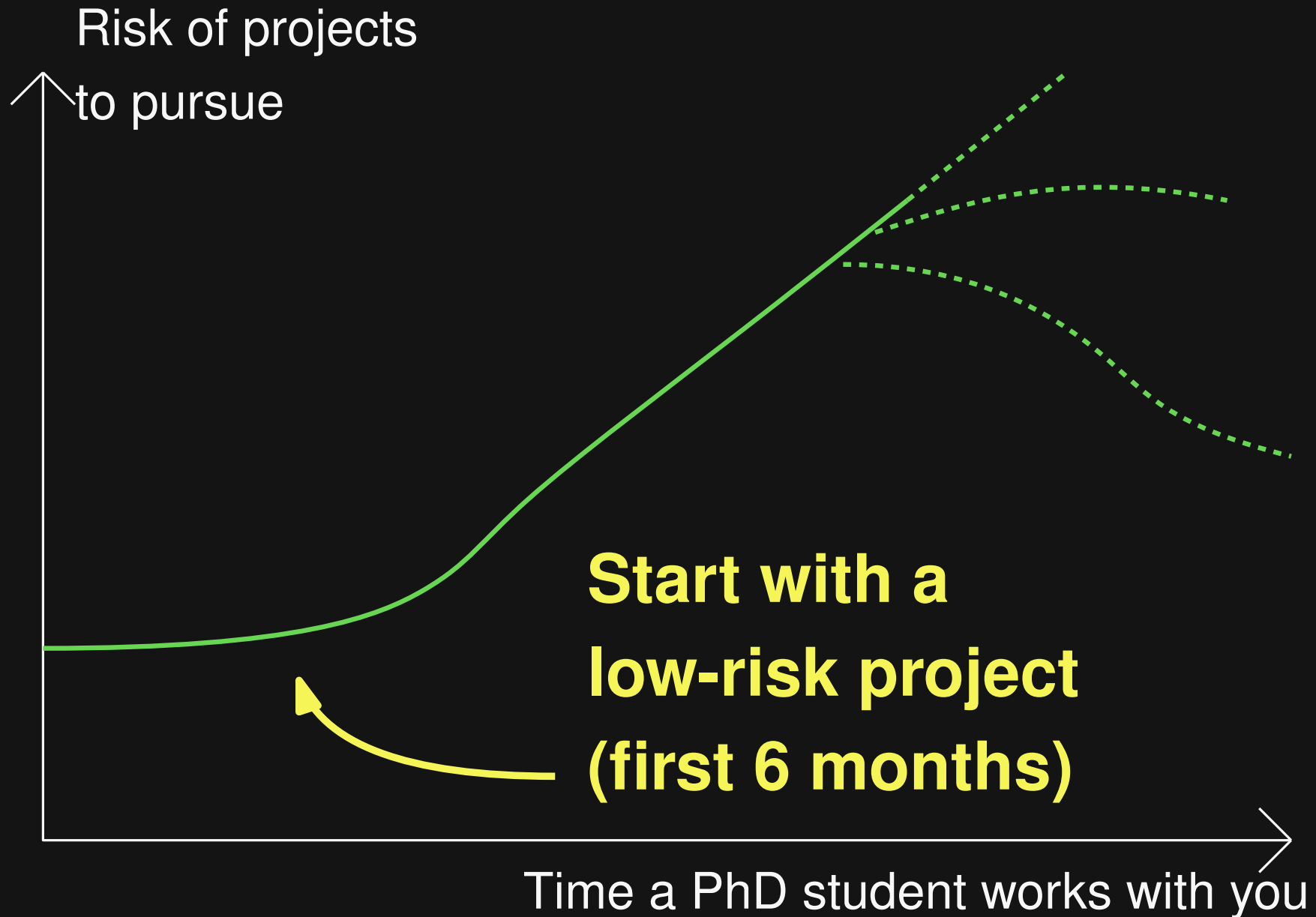
Risk of Projects



Risk of Projects



Risk of Projects



Risk of Projects

Performance Issues and Optimizations in JavaScript: An Empirical Study

ICSE'16

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ABSTRACT

As JavaScript is becoming increasingly popular, the performance of JavaScript programs is crucial to ensure the responsiveness and energy-efficiency of thousands of programs. Yet, little is known about performance issues that developers face in practice and they address these issues. This paper presents an empirical study of 98 fixed perfor-

forms poorly can cause users to perceive an application as unresponsive [34], which may encourage them to instead use a competitor's web site.

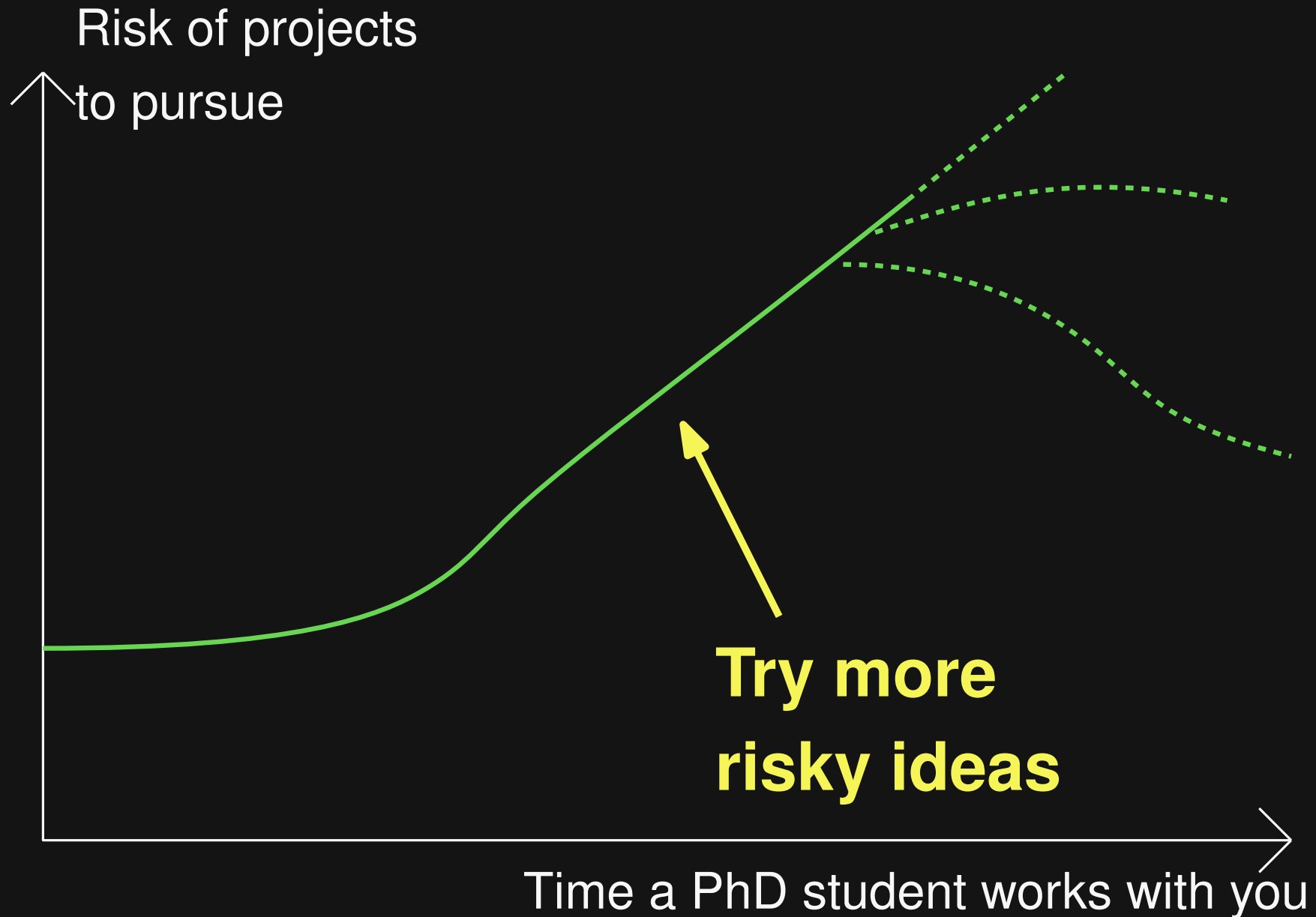
The use of the language has evolved from simple client-side scripts to complex programs, such as email clients, word processors, and interactive games. This development has been enabled by significant improvements of JavaScript's



**Start with a
low-risk project
(first 6 months)**

Time a PhD student works with you

Risk of Projects



Risk of Projects

NL2Type: Inferring JavaScript Function Types from Natural Language Information

ICSE'19

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Abstract—JavaScript is dynamically typed and hence lacks the type safety of statically typed languages, leading to suboptimal IDE support, difficult to understand APIs, and unexpected runtime behavior. Several gradual type systems have been proposed, e.g., Flow and TypeScript, but they rely on developers to annotate code with types. This paper presents NL2Type, a learning-based approach for predicting likely type signatures of JavaScript functions. The key idea is to exploit natural language information in source code, such as comments, function names, and parameter names, a rich source of knowledge that is typically ignored by type inference algorithms. We formulate the problem of

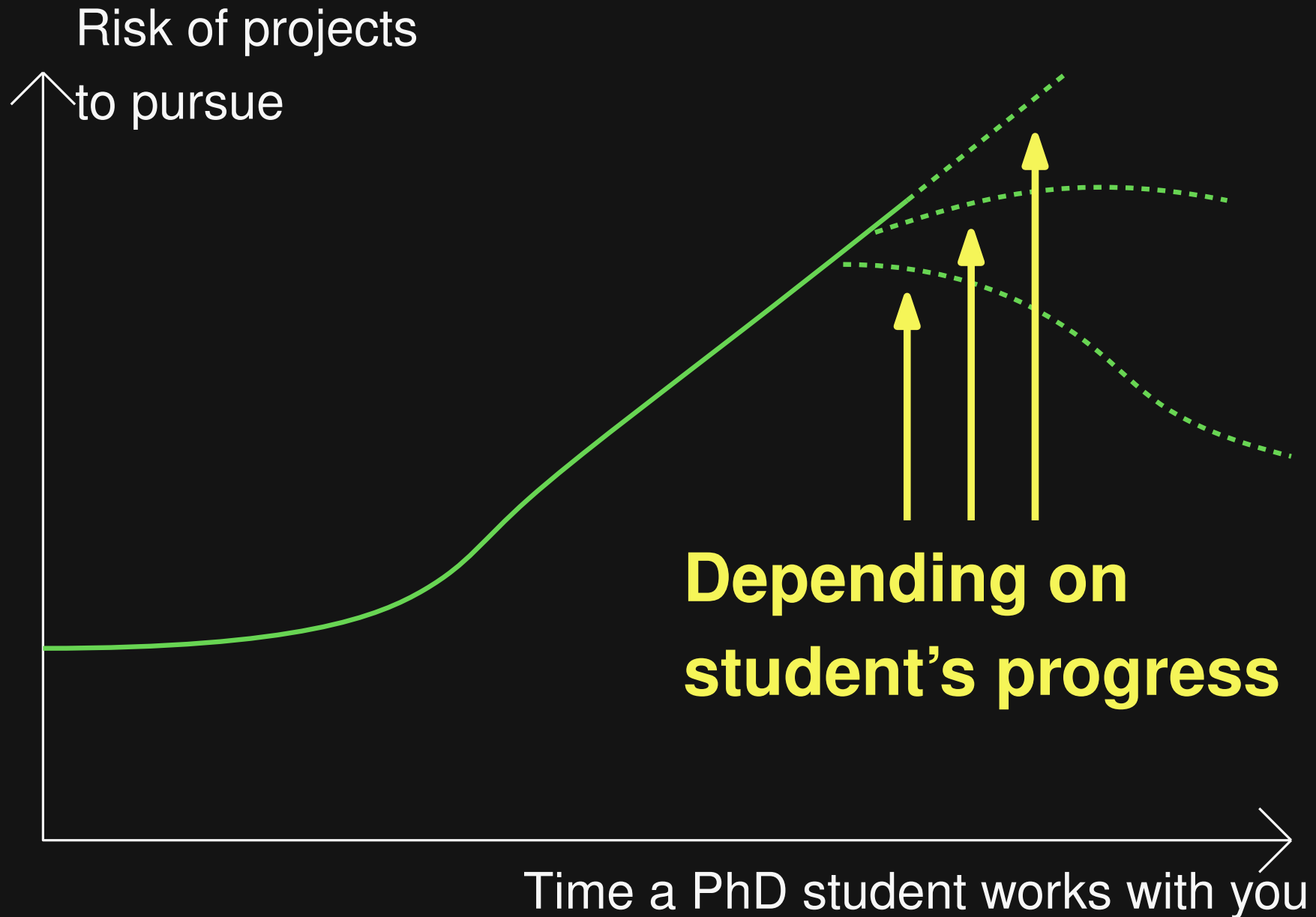
```
/** Calculates the area of a rectangle.
 * @param {number} length The length of the rectangle.
 * @param {number} breadth The breadth of the rectangle.
 * @returns {number} The area of the rectangle in meters.
 * May also be used for squares.
 */
getArea: function(length, breadth) {
  return length * breadth;
}
```

Fig. 1: Function with JSDoc annotations. The annotations include comments, parameter types, and the return type.

Try more
risky ideas

Time a PhD student works with you

Risk of Projects



“Old” vs. New Topics

When to diverge from your “usual” line(s) of work?



Be Selective

- **Earlier me:**

Have a cool idea? Let's get started!

Be Selective

- **Earlier me:**

Have a cool idea? Let's get started!

- **Current me:** Keep iterating over ideas until a really promising one found

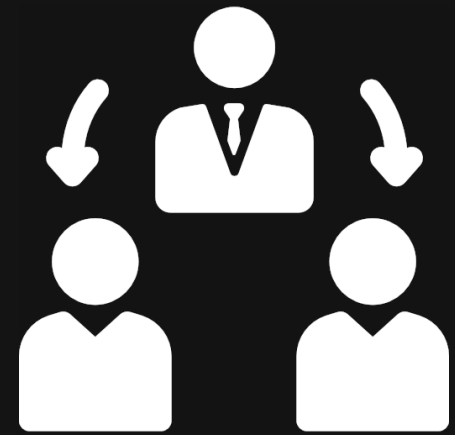
- Write short project proposal (2-3 pages)
- Try it on realistic examples
- Estimate risk, impact, feasibility
- Discard 9 out of 10 ideas

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Hands-on vs. Delegation

Where do **you** want to be?



Hands-on vs. Delegation

■ Research

- Stay **directly involved** in at least **some projects**
- Write code, perform experiments

■ Everything else

- **Learn to delegate**
- Especially administrative tasks

Example: DeepBugs

4th year assistant professor:
Toy project on deep learning
for code analysis

Paper at OOPSLA'18

Basis for 1.5M Euro ERC **grant**

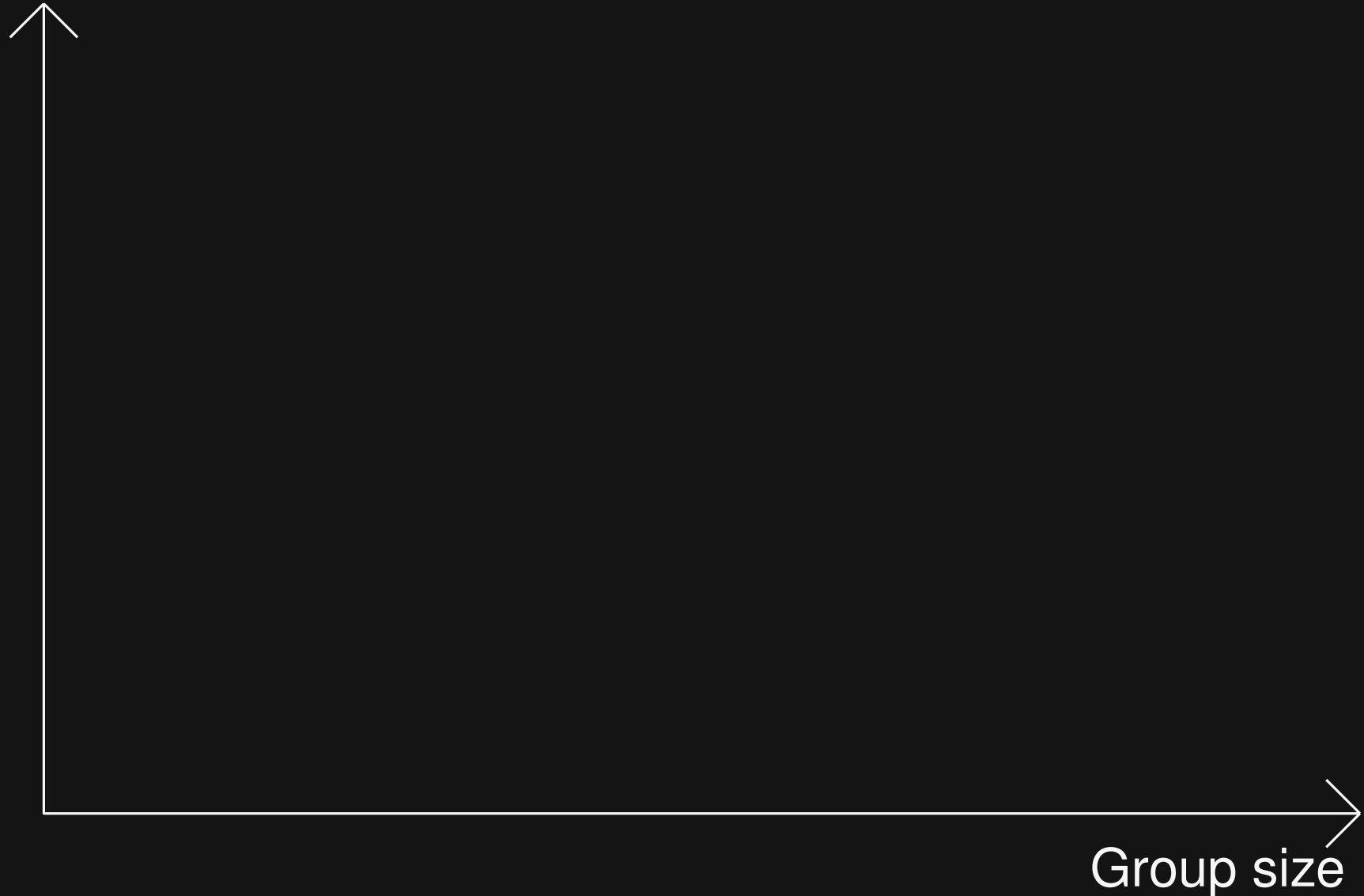
Now: My **second-most cited** paper

time



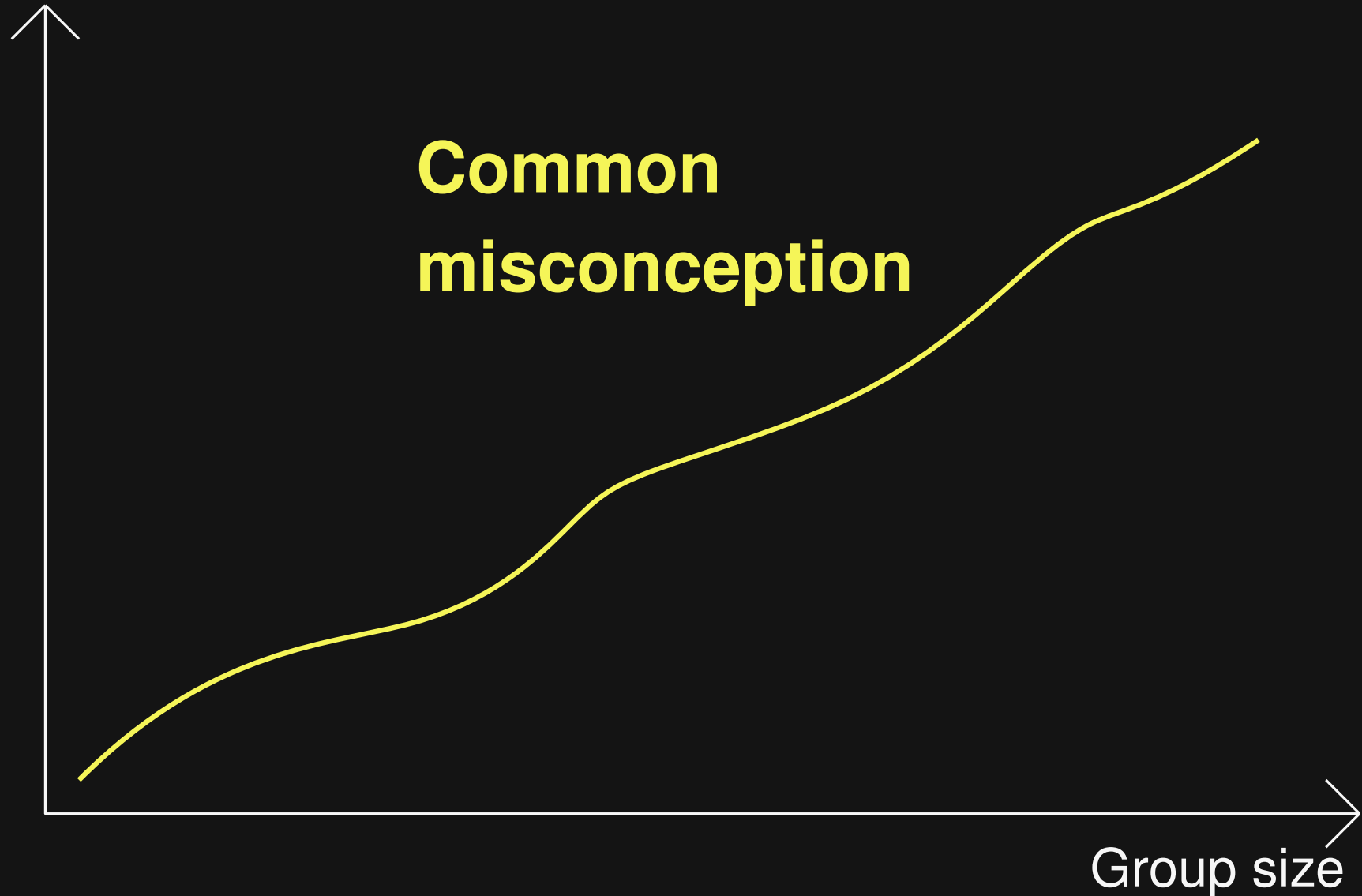
Size of Your Research Group

Productivity



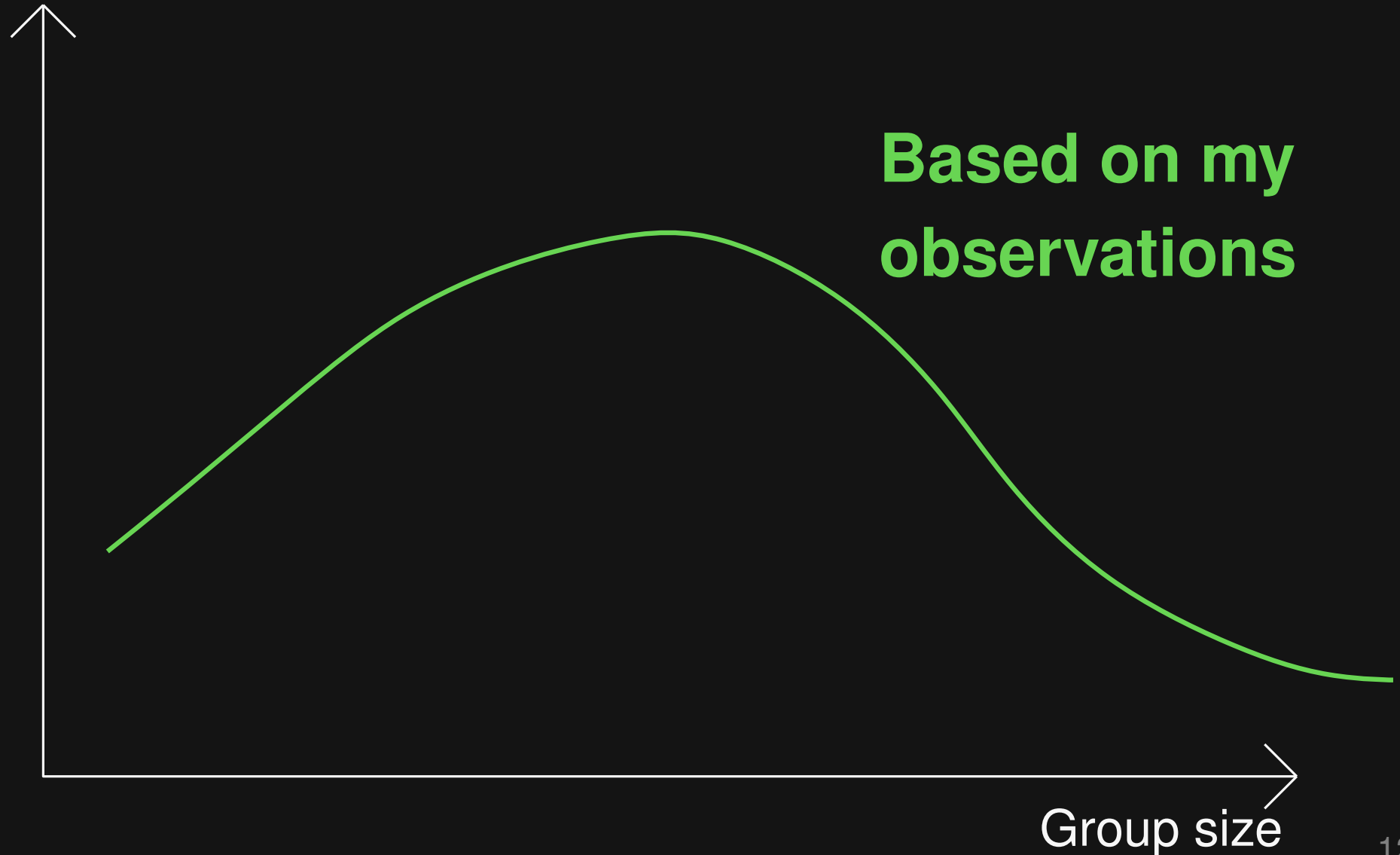
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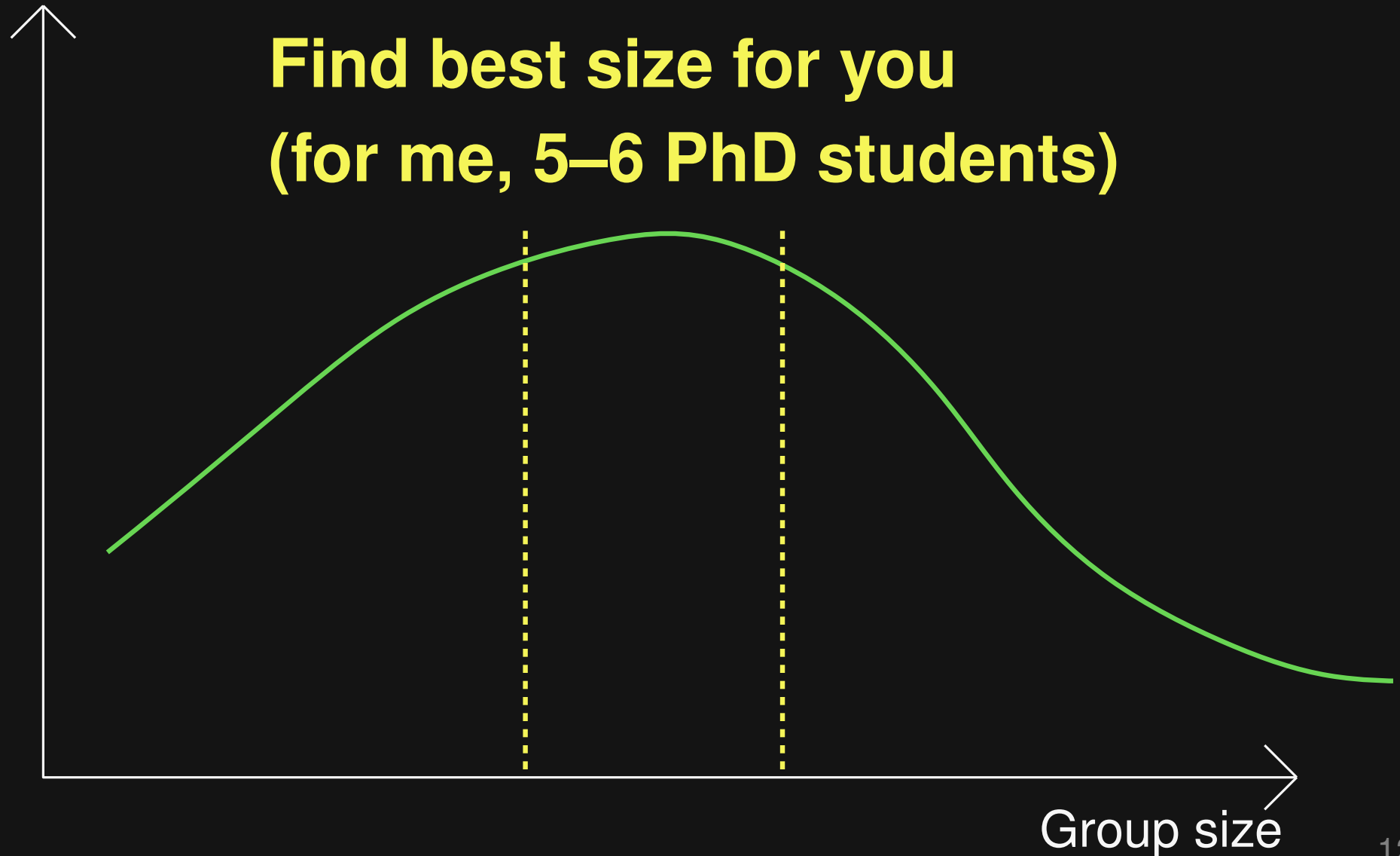
Productivity




Size of Your Research Group

Productivity

**Find best size for you
(for me, 5–6 PhD students)**



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Funding

How to pay for my research?

High-prestige
individual grants

Industry
grants

Large
collaborative
grants



Small
individual
grants

1 Euro \neq 1 Euro

(replace “Euro” with your local currency)

Every funding scheme comes with
constraints and **expectations**

- Reporting
- What can(not) be paid
- Freedom vs. sticking to the plan

1 Euro \neq 1 Euro (replace “Euro” with your local currency)

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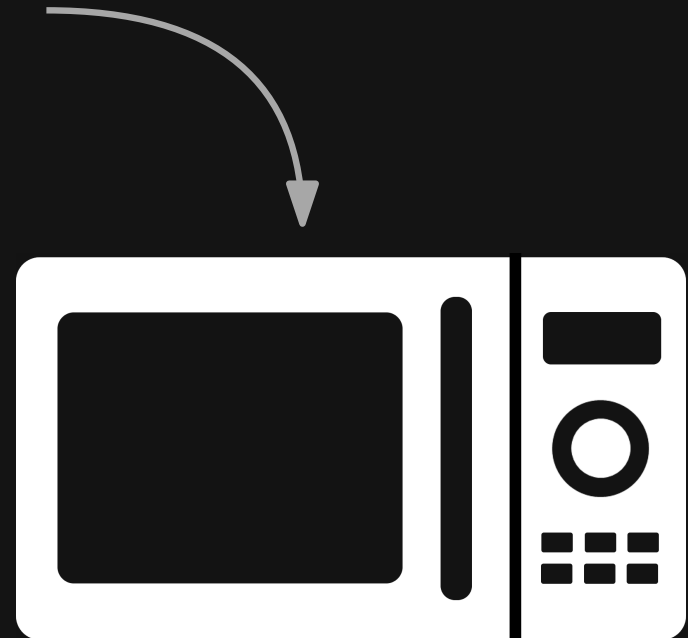
3-page travel report for a conference trip

1 Euro \neq 1 Euro

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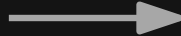
Want:

Low-maintenance, high-freedom funding

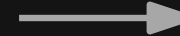
Recipe for a Successful Grant



**Recent
paper**



**Larger story
(broader scope,
related problems)**

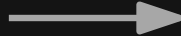


Money

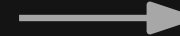
Recipe for a Successful Grant



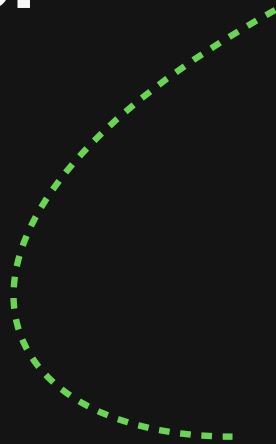
**Recent
paper**



**Larger story
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Money



$1/3$

work already done

$+ 1/3$

realistic future work

$+ 1/3$

fantasy

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Teaching

Common mistake: First semester spent almost only on teaching


Teaching

Common mistake: First semester spent almost only on teaching

Perfect is the enemy of good enough!

Preparing for a Lecture

Mon	Tue	Wed	Thu	Fri	Sat	Sun

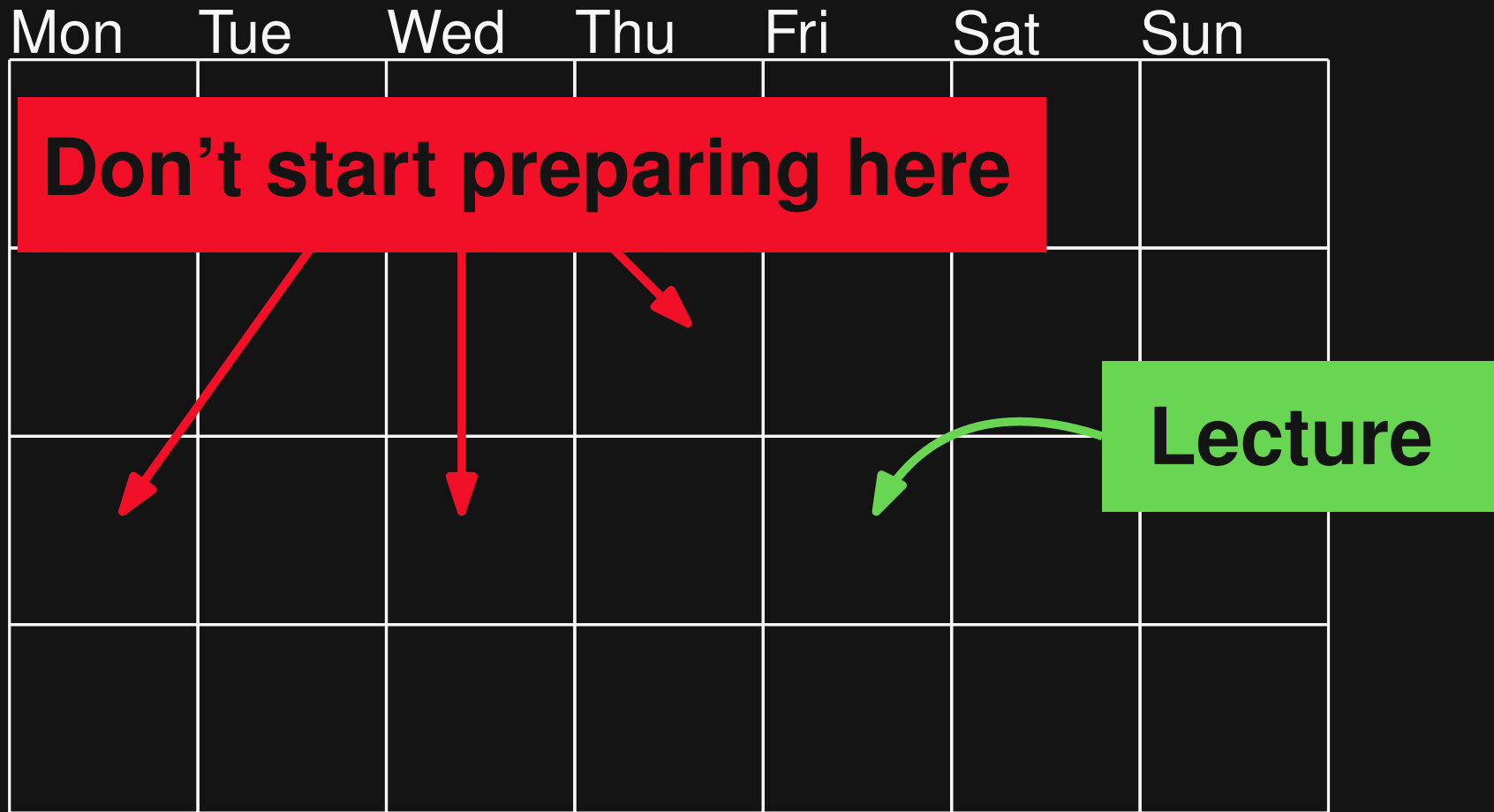


Lecture

Assumption:

You more or less know the topic you're lecturing about

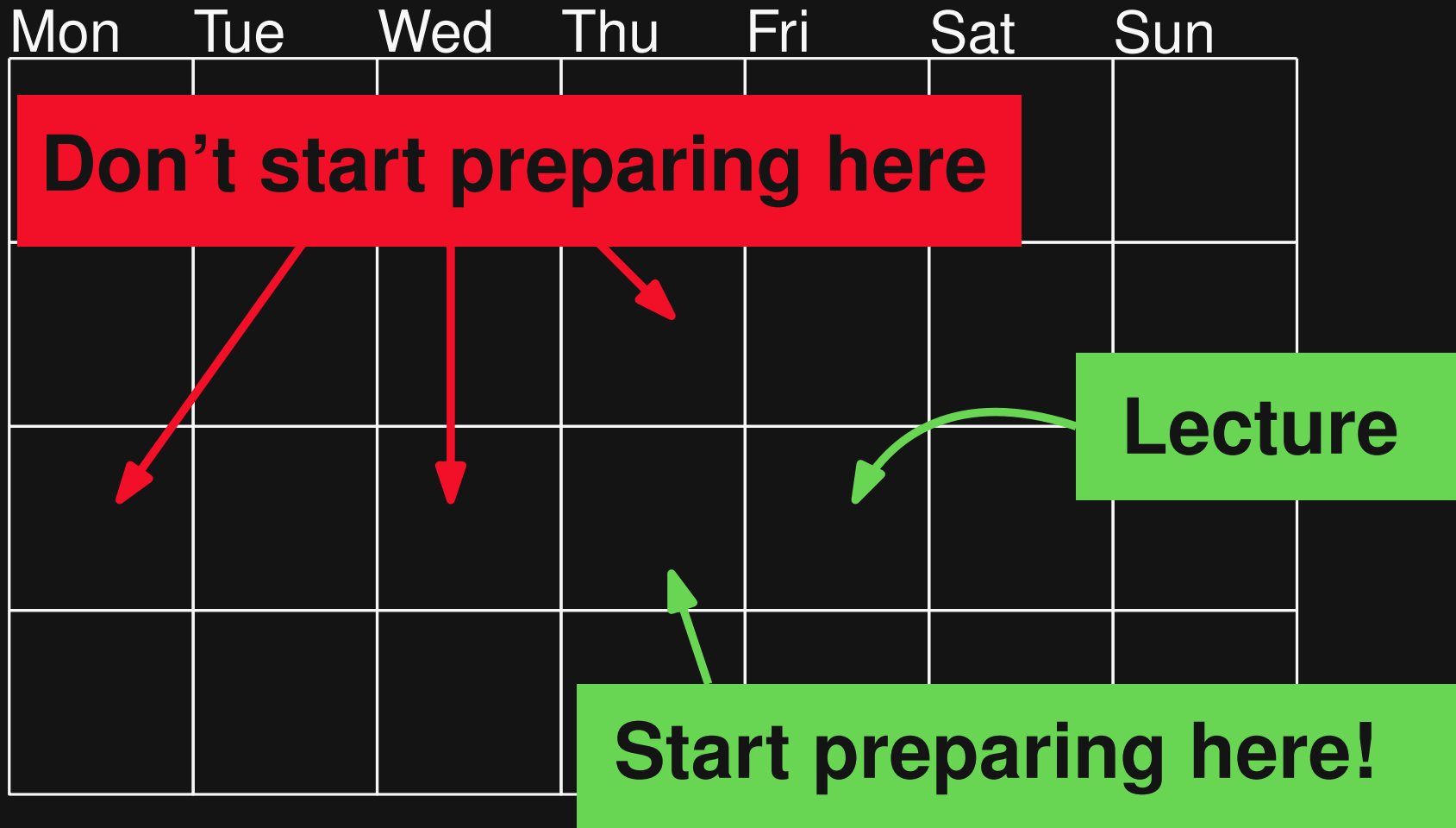
Preparing for a Lecture



Assumption:

You more or less know the topic you're lecturing about

Preparing for a Lecture



Assumption:

You more or less know the topic you're lecturing about

Combining Teaching and Research

- Advanced courses based on **recent research results**
- **Course projects** to try (small) research ideas
- Students as participants in **studies**

Combining Teaching and Research

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Example: Seminar on “Machine Learning for Programming”

Combining Teaching and Research

- Advanced courses based on **recent research results**
- **Course projects** to try (small) research ideas
- Students as participants in **studies**

Example: Course on “Program Testing and Analysis” with 10 different projects

Combining Teaching and Research

- Advanced courses based on **recent research results**
- **Course projects** to try (small) research ideas
- Students as participants in **studies**

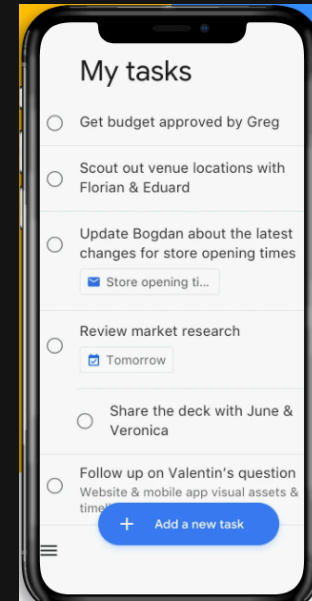
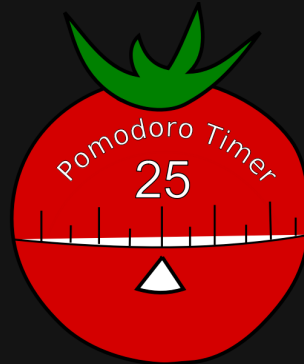
Example: ASE'21 paper on attention paid by developers when understanding code

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Time Management

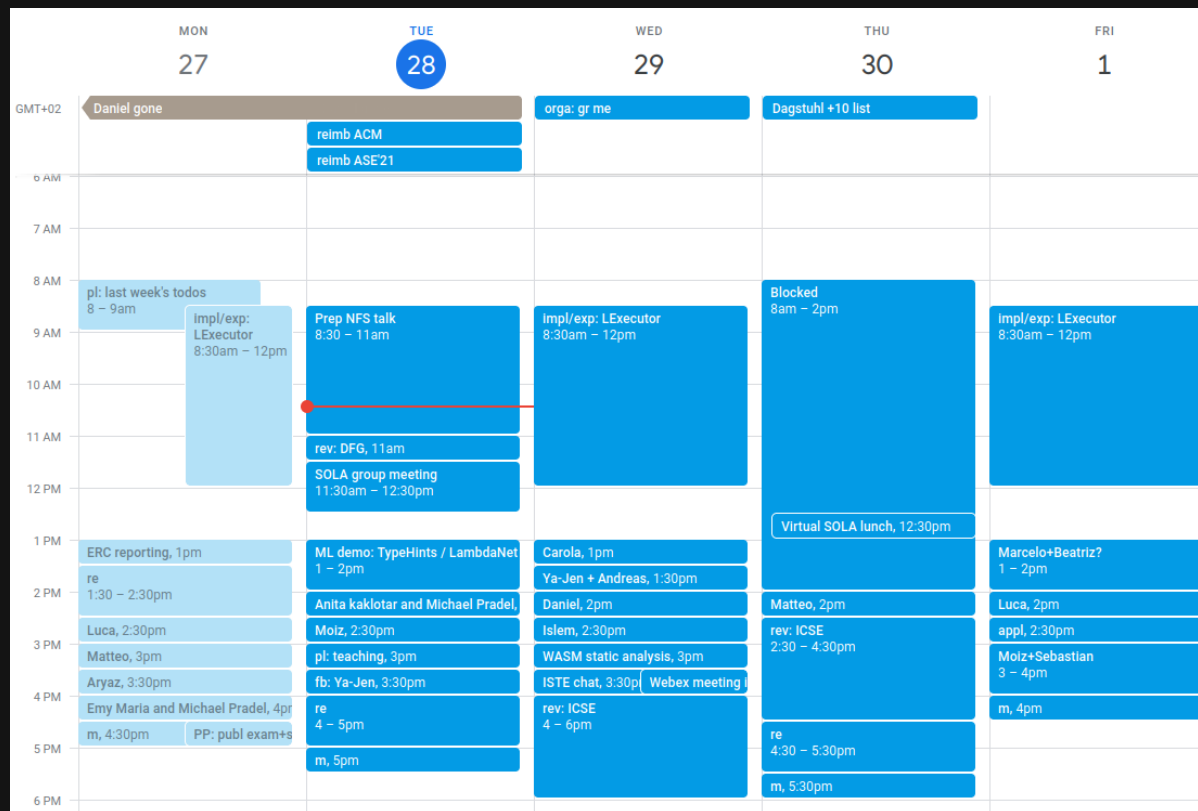
Tools and **techniques** to use?



Many years of experimentation with existing and >5 self-implemented tools ...

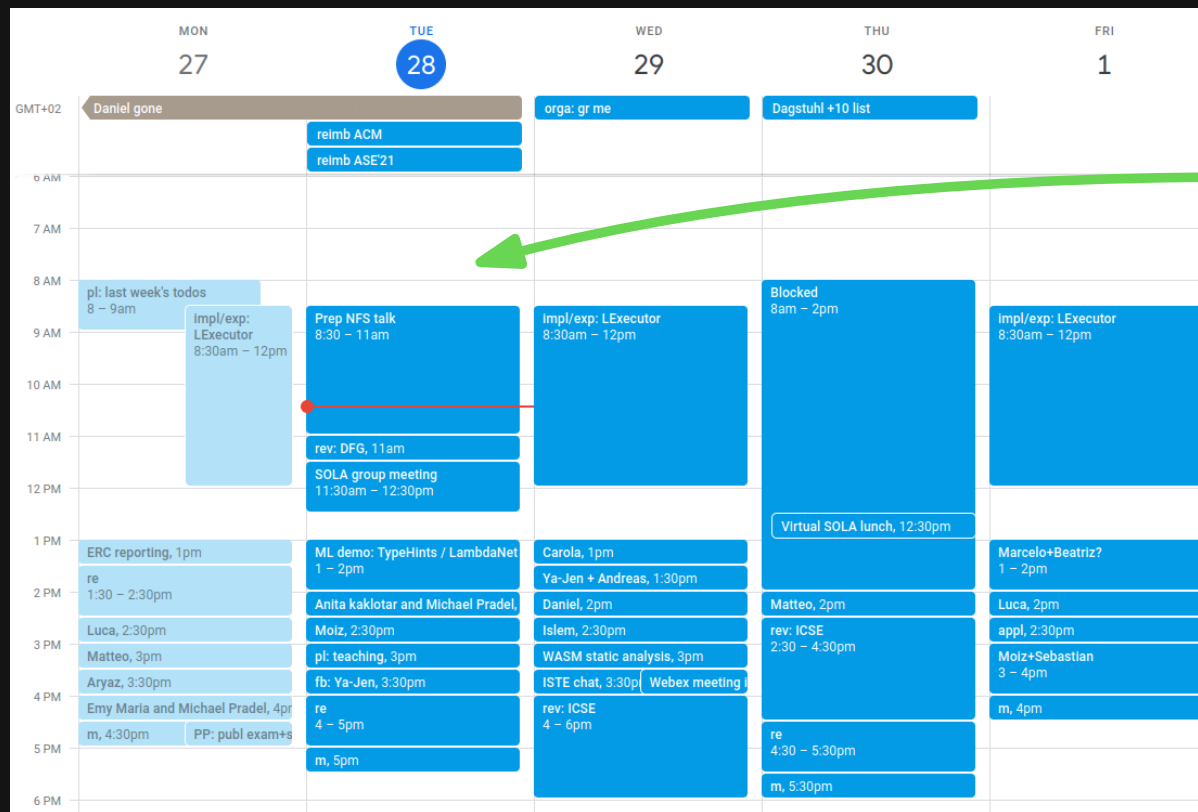
Time Management

Best for me: **Calendar-based time boxing**



Time Management

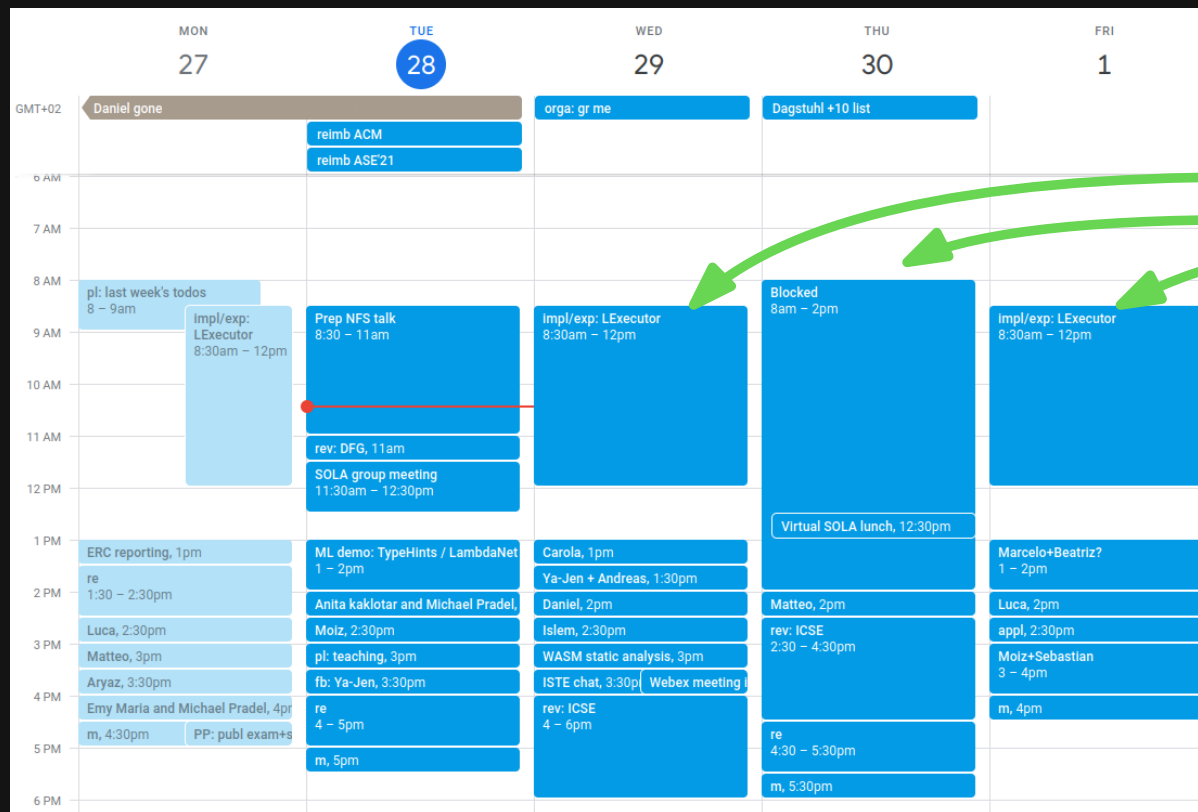
Best for me: **Calendar-based time boxing**



**Every
minute
allocated
to a task**

Time Management

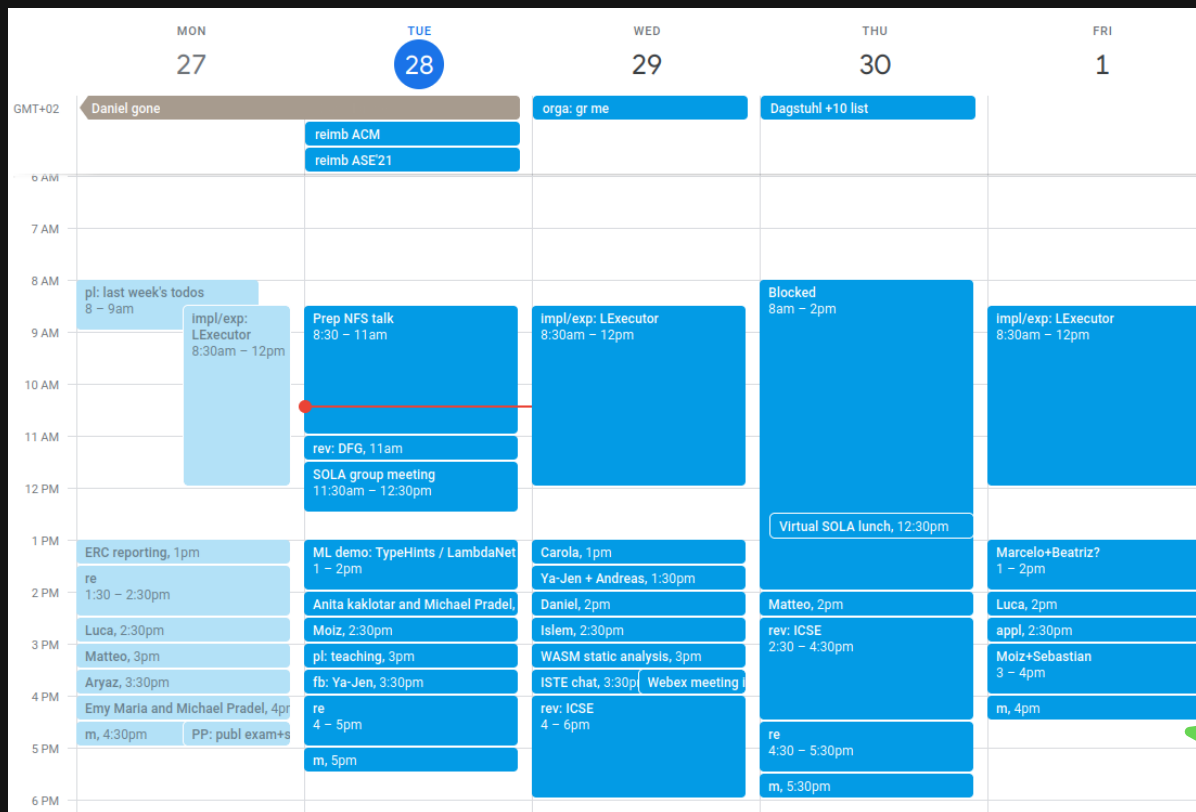
Best for me: **Calendar-based time boxing**



Long slots in the morning:
Deep work
with no/few interruptions

Time Management

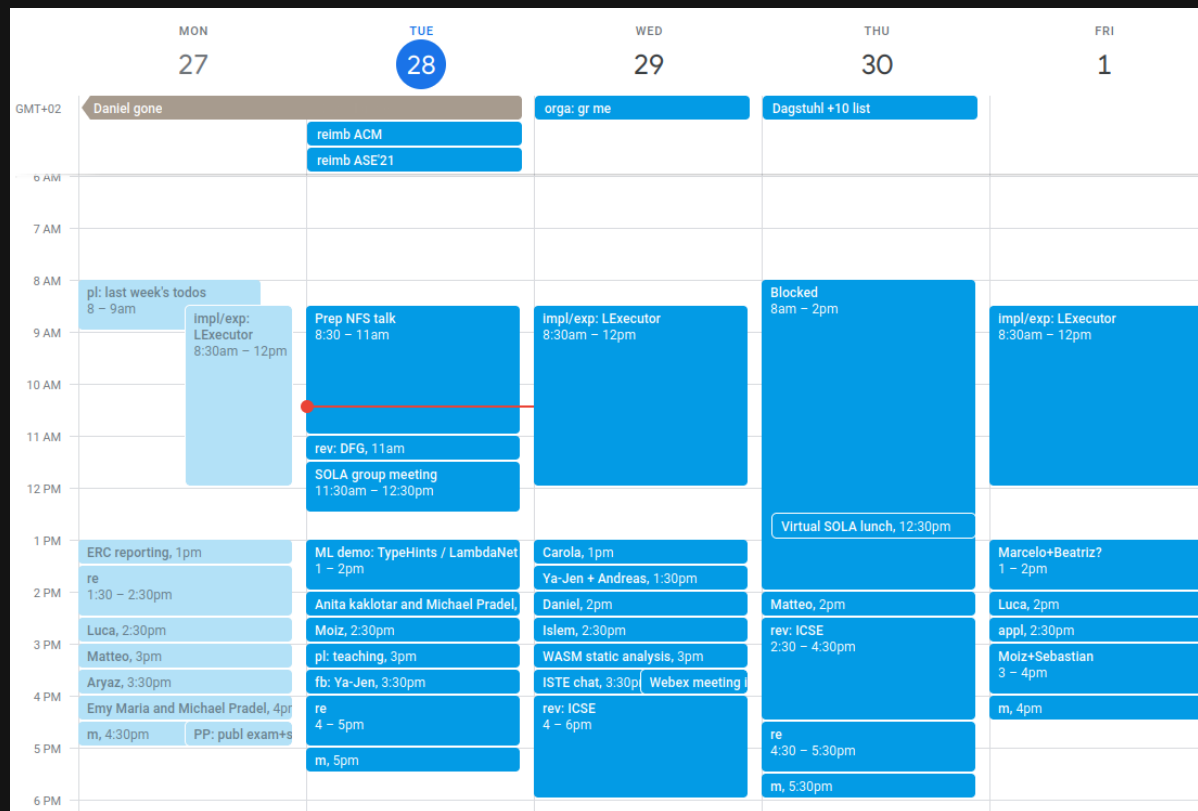
Best for me: **Calendar-based time boxing**



Shorter slots in the afternoon: Meetings, email, etc.

Time Management

Best for me: **Calendar-based time boxing**

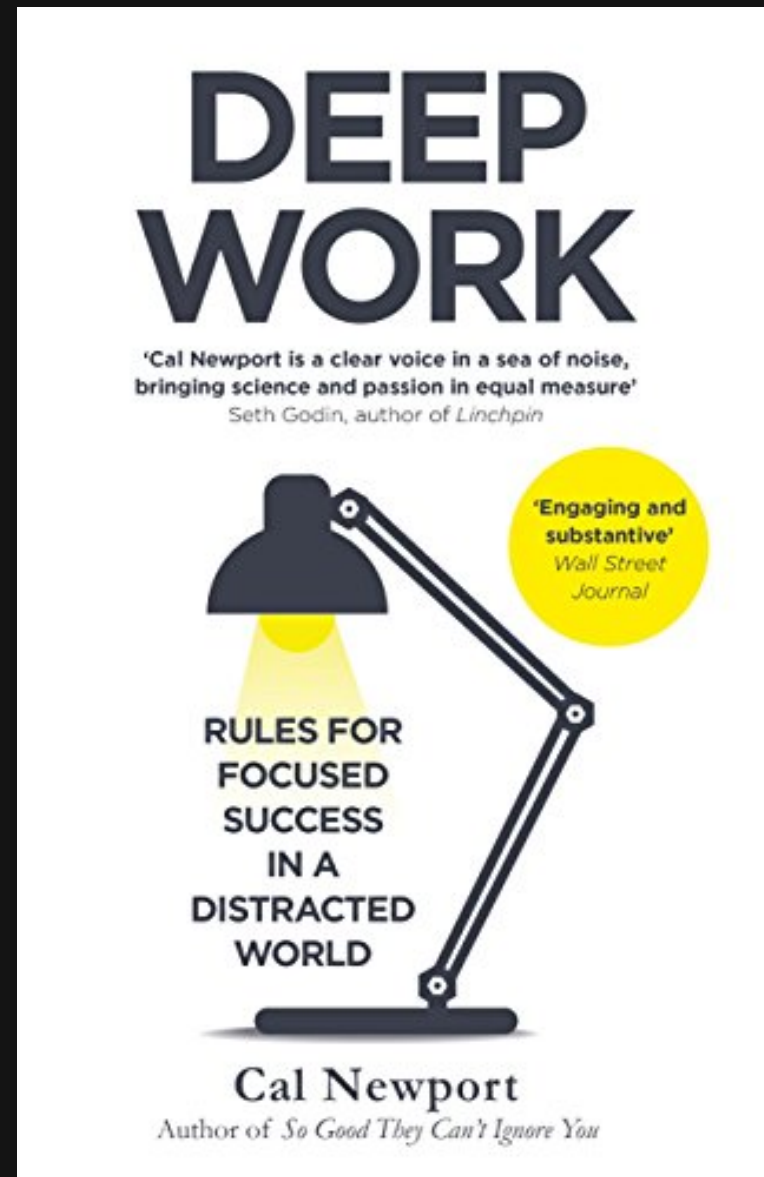


No space left
in your
calendar?
**Re-prioritize
or say no!**

How to Beat Your Inbox

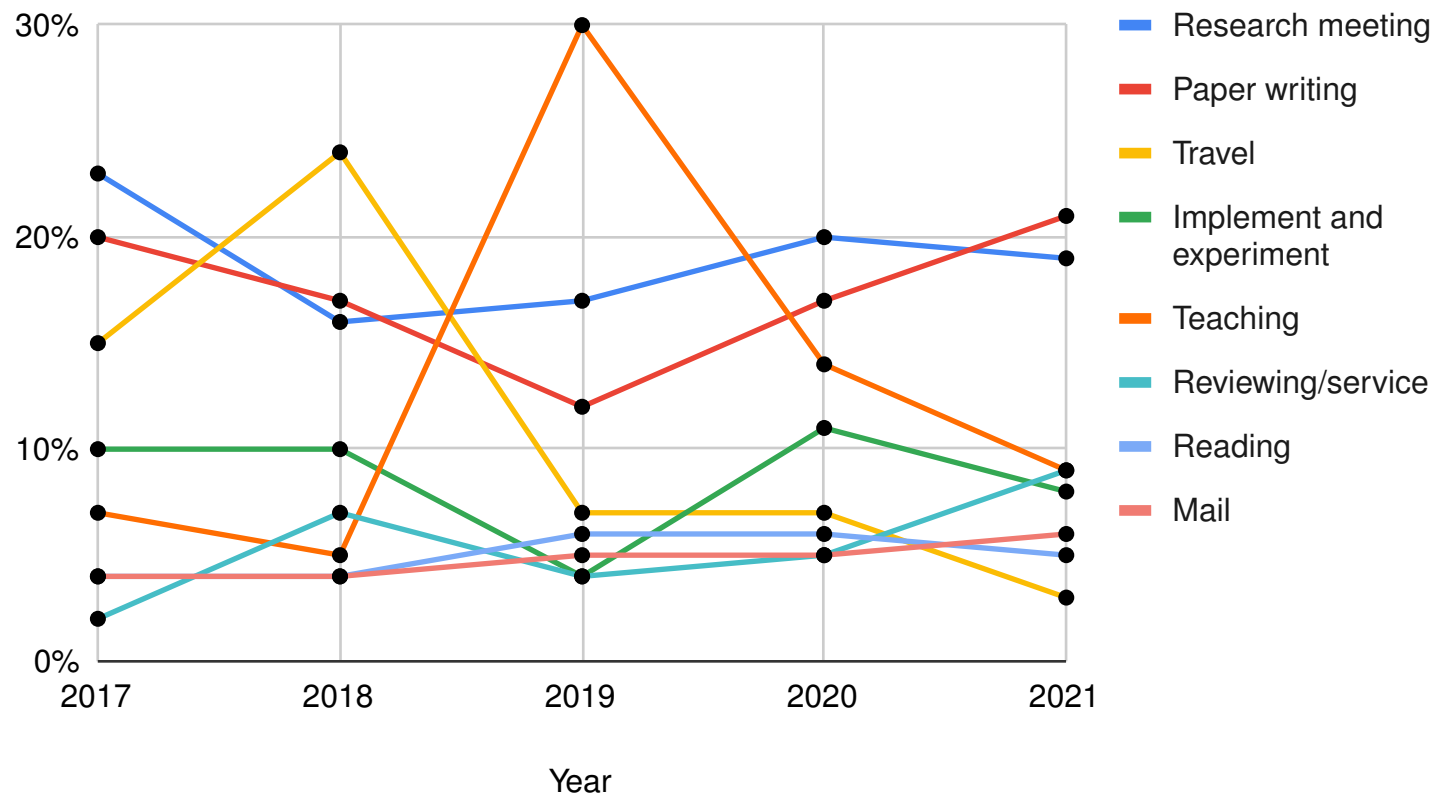
- Handle email only **once per day**
- Fixed-length time slot
- Consequences
 - No immediate responses
 - More time for actual work

Recommended Book



Time Tracking

My Working Hours



Don't Forget: Life > Work



Running



Unusual
vacation

Family



Summary

Research topics

Select based on risk, impact, and feasibility

Hands-on vs. delegation

Learn to delegate, but keep your hands dirty

Funding

Low maintenance, high freedom

Teaching

Perfect is the enemy of good enough

Time management

Time-boxing, time-tracking