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

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Disclaimer

Me ≠ You

∃ Me’
Overview

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

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- Funding
- Teaching
- Time management
Research Topics

How to pick what to work on?

To consider:

- Risk
- Impact
- Skills and abilities
Risk of Projects

Risk of projects to pursue

Time a PhD student works with you
Risk of Projects

Time a PhD student works with you

Risk of projects to pursue
Risk of Projects

Start with a low-risk project (first 6 months)
Performance Issues and Optimizations in JavaScript: An Empirical Study

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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-

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Risk of Projects

Try more risky ideas

Risk of projects to pursue

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NL2Type: Inferring JavaScript Function Types from Natural Language Information

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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.
* @returns {number} 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

- Risk of projects to pursue
- Depending on student’s progress
- Time a PhD student works with you
“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!

- **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
Be Selective

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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
Size of Your Research Group

Productivity

Group size
Size of Your Research Group

Productivity

Group size

Common misconception
Size of Your Research Group

Based on my observations

Productivity

Group size
Size of Your Research Group

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
Large collaborative grants

Industry grants
Small individual grants
Every funding scheme comes with constraints and expectations

- Reporting
- What can(not) be paid
- Freedom vs. sticking to the plan
Every funding scheme comes with constraints and expectations

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

3-page travel report for a conference trip
Every funding scheme comes with constraints and expectations

- Reporting
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Every funding scheme comes with constraints and expectations

- Reporting
- What can(not) be paid
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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 (broader scope, related problems)
- Money

1/3 work already done
+ 1/3 realistic future work
+ 1/3 fantasy
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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

Assumption:
You more or less know the topic you’re lecturing about
Prefering for a Lecture

<table>
<thead>
<tr>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t start preparing here</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Assumption:
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Preparing for a Lecture

Don’t start preparing here

Start preparing here!
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

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

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

<table>
<thead>
<tr>
<th>MON</th>
<th>TUE</th>
<th>WED</th>
<th>THU</th>
<th>FRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>1</td>
</tr>
</tbody>
</table>

- **Daniel gone**
- **Orga: gr me**
- **Dogboil 4/10 list**

### 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

DEEP WORK

‘Cal Newport is a clear voice in a sea of noise, bringing science and passion in equal measure’
Seth Godin, author of Linchpin

‘Engaging and substantive’
Wall Street Journal

RULES FOR FOCUSED SUCCESS IN A DISTRACTED WORLD

Cal Newport
Author of So Good They Can’t Ignore You
Time Tracking

My Working Hours

- Research meeting
- Paper writing
- Travel
- Implement and experiment
- Teaching
- Reviewing/service
- Reading
- Mail

Year:
- 2017
- 2018
- 2019
- 2020
- 2021
Don’t Forget: Life > Work

- Running
- Unusual vacation
- Family
# Summary

<table>
<thead>
<tr>
<th>Research topics</th>
<th>Select based on risk, impact, and feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on vs. delegation</td>
<td>Learn to delegate, but keep your hands dirty</td>
</tr>
<tr>
<td>Funding</td>
<td>Low maintenance, high freedom</td>
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<td>Time-boxing, time-tracking</td>
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