

*CS 2001: Research Topics*  
**Introduction**

Prof. Adriana Kovashka  
University of Pittsburgh  
August 30, 2021

# About the Instructor



Born 1985 in  
Sofia, Bulgaria



Got BA in 2008 at  
Pomona College, CA  
(Computer Science &  
Media Studies)



Got PhD in 2014  
at University of  
Texas at Austin  
(Computer Vision)

# Course Info

- **Course website:** [http://people.cs.pitt.edu/~kovashka/cs2001\\_fa2021](http://people.cs.pitt.edu/~kovashka/cs2001_fa2021)
- **Instructor:** Adriana Kovashka ([kovashka@cs.pitt.edu](mailto:kovashka@cs.pitt.edu))
  - Use "CS2001" at the beginning of your Subject
- **Office:** Sennott Square 5325
- **Class:** Mon/Wed, 1pm-2:15pm
- **Office hours:** Mon/Wed, 9am-10:55am

# Topics

1. PhD journey and logistics
2. Learning from and evaluating the literature
3. Developing and pitching ideas
4. Conducting research
5. Writing and presenting your work
6. Mini-project presentations
7. Faculty presentations

# Skills

- Reading for research
- Debating yours and others' work
- Pitching ideas
- Writing for research
- Presenting your work

# Grading

- Attendance: 30%
- Reviews of papers, literature review: 30%
  - Review ~20 papers chosen by faculty presenters
  - Write literature review with claim to be defended
- Mini project presentation: 20%
  - Teams of 2; identify a claim to investigate; make small change in existing project code, compare methods, etc.
  - Mid-semester and final reports (presented in class)
- Debates, pitches, participation: 20%

Please bring your laptops!  
(and only use them for class work)

# Introductions (1-2 min)

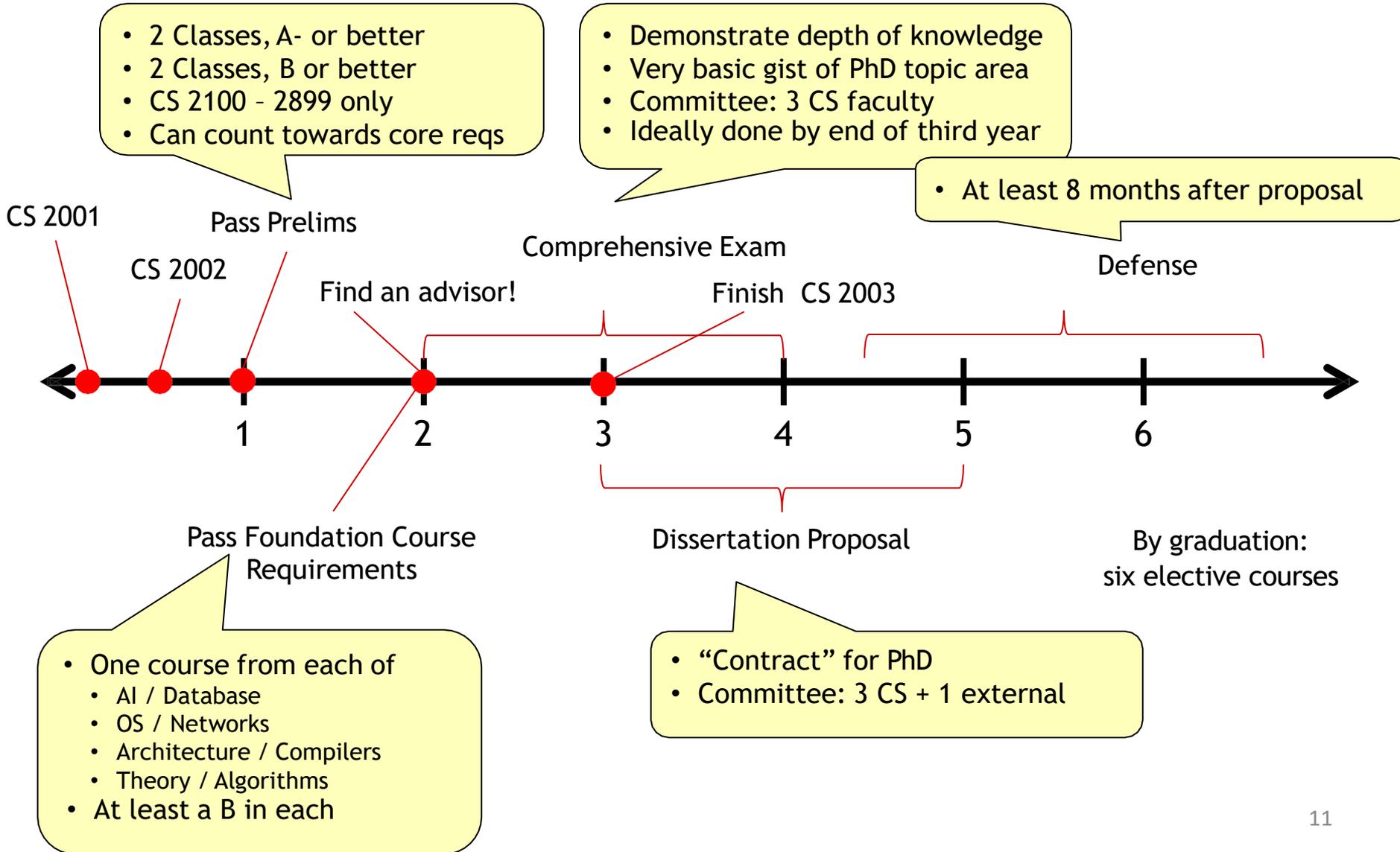
- What is your name?
- What topics within computer science are you interested in?
- What do you like to do outside of school/work?
- Why did you choose to pursue a PhD?
- Why did you choose to pursue it at Pitt?

# Plan for this lecture

- PhD journey
  - PhD timeline at Pitt
  - Motivation and challenges of doing a PhD
- Managing a PhD career
  - Navigating publishing
  - Communicating with your advisor
  - Gaining confidence
  - Work/life balance
- Resources
  - Computing resources
  - Research fellowships
  - Writing resources
  - Mental health resources

# PhD Journey

# PhD Timeline at Pitt



# PhD Timeline at Pitt

- <https://www.cs.pitt.edu/current-students/phd-computer-science/degree-requirements>
  - Let's spend 10 min to read and ask questions
- <https://www.cs.pitt.edu/current-students/graduate-policies>
  - Let's spend 10 min to read and ask questions

# PhD Timeline at Pitt

- Work hard to finish course requirements
- Identify research areas/professors of interest
- Begin reading papers & discussing area

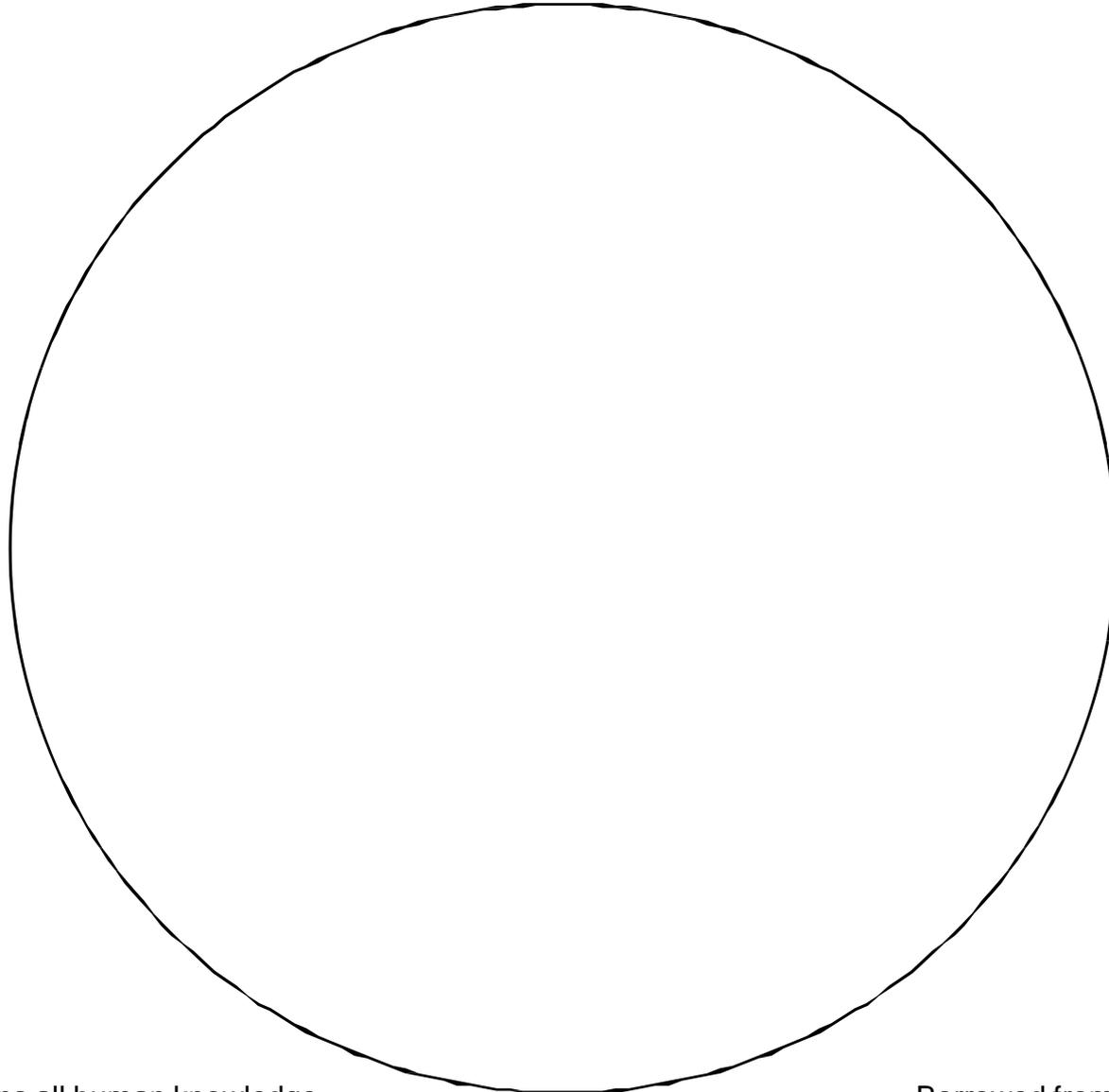
- More than smarts: Persistence!
- Time management should become an art...
- Identify larger open problem, not just many small “neat” problems
- writing, Writing, WRITING



- Attend group meetings
- Read several papers per week
- Research! Develop your niche.
- Work on time management skills

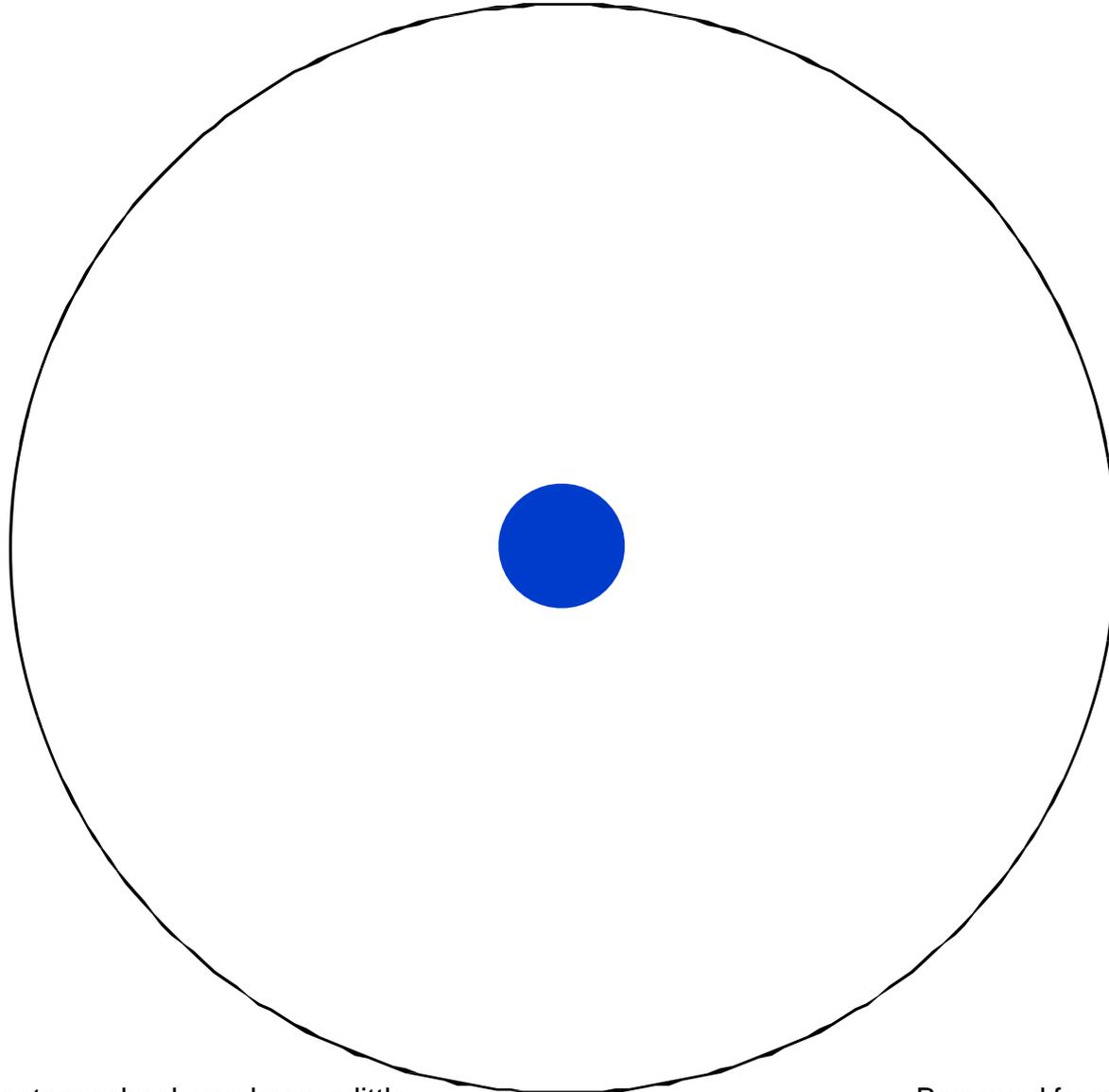
- Good thesis or great thesis?
- To defend, you must be an expert. Are you?
- Resist the temptation to take a job before you defend. This is a recipe for disaster.

# What is a PhD?

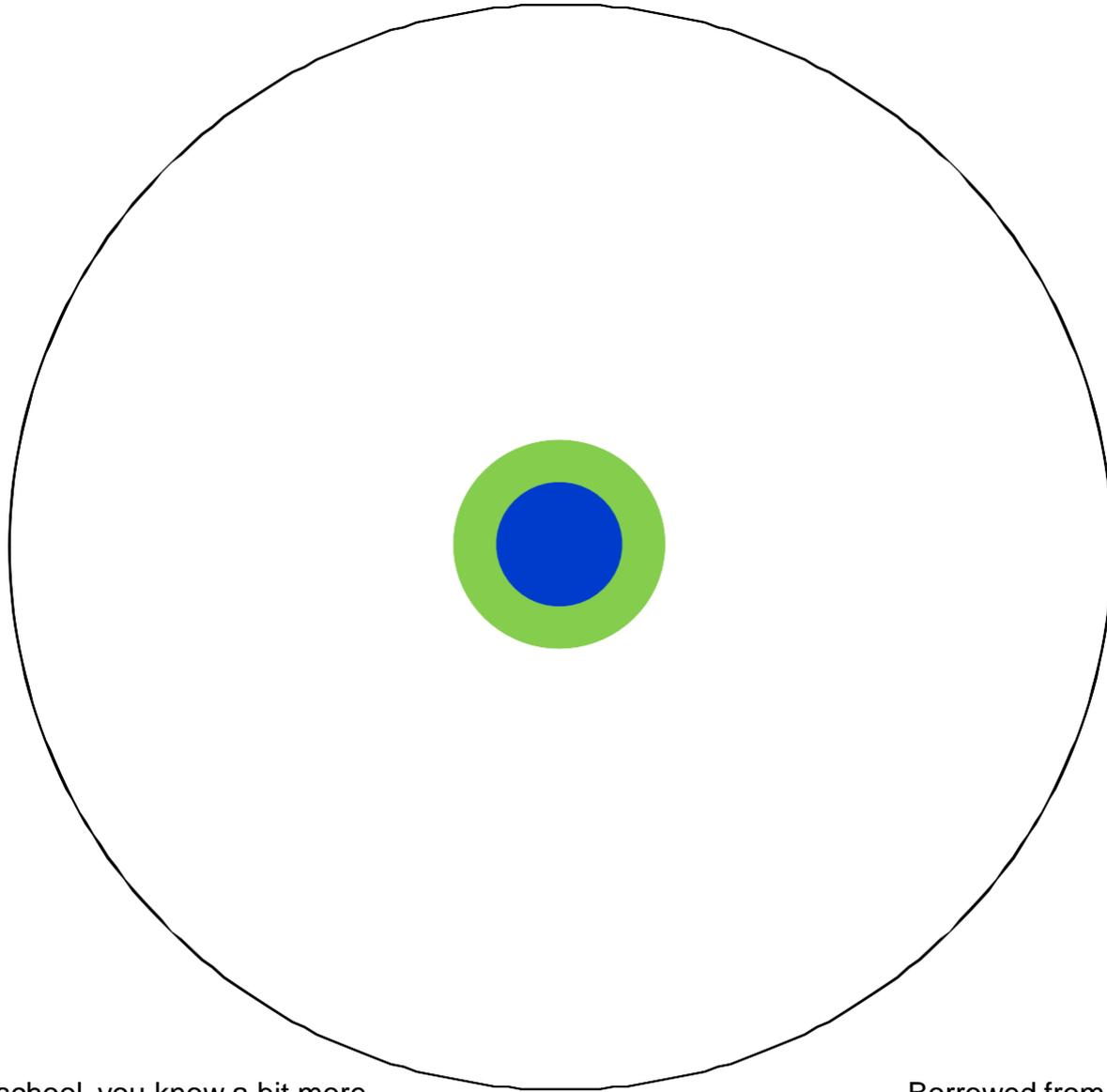


Imagine a circle that contains all human knowledge

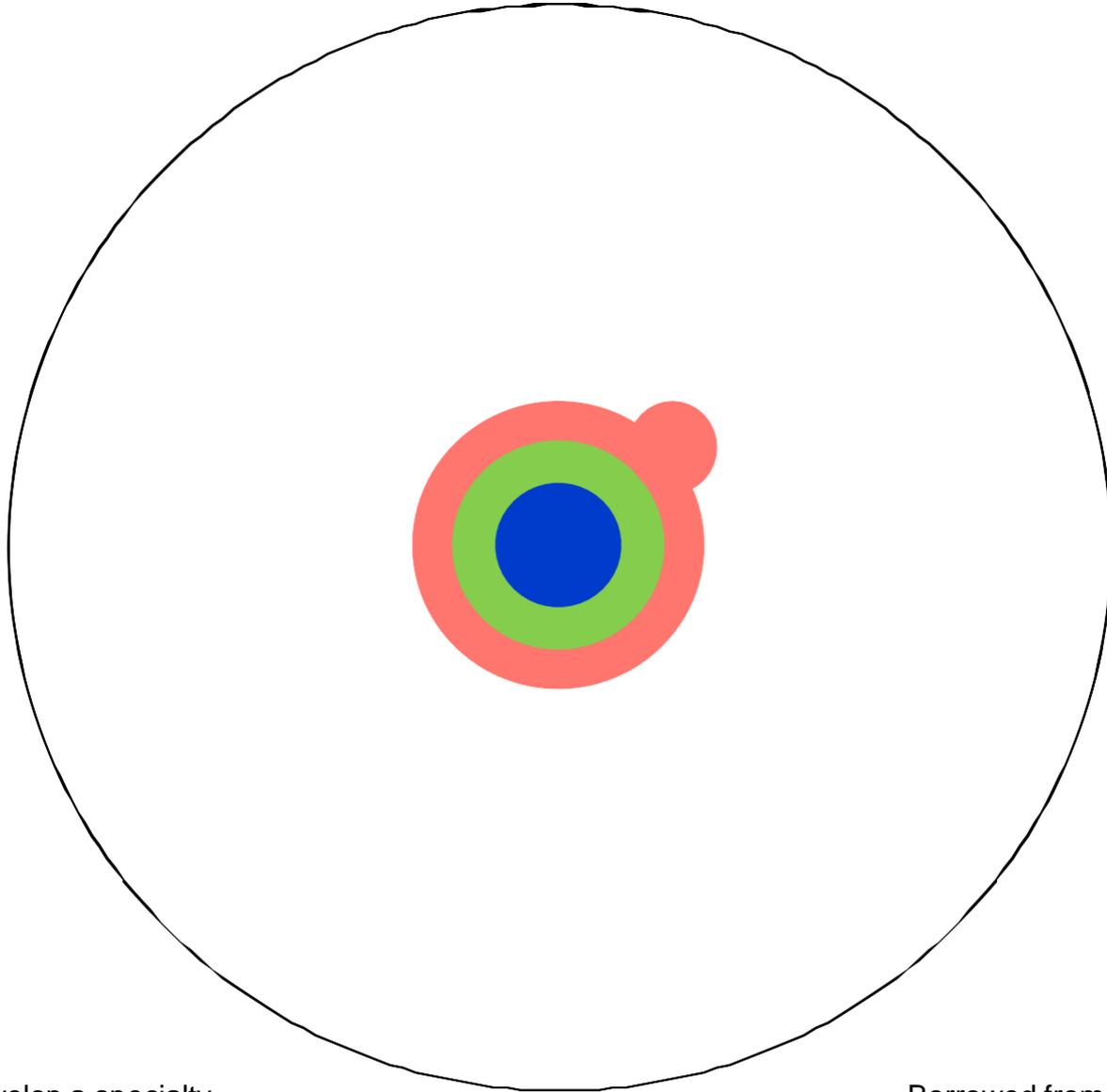
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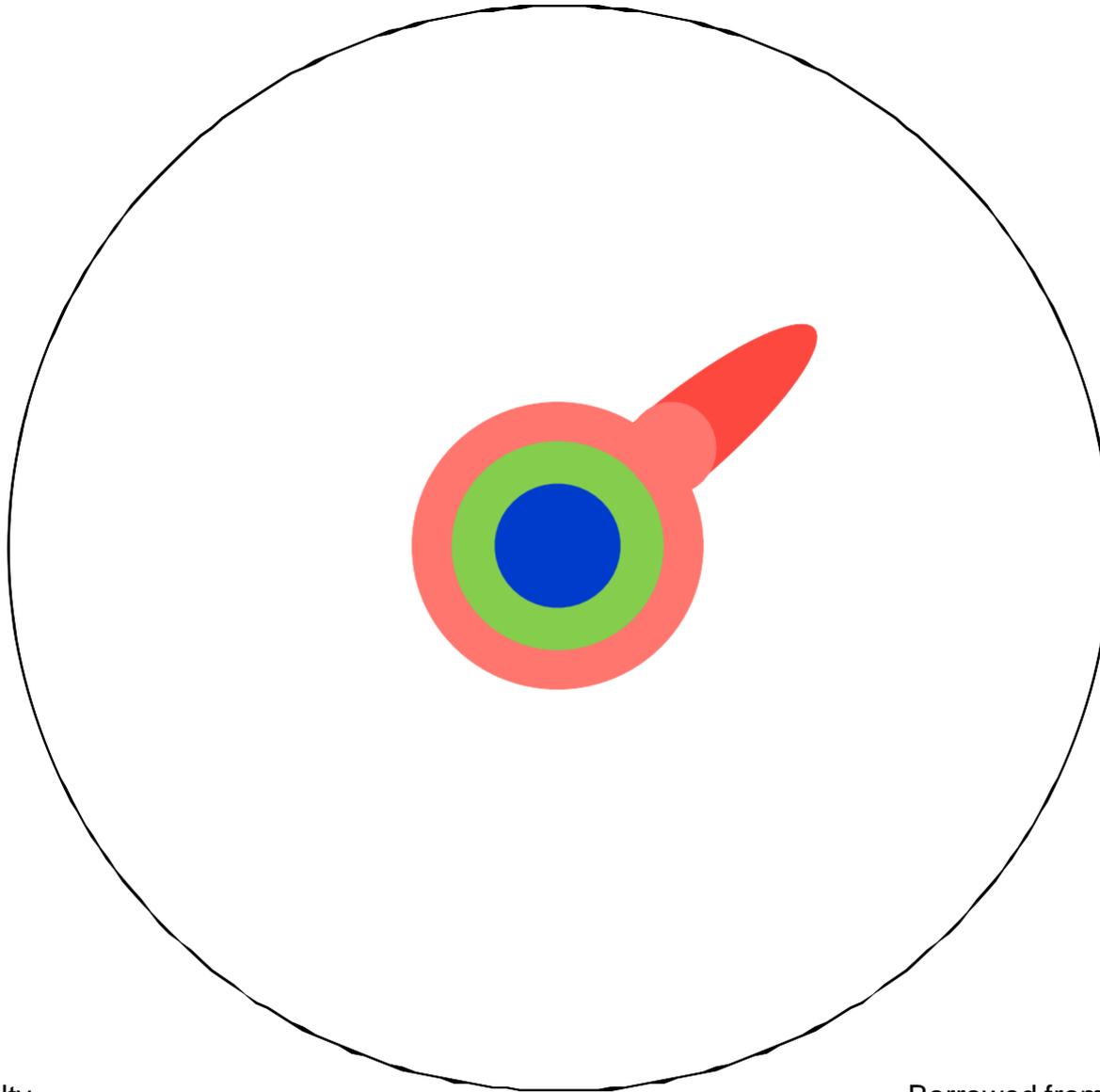
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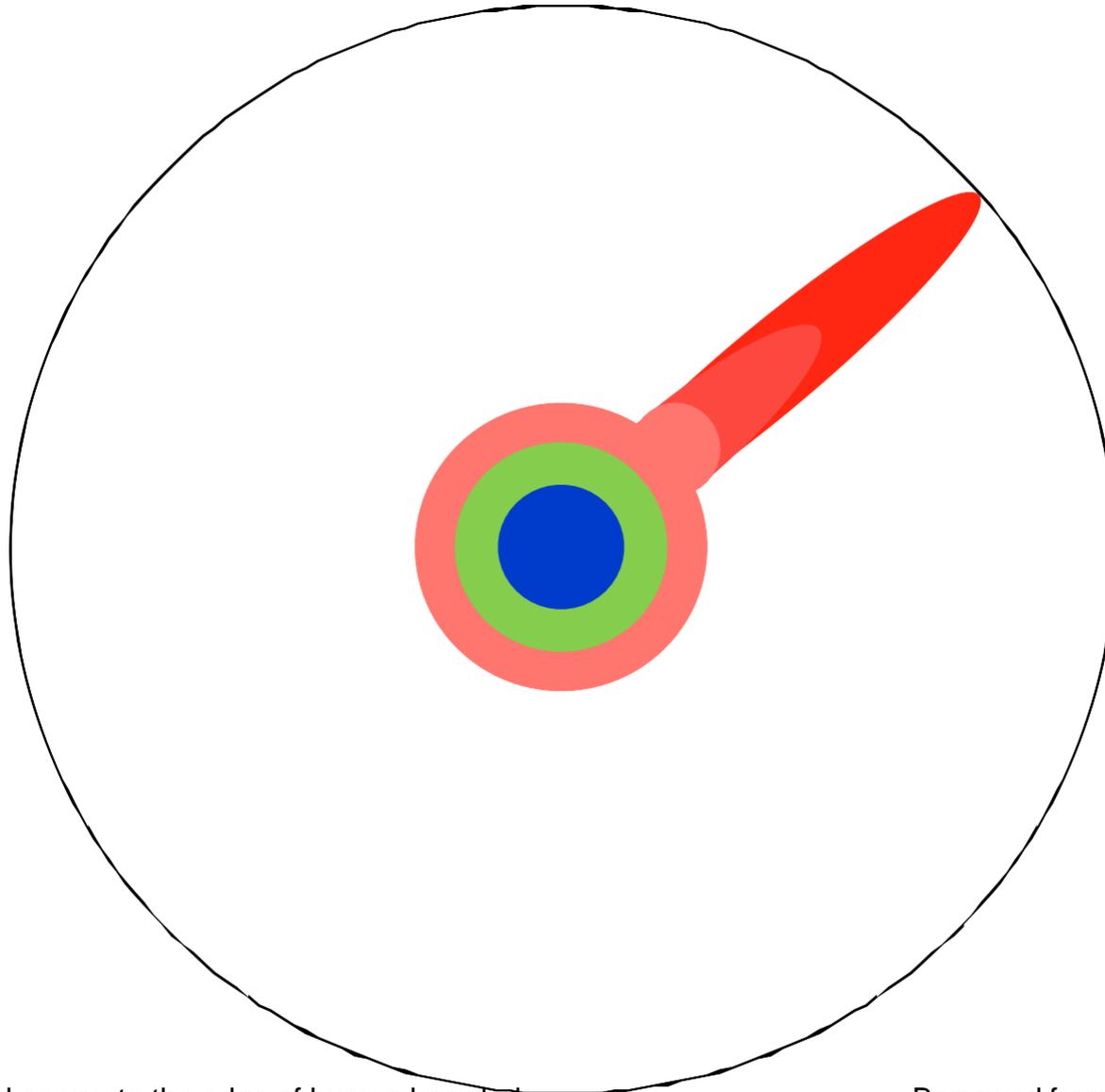
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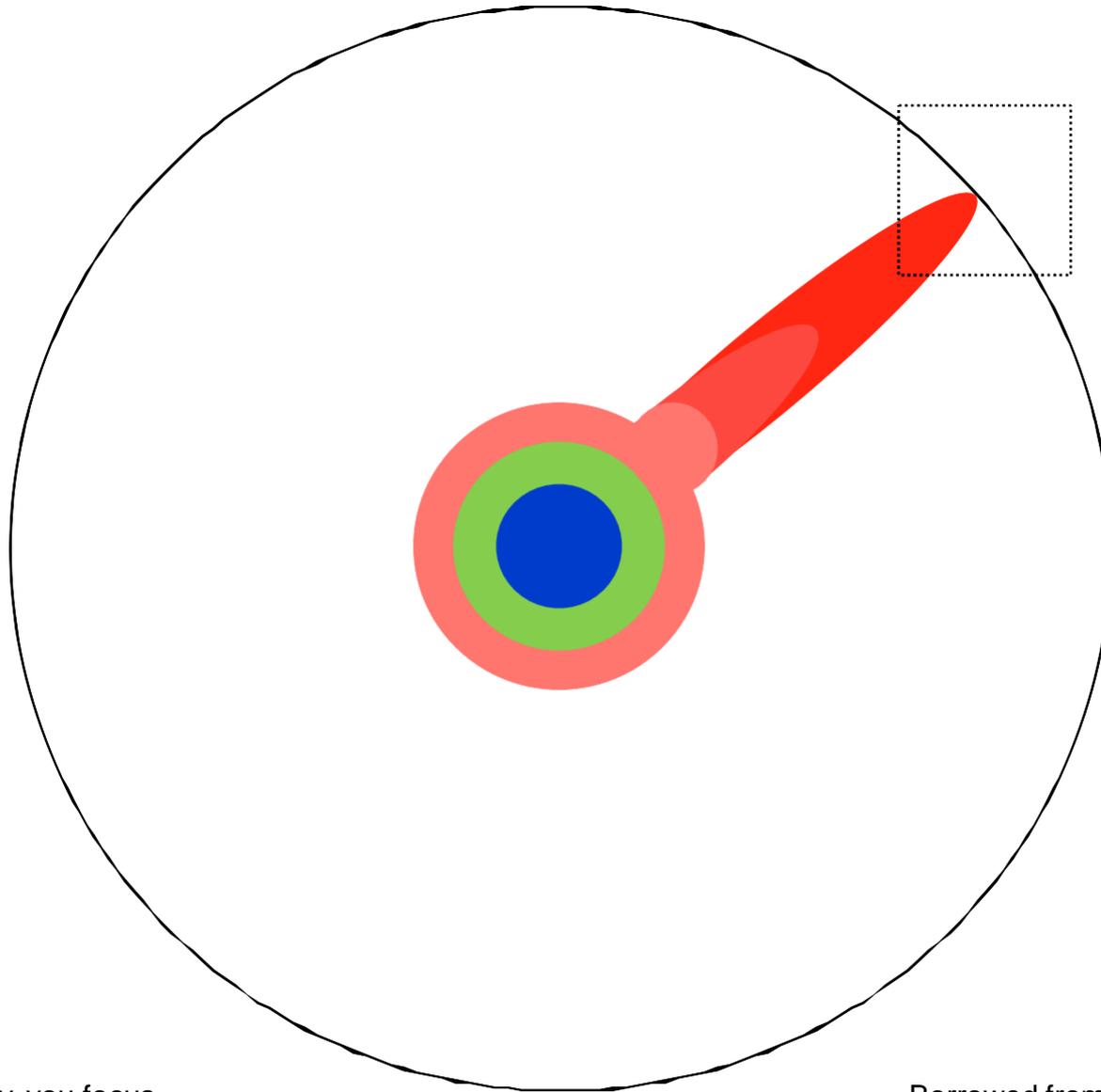
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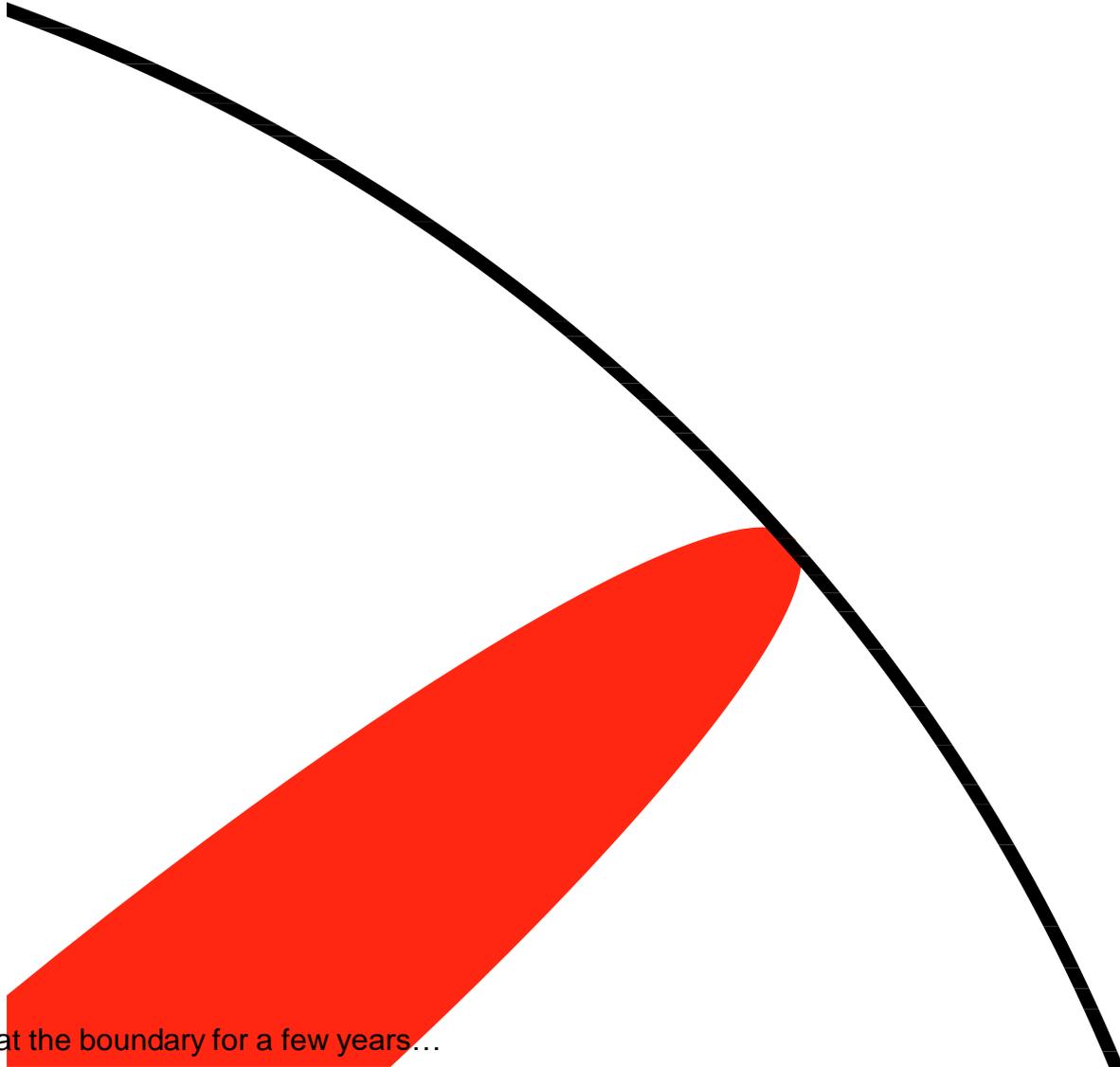
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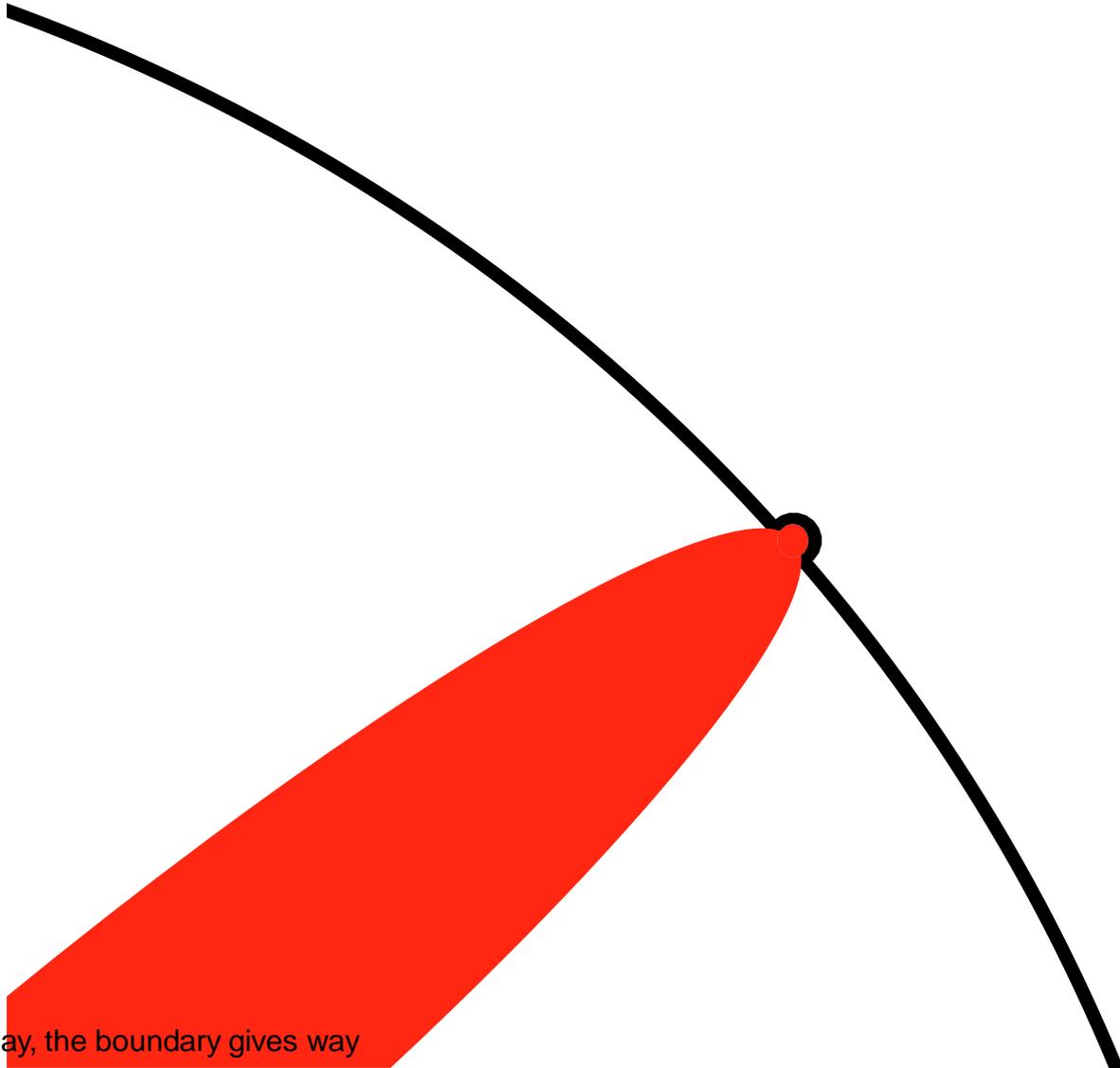


# What is a PhD?



You push at the boundary for a few years...

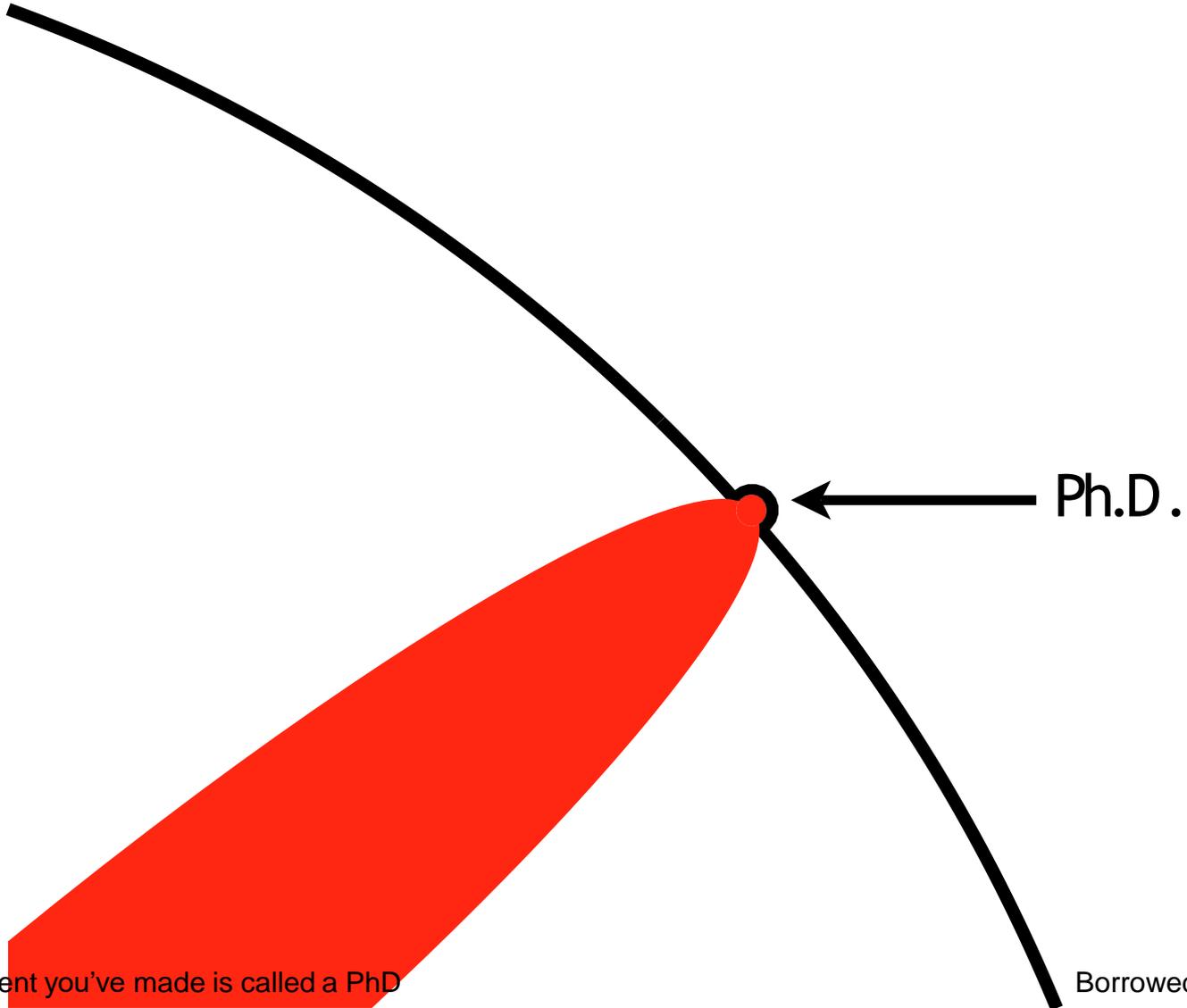
# What is a PhD?



Until one day, the boundary gives way

Borrowed from <http://matt.might.net>

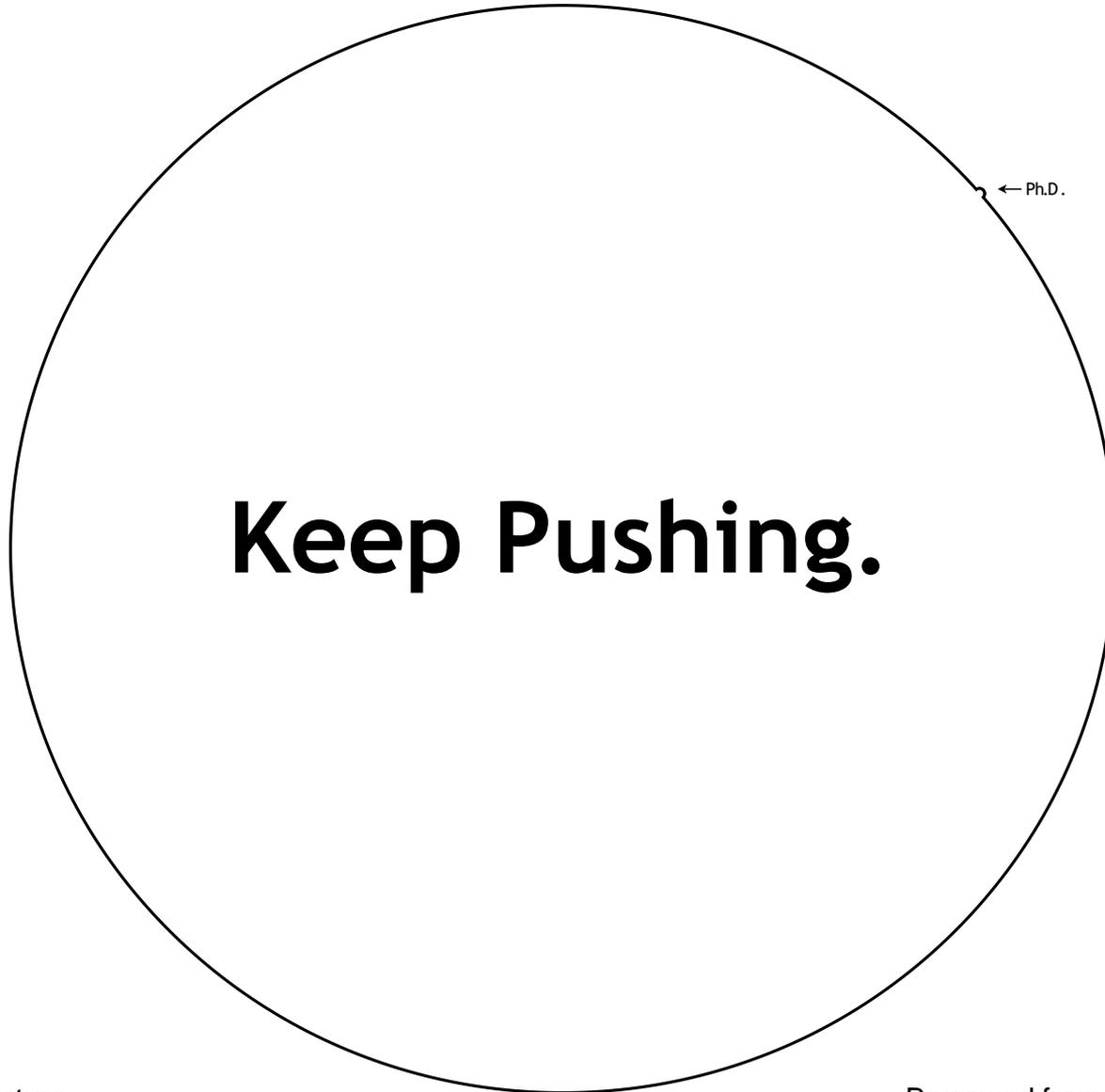
# What is a PhD?



Ph.D.

# What is a PhD?

# What is a PhD?



# So... What *is* a PhD?

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## A PhD is a process!

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Smart is not enough, so a demoralizing process at times...

- So much has been done already, how do I keep up?
- What **new** problem should I be solving?
- Solving this problem is **way harder** than I thought it would be...
- Why doesn't my code (or code that I've borrowed) work?!
- Why do my papers keep getting rejected?

But a process that will educate you greatly

- Problem identification and solving
- Persistence and hard work
- Clear (written and spoken) communication skills
- Team work, management, and mentoring

# My Path

- Decided to do a PhD because I thought I would enjoy learning more about AI— but no clear plan or goal
- My first paper got into CVPR with good reviews, but I quickly got demoralized because the field seemed like chasing 0.5% improvement in accuracy on a benchmark
- Then I discovered a topic I was really, really excited about, by reading a paper in reading group; my thesis ended up revolving around it
- Even so, my first attempt on this topic didn't succeed— yet a labmate later got a best paper award out of a similar idea—the line between success and failure is thin
- I learned the importance of how you present and argue the importance of your work
- I had to at least once read through related work in great detail and implement mathematical details from scratch
- I greatly enjoyed having huge time flexibility; one time, this meant I even took an acting class; more than one time, it meant spending weeks on 4 hours of sleep—but it was my choice and I felt that it was worth it

A PhD journey is long and not very  
well defined.

What are you worried or confused  
about?

# Managing a PhD

# Navigating Publishing

- Conferences and journals
- Ratio of conference to journal pubs typically higher in CS than other areas
- Conferences at different tiers; top-tier may have acceptance rates of 15-30%
- Example goal for your PhD:
  - 2-3 top-tier conference pubs,
  - 2-3 second-tier conference pubs,
  - 1-2 journal pubs

# Conference Review Process

- Papers are submitted by a fixed deadline
  - The more prestigious the conference, the less likely deadline will be extended
- Program Chairs assign papers to Area Chairs (semi-automatically) for handling
- Area Chairs select reviewers from available pool (and help recruit reviewers)
- A paper may be reviewed by 3-5 reviewers

# Conference Review Process (cont'd)

- In many conferences, reviews are released before final decision, and authors get a chance to respond to comments (rebuttal), to correct misunderstandings and provide further details
- Next, reviewers discuss (moderated by AC), update their reviews, and AC makes decision recommendation based on final reviews

# Conference Review Process (cont'd)

- If decision is accept, authors have a few weeks to submit final (“camera-ready”) version
- If decision is reject, authors may submit to a workshop associated with the conference, or submit to another conference
- Dual submissions usually not ok (can’t have same paper under review for two conferences at the same time)
  - Exception: some 4-page extended abstract submissions, considered work in progress
  - Those are good to do, can add to CV, but they are non-archival and not considered real publications, so don’t invest too much time

# Reviewing and Anonymity

- Most conferences use double-blind review: authors don't know who reviewers are, vice versa
  - Why?
- Journals may be single-blind: authors don't know reviewer identities
- There may be policies about “tech report” submissions (e.g. on arxiv.org) during paper anonymity/review time – allowed/not
- You may accidentally find out a paper's author identities when you review, but you shouldn't actively try to find it out

# Choosing an Advisor

- Choosing an advisor is a **big** decision...
- Key points: **research interest** and **fit**
- You are unlikely to finish a PhD that you aren't interested in...
  - Use CS2001 to get to know faculty whose work seems interesting
  - Take courses and seminars in these areas
  - Read papers, make sure you're interested in recent developments
  - Think about whether you like theory vs. applications
- You will be working **very closely** with your advisor
  - Do you prefer “hands on” or “hands off” advising?
  - Can you take direction/criticism from this person?
  - Use CS2002 and course projects to test fit!

# Communicating with your Advisor

- Your advisor needs to know that:
  - You are independent
  - You are reliable
  - You are excited about your research
  - You will find and read literature without pointers
  - You are capable of generating (good) ideas
  - You understand the difference between low-level tweaks and mid-level technical innovation
  - You can express your ideas and motivate them

# Communicating with your Advisor

- You need to know that:
  - (Same as above, plus)
  - Your advisor can fund you (as GSR, TA)
  - Your advisor is supportive and kind
  - Your advisor can provide the type of help you need
  - Your advisor knows about and cares enough about the direction you want to pursue
  - What else?

# Meetings with your Advisor

- Likely every week, maybe more than once a week—set a schedule (more advisable), or meet as-needed
- Summarize what your goals were in the past week – what hypotheses you aimed to test, and how you went about testing them
- Describe the methods you read about or developed
- Describe results you obtained, and interpret them– are they reliable/significant? What do they imply? What's next?
- Describe challenges you faced, how you resolved them, and how long it took
- Your advisor may or may not want to see code, depending on research area
- Agree on goals for next week

# Communication Issues: Examples

- You tried a method; you can't explain why it makes sense, or it actually doesn't make sense
- You spent a whole week working on something, but have nothing to show for it
- You waited a week for a dataset/code/something else to become available, but didn't ask your advisor for help
- You misunderstood what your advisor asked you to try

# Trust and Diligence Issues: Examples

- Your code obviously has a bug (e.g. you are getting 100% prediction accuracy on a difficult AI task) but you present the results to your advisor without analyzing them
- You accidentally deleted your advisor's dataset/work
- You missed a paper deadline (incl. missing the earlier abstract deadline to register the paper)
- You are not responding to email during business hours, on multiple occasions

# Gaining Confidence

- You have to convince yourself you can do research, starting with a small project where perhaps novelty is present, but small
- You have to be strategic about the work you do—it has to be publishable today, given the state of the field
- You have to develop a unique research identity—what do you want to be known for?

What is your work/life balance strategy?

What advice have you heard?

What advice works/doesn't?

# Resources

# Computing etc. Resources

- Department labs
- Department cluster (RIC)
- Department storage (AFS)
- Your advisor's machines
- Center for Research Computing (CRC)
- Google's Colab
- Code sharing and storage: GitHub
- Collaborative writing: Overleaf
- Reading: Google Scholar, DBLP, etc

# Research Fellowships

- Pitt: CS50
- US government: NSF Graduate Research Fellowship
- Industry: Google, Facebook, Microsoft, Amazon, IBM, NVIDIA, Qualcomm, etc.
- Foundations: Anita Borg
- Slightly outdated list:  
[https://docs.google.com/spreadsheets/d/1UpZIMvZ4AMK41MDa8zlnS817BJeeK8ZoCFdhs\\_AaVbQ/](https://docs.google.com/spreadsheets/d/1UpZIMvZ4AMK41MDa8zlnS817BJeeK8ZoCFdhs_AaVbQ/)

# Writing Resources

- The Writing Center:  
<https://www.writingcenter.pitt.edu/>

# Mental Health Resources

- University Counseling Center:  
<https://www.studentaffairs.pitt.edu/cc/>

Welcome to the program!

Questions? Comments? Concerns?