Growing Healthy Labs (2020)

Christine Y. Chen

DOI: 10.6084/m9.figshare.12660077 (or access via https://bit.ly/GrowingHealthyLabs)

Dear Reader,

July 16, 2020

If you're here, I first want to say thanks. Thanks for taking the time to look into this important subject, despite all of the perverse incentives in academia that tell you not to. I hope this resource proves worth your while.

Some backstory: I designed this workshop in 2018–2019, while I was still a graduate student. I based it around my experiences as a trained graduate student mediator providing peer-to-peer confidential conflict coaching to other students. After a few years of listening and coaching various students on their issues, I came to the dissatisfying realization that I was merely treating a symptom of a much bigger problem — that problem being **the lack of leadership, management, and mentorship skills in faculty**. As more and more students came to me with problems all having this common root, my frustration grew. So, in order to fight back against feelings of powerlessness, I tried to do something about it. And thus this workshop — Growing Healthy Labs — was born.

This workshop was aimed at aspiring faculty (graduate students and postdocs) because, frankly, broaching this subject with current faculty was too tiring. My hope is to "inoculate" aspiring faculty from making common, preventable mistakes through early exposure to these ideas presented. ***I also hope to plant seeds, and I hope these seeds will grow and sprout anew elsewhere.*** To that end, you have my permission to use these slides in whatever way is most helpful to you, under the CC BY-NC license.

These slides are slightly modified from a workshop I gave at the **Department of Geosciences at Princeton University** in **May 2019**, at the invitation of the Princeton Women in Geosciences Initiative (PWiGs). Thus, some slides are catered with specificity to that institution.

I owe a great deal of thanks to my friend and colleague, Rohini Shivamoggi, for helping me facilitate earlier versions of this workshop at MIT. I also want to make clear that I am by no means an expert: after all, I am a postdoc and have never run a lab myself. This workshop is based on my formal training in conflict management and mediation, classes on negotiation and leadership through the MIT Sloan business school, and my own self-education. This workshop also does not claim to be comprehensive — you can't cover everything there is to know in 2-3 hours. I'm still learning, too. If I were to present this workshop again, I would incorporate lessons on mentoring across racial divides (see slide 87) and how current norms surrounding lab leadership can unwittingly uphold white supremacy.

If you have any questions or feedback, feel free to reach out with a direct message on Twitter (@earth2christine) or by email (`cychen [at] caltech [dot] edu`). I would love to hear from you! In any case, thank you for reading and considering.

All the best and best of luck,
Christine

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Email template of workshop description

A healthy work environment is fundamental to good science, but we rarely discuss strategies for how to create and maintain one. Despite measurable and empirically-supported benefits associated with effective leadership, management, and mentorship for both advisors and trainees, most faculty are rarely trained in these skills. As a result, academic teams can lose time to unproductive interpersonal issues, lack of motivation, and unnecessary conflict. These problems can lead to high costs in terms of money, productivity, mental health, and retention of talent, and often disproportionately impact students from groups underrepresented in STEM fields.

In response, <SPONSORING ORGANIZATION> is pleased to offer a workshop on effective lab and personnel management for **graduate students** and **post-doctoral researchers**. The goal of this workshop is to help future principal investigators (PIs) become more effective at managing their research groups and creating inclusive spaces that develop excellent science and scientists.

In this workshop, participants will

- **learn** about recent research on the impact of leadership and lab culture on productivity and overall group well-being
- **consider** and **discuss** common evidence-based "best practice" strategies for effective personnel management
- **share** ideas and **practice** strategies for good supervision of trainees with other participants
- leave with additional resources for future self-education and formal training

Due to the interactive nature of the workshop, it is currently limited to <N> attendees. Priority will be given to members in the <fill in> Departments. To sign up, <please fill out this Google form> by <DATE>.

We hope you will consider this opportunity to learn more about managing healthy, happy, and productive research groups that enable people of all backgrounds and identities to succeed. For more information, feel free to reach out to the workshop facilitator, <NAME> (<EMAIL ADDRESS>).

Growing Healthy Labs

A workshop to improve leadership of research groups

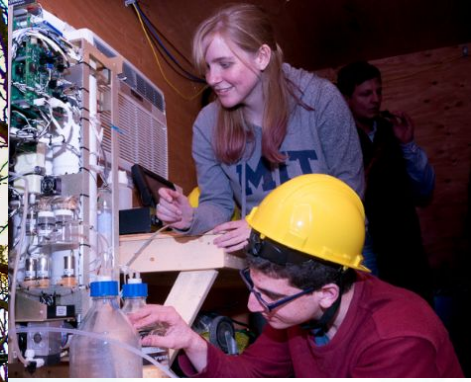
May 17, 2019

Sponsored by the **P**rinceton **W**omen **i**n **G**eo**S**ciences (**PWiGS**) Initiative

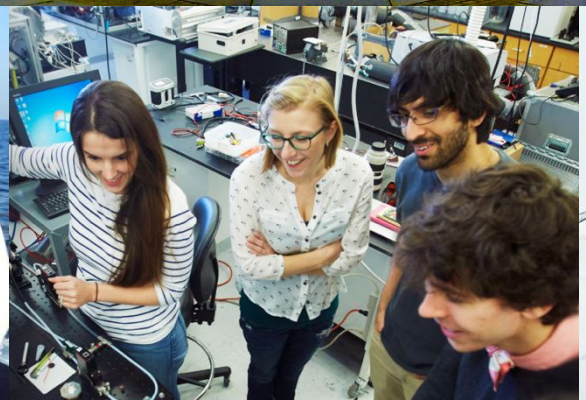
Princeton University's Informal Motto

"In the Nation's Service and the Service of Humanity"









U.S. COAST GUARD

INSIDE HIGHER ED

#News

Mental Health Crisis for Grad Students

Study finds "strikingly high" rates of depression and anxiety, with many reporting little help or support from supervisors.

By Colleen Flaherty // March 6, 2018

More academics and students have mental health problems than ever before

February 22, 2018 4.52am EST

ROBERT NEUBECKER

Mental health in academia is too often a forgotten footnote. That needs to change

By Arnav Chhabra | Apr. 19, 2018 , 2:00 PM

EDUCATION

Graduate School Can Have Terrible Effects on People's Mental Health

Ph.D. candidates suffer from anxiety, depression, and suicidal ideation at astonishingly high rates.

ISTOCK.COM/KAIPONG

Graduate students need more mental health support, new study highlights

By Elisabeth Pain | Mar. 6, 2018 , 5:55 PM

nature biotechnology a natureresearch journal

Careers and Recruitment | Published: 06 March 2018

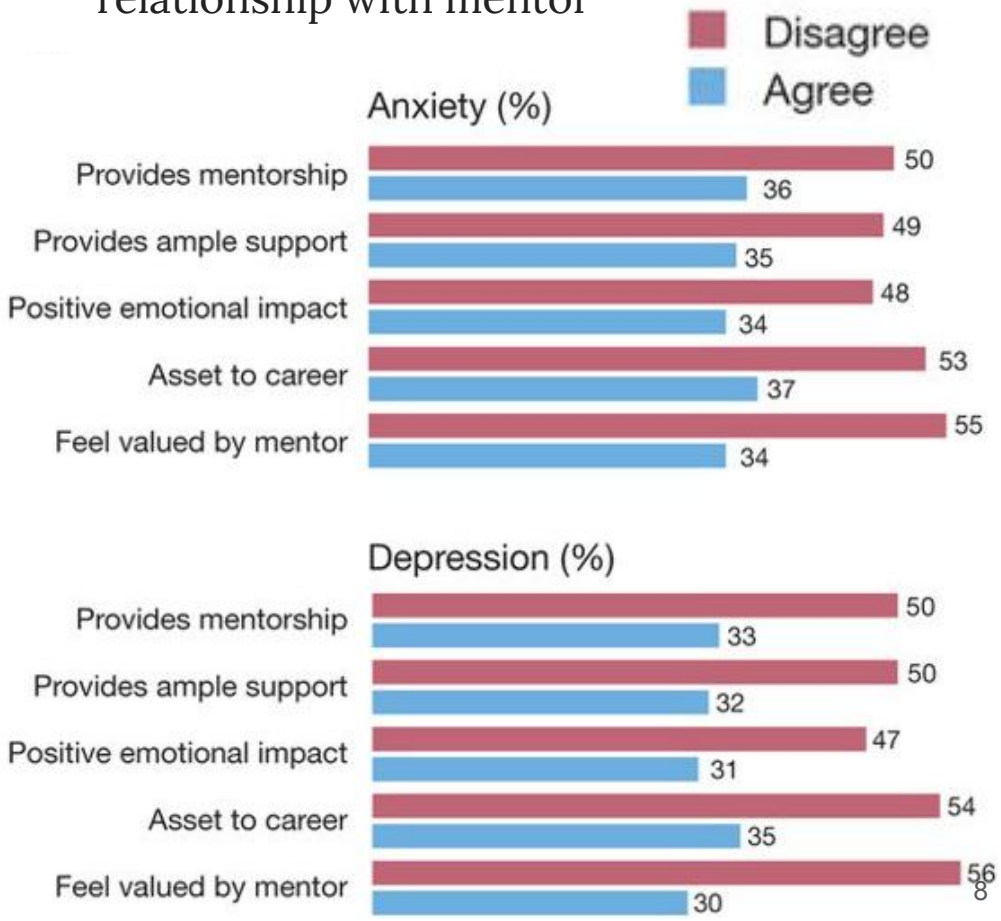
Evidence for a mental health crisis in graduate education

Teresa M Evans ✉, Lindsay Bira, Jazmin Beltran Gastelum, L Todd Weiss & Nathan L Vanderford ✉

Nature Biotechnology **36**, 282–284 (2018)

"Our results show that graduate students are more than **six times as likely to experience depression and anxiety** as compared to the general population."

Figure 1D. Effect of relationship with mentor



LEADERSHIP PROBLEMS IN THE LAB

A survey of 3,200 scientists reveals the tensions bubbling in research groups around the world.

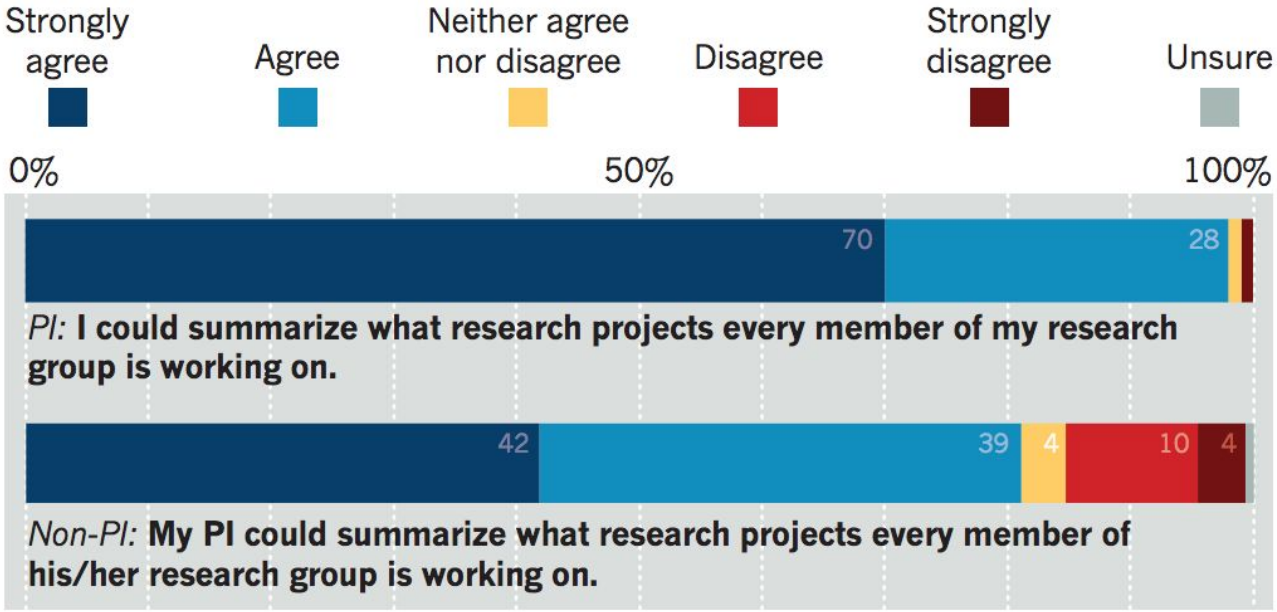
BY RICHARD VAN NOORDEN

A *Nature* survey of 3,200 scientists reveals that **poor lab and personnel management by principal investigators** (PIs) is one of the strongest contributors to an unhealthy lab culture.

Some hard numbers on science's leadership problems, Nature News, May 26 2018.
https://www.nature.com/articles/d41586-018-05143-8

PERCEPTION GAP

Principal investigators (PIs) and researchers in more junior positions have different views on how involved lab leaders are in the work of the group.



"Scientists pride themselves on being keen observers, but many seem to have trouble spotting the problems right under their noses."

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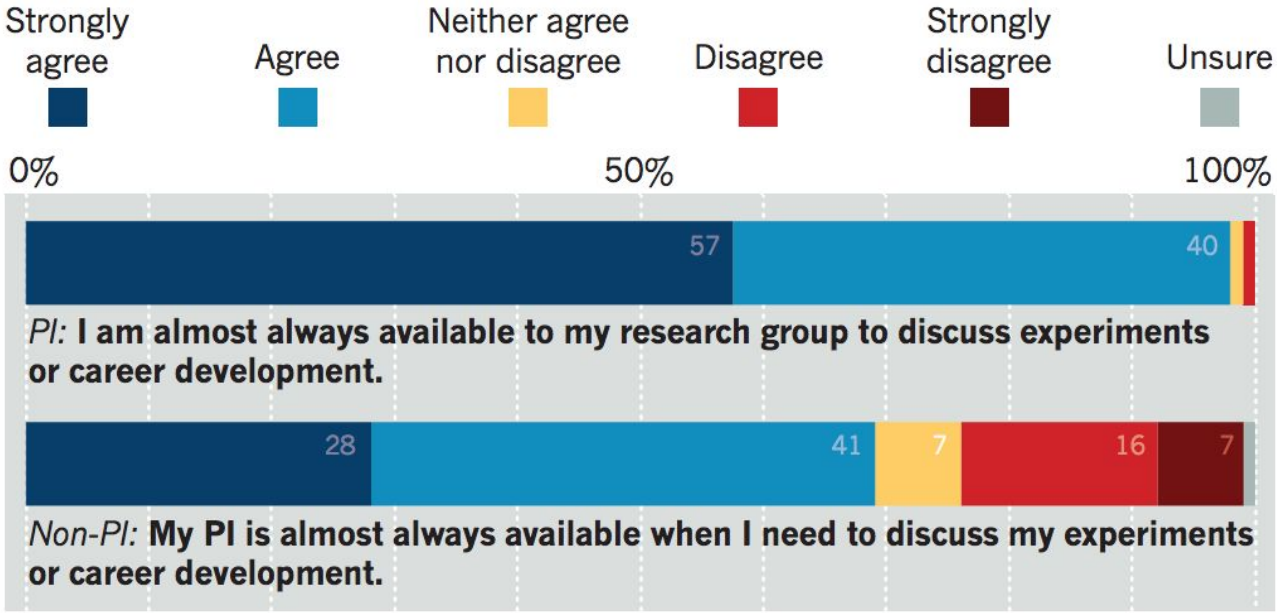

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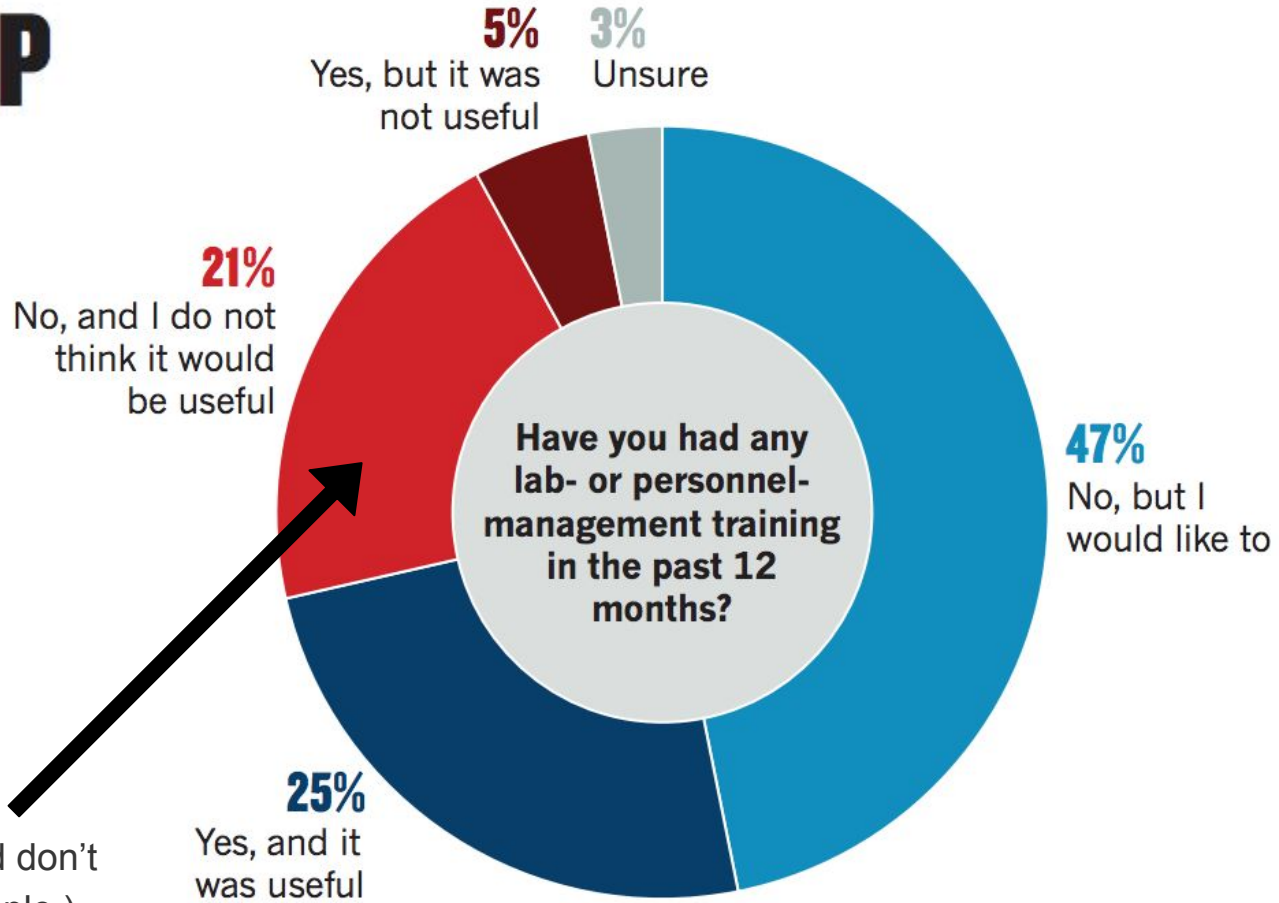
TRAINING GAP

Most PIs have ***no training*** in lab management—but nearly half want to.



(Do us all a favor and don't be one of these people.)

Some hard numbers on science's leadership problems, Nature News, May 26 2018. https://www.nature.com/articles/d41586-018-05143-8

Responsibilities of Professors

Research

- Writing papers and submitting them for publication
- Writing textbooks
- Submitting grants
- Traveling to conferences and other universities to share results
- Reading papers
- Collaborating with other researchers
- Thinking, a lot

Teaching

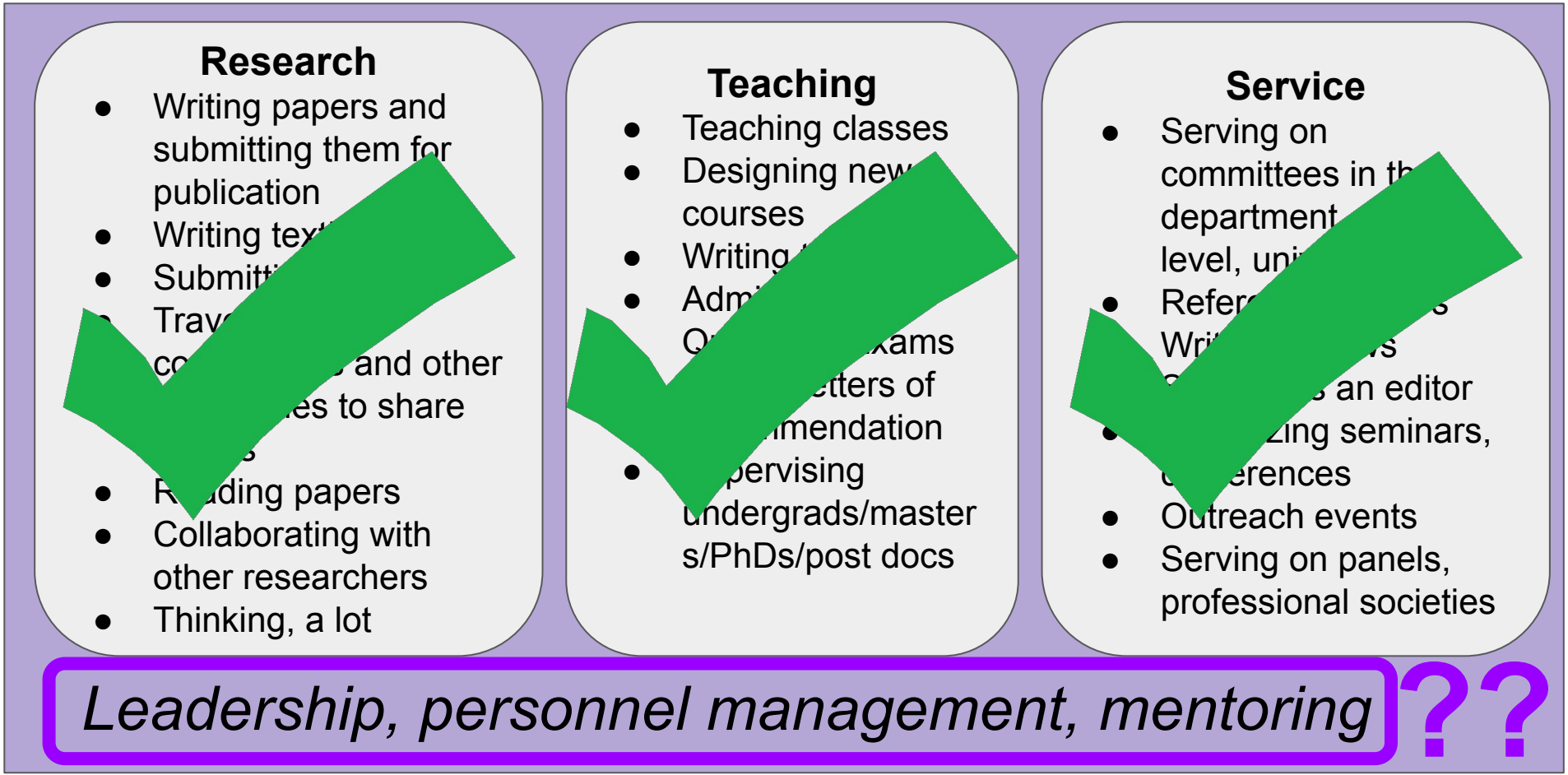
- Teaching classes
- Designing new courses
- Writing textbooks
- Administering Qualifying Exams
- Writing letters of recommendation
- Supervising undergrads/masters/PhDs/post docs

Service

- Serving on committees in the department, college level, university level
- Refereeing papers
- Writing reviews
- Serving as an editor
- Organizing seminars, conferences
- Outreach events
- Serving on panels, professional societies

What Do Professors Do?, https://www.math.uh.edu/~tomforde/WhatProfessorsDo.html

Skills we learned as students and post-docs

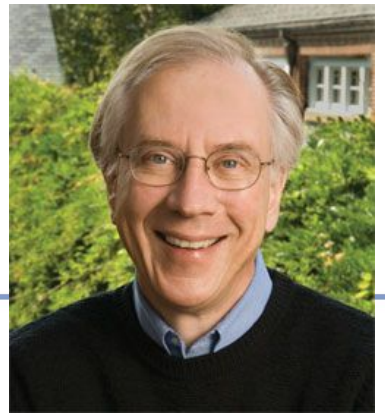


Power dynamics

If I had one piece of advice to give it's that although you've been hired for your scientific skills and research potential, your eventual success will depend heavily on your ability to guide, lead, and empower others to do their best work.

—Thomas Cech, HHMI

(Quoted in 2006)



HHMI President (2000–2008)

Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty. Burrough Wellcome Fund and Howard Hughes Medical Institute (2006). Link to Guide (free PDF)

STEM EDUCATION

To build a scientist

Thought leaders across the globe answer one question: what is the biggest missing piece in how we educate scientists?

"Something that we in the scientific community have not confronted very well is how to get [students and postdocs] to focus on interacting productively with other people. **Learning to manage teams and to work with others is going to become more important**...

The biggest part of leading a lab is getting the best work out of technicians, trainees and even colleagues. Typical programmes include little or no training in people management... It took a while before I learned how to guide students without tearing down their self-confidence or how to motivate students in different ways depending on their personalities."

Dr. Robert Tjian, former President of the Howard Hughes Medical Institute (2009–2016)

STEM education: To build a scientist, NatureJobs, July 15, 2015. https://www.nature.com/naturejobs/science/articles/10.1038/nj7560-371a

Science professors need leadership training

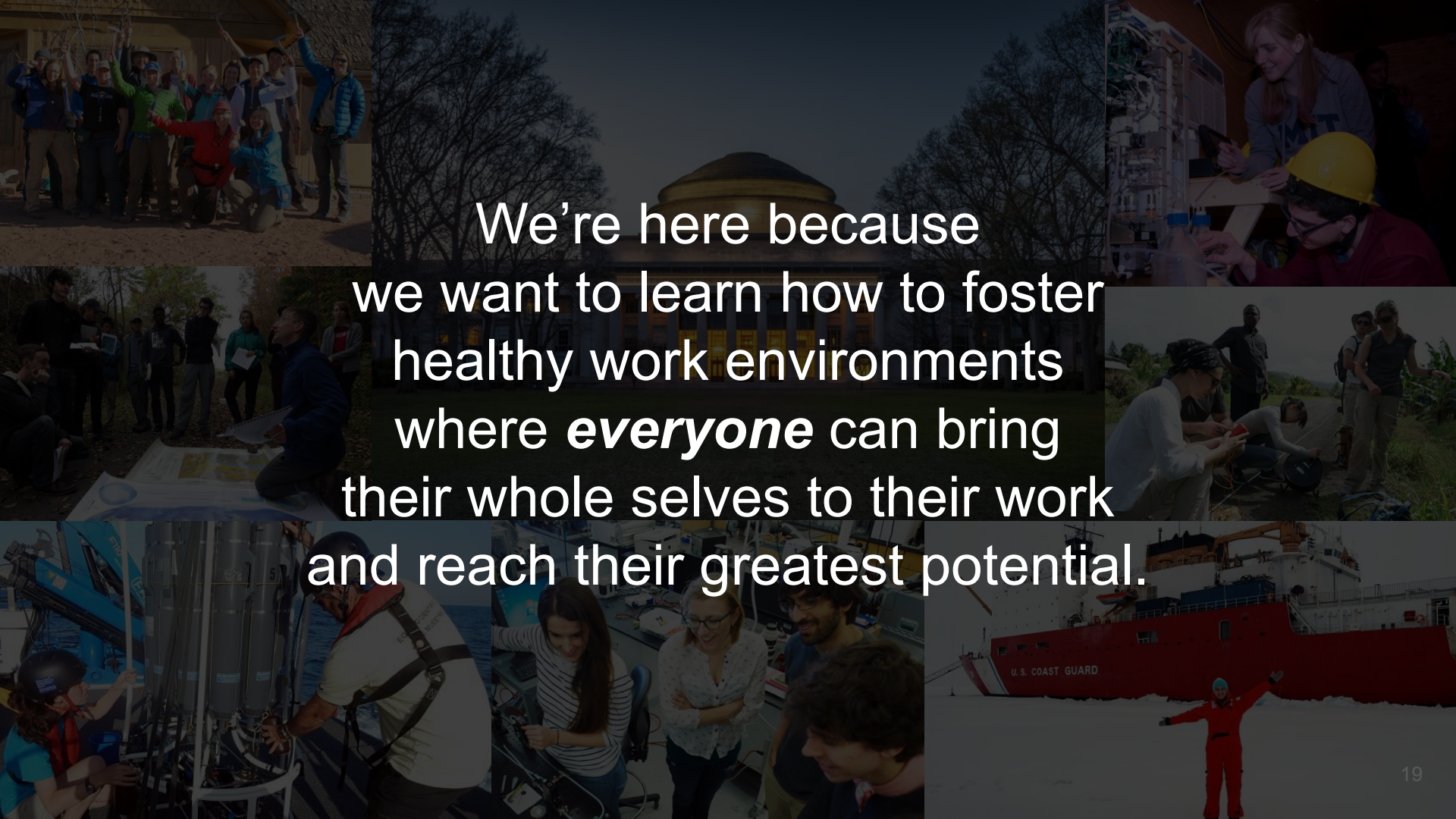
To drive discovery, scientists heading up research teams large and small need to learn how people operate, argue **Charles E. Leiserson** and **Chuck McVinney**.

16 JULY 2015 | VOL 523 | NATURE | 279

"Professors must update and develop their technical skills throughout their careers. But as they progress, few take the time — or are offered the opportunity — to become educated in **how to be an effective leader**.

As a consequence, academic teams **waste time** dealing with **unproductive interpersonal issues**, **lack of motivation** and **unnecessary conflict**. When things do not run smoothly, the costs in terms of **money**, **productivity** and **retention of talent are high**."

Lifelong learning: Science professors need leadership training, Nature Comment, July 15 2015.
https://www.nature.com/news/lifelong-learning-science-professors-need-leadership-training-1.17955


We’re here because
we want to learn how to foster
healthy work environments
where ***everyone*** can bring
their whole selves to their work
and reach their greatest potential.
U.S. COAST GUARD

Workshop Objectives

- **Learn** about recent research on the impact of leadership and management on productivity and overall group well-being.
- **Consider** and **discuss** common “best practice” strategies for effective management.
- **Share ideas** and ***practice*** strategies for good supervision of trainees with other participants.
- **Equip ourselves with tools, resources, and direction for future self-education and formal training.**

It’s not possible to learn or talk about everything we ought to learn in 2 hours!

(If you leave realizing you know *less* than you thought you did about this topic, then I’ve done my job.)

It’s not possible to learn or talk about everything we ought to learn in these 2 hours together.
We will be missing many important topics.

Today, you will be given ***seeds*** to
further cultivate and grow.

A little bit about me, and where I'm coming from

We are a support network of graduate student mediators (**REFS**) who have completed extensive training with Conflict Management@MIT to provide low barrier, confidential peer-to-peer coaching, listening, de-escalation, and informal mentoring and mediation to students and post-doctoral researchers.

REFS Website for MIT Earth, Atmospheric, & Planetary Sciences (EAPS REFS)

There is no “gold standard model” for how to lead, manage, or supervise!

- **I am *not* an expert!** Collectively, you all are. I am a facilitator.
    - I will be going through some slides quickly to maximize the amount of time for interaction. You will get access to these slides after the workshop.
- **This is a group conversation.**
- **Please be respectful** of others as you share ideas and ask questions.

Ground rules for respectful conversations

- Focus on ideas, no directed personal comments.
- All voices should be heard — listen to each other and don't dominate the conversation.
- Seek to understand others' perspectives — yet don't ask individuals to speak for a group
- Listen attentively
- "Ouch and Educate": Permission to speak up if you feel uncomfortable or if comments are offensive in some way. Help others to see your perspective.
- Honor confidentiality.
- Be kind to yourself and others.

Would anyone like to add anything else?

Agenda: Part 1

#	Time	Topic / Activity	
1	5 min	Introduction: The case for leadership and management training in academia	
2	5 min	**Active Learning Role-Playing Scenario**: Meeting between a Graduate Student and their Adviser	Introduction and instructions
	5 min		Individual preparation
	15 min		Role-Play (in groups of 2, or 3 with Observer)
	20 min		Debriefing and discussion with whole group
	10 min		Introduction to best practices: Establishing expectations, “psychological safety”, lab manuals
-	5 min	Individual reflections and reading or break	

Agenda: Part 2

interactive | individual | slides

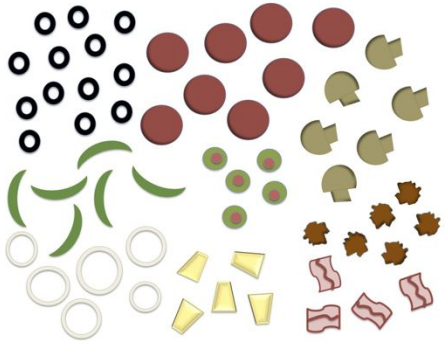
#	Time	Topic / Activity
3	15 min	Conflict: Why do we need to handle conflict better than we do?
4	15 min	Small group discussion of everyday conflict situations
5	5 min	Fish-bowl role-playing (if time)
6	10 min	**Open discussion**
7	5 min	Workshop Evaluations and Reflection
	3 min	Sharing of Workshop Takeaways

Icebreaker: Blitz Edition!

Both you and your partner have **30 seconds total** to find out the following about each other:

- Your name (what you liked to be called)
- Your employment status (grad student, postdoc, faculty, or other)

And your choice of ONE of these pieces of information:

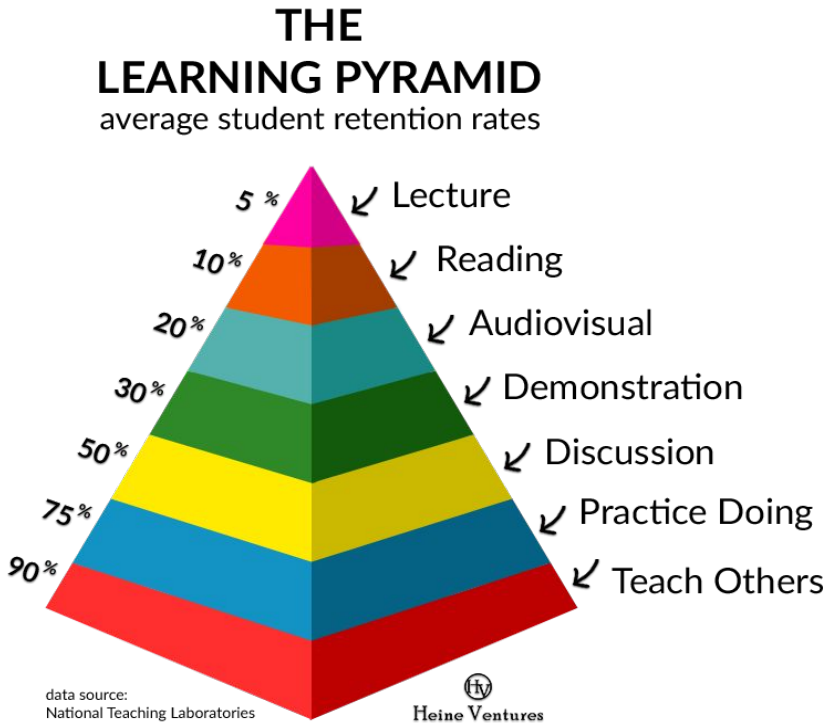


- Favorite pizza topping
- Superpower (real or wishful)

You are going to introduce your partner to the rest of the group!

Intro: Using Role-Plays in Educational Settings

- Role play is an activity in which learners take on roles and act out scenarios.
  - Our scenario: **A meeting between a graduate student and their faculty advisor.**
- Role-playing is a type of **active learning technique**.
  - Deep learning
  - Long-term retention
  - Memorable and powerful



Intro: Using Role-Plays in Educational Settings

- The purpose is to provide an **active learning experience** in a **safe, non-threatening setting** where issues can be explored without being a real problem.
  - “Inoculation model”: Practicing these conversations helps you be prepared for the real situation.
- After the role play, **we will regroup** and discuss the experience.
- Observer role available for anyone very uncomfortable with the activity.

- There is no “right” answer in role-plays!
- Also, no good or bad guys.
- Engage authentically to get the most out of this.

Instructions

- Each of you was assigned the role of the **STUDENT** or the **FACULTY** adviser.
- We will take ~4-5 min for everyone to individually read their role and plan for the meeting.

- Find a partner who has the *opposite* role as you. **Find someone you do not normally interact with on a professional basis**. **DIFFERENT FLOOR**
- You and your partner will sit together somewhere in this room — spread out.
- When you're ready, begin the role play (~10 minutes).
  - Role-play starter dialog on page 3 is for those who need help warming up.

- One chime = 2 minutes left!
- Two chimes = 1 minute left!
- Three chimes = Return to your seat! (Try to sit near your partner.)

Discussion of Role-Play Scenario

Remember, there are no “right” or “wrong” answers!

How did it go?

Discussion of Role-Play Scenario

Remember, there are no “right” or “wrong” answers!

For those playing the student:

What were your concerns?

How did you understand the situation?

For those playing the faculty:

What were your concerns?

How did you understand the situation?

Discussion of Role-Play Scenario

Essential facts of the two main roles:

FACULTY

- Expects to get the actual data for the paper drafted
- Expect a quick, professional meeting
- Style is to ask questions, and not overly direct students
- In a hurry

STUDENT

- Wants to work up to the issues with the study results
- Goal is building and maintaining the relationship
- Thinks the advisor may believe they have results that they don’t have yet
- Wants to propose starting the project over

Discussion of Role-Play Scenario

Remember, there are no “right” or “wrong” answers!

- How closely do the two versions that emerged in discussions match?
  - Aligned? What was helpful in eliciting information and establishing trust, leading to a useful and constructive discussion?
  - Not aligned? What kept the two versions from aligning? Was information missing? What kept it from coming out?

Discussion of Role-Play Scenario

Remember, there are no “right” or “wrong” answers!

What would be the most productive way for the student to communicate the bad news?

Who should take the next steps here? Why?

Is there a good outcome to this situation?

Discussion of Role-Play Scenario

What role do mismatched expectations play in what was taking place?

What could the student or the adviser have done earlier to change or prevent the current outcome?

Role-Play Scenario Summary

The following is an excerpt from the official summary of the role-play:

"This scenario **highlights the mismatch of expectations** that can arise in a mentoring relationship between a graduate student and a research adviser. The adviser wants a solely professional relationship, but the student seeks a more personal relationship. Their **inconsistent desires** lead to **inconsistent expectations** about how long they should meet and what they should discuss, and subsequently to **misunderstandings** about the preliminary results..."

"This role-play scenario illustrates a common situation in which **each person starts with only partial information**… To ensure that each person receives complete information, **the professor and student must communicate openly**: the student should convey the bad news about the results clearly, and the professor should criticize the student's behavior constructively. But **the situation is risky** because each person will be disappointed by the other's information."

Role-Play Scenario Summary

The following is an excerpt from the official summary of the role-play:

"To communicate in a risky situation (Patterson et al., 2002), each person should first state the facts and his or her own interpretation of the facts, then invite the other's interpretation. Each person should use tentative language. Each should listen carefully to the other, asking questions for clarification."

The professor might say,

"I notice that you are spending a lot of time organizing social events.

(*States facts.*)

I am concerned that this is taking time away from the experiments we had previously discussed.

(*Shares personal tentative interpretation.*)

How do you see the situation?"

(*Invites interpretation with a question.*)

The importance of communicating expectations

Based on our experience with students as REFS, the leading *underlying* source of unhappiness, stress, and anxiety is conflicts between advisors and advisees is due to a **lack of communication and understanding of expectations.**

Ask yourself:

What do you expect from your trainees, and what can they expect from you?

Student-Advisor Expectation Scales

Read each of pair of statements describing end points on a continuum. Estimate your position and mark it on the scale. For example, if you believe very strongly that it is the advisor's responsibility to select a research topic for the student, on scale #1 you should circle '1'. If you think that both the advisor and student should be equally involved, circle '3'.

The other side of this document describes ways to use this worksheet.

Course of Study & Dissertation Planning			
1.	The advisor should suggest and approve which courses the student takes.	**1 2 3 4 5**	Students should solely determine which courses they take.
2.	It is the advisor's responsibility to select a promising dissertation research topic.	**1 2 3 4 5**	The student is solely responsible for selecting the dissertation topic.
3.	The advisor should select the other members of the dissertation reading committee.	**1 2 3 4 5**	The student should select the members of the dissertation reading committee.
Contact & Involvement			
4.	The advisor should determine when to meet with the student.	**1 2 3 4 5**	The student should decide when to meet with the advisor.
5.	Faculty-student relationships are purely professional and personal matters are not appropriate.	**1 2 3 4 5**	Close personal relationships are essential for successful advising.
6.	The advisor should check regularly that the student is working consistently and on task.	**1 2 3 4 5**	Students should work independently without having to account for how they spend their time.
7.	The advisor should be the first place to turn when the student has problems with the research project.	**1 2 3 4 5**	Students should try to resolve problems on their own, including seeking input from others, before bringing a research problem to the advisor.

WORLD VIEW *A personal take on events*

The key to a happy lab life is in the manual

A well-crafted set of guidelines and advice can save time, reassure trainees and promote a positive lab culture, argues **Mariam Aly**.

6 SEPTEMBER 2018 | VOL 561 | NATURE | 7

MY TRAINEES DO NOT **HAVE TO STRUGGLE** TO FIND ANSWERS TO **COMMONLY ASKED** QUESTIONS.

"I put into writing **things that are usually transmitted informally**. For example, that it doesn't matter to me whether trainees arrive at 9 a.m. or 1 p.m. or work from home, as long as they get their work done and honour their commitments."

Mariam Aly, *Nature News & Comment*, 5 September 2018. https://www.nature.com/articles/d41586-018-06167-w Lab manual: https://github.com/alylab/labmanual/blob/master/aly-lab-manual.pdf

The key to a happy lab life is in the manual

A well-crafted set of guidelines and advice can save time, reassure trainees and promote a positive lab culture, argues **Mariam Aly**.

"Here's another example: my lab manual states that trainees are entitled to read my grants, and my lab members have requested to see them. **That's something I never asked my previous advisers; I worried it would be presumptuous**. I realize now that my thinking was almost certainly wrong, but my own uneasy feelings as a trainee just drive home how **important it is to put into writing that something is OK** — otherwise, trainees might assume it is not. That goes double for the areas that trainees are most sensitive about: **I've written down in black and white that it is OK to make mistakes and to maintain a work–life balance."**

Mariam Aly, *Nature News & Comment*, 5 September 2018. https://www.nature.com/articles/d41586-018-06167-w Lab manual: https://github.com/alylab/labmanual/blob/master/aly-lab-manual.pdf

Classic example: The laptop

Penelope is a few months into graduate school and needs a new laptop, but they're afraid to bring it up with their advisor.

Is it presumptuous to ask my advisor to pay for a new laptop?

It's been a few months now… what if they are annoyed that I didn't ask sooner?

Will my advisor think less of me for bothering them with such a trivial question? I want to appear competent...

I feel like I should already know the answer to this...

Use lab manuals to communicate: **What do you expect from your trainees, and what can they expect from you?**

Benefits include the following:

- **Saving time**: Easier on-boarding of new group members, knowledge transference, FAQs, standard protocols
- **Equal access to information**: Decreases the implicit disadvantages for those not already knowing the "hidden curriculum" (*e.g.*, first-generation, international students) or for those who have a different background or identity to the PI
- **Imbue sense of purpose in individuals**: Team members better understand the PI's vision and where they fit in the big picture
- **Deeper insight for prospective trainees**: Grad students and postdocs can assess if the PI's vision and management style is aligned to their own goals, saving potential disappointment for all parties
- **Promotes feedback, in both directions**: When expectations are not being met, or codes of conduct being crossed, easier to refer to a document when having difficult conversations–for both trainees and PIs (recall the "perception gap")

The following slides show **examples** of different lab manuals. This is ***not* an endorsement** of the content or language within them — each PI has their own vision and plan for how they want their lab to function.

You may find that you disagree with some policies mentioned, which is all the more reason to be explicit in communicating your own expectations.

Use these as **guidance** for what **topics** to cover in your own lab manual.

Lab manuals

Communicate your expectations, preferences, and any standard protocols; save time with on-boarding and knowledge transference.

Dr. Katharine Huntington
Associate Professor, Geochemistry & Tectonics,
Univ. of Washington
Link to lab manual

Graduate Student Expectations & Information

This document is intended to provide a clear framework for our professional interaction, by making clear what my expectations are of you and facilitating a discussion of what your expectations are of me. Read this and discuss any questions, issues, or suggested changes. Remember that our professional relationship is a two-way interaction, and you are equally responsible for keeping the lines of communication open.

Goals

You may have many reasons for entering our graduate program. Regardless of your exact reasons, your major goal should be learning how to be a professional scientist, and my major role as a mentor is to help you learn how to develop into a professional scientist.

As a mentor, my specific goals are to:

- teach you how to do rigorous science and guide you on project(s) of mutual interest
- help you bring your project(s) to a conclusion through publication

An excellent example of communicating expectations

Dr. Kay Tye, associate professor of Brain & Cognitive Sciences at MIT

“Above all, I expect everyone to do their very best and to be aware and communicative of what you need to be happy and feel fulfilled.”

Note that it is simply the **explicit statement of expectations** that makes this great—you may have different expectations of your lab group!

Expectations are from Dr. Kay Tye’s website: https://tyelab.mit.edu/philosophy/

Table of Content

- The Tye Lab Mission
- Expectations of all Lab Members
- Expectations of Post-Docs
- Expectations of Graduate Students
- Expectations of UROPs
- Expectations of Staff
- Expectations of Kay

The Tye Lab Mission

To make a lasting impact on the field of behavioral neuroscience. To make a great impact on the field, we must achieve the following tasks:

- Perform well-designed experiments that lead us to exciting and novel discoveries.
- Communicate these findings within and beyond the greater scientific community.
- Mentor trainees to become some of the best neuroscientists of their generation.

Expectations of all Lab Members

Above all, I expect everyone to do their very best and to be aware and communicative of what you need to be happy and feel fulfilled. I expect you to work both individually and as part of a team, and open and honest communication is an absolute must. More specifically, I

Lab manuals

Communicate standard protocols

Dr. Matthew Turk
Assistant Professor,
The Data Exploration Lab,
UIUC
Link to lab manual

Welcome to the Data Exploration Lab

In the Data Exploration Lab (DXL) we explore the intersection between data, analysis, visualization and computational science.

tl;dr: data is fun when it has a metric. Let's do cool things with that.

This document is designed to be a reference document for lab members as well as part of an "onboarding" process when folks join the lab. It is a living document, and lab members are encouraged to submit pull requests if they wish to update it.

Contents:

- Lab Code of Conduct
  - The Quick Version
  - The Less Quick Version
- Mission Statement
  - Short Version
  - Long Version
  - Core Values
  - DXL and yt
- Expectations
  - Authorship
  - Project Ownership
  - Lab Presence and Environment
  - Data Management
  - Openness
  - Record Keeping
  - Reproducibility
  - Ethics
  - Acknowledgments
- Infrastructure Guide
  - Compute Resources
  - Shared Storage
  - Version Control
  - Accounts
  - Tools
  - Purchasing
- Communication
  - Venues
  - Detail Level
  - External Projects
  - Social Media Policy
- Coding and Software
  - Coding Standards
  - Commenting
  - Licensing
  - Languages
  - Using Other Code
  - Project Leadership
- Writing Papers
  - Figures Directory
  - Data Directory
  - Scripts Directory

Lab manuals

Communicate standard protocols

Dr. Matthew Turk
Assistant Professor,
The Data Exploration Lab,
UIUC
Link to lab manual

Data Management

When data is used by the lab, it is expected to reside on the shared filesystem. Accompanying this should be an index or README file describing what the data *is*, where it originated from, and what restrictions there are on its use. When data is stored on the shared filesystem, there is no expectation of privacy within the lab unless it is explicitly enforced; for special cases this can be dealt with differently. Lab members are not encouraged to browse other directories, but it is not forbidden. For example, this might be an example directory structure::

```
/dpool/mturk/DarkSkySims-DS14a/README
/dpool/mturk/DarkSkySims-DS14a/ds14_a_1.0000.sdf
/dpool/mturk/LIDAR-Philly/README
/dpool/mturk/LIDAR-Philly/data*
/dpool/mturk/HRRR-20140726/README
/dpool/mturk/HRRR-20140726/dir1/*
/dpool/mturk/HRRR-20140726/dir2/*
```

and so on. In the near-term future, we will be deploying a data cataloging system which will be fed with the data from README files, and which will be the primary cataloging system in the future.

Lab manuals: There is no “gold standard” model

What’s important is to clearly convey **the way you want your lab to run** so that your supervisees don’t have to guess and stress.

Meetings with students

Dr. Katharine Huntington
Associate Professor, Geochemistry & Tectonics,
Univ. of Washington
Link to lab manual

“We will meet individually, on an **as-needed basis**. Please **bring your calendar** to each meeting so that we can talk about goals and future meetings.”

“I'm a proponent of regular faculty-student meetings, where at a minimum, **we meet once a week**… I would like you to **always bring a notebook** to write down our agreed upon tasks.”

Dr. Tolulope Olugboji
Assistant Professor, Seismology
Univ. of Rochester
Link to lab manual

Dr. Olugboji would like to thank Ed Ganero for providing a starting basis for his guide.

Lab manuals: There is no “gold standard” model

What’s important is to clearly convey **the way you want your lab to run** so that your supervisees don’t have to guess and stress.

Expected presence at work

Dr. Katharine Huntington
Associate Professor, Geochemistry & Tectonics,
Univ. of Washington
Link to lab manual

“**I don’t keep track of your hours**… flexibility is a major perk of academia and working from home can sometimes can be very efficient; but make sure you’re not a ‘stranger’ to me, the lab group, or the department in general.”

“If you are a night owl, that’s fine; I am too. I only ask this: **that a portion of your day overlaps with mine** so that we can interact. My typical day is around 9:30am-8:30pm…”

Dr. Tolulope Olugboji
Assistant Professor, Seismology
Univ. of Rochester
Link to lab manual

Lab manuals: There is no “gold standard” model

What’s important is to clearly convey **the way you want your lab to run** so that your supervisees don’t have to guess and stress.

Vacation during breaks

Dr. Katharine Huntington
Associate Professor, Geochemistry & Tectonics,
Univ. of Washington
Link to lab manual

“You may find that in order to get everything done, it may take you 45–60 hours/week to complete your work. **Sometimes, this will mean working weekends or during University breaks**.”

“I do not consider spring break a vacation time. **Spring break, winter break, and summer time are when we get our research done**… Please adopt the model of 2-3 weeks per year of vacation.”

Dr. Tolulope Olugboji
Assistant Professor, Seismology
Univ. of Rochester
Link to lab manual

Lab manuals: There is no “gold standard” model

What’s important is to clearly convey **the way you want your lab to run** so that your supervisees don’t have to guess and stress.

Authorship and writing papers

Dr. Katharine Huntington
Associate Professor, Geochemistry & Tectonics,
Univ. of Washington
Link to lab manual

“First authorship means that you have performed the majority of the intellectual and physical effort, completed the project, and conducted the majority of the writing.”

“Keep in mind: you are the author. The first author writes the document. If I write the paper, I am first author. If you write it, you are first author.”

Dr. Tolulope Olugboji
Assistant Professor, Seismology
Univ. of Rochester
Link to lab manual

Written expectations guidelines ≠ **rigid** and **inflexible**!*

Use the document as a base for ***conversation*** between you and your mentee on how you can best support each other in your goals.

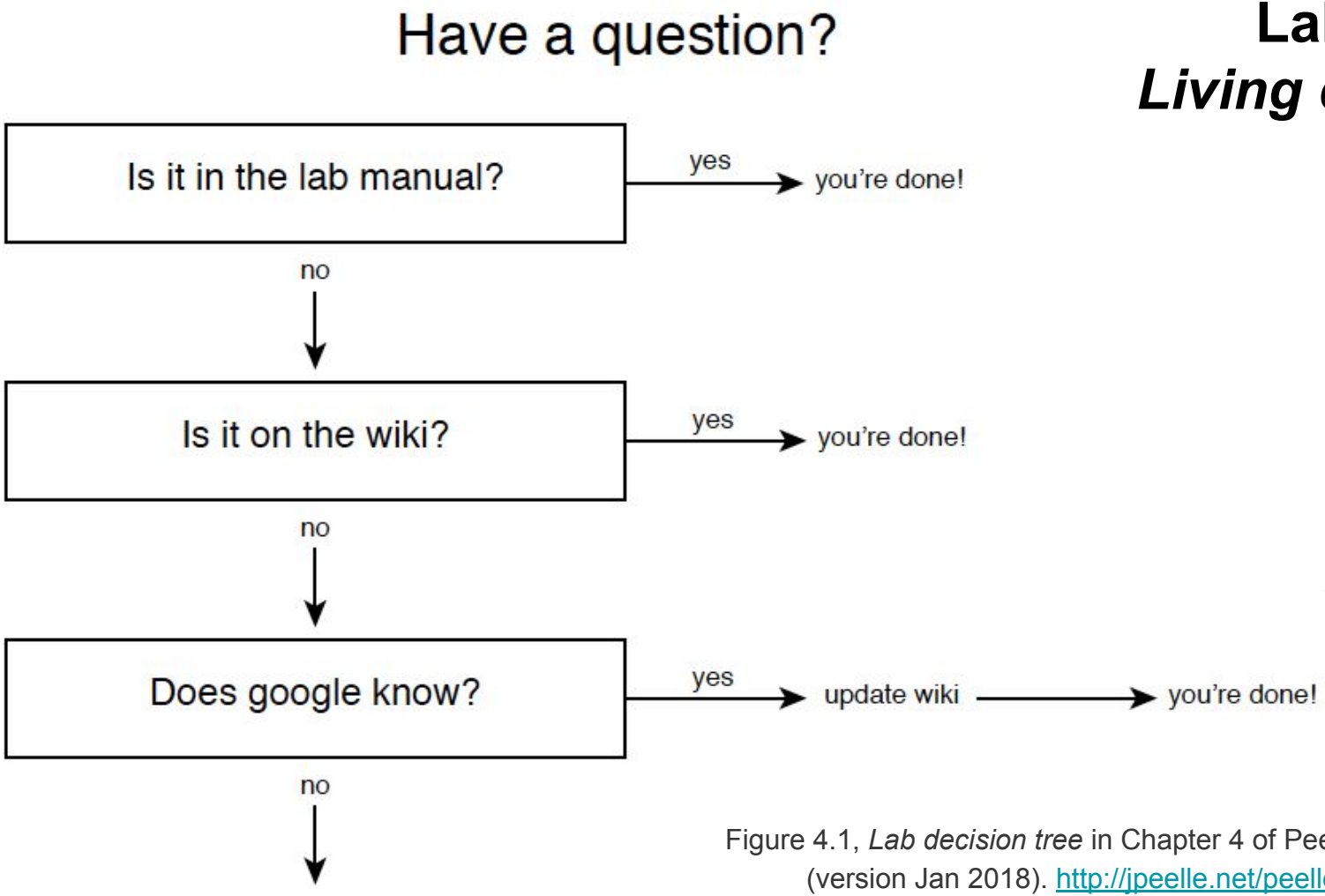
Give your trainees ***confidence*** to reach out to you with their needs.

Mentors AND mentees should ask themselves, and then discuss together.

What do you expect from your trainees, and what can they expect from you?

*Except for rules that pertain to safety.

Lab manuals: *Living documents*



Dr. Jonathan Peele
Associate Professor of Otolaryngology
Wash U at St. Louis

Figure 4.1, *Lab decision tree* in Chapter 4 of Peele's Lab Manual (version Jan 2018). http://jpeelle.net/peellelab_manual.pdf

Lab manuals: *Living documents*

Dr. Jonathan Peele
Associate Professor of Otolaryngology
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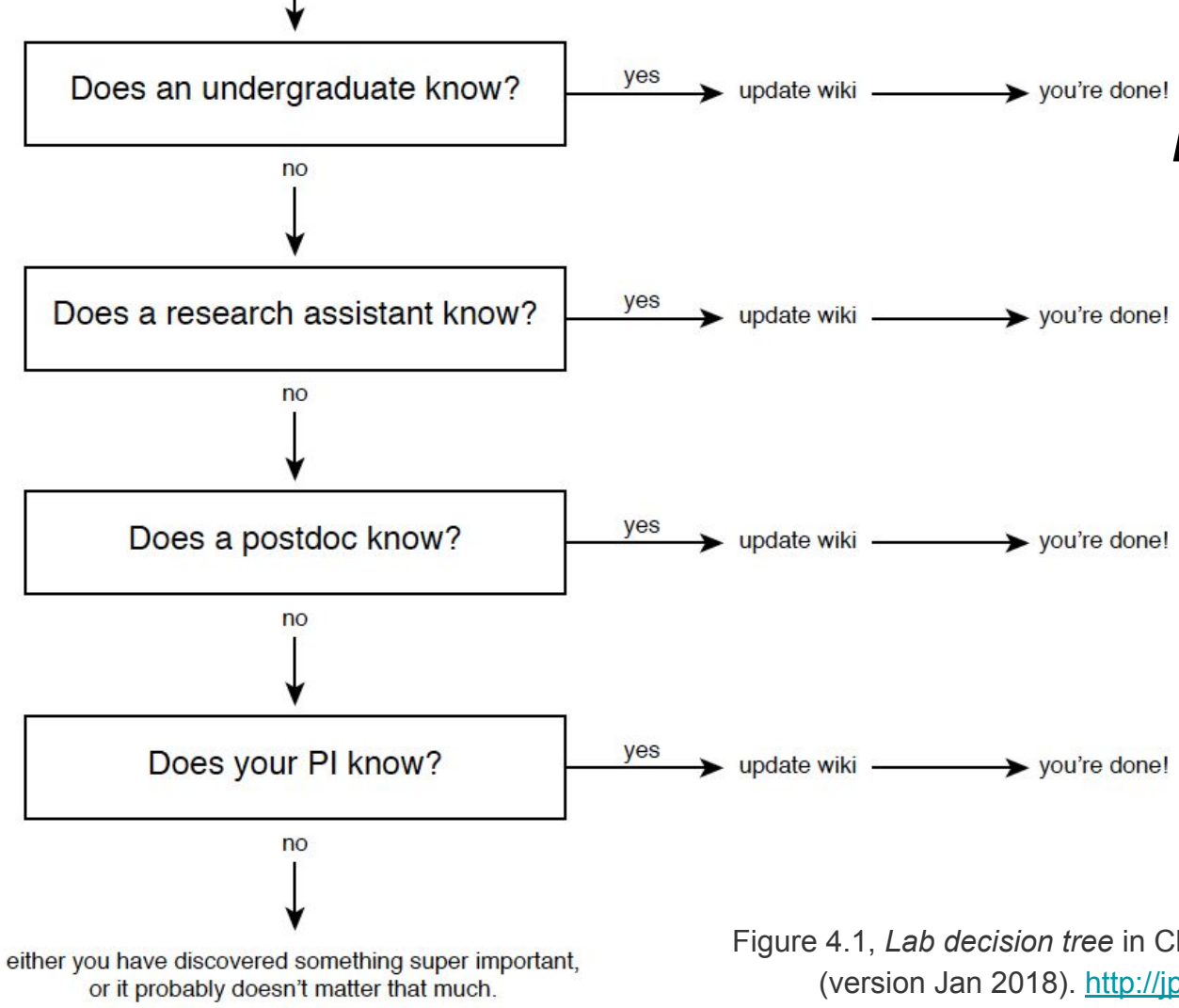


Figure 4.1, *Lab decision tree* in Chapter 4 of Peele's Lab Manual (version Jan 2018). http://jpeelle.net/peellelab_manual.pdf

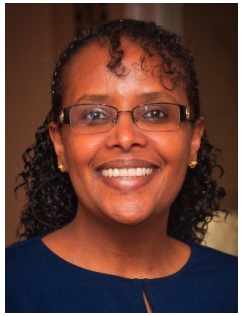
Other questions/topics to consider when writing your manual

- What is your vision for how your group will contribute positively to **diversity, equity, and inclusion (DEI)** in your field? What is your policy for time spent doing DEI work and outreach? If you are supportive, how will you show that — what support can your trainees expect from you?
  - Dr. Aradhna Tripati, UCLA, climate & biogeochemistry
  - Dr. Dawn Sumner, UC Davis, geobiology
  - Dr. Kevin Anchukaitis, U Arizona, dendrochronology
  - Dr. Asmeret Asefaw Berhe, UC Merced, soil biogeochemistry

- Can your expectations be reasonably met by people of all backgrounds, identities, and abilities? (e.g., people who are **caretakers**, **those who want to have a family**, **disabled/chronically-ill**)
  - *If not, why?*

Dr. Aradhna Tripati

Dr. Dawn Sumner



Dr. Asmeret Asefaw Berhe

Dr. Kevin Anchukaitis

List of Lab Manual Examples

- Mariam Aly, Neuroscience, Columbia University: https://github.com/alylab/labmanual
- Katherine Huntington, Geochemistry & Tectonics, UW: http://faculty.washington.edu/kate1/ewExternalFiles/Huntington%20Group%20Guidelines%20for%20Graduate%20Students%202016.pdf
- Paul Minda, Psychology, University of Western Ontario: https://osf.io/fztua/
- Hayley Whitaker, Cancer Research, University College London: https://github.com/WhitakerLab/Onboarding
- Melissa A. Wilson, Sex Chromosome Lab, ASU: http://www.sexchrlab.org/lab#/expectations
- Glenn Beher, Evolutionary Psychology, SUNY New Paltz: https://faculty.newpaltz.edu/glenngeher/new-paltz-evolutionary-psychology-lab-member-orientation-page/
- Kay M. Tye, Systems Neurobiology, Salk Institute: https://tyelab.org/philosophy/
- Jonathan Peelle, Cognitive Psychology, Washington University at St. Louis : http://jonathanpeelle.net/blog/2016/01/07/maintaining-a-lab-manual
- Mathew Ling, Psychology, Deakin University: https://osf.io/kgd9b/wiki/home/
- Candice Morey, Brain and Cognition, Cardiff University: https://ccmorey.github.io/labHandbook/
- Talia Lerner, Neuroscience, Northwestern University: https://docs.google.com/document/d/1phmA17c_hkAfLZN1yMXtFlCYlEqXEc8izEQsfoqgdTY/edit
- Mary Salcedo, Post doc at the Socha Lab at Virginia Tech: https://docs.google.com/document/d/1t7P2m9bGRUJfQ54lNQlYqC1LBCQJTkPc7ObU_eo_yMk/edit

- Twitter thread on main topics to cover in lab manuals: https://threadreaderapp.com/thread/1139733291899080705.html

Lab manuals: Establishing clear expectations for less mind reading

Lab manuals can prevent or lessen the severity of many stressful situations, but it's not a catch-all.

Remember, there are ***power dynamics.***

Recall the **perception gap.** How can you do your job as a PI if you're not getting all the facts?

How can you encourage trainees to tell you what is or what isn't working—upward feedback—and to also share feedback with each other?

How can you prevent your own unconscious "***affinity bias***" from influencing who you are successful in mentoring and working with?

Foster “psychological safety”

“In 2015, Google published their results from a two year study into what makes a great team… it wasn’t necessarily teams with the most senior people, highest IQs or even teams that made the fewest mistakes… **psychological safety** stood out as the most important factor.”

According to Dr. Amy Edmondson, who coined the term:

> “Psychological safety is a belief that one will not be punished or humiliated for speaking up with ideas, questions, concerns or mistakes.”

Dr. Amy C. Edmondson
Novartis Professor of Leadership and Management
Harvard Business School

What is psychological safety?
https://blog.impraise.com/360-feedback/what-is-psychological-safety-and-why-is-it-the-key-to-great-teamwork-performance-review

What Google Learned From Its Quest To Build the Perfect Team:
https://www.nytimes.com/2016/02/28/magazine/what-google-learned-from-its-quest-to-build-the-perfect-team.html

What is **psychological safety**?

A team feels **psychologically safe** when members share the belief that they will not be punished or humiliated for engaging in learning behaviors such as

- asking for help
- seeking feedback
- admitting errors or lack of knowledge
- trying something new or
- voicing work-related dissenting views.

A. Edmondson (1999) "Psychological Safety and Learning Behavior in Work Teams"

Interpersonal or social threats are things like:

- being branded negatively (ignorant, incompetent, or disruptive);
- being responded to with ridicule, rejection, blame, disrespect, anger, intimidation, disregard;
- or, being punished (with negative performance reviews).

Harri Kaloudis, *What Do Psychologically Safe Teams Work Teams Look Like?*

Reflect: Is your research group **psychologically safe**?

Think for a moment about your work and the group you are a part of.
Ask yourself the following questions:

- Do people feel comfortable in group meetings asking about things they do not know or they do not understand?
- What happens when mistakes, near misses, failures and critical incidents happen? Are they seen as opportunities for team learning?
- How often do people **give and receive feedback**? Is feedback given often?
- Or do they generally try to maintain an image of perfect knowledge about work matters?
- Or is people's first reaction to distance themselves from them so they are not blamed?
- Or is **feedback** (both positive and/or negative) **withheld**?

Harri Kaloudis, *What Do Psychologically Safe Teams Work Teams Look Like?*

Common trainee responses to scenarios with or w/o psych. safety

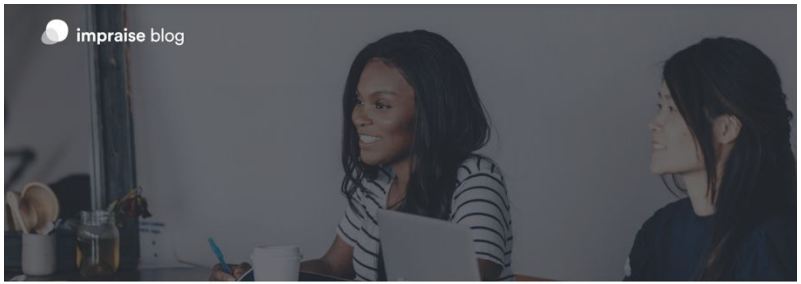
	psychological safety	**no psychological safety**
The advisor makes a statement using a term that is unfamiliar to the student, but says it in a matter-of-fact tone, suggesting that they expect the student to know what they're talking about.	"Can you clarify: What does that word mean?"	*Trainee nods.*
While out on remote fieldwork with a group comprised of professors, postdocs, and students, a student starts feeling a bit unwell. The student thinks they may be dehydrated.	"I feel sick. Could we take a break? I think I need some water."	*Trainee is afraid of appearing incompetent and "soldiers" on, risking their physical safety.*

Reflect: How might these responses be different if the trainee belonged to a marginalized group? The majority group?

Benefits of **psychological safety**

- Team members **bring their whole selves to work**.
  - Able to express their creativity, talents, and skills.
  - Able to **feel that they belong**, regardless of their identity and background.
- Team members are **empowered to learn actively** on the job.
  - Will identify their own needs and seek them out.
  - Promotes **real growth and learning experiences** unhampered by "posturing" behaviors.
- Teams and individuals will see **feedback as a way to strengthen** and build upon their ideas and processes.
  - Encourages "**upward feedback**." Get real information about what going right and what could be improved.

What are ways to promote psychological safety?



Leadership

What Is Psychological Safety And Why Is It The Key To Great Teamwork?

6 min read

7 ways to create psychological safety in your workplace

Psychological safety is vital in a healthy workplace. Find out how to improve yours with this actionable article.

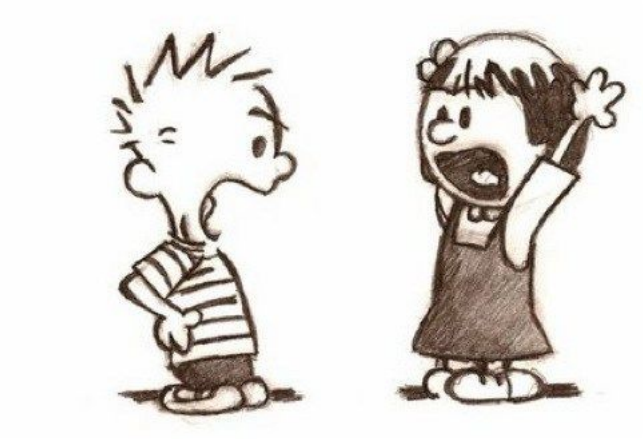
By Bev Attfield

There are several key things you can do!

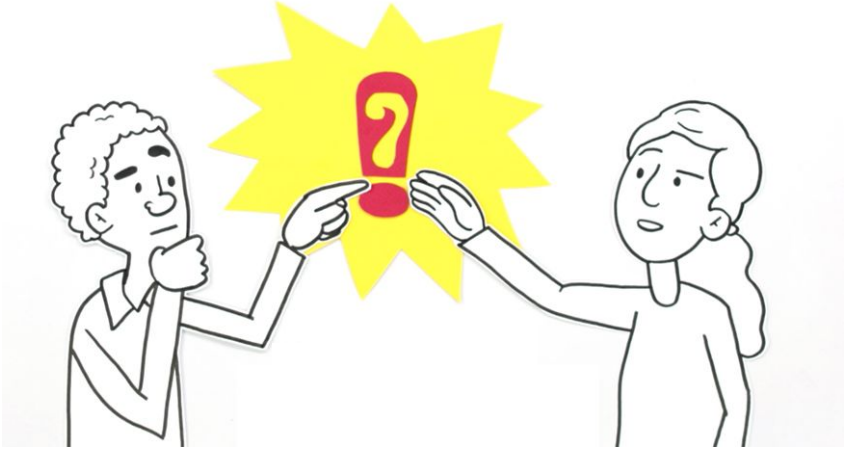
We will just discuss one particular aspect in Part 2, which is to **treat conflicts as an opportunities to learn and solve problems together.**

- how to navigate conflict constructively
- giving and receiving feedback
- promote “upward” feedback

Conflict



How you feel about conflict now



How I hope you feel about conflict in 1 hour

Role-Play Scenario Summary

The following is an excerpt from the official summary of the role-play:

"This scenario **highlights the mismatch of expectations** that can arise in a mentoring relationship between a graduate student and a research adviser. The adviser wants a solely professional relationship, but the student seeks a more personal relationship. Their **inconsistent desires** lead to **inconsistent expectations** about how long they should meet and what they should discuss, and subsequently to **misunderstandings** about the preliminary results..."

"This role-play scenario illustrates a common situation in which **each person starts with only partial information**… To ensure that each person receives complete information, **the professor and student must communicate openly**: the student should convey the bad news about the results clearly, and the professor should criticize the student's behavior constructively. But **the situation is risky** because each person will be disappointed by the other's information."

What is conflict?

- Long, textbook version:

  "A conflict is an expressed struggle between at least 2 interdependent parties who perceive incompatible goals, scarce resources, and interference from others, in achieving their goals."

- Shorter version:

  "**A discomforting difference**."

Prof. Michael Dues, *Art of Conflict Management: Achieving Solutions for Life, Work, and Beyond*, The Great Courses

Why do we need to handle conflict better than we do?

<u>The Four Awful Truths of Conflict</u>

1. Conflict will occur.
2. Conflict always involves **risks** and **costs**.
3. The damage that happens usually results not from the conflict itself, but from the ***dysfunctional* strategies** that people use to deal with it.
4. Some of this damage is **irreversible**.

Why do we need to handle conflict better than we do?

Good things that can come from conflict

1. Conflict surfaces problems that we did not see before. **Conflict = information**.
2. Going through a conflict well can deepen our understanding of one another and forge stronger relationships.

The Orange

The Orange

You

“I want the orange.”

Me

“I want the orange.”

There is one orange. You and I both want the orange.

This is a conflict.

What should we do?

The Orange

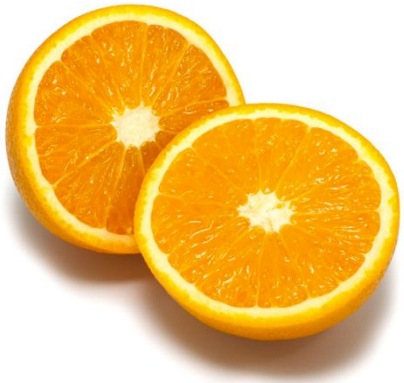
You

“I want the orange.”

Me

“I want the orange.”

Compromise?



The Orange

You

"I want the orange."

"I want the peel for a garnish."

Me

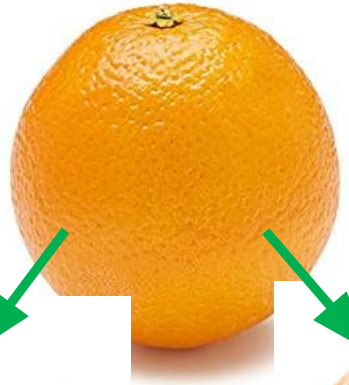
"I want the orange."

"I want to make juice."

The Orange

A win-win situation!

“I want the orange.”



“I want the orange.”

“I want the peel for a garnish.”

“I want to make juice.”

The Myth of the “Fixed Pie”

“Fixed Pie” mindset: The pie of resources is fixed. One side wins, the other side loses.

If there are common or mutually compatible goals, **there exists a solution that creates the most overall value** — makes the pie bigger!

How do we change the way we handle conflict to find this optimal solution?

Every decent negotiation analysis class or book

The Orange: **Positions** versus **Interests**

POSITION

"I want the orange."

POSITION

"I want the orange."

INTEREST

"I want the peel for a garnish."

~~Compromise~~

Unnecessary lose-lose!

INTEREST

"I want to make juice."

The Orange: **Positions** versus **Interests**

POSITION

"I want the orange."

POSITION

"I want the orange."

INTEREST

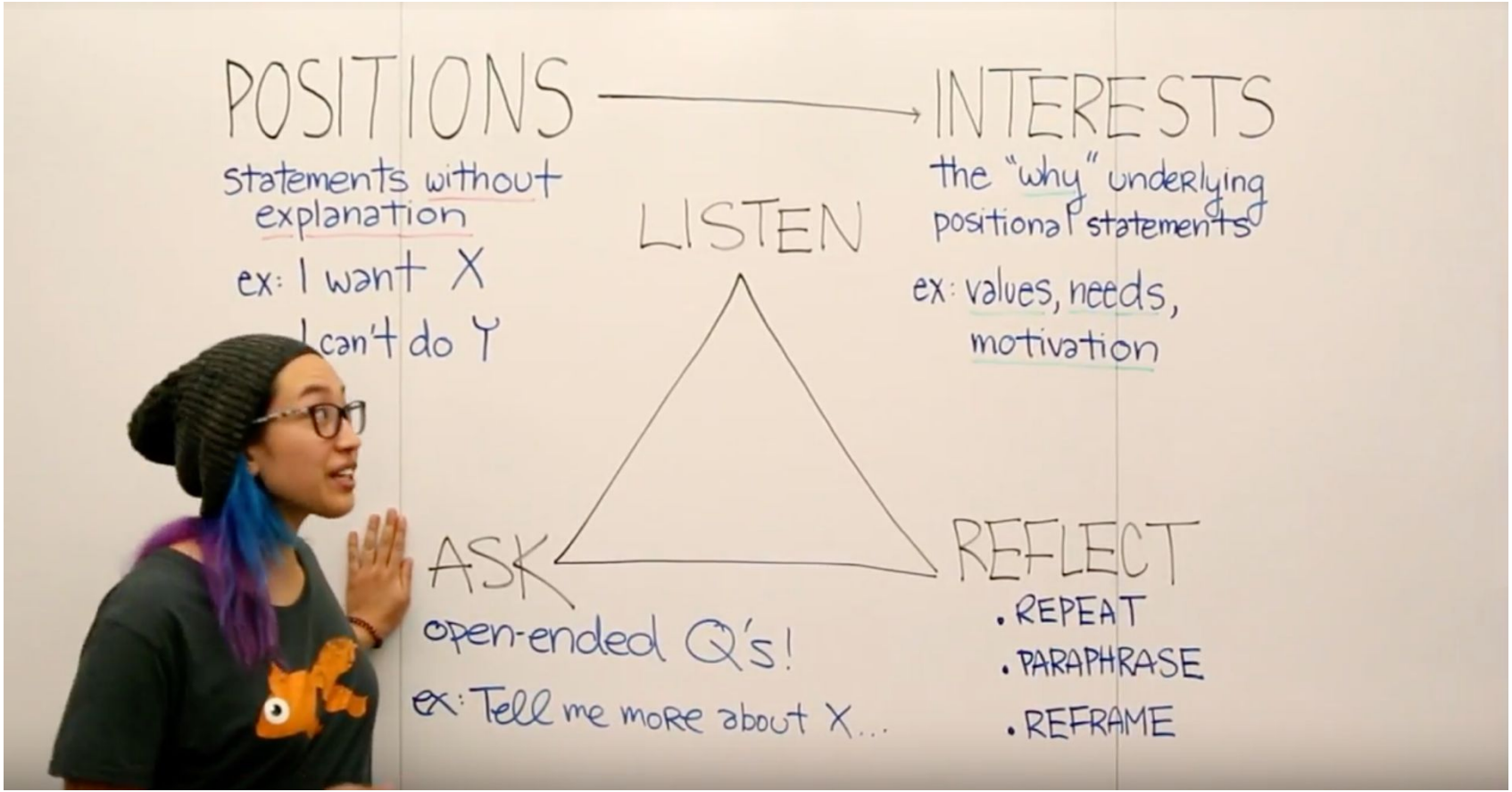
"I want the peel for a garnish."

How can we communicate in ways that reveal ***interests****?*

INTEREST

"I want to make juice."

Active Listening: The Listening Triangle for Info Seeking



Former MIT REFS Moni Avello: https://www.youtube.com/watch?v=cHkUBc-tEkw

ASK: Ask better questions

From H. Kearns & J. Finn, "Supervising PhD Students" www.ithinkwell.com.au

Question	Likely response	Better question
Everything going OK?	Yes. All OK.	What have you been doing? What have you read? What have you written?
Have you been reading?	Oh yes, lots.	What have you been reading? What articles did you find useful?
How is the writing going?	It's fine. It's going OK.	What have you written? Can you show me some writing?
All clear?	Yes, all clear.	To make sure we're on the same page, can you tell me what you think we've agreed?
Do you understand?	Yes. *nodding*	To make sure we're on the same page, can you tell me in your own words what you think we've agreed?
Do you know what to do next?	*more nodding*	To make sure we're on the same page, tell me in your own words what you are going to do next.

ASK: Beware of **closed-ended**, **faux**, or **leading** questions

You are *no longer listening* if you ask these kinds of questions.
You are instead *responding*. **Listen to *understand*** first. Then respond.

Examples:

Do you feel as though a deadline is approaching?

What do you think about trying to run the experiment a few times?

What if you tried…

Have you considered…

Do you have any problems working with George?

Why did you do that?

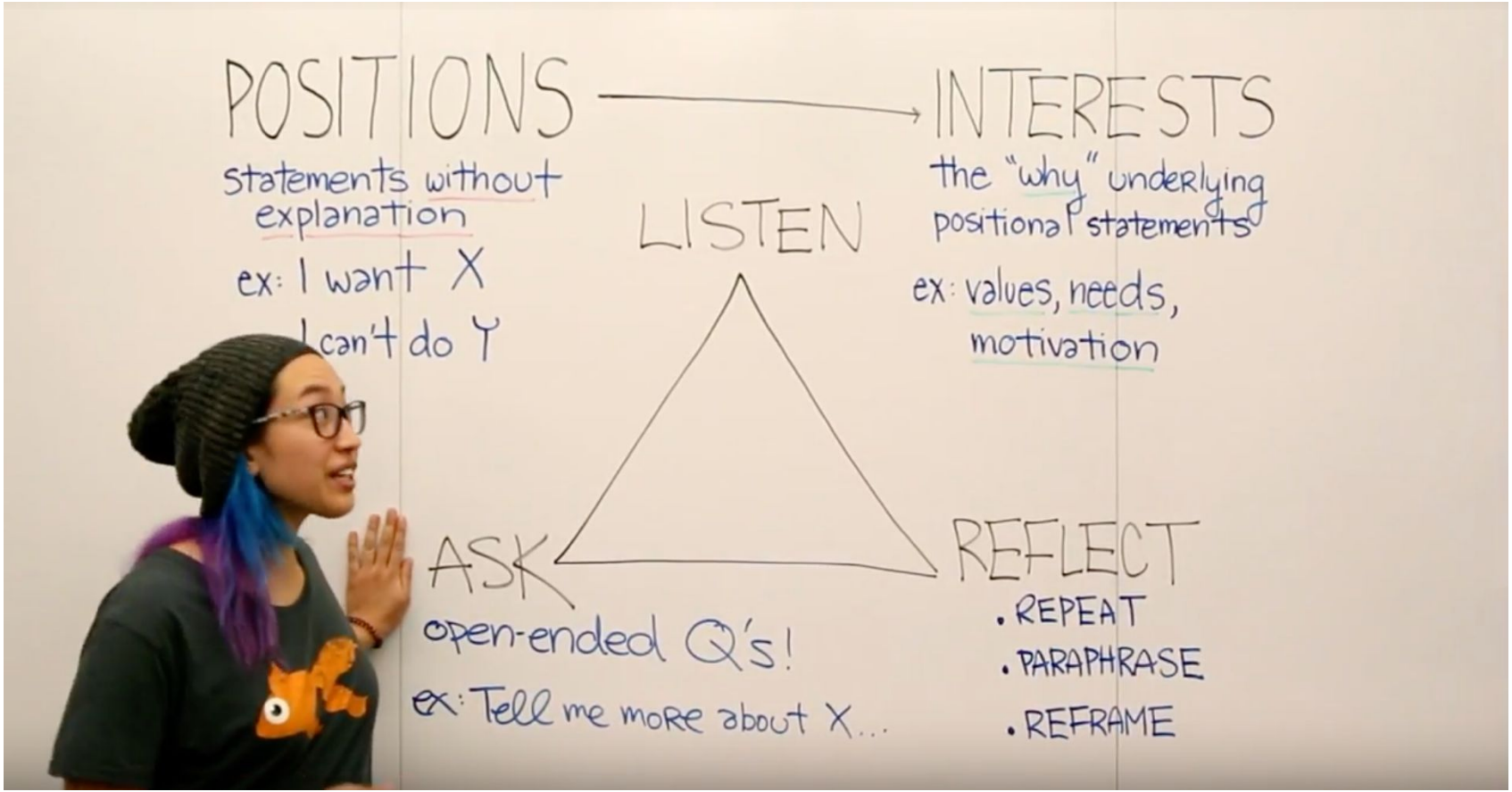
Can yield defensive, rather than clarifying, response.

Common mistake is to start offering up advice/solutions before you have adequately collected information on interests, values, feelings, attitudes, and views.

Unproductive Questioning Styles

Type	Definition	Example
Leading	phrasing that suggests a desired response	You're against my idea, right?
Closed	phrasing that requires a yes/no response	Did you finish the programming budget?
Prosecutorial	phrasing/tone that implies blame	So you left the sample exposed on the counter?
Judgmental	phrasing/tone that suggests disapproval	Couldn't you have planned better?

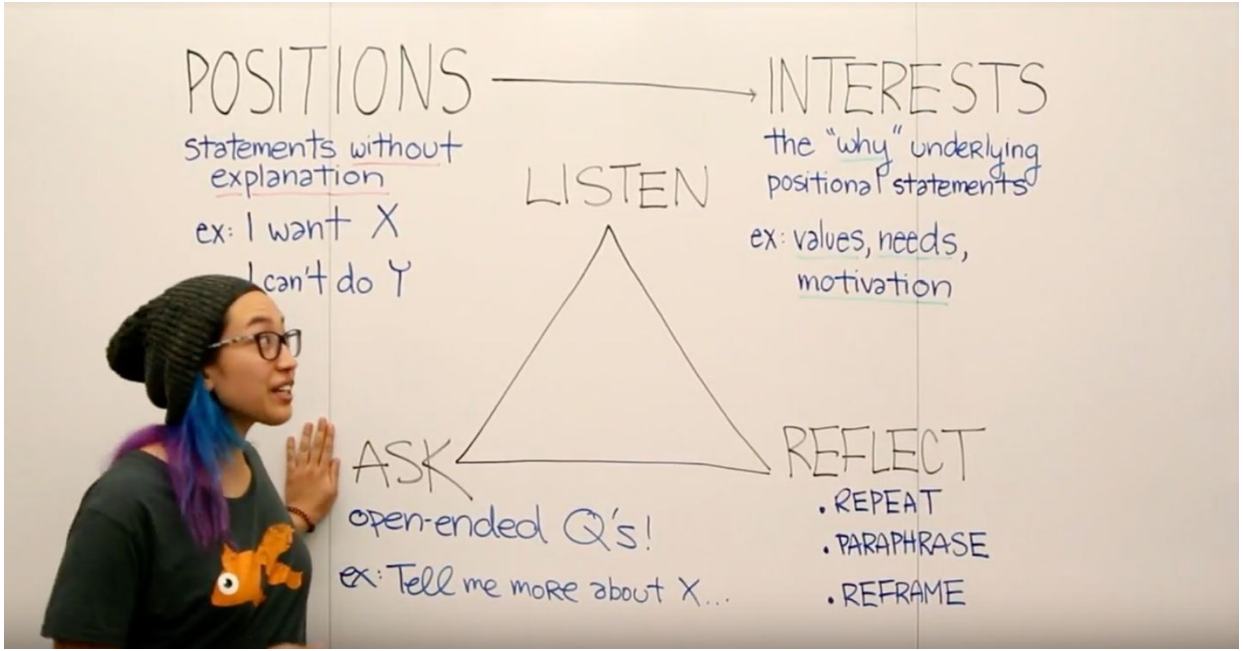
***Active* Listening**: The Listening Triangle for Info Seeking



Former MIT REFS Moni Avello: https://www.youtube.com/watch?v=cHkUBc-tEkw

The Listening Triangle in practice

You set a deadline to review a paper that your graduate student is writing. You did not hear anything from your student for a week prior, and now the deadline has passed.



The Listening Triangle in practice: Small group role-play

1. Get into groups of 3-4, again with people who you don't normally work with.
2. Rotate role-playing pairs, where one plays the "advisor" and another plays the "student" or "trainee." [5 minutes]
3. Advisors, start by practicing the listening triangle. Observers should make note if a question is not an open-ended question: closed-ended, faux ("fake"), or a leading question.
4. After 5 minutes, take one minute where the student and observers give feedback on how the "advisor" approached the situation.
5. Rotate, rinse, and repeat.

Scenarios

Your volunteer field assistant has slept in for the 3rd morning in the past two weeks. This is holding up the rest of the team. You can't fire the person midway through the season—what do you say?

Your grad student wants to delay their candidacy exam because they don't feel ready, but you want them to have it this semester and you think with some preparation, they will be fine. What do you say?

One of your graduate students is less involved in optional lab activities than the others, like getting dinner or a drink after work, because of their parenting activities for their young son. Although their work is good, they aren't as integrated into the lab as you would like and haven't developed a rapport with the lab group. How do you help include them in the broader lab culture?

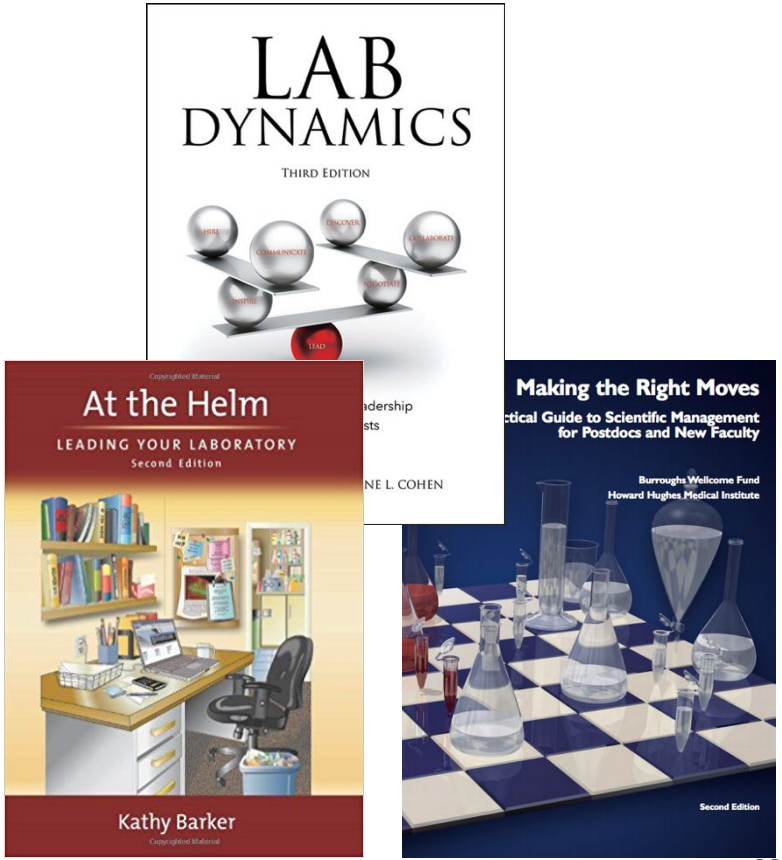
The undergraduate students that your grad student supervises are leaving a mess in the lab.

Scenarios from Hund et al. (2018) "Transforming mentorship in STEM by training scientists to be better leaders" *Ecology and Evolution.*

So you want to learn how to lead and manage a lab well. What can you do next?

Self-educate: Some comprehensive books

- *Lab Dynamics*: Management and Leadership Skills for Scientists, by Carl M. Cohen, Suzanne L. Cohen.
- *At the Helm: A Laboratory Navigator* by Kathy Barker.
- *Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty* by the Burroughs Wellcome Fund and the Howard Hughes Medical Institute. 2004.
  - **Free** PDF! [link]

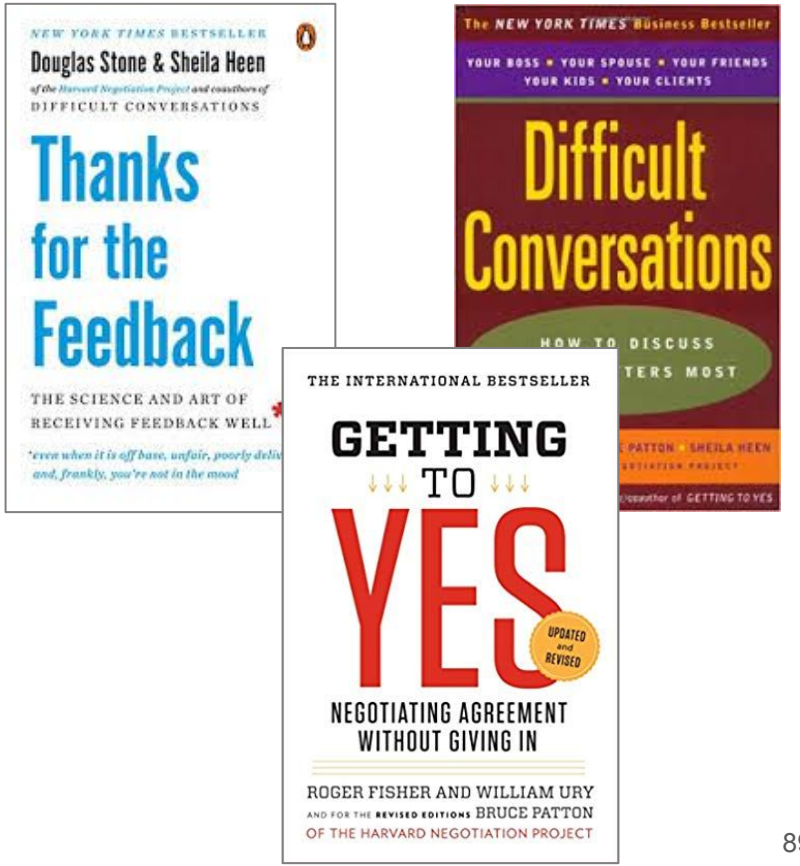


Self-educate: On difficult conversations

- *Thanks for the Feedback: The Science and Art of Receiving Feedback Well,* Douglas Stone and Sheila Heen

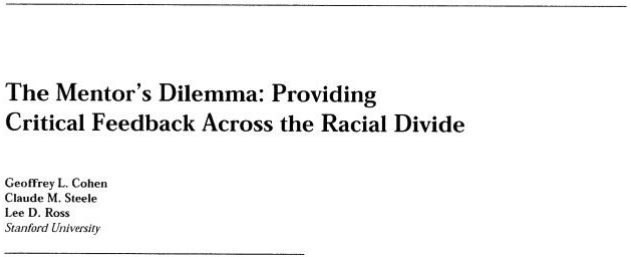
- *Difficult Conversations: How to Discuss What Matters Most*, Douglas Stone, Bruce Patton, Sheila Heen

- *Getting to Yes: Negotiating Agreement Without Giving In,* Roger Fisher, William Ury, Bruce Patton

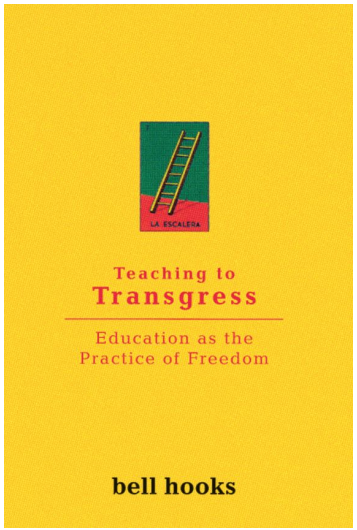


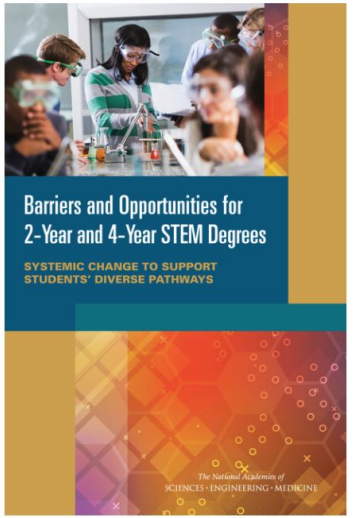
Self-educate: Race in the classroom / supporting URMs

- *Teaching to Transgress: Education as a Practice of Freedom*, Bell Hooks
- *The Mentor's Dilemma: Critical Feedback Across the Racial Divide (1999).* Cohen, Steele, & Ross.
- *Is Science for Us? Black Students' and Parents' Views of Science and Science Careers.* Archer et al. (2015)
- NASEM Report: Barriers and Opportunities for 2-Year and 4-Year STEM Degrees (2016)


The Mentor's Dilemma: Providing Critical Feedback Across the Racial Divide

Geoffrey L. Cohen
Claude M. Steele
Lee D. Ross
Stanford University





Hot off the press!

“Ten simple rules for building an anti-racist lab”

by Professors Bala Chaudhary and Asmeret Asefaw Berhe

https://ecoevorxiv.org/4a9p8/

Self-educate: Other readings and helpful links

- **ADVANCEGeo Partnership**: Empowering geoscientists to transform workplace climate
  - An abundance of resources. See Creating Inclusive Workplace Climates.
- **Hund et al. (2018):** Transforming mentorship in STEM by training scientists to be better leaders

- The Nuts and Bolts of Managing a Research Lab - UW ADVANCE
- Ten simple rules for developing a mentor–mentee expectations document
- Reducing Harrassment in Science: Funding Follows Trainees
- iThinkWell's Free Toolkit for PhD Supervisors
- A Guide to Identifying and Reducing Stereotype Threat to Maximize Student Performance
- Entering Mentoring: A Seminar to Train a New Generation of Scientist
- Ryerson University: Best Practices in Graduate Supervision
- LGBT+ Inclusivity in Physics and Astronomy: A Best Practices Guide
- Ten simple rules towards healthier research labs

- Coursera's Leading People and Teams (note: I've not personally taken this, but the syllabi look good)
- National Center for Faculty Development and Diversity

*When negotiating your start-up,
***ask for funds* to support leadership and management training!**

(Your Dean will absolutely love you for asking.)

Your Dean, when you ask

Other key topics for further self-education

- Planning the lab you want: Vision, mission, 5- or 10-year plans
- Choosing your people: How to effectively interview and evaluate candidates
- Lab organization: Lab culture, policies, meetings
- Dealing with group dynamics
- How to give constructive, honest feedback without destroying morale, while taking into account differences in background, identity, and life experience
- How to run meetings
- Difficult conversations and negotiations

Parting Words

Treat people as well as we treat our data.*

The research says that the way things are done now is hurting science and the people who do it, too.

There's also research that gives us many solutions to fix this.

Challenge the status quo!
Have the moral courage to ***reimagine science***!

Science Is For Everyone pin by Two Photon Art (https://twophotonart.com/)

Quote inspired by Dr. Erika Marin Spiotta, Professor at University of Wisconsin, soil scientist