A Research Mindset

Lori Pollock (U of Delaware)

Amanda Stent

About Lori Pollock

Alumni Distinguished Professor, University of Delaware
- PhD U of Pittsburgh 1986
- Rice U 1986-1989
- U of Delaware 1990-present
- Sabbaticals: ABB Inc & Army Research Lab

Research in Software Engineering, CS Education

Service
- CRA-WP, CRA-E
- Partner4CS K-12 Teacher professional development
- Computational Thinking in University Gen Ed

For Fun
- Outdoor activities, handcrafts, traveling

About Amanda Stent

Director, Davis Institute for AI, Colby College (and Professor, CS)

- PhD U of Rochester 2001
- Post-doc AT&T Research
- Academia: Stony Brook University (02-09), Colby (2021-)
- Industry Research: AT&T (07-13); Yahoo Labs (13-16)
- Industry Not Research: Bloomberg (16-21)
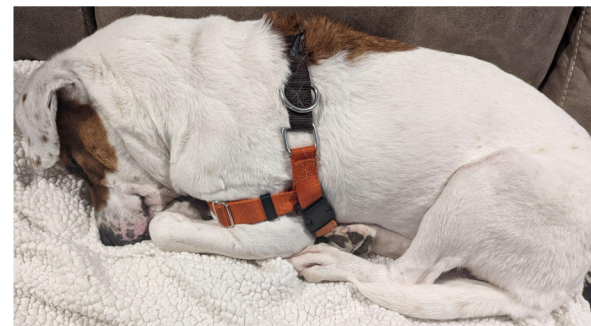- Have not (yet!) worked at a startup, a government lab or agency, a nonprofit

Research in NLP, with divergences into speech, video, assistive technology

Service

- CRA-WP, ABET, ACL

For Fun

- EMT, walking, music, bird watching, finding things funny

"It's not what happens to you, but how you react to it that matters."

— Epictetus

Our Mindset & Strategies

Optimistic
- Always (almost)

Mindset with paper/proposal rejections
- Initially, disappointed; maybe angry at the reviewers; sad;
- Later, reread reviews with an open mind and improve

Stress strategies
- Daily exercise (hiking!), organization, family time, hobbies

Research strategies
- Paper reading, weekly conversations, regular writing, learn broadly

Our Mindset & Strategies

For bias in problem/solution decisions
- Don't be where everyone else is
- Classic problems never go out of style; they just have new contexts

For research setbacks
- Limit feeling sad to X days, then consciously channel sad to response
- Synthesize feedback to adjust strategy
- Strategize with collaborators, ask advice more broadly
- Have 2-4 things in progress

For managing emotions
- Daily exercise, sleep, fruits & veggies, hobbies, family & friends time

For creativity
- Read a lot and critically; what did they forget? logical next 4 steps/papers?
- Create unscheduled work time

Defining
Your Research Mindset

A Research Mindset

I will

1. Examine and counter my biases

2. Learn from failures

3. Learn emotional resilience

4. Learn & innovate technically
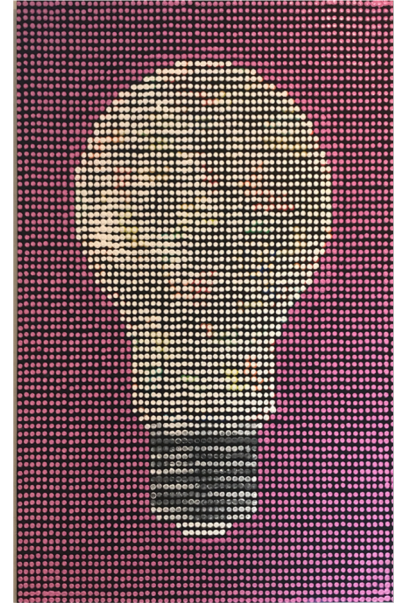
What's Next?

Concepts

- Cognitive bias and creativity
- Flexible optimism for perseverance
- Growth Mindset

Bias

- A **cognitive bias** is a pattern judgment, which humans need to function and *at the same time* leads to illogical conclusions

- Bias arises from various processes and are difficult to distinguish
  - use of information-processing shortcuts (heuristics, generalizations)
  - mental noise
  - the mind's limited information processing capacity
  - emotional and moral motivations
  - social influence

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Example Biases

- Stereotypes
- Survivor
- Anchoring: 1st info
- Confirm prior beliefs
- Exposure & Recency
- Attention (repetition)
- Conservative (Bayesian)
- Gamblers' fallacy

- Listen to authority
- Join the bandwagon
- Dunning-Kruger effect: newbies overestimate their knowledge, experts underestimate
- Framing/presentation
- Von Restorff effect: we remember the unusual
- Curse of Knowledge
- Congruence (one hypothesis)

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Example Biases

- Stereotypes
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- Ancho...
- ... ...newbies
  ...their knowledge,
  ...s underestimate
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CREATIVE THINKING "OUTSIDE THE BIAS BOX"

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Example Biases

- Stereotypes
- Survivor

CREATIVE THINKING
"OUTSIDE THE BIAS BOX"

Slow Down
Examine your Biases

- ...asual
- ...se of Knowledge
- Congruence (one hypothesis)

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Life Happens

Real Life is Unpedictable

- World events

- Local events

- Family & Friends   good / bad

- Relationships

- Health

Research Events are Predictable

Have ideas	good / bad
Work on ideas	succeed / fail
Discuss ideas informally	well / poorly
Write up ideas	well / poorly
Submit paper	accept / reject
Give talk / teach class	well / poorly
Receive feedback	positive / negative
Receive structured feedback	positive / negative

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How you interpret and react to good & bad life events
is under your control

Keeping Positive

I will

- learn and execute strategies to overcome failures and obstacles

- learn and execute emotional resiliency strategies to manage myself in times of stress and failures

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Pessimism vs Optimism

- What is optimism?
- What is pessimism?

- Can optimism be learned?

- Is optimism a biased view of reality?
- Is optimism always the better choice than pessimism?

Benefits of Optimism

- Improved Health

- Higher motivation and performance

- Elevated career success

Explanatory Style (The 3 P's)

1. Permanence (time)

2. Pervasiveness (space)

3. Personalization (you or not you)

Permanence (Time)

- **Optimistic**
  - Good events have permanent causes
  - Bad events have temporary causes / specific to situation

- **Pessimistic**
  - Good events have temporary causes
  - Bad events have permanent causes / specific to situation

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Pervasiveness (Space)

- **Optimistic**
  - Good events caused by general / universal factors
  - Bad events caused by specific factors

- **Pessimistic**
  - Good events caused by specific factors
  - Bad events caused by general / universal factors

Personalization

- **Optimistic**
  - Good events caused by me & other factors
  - Bad events caused by circumstances, luck, others

- **Pessimistic**
  - Good events by circumstances, luck, others
  - Bad events caused by me

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Pessimists

Believe bad events / misfortune

1. will last a long time

2. will undermine everything they do

3. are their own fault

Pessimistic explanatory style produces <u>passiveness</u> … as they believe action is futile

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Optimists

Believe bad events / misfortune

1. is a temporary set back

2. is limited to this one event

3. is not their fault

Optimistic explanatory style produces <u>action</u> … optimists will even try *harder* after a defeat

Delusions

- It is never your fault

- Optimism is desired in all situations

- Optimistic people face less failures

- Optimism is a character trait and cannot be learned

- Success favors the most talented

Explain to Yourself

1. Permanence (time)

2. Pervasiveness (space)

3. Personalization (you or not you)

- Your paper gets accepted ☺

☹

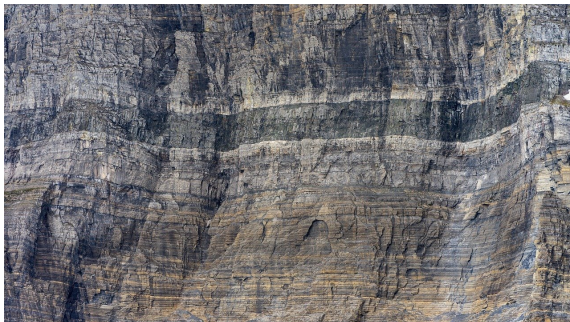Your paper gets rejected

The Next Layer

Fixed vs Growth Mindset

- Fixed Mindset
  - I am smart or not
  - I am athletic or not
  - I am empathetic or not … etc.
  - Success is because I am X
  - Failure is because I am not X or I am not X enough
- Growth Mindset
  - If I work hard, I can learn X

Research Mindset for Research Life Events

I will

1. Counter my biases
2. Learn from failures
3. Learn emotional resilience
4. Learn & innovate technically

As I

- Have ideas
- Work on ideas
- Discuss ideas informally
- Write up ideas
- Submit paper
- Give talk / teach class
- Receive verbal feedback
- Receive formal evaluation

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Resources & Exercises

Acknowledgements

- Inspired by Professor Samuel Kounev's course notes
- Professor Lori Pollock

Resources

- Carol Dwick, "Mindset: The New Psychology of Success"

- Martin Seligman, Learned Optimism, Questionaire

- Daniel Kahneman, "Fast versus Slow Thinking"

- Implicit Bias Testing, https://implicit.harvard.edu/

- Olivia Goldhill, "The World is Relying on a Flawed Psychological test to Fight Racism"

Discussion & Questions