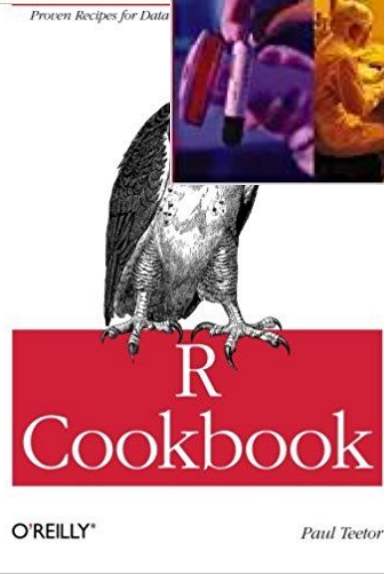
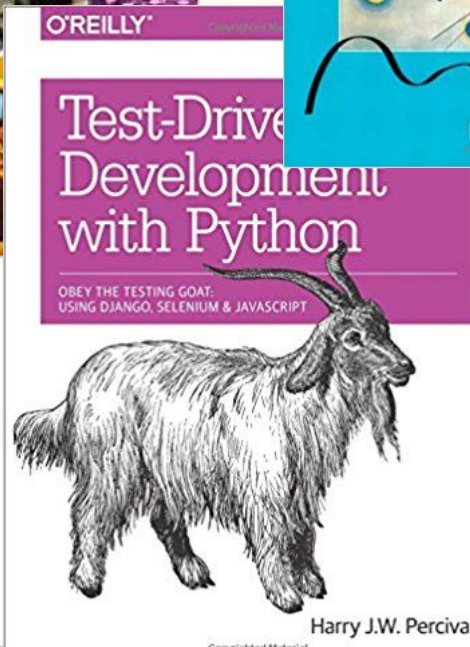
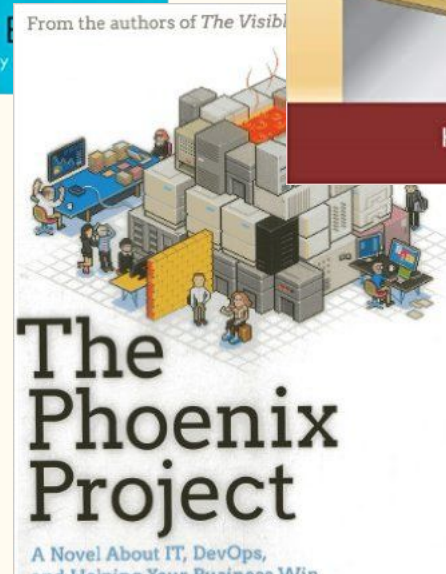
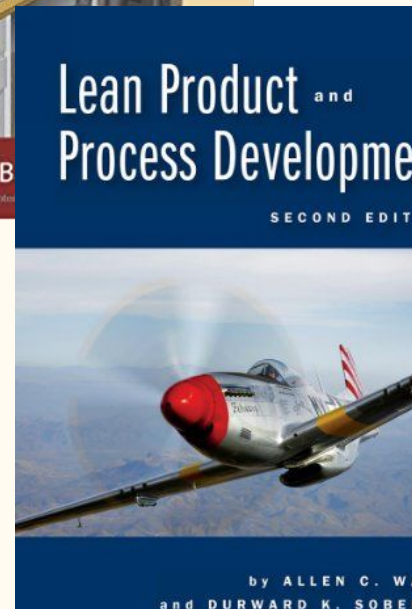
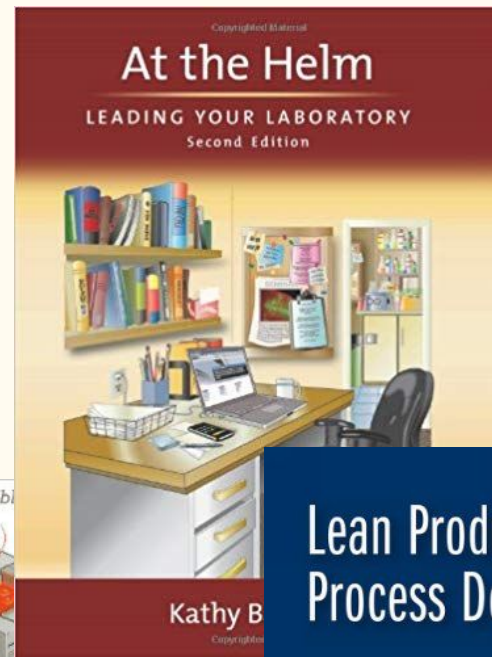
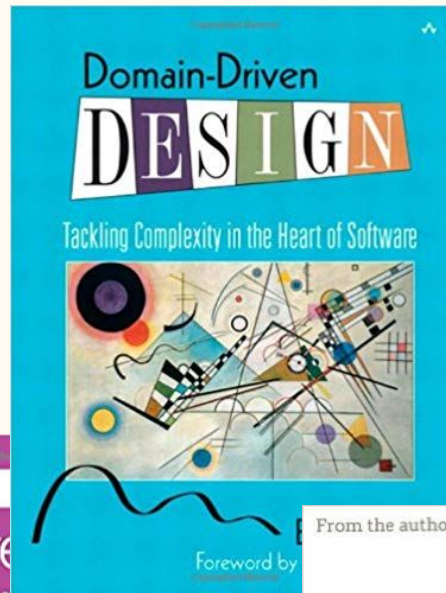
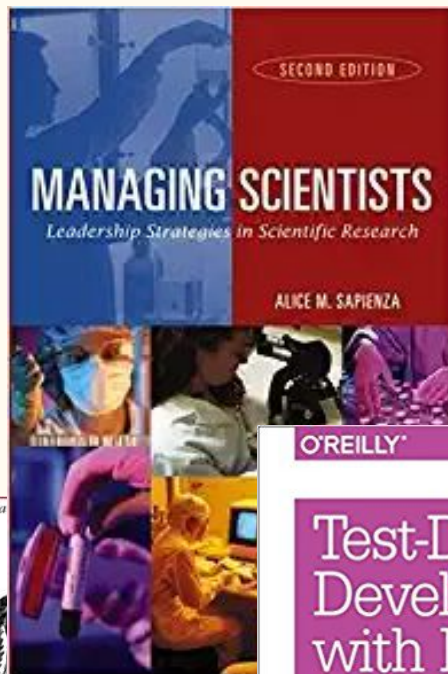


# This Workshop

---

By Nick Del Grosso



# Why Did You Decide to Do a PhD?

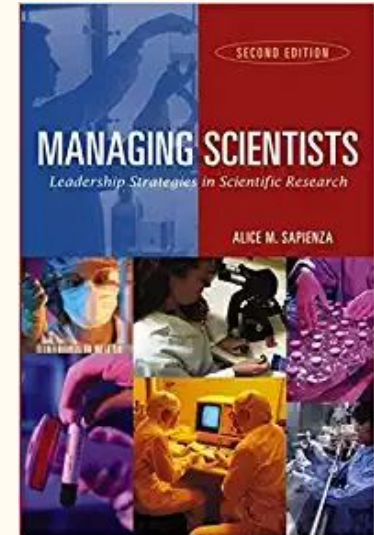
“I Decided to do a PhD because I...”

# What Gives You Motivation at Work?

“I am motivated when...”

# David McClelland's 3 Work-Related Needs

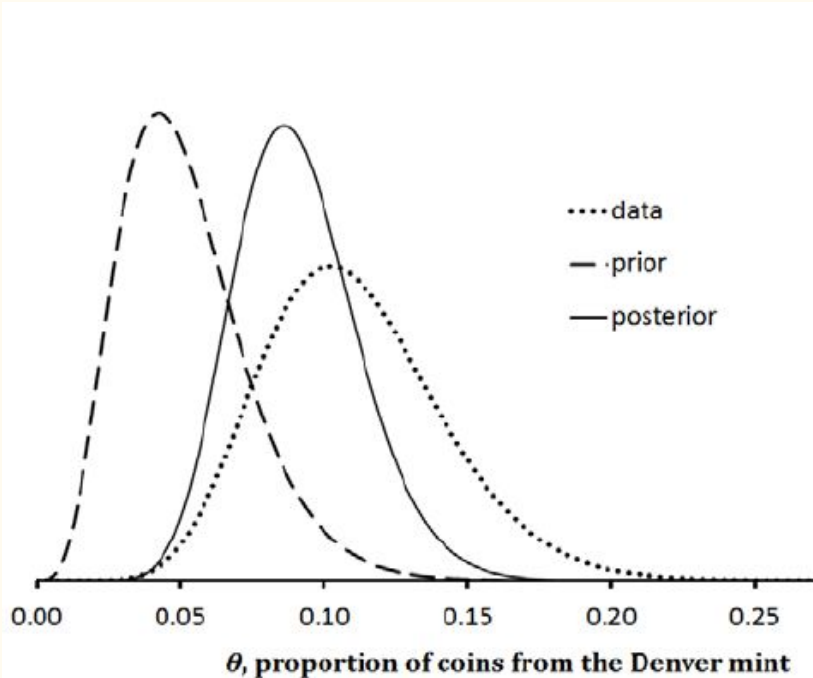
- **Power:** A Desire to Have an Impact on People
  - titles, activity to influence or inspire, concern with organizational action or success, career position and prestige, strategy
- **Achievement:** A Concern for Doing Things Better
  - Numbers, Means-end Statements, winning, doing as well or better than another, concern with how well a task is being performed
- **Affiliation:** A Concern for Establishing Positive Affective Relationships
  - Friends, emotions about relationship, helping, positive response from another



I'd like to discuss Bayes' Rule today...

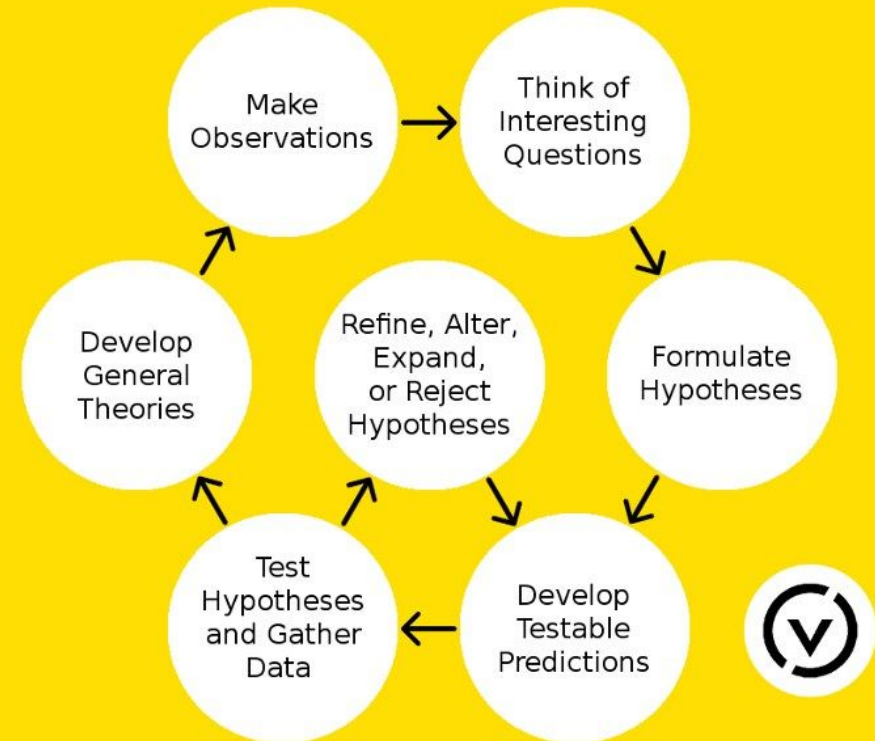
$$P(A \mid B) = \frac{P(B \mid A) P(A)}{P(B)}$$

Bayes' Rule can be applied iteratively to gain knowledge.



(Mossman et al, 2014)

## THE SCIENTIFIC METHOD AS AN ONGOING PROCESS



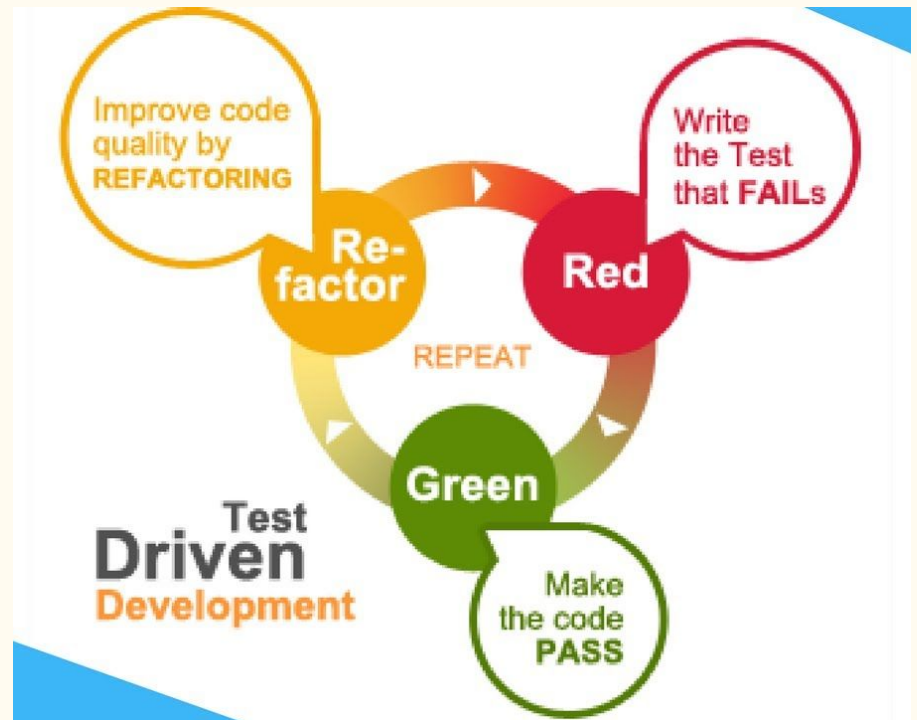
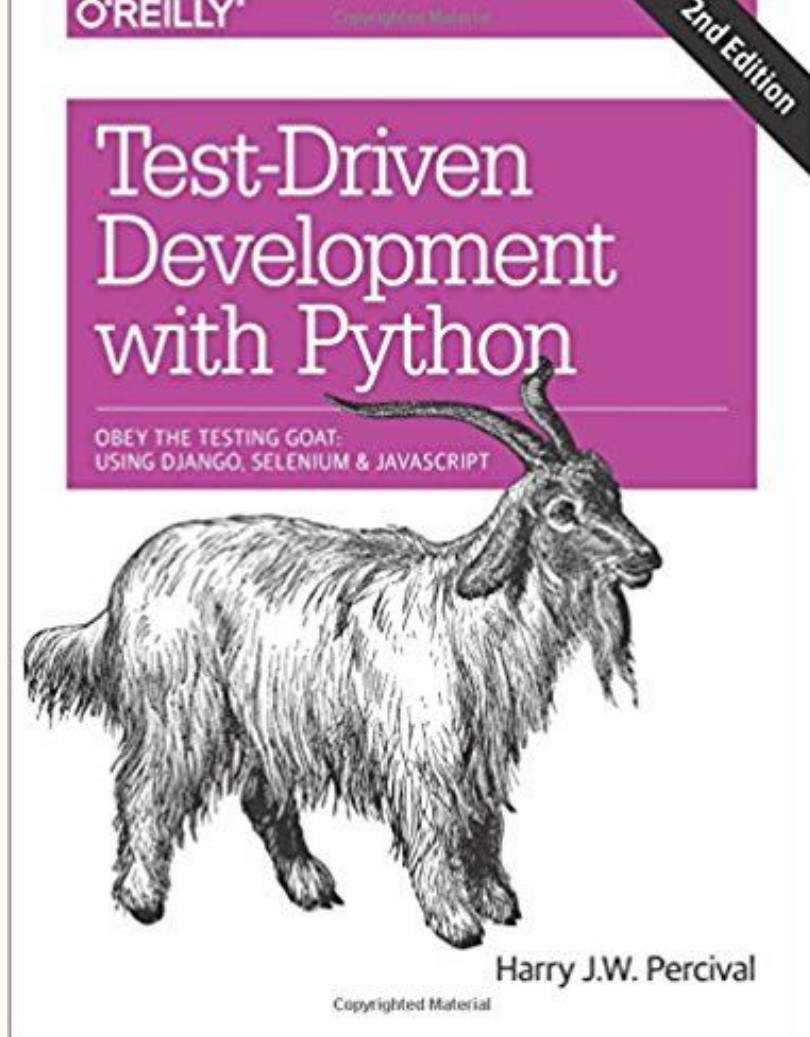
The Venus Project advocates a world where science is applied to the social system. Find out how this will uplift humanity.

**THE VENUS PROJECT**  
BEYOND POLITICS POVERTY AND WAR  
[www.thevenusproject.com](http://www.thevenusproject.com)

...But will people use actually Bayes' if I teach it here?  
(low impact motivation)



And that reminded me of something I ***do*** use, all the time...



“Tech Primers: What is TDD?”

<https://i.ytimg.com/vi/T38L7A0xP-c/maxresdefault.jpg>

9

and that reminded me of something...

# My Sensorimotor Integration Research: Trying and Trying to Close the Loop.

—

# Early Inspirations

---

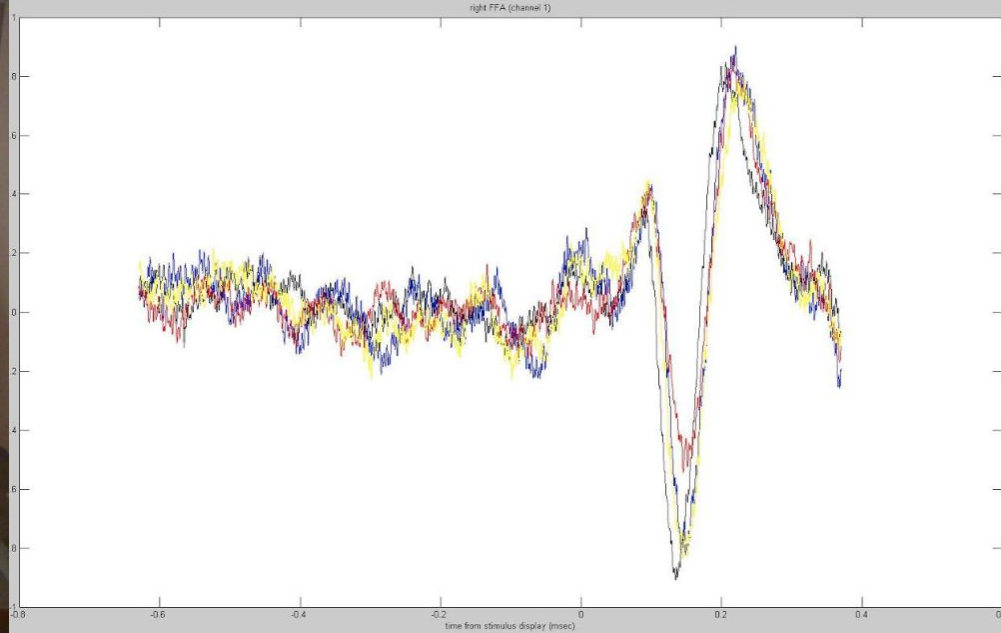
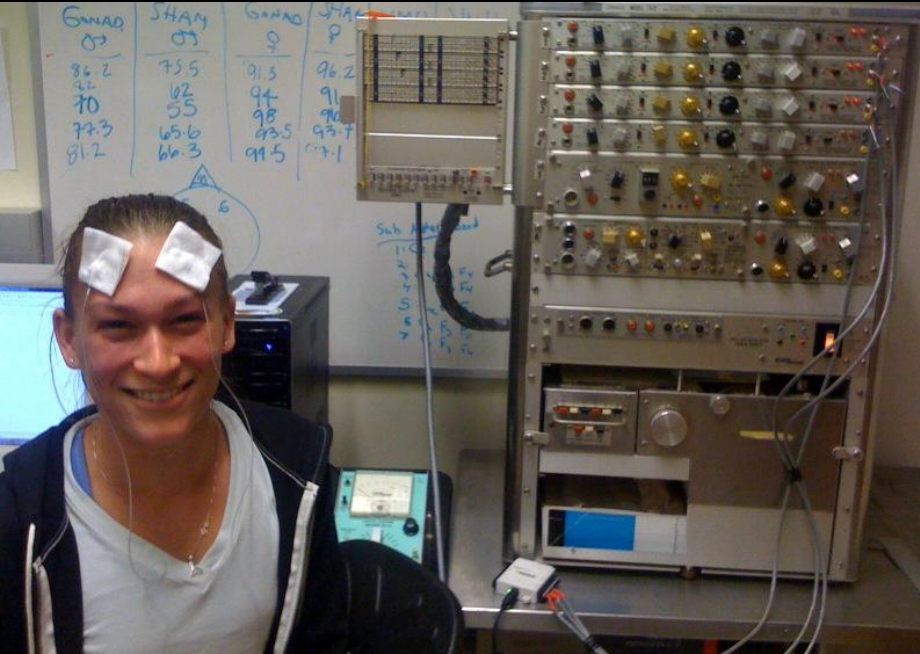


“Teenager moves video icons  
just by imagination.”

-Leuthard and Blakely, 2006

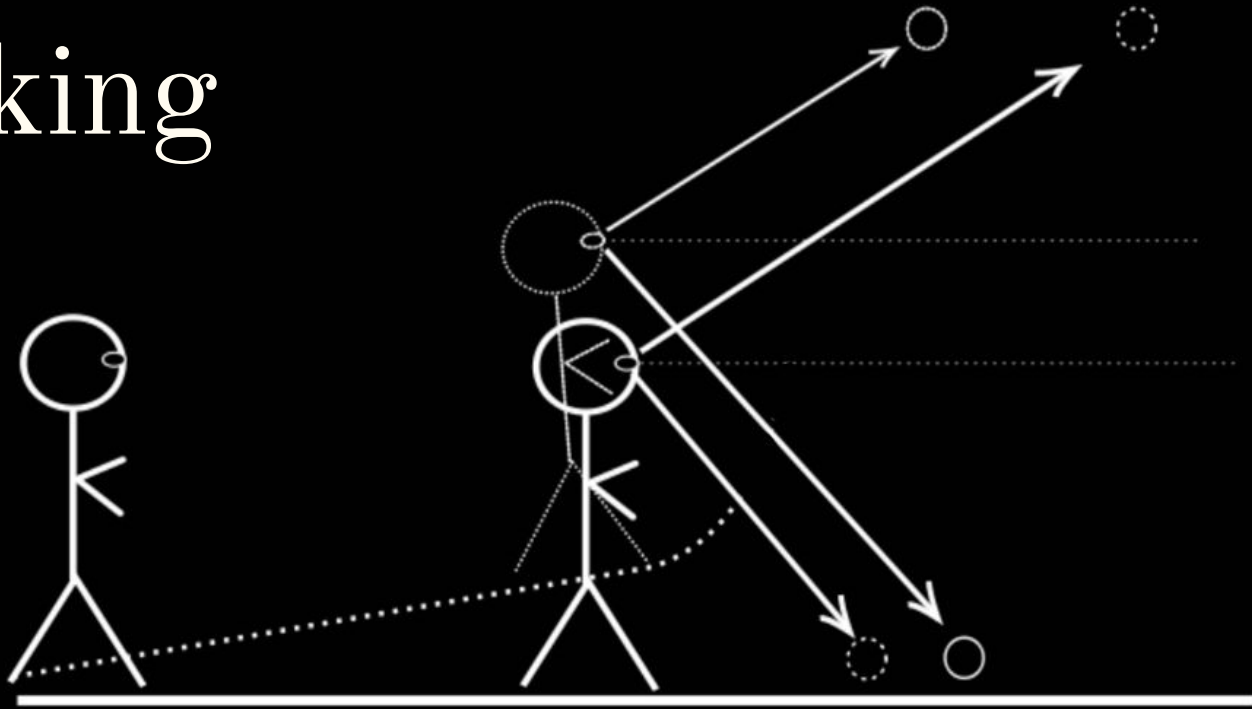


My Bachelor Work: “DIY ERPs: Designing inexpensive EEG systems for performing auditory and visual cognitive studies.”



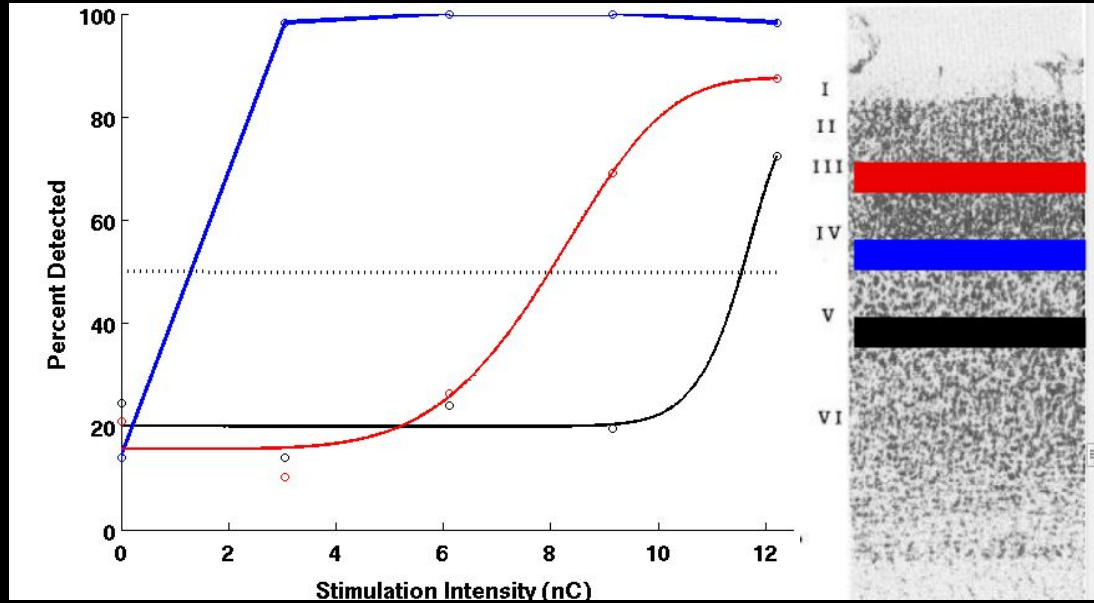
# Blind Walking

—

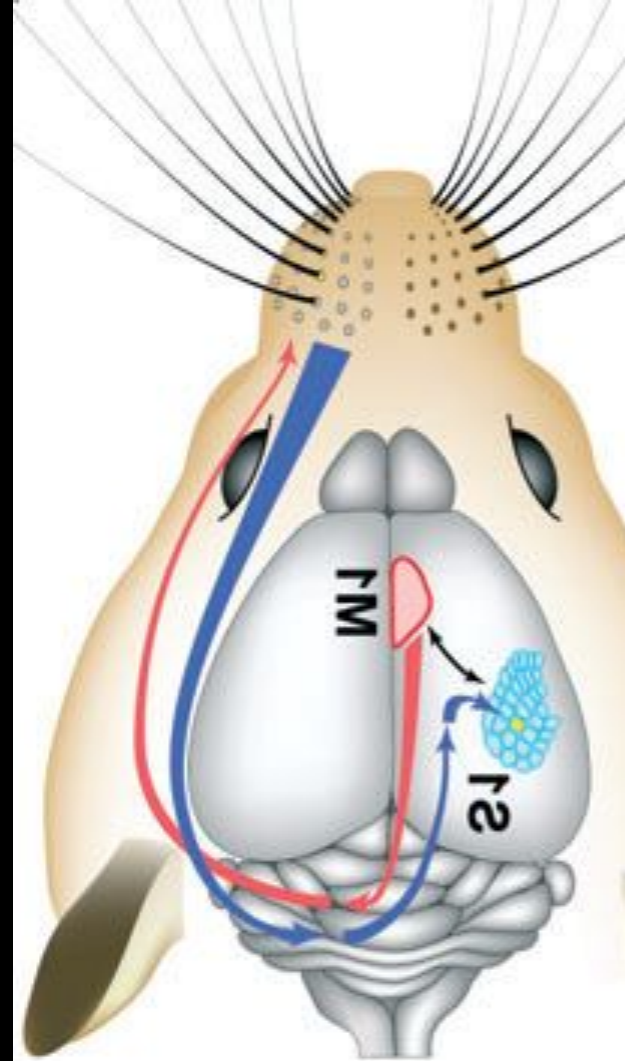




My Lab Rotation:  
“Layer-Dependent Sensitivity to  
Electrical Stimulation in Barrel  
Cortex”



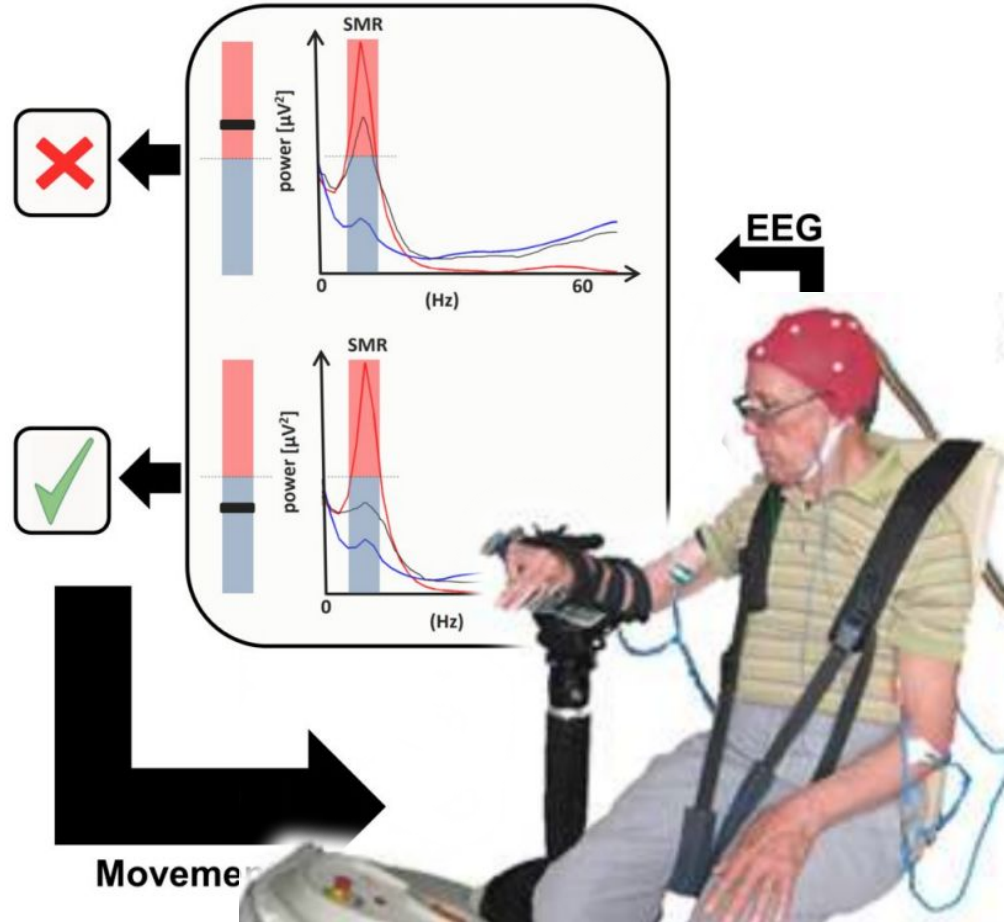
(Aronoff et al, 2010)



\_\_\_\_\_

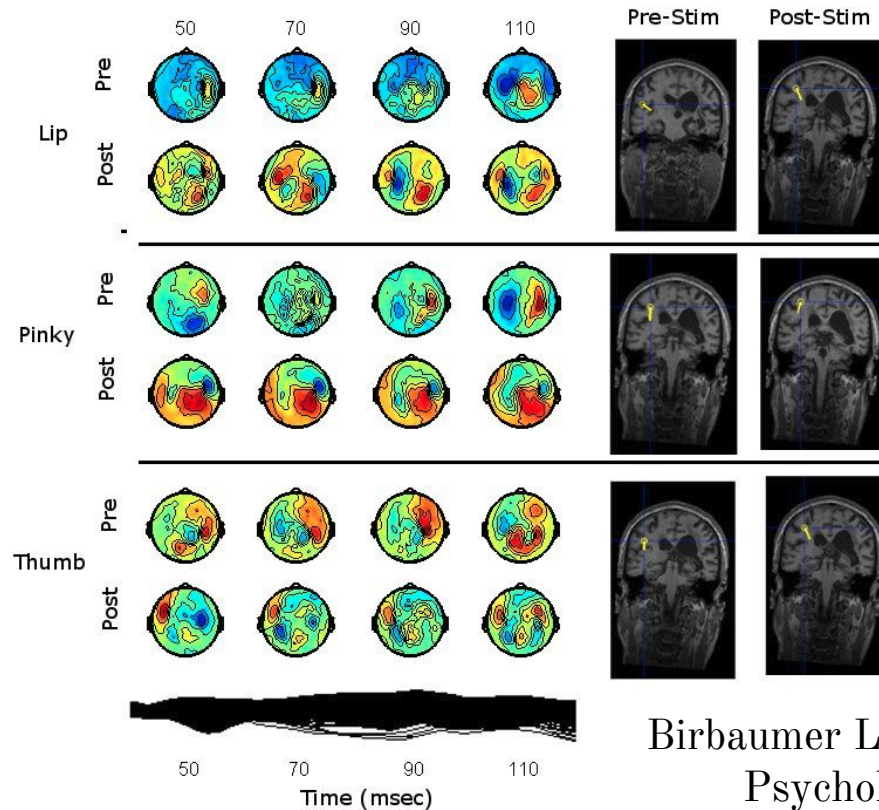
(Ramos et al, 2014)

|        |          |        |              |        |
|--------|----------|--------|--------------|--------|
| 2 days | 8 weeks  | 2 days | 8 weeks      | 2 days |
| Pre1   | Baseline | Pre2   | Intervention | Post1  |

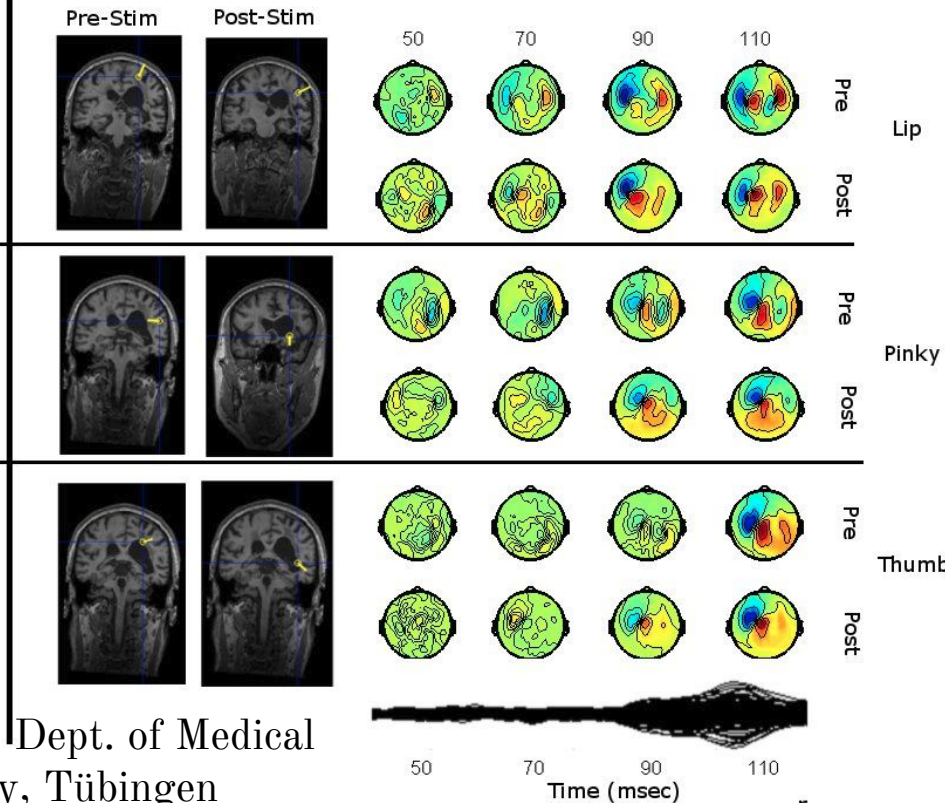


# My Master's Thesis: "Neuroplasticity in the Recovering Hemiparetic Stroke Patient"

Healthy (Right) Side Stimulation



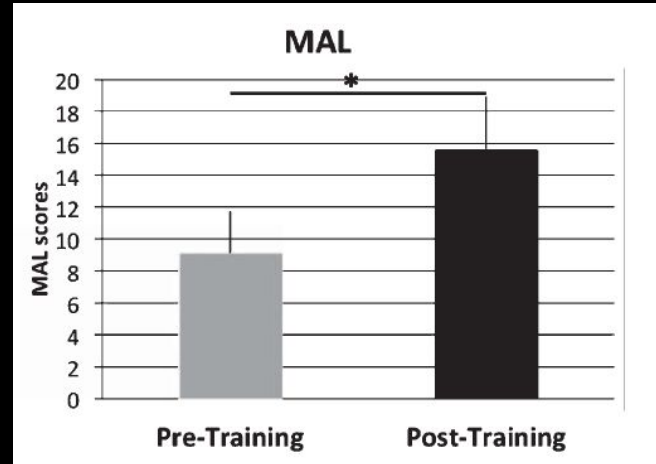
Paretic (Left) Side Stimulation



Birbaumer Lab, Dept. of Medical  
Psychology, Tübingen



# Physiotherapy Enhancement through Rich Experiences

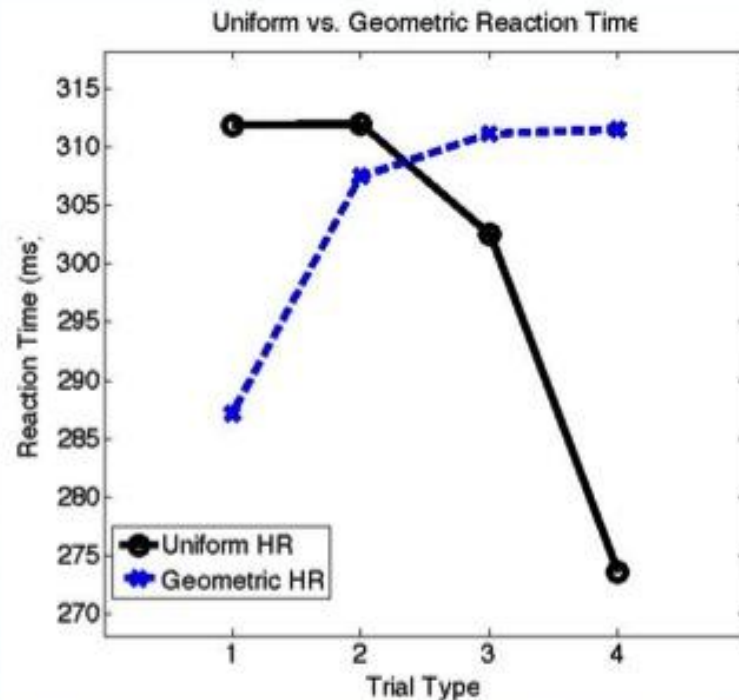
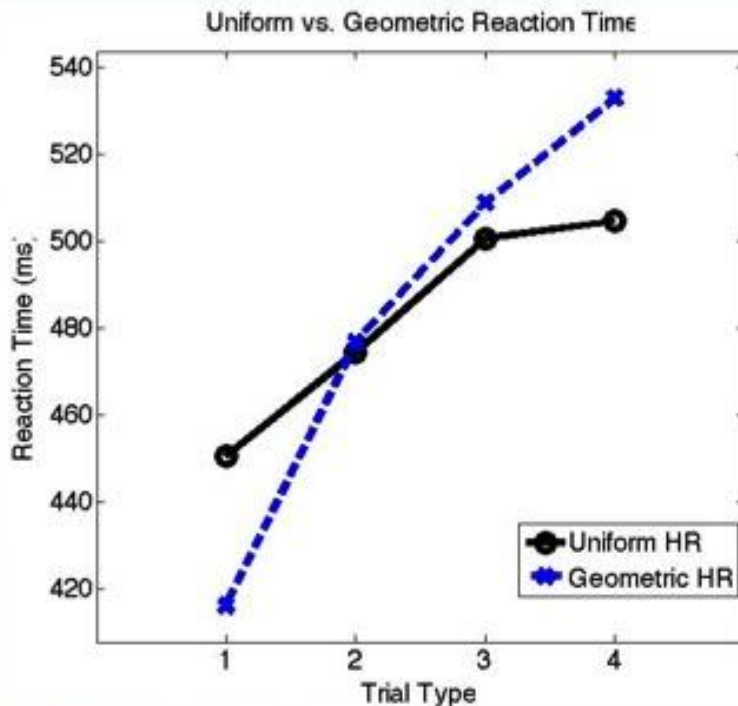


(Broetz et al, 2014)

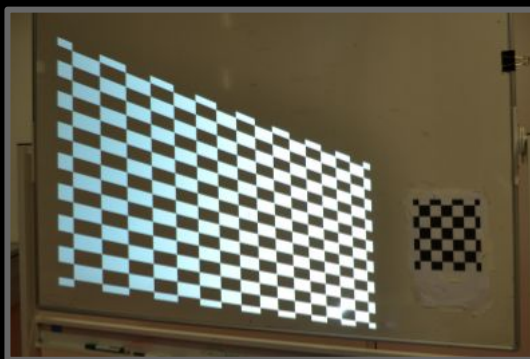
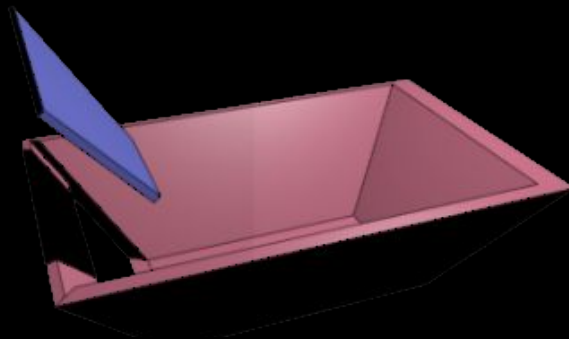
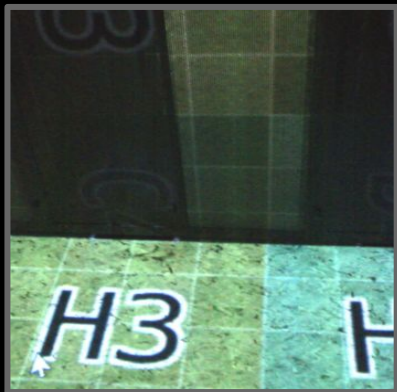
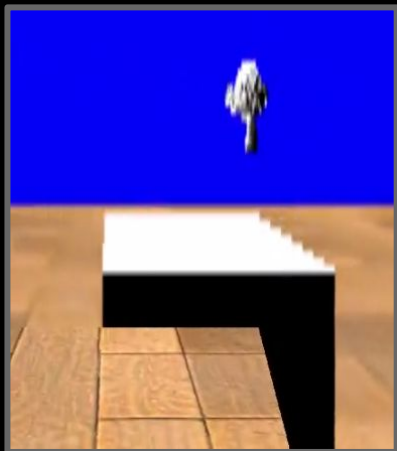




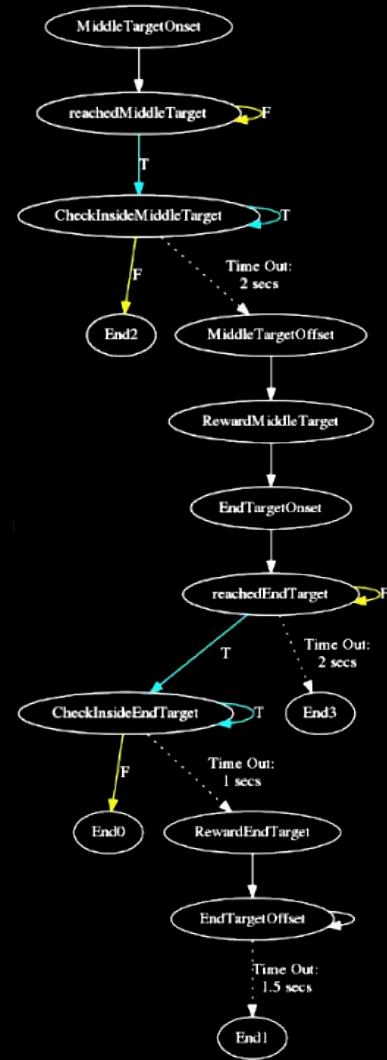
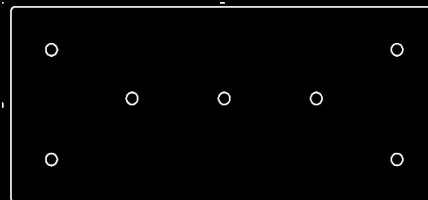
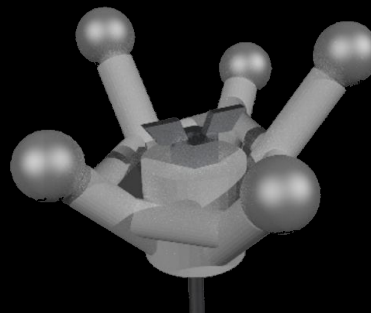
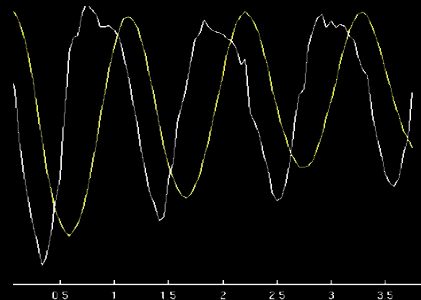
## Uniform Vs Geometric Distribution

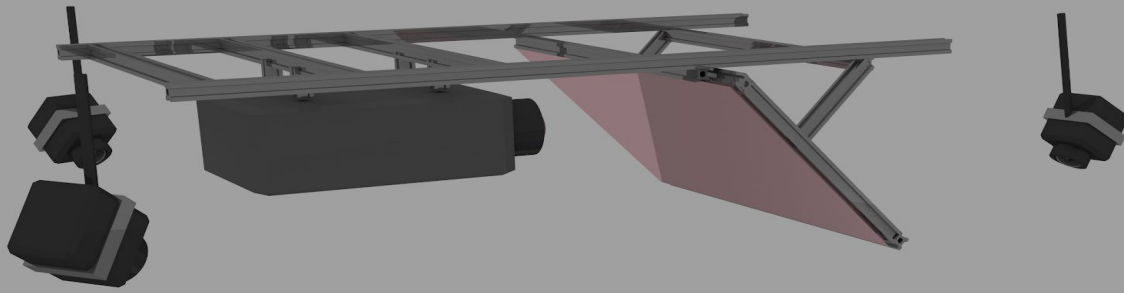


# 2013-2014: HippoVR

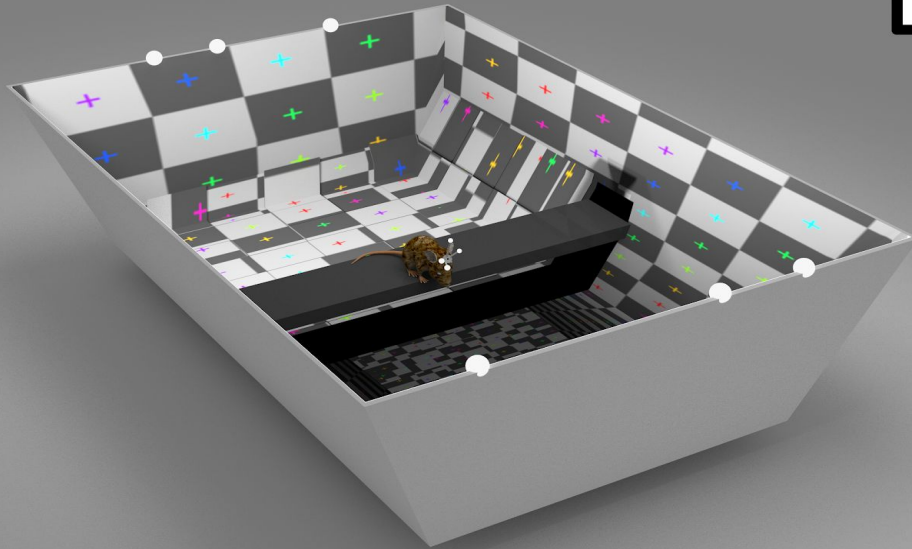
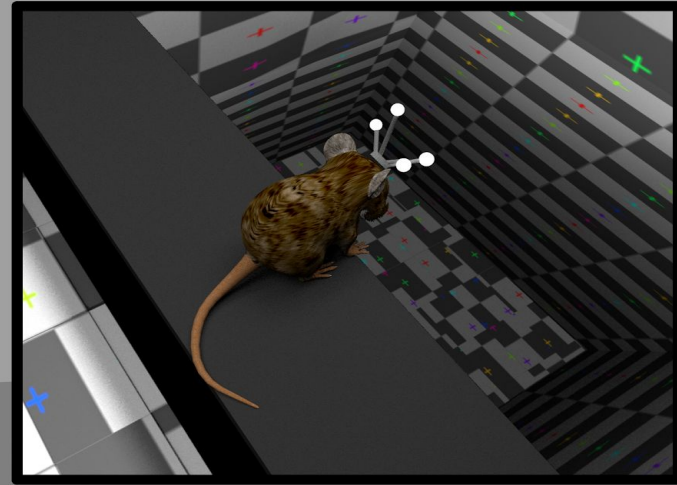


Input Lag: 120 msecs





# 2016: The ratCAVE VR Setup





Preventing  
VR Sickness



## In Summary:

I am very interested in the importance of closed loops in sensorimotor research.

I have also not published much.



# Publish or perish

From Wikipedia, the free encyclopedia

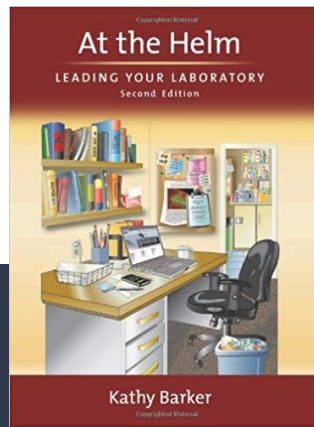
*This article is about the concept in literature. For the Columbo episode, see [Columbo \(season 3\) § Episodes](#).*

"**Publish or perish**" is a phrase coined to describe the pressure in [academia](#) to rapidly and continually [publish](#) academic work to sustain or further one's career.<sup>[1][2][3]</sup>

Frequent publication is one of the few methods at scholars' disposal to demonstrate academic talent. Successful publications bring attention to scholars and their sponsoring institutions, which can facilitate continued funding and an individual's progress through a chosen field. In popular academic perception, scholars who publish infrequently, or who focus on activities that do not result in publications, such as instructing [undergraduates](#), may lose ground in competition for available tenure-track positions. The pressure to publish has been cited as a cause of poor work being submitted to [academic journals](#).<sup>[4]</sup> The value of published work is often determined by the prestige of the academic journal it is published in. Journals can be measured by their [impact factor \(IF\)](#), which is the average number of citations to articles published in a particular journal.<sup>[5]</sup>

See also  [ [edit](#) ]

- [Academic careerism](#)
- [Forced ranking](#)
- [Impact factor](#)
- [Least publishable unit](#), reduction to which is often disparagingly labeled "[salami slicing](#)"
- [Slow science](#)



# Figures

211

GSN<sup>LMU</sup>/ENB Students

157 PhD  
41 Fast-track PhD  
13 MSc

Male Students

130

Female Students

134

Graduates

77 PhD  
11 Fast-track PhD  
46 MSc

104

MCN<sup>LMU</sup> Members

133

GSN<sup>LMU</sup> Faculty Members

Over 20

International & National Collaborations

56%

Internationals

37

Nationalities

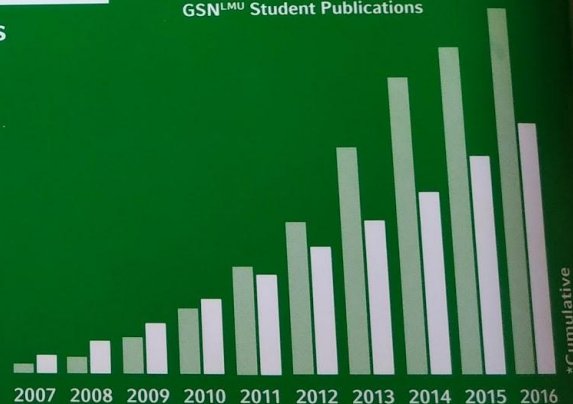
Over 500

GSN<sup>LMU</sup> Student Publications

7

Teaching Sections

Publications\*  
Students\*



Munich C

Ludwig-Max  
Grosshadern  
82152 Planegg  
+49 89 2180  
mcn.office@l



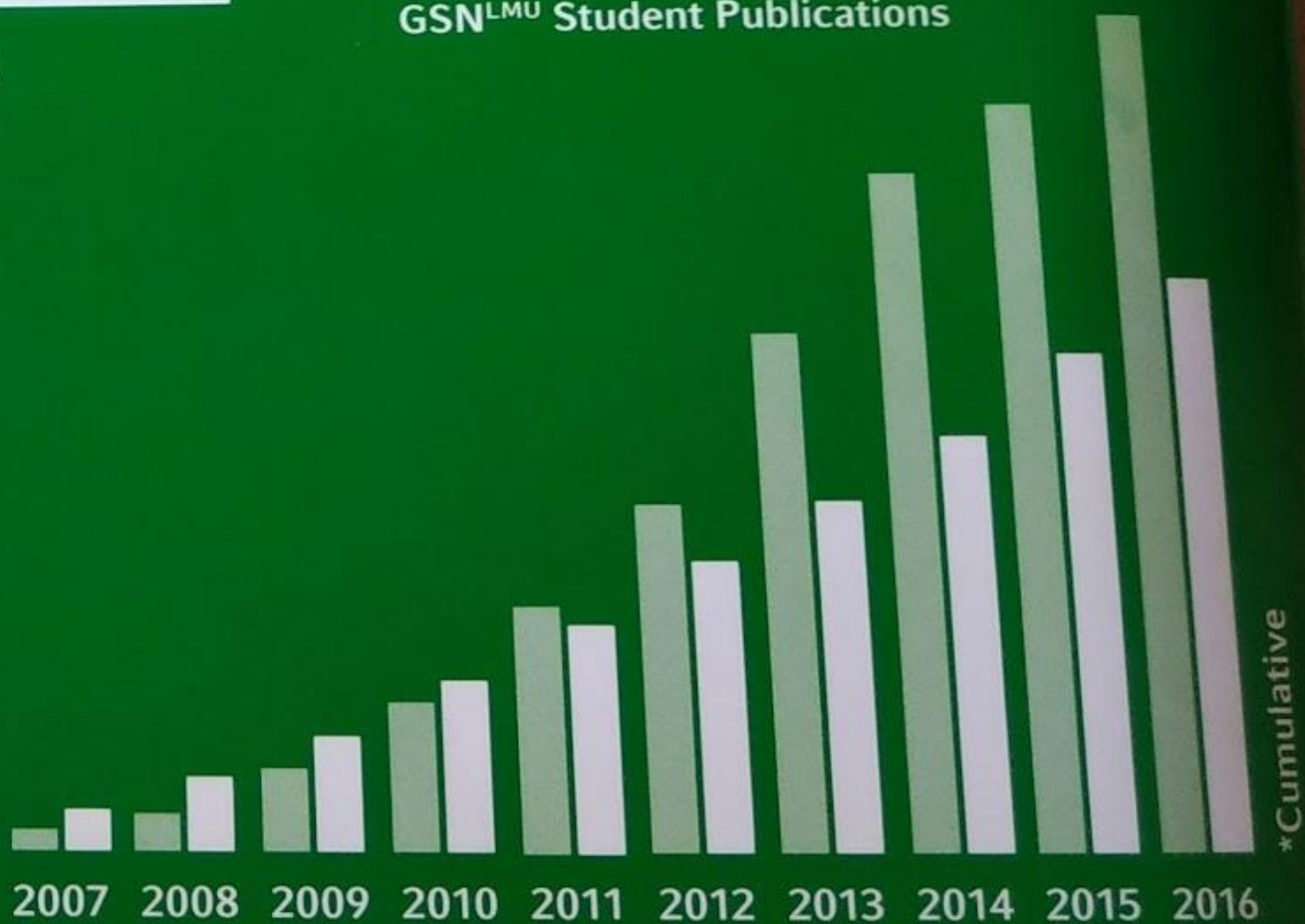
## Internationals

37

Nationalities

Publications\*

Students\*



# Power failure: why small sample size undermines the reliability of neuroscience

*Katherine S. Button<sup>1,2</sup>, John P. A. Ioannidis<sup>3</sup>, Claire Mokrysz<sup>1</sup>, Brian A. Nosek<sup>4</sup>,*

## **False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant**

...true effect,

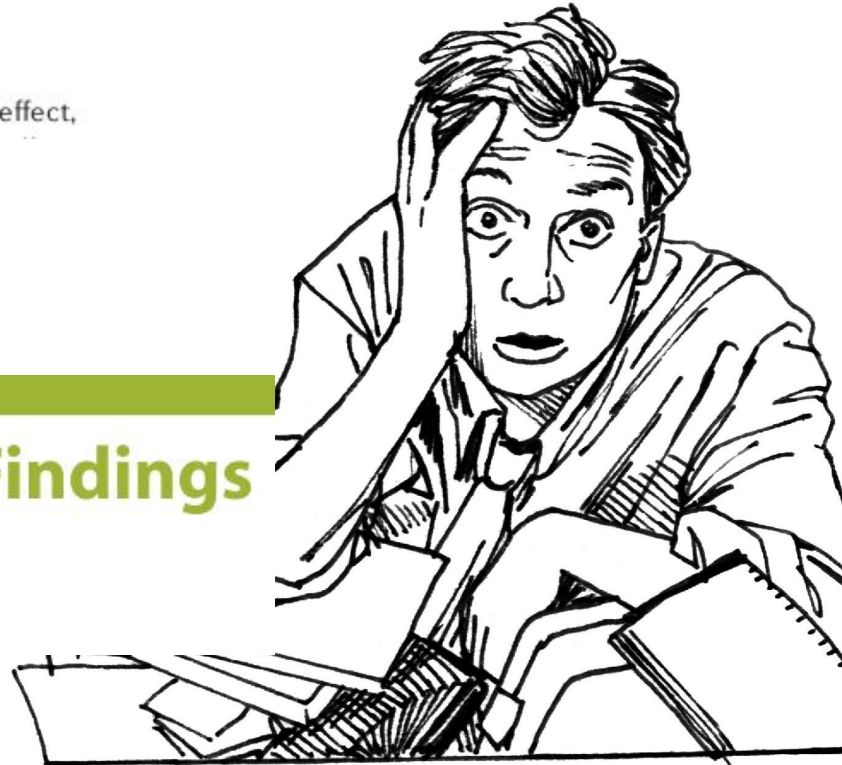
**Joseph P. Simmons<sup>1</sup>, Leif D. Nelson<sup>2</sup>, and Uri Simonsohn<sup>1</sup>**

<sup>1</sup>The Wharton School, University of Pennsylvania, and <sup>2</sup>Haas School of Business, University of California, Berkeley

**Essay**

## **Why Most Published Research Findings Are False**

John P. A. Ioannidis



# Burnout:

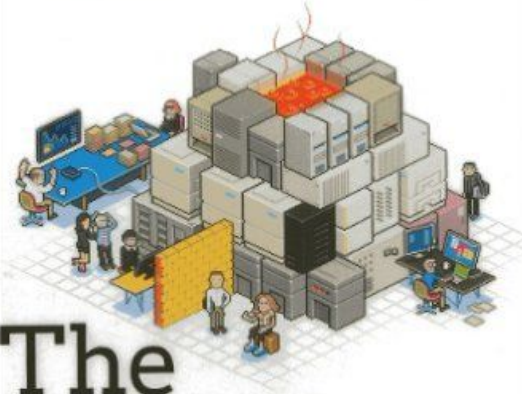
What happens when your work-related needs aren't met for a long time.

"Burnout is a psychological syndrome of

- **emotional exhaustion**
- **reduced personal accomplishment**
  - may feel unhappy with oneself
  - feel dissatisfied with accomplishments on the job
- **depersonalization**
  - negative, cynical attitudes and feelings
  - dehumanized perception of others

(Maslach et al, 1996)

From the authors of *The Visible Ops Handbook*



# The Phoenix Project

A Novel About IT, DevOps,  
and Helping Your Business Win

Gene Kim, Kevin Behr, and George Spafford

# Lean Product and Process Development

SECOND EDITION



by ALLEN C. WARD  
and DURWARD K. SOBEK II

...and that's how I came up with this workshop:



# Productivity in Science

---

Probability Theory, Test-Driven Development, and  
Lean Management Principles, presented by Nick Del Grosso

Motivation:

To be accomplished researchers doing impactful research in an engaging, innovative, and positive research community.

# Proposal: Let's Embrace “Publish or Perish”

## **Publish or Perish? Yes. Embrace It.**

That academic mantra doesn't have to be a threat, or a gloomy mandate to live or die under



Drew Coffman / Creative Commons

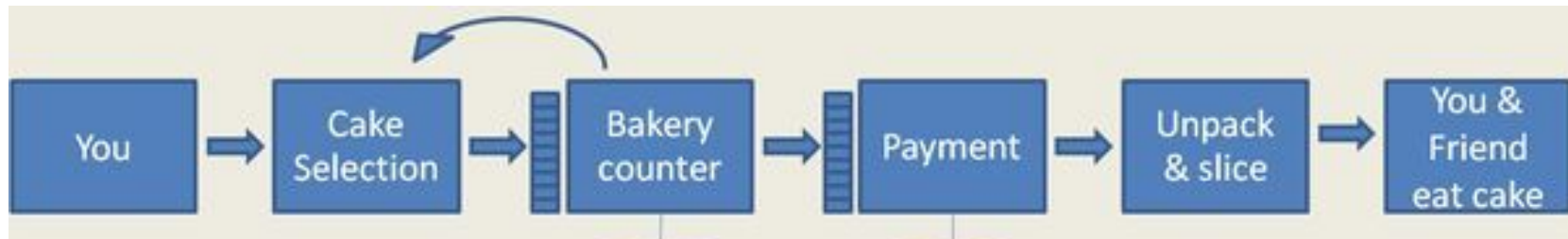
## **Research Outputs**

- Theoretical Models
- Experimental Data
- Important Insights
- Intellectual Property (e.g. Patents)

Goal: To Regularly Publish  
High-Impact, High-Quality  
Research

## p(Success): What is your Project Risk?

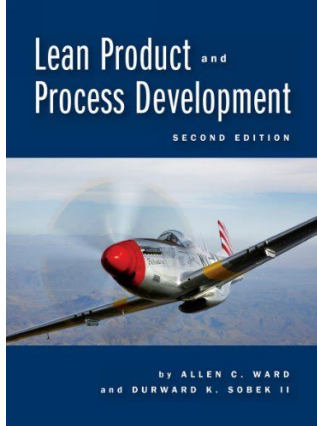
- Independent Probabilities can be multiplied.
  - ▷  $p(\text{My Animals Surviving Surgery}) = 0.9$
  - ▷  $p(\text{My Animals Learning the Task}) = 0.8$
  - ▷  $p(\text{Both}) = 0.9 * 0.8 = 0.72$
- Task: estimate the total risk of each of your projects.



# Lead Time: Can You tolerate this risk?

Lead time is the sum of four periods:

1. **Reaction time**, between the opportunity appearing and the company deciding to invest.
2. **Exploration time**, during which the team explores multiple alternative implementations (and knowledge-value is efficiently added).
3. **Lock-in time**, during which only a single solution is detailed.
4. **Fix-up time**, during which the company tries to deal with the problems of the solution.



# Literature Reviews Make a Big Difference

Mendeley Desktop

File Edit View Tools Help

Add Folders Related Sync Help

Search... Nicholas

**Mendeley**

Literature Search

**My Library**

- All Documents
- Recently Added
- Recently Read
- Favorites
- Needs Review
- My Publications
- Unsorted
- Attention
- Auditory
- Books
- Career
- Dissertation
- Exploration

Filter by Authors

- All
- ??zg??bek, ??zlem
- Abbott, Allison
- Abdi, Hervé
- Abdul-Rahman, Hussein
- Abdullah, Mohd Zaid
- Abe, Taiga
- Abellán, Antonio
- Abplanalp, W.
- Abraham, D.
- Abraira, Victoria E
- Abressart, D.
- Acharya, Lavanya
- Acland, Benjamin
- Acosta-Galvan, G.
- Acsády, László
- Adam, Sven
- Adamovich, S. V., Fluet, G. G., Tu...
- Adams, Daniel L

**All Documents** Edit Settings

| ★ | Authors   | Title   | Year | Published In                | Added   |
|---|---|---|------|-----------------------------|---------|
| ★ | Liang, Jiandong; Shaw, Chris; Green, Mark       | On temporal-spatial realism in the virtual reality environment                            | 1991 | Proceedings of the 4th a... | Sep. 30 |
| ★ | Steed, Anthony                                  | A simple method for estimating the latency of interactive, real-time graphics simulations | 2008 | Proceedings of the 2008...  | Sep. 30 |
| ★ | Wloka, Matthias M                               | Lag in Multiprocessor Virtual Reality   | 1995 | Presence                    | Sep. 30 |
| ★ | White, William J.                               | Airplane simulator qualification  | 1991 |                             | Sep. 29 |
| ★ | Kennedy, Robert S; Lane, Norman E; Berb...      | Simulator Sickness Questionnaire: An Enhanced Method for Quantifying Simulator...         | 1993 | The Internation...          | Sep. 28 |
| ★ | Mathis, Alexander; Mamidanna, Pranav; ...       | DeepLabCut: markerless pose estimation of user-defined body parts with deep learning      | 2018 | Nature Neuroscience         | Sep. 28 |
| ★ | Sewing, Andreas; Winchester, Toby; Car...       | Helping science to succeed: improving processes in R&D                                    | 2008 | Drug Discovery T...         | Sep. 26 |
| ★ | Is, What; Creativity, Business                  | How to Kill Creativity How to Kill Creativity   | 2008 |                             | Sep. 26 |
| ★ | Barber, Christopher G.; Haque, Nuzrul; Gardn... | 'OnePoint' - combining OneNote and SharePoint to facilitate knowledge transfer            | 2009 | Drug Discovery T...         | Sep. 26 |
| ★ | Schweikhart, Sharon A.; Dembe, Allard E.        | The Applicability of Lean and Six Sigma Techniques to Clinical and Translational Rese...  | 2009 | Journal of Investigativ...  | Sep. 26 |
| ★ | Shook, John                                     | How to Change a Culture : Lessons From NUMMI  | 2010 | MIT Sloan Managemen...      | Sep. 26 |
| ★ | Carleysmith, S.W.; Dufton, a.M.; Altria, K.D.   | Implementing Lean Sigma in pharmaceutical research and development: a review by pract...  | 2009 | R&D Management              | Sep. 26 |
| ★ | Amabile, Teresa M; Khaire, Mukti                | Creativity and the Role of the Leader - Harvard Business Review                           | 2011 | Business                    | Sep. 26 |
| ★ | Carney, Steve                                   | How can we avoid the productivity gap?  | 2005 | Drug Discovery T...         | Sep. 26 |
| ★ | Ritchie, Timothy J.; McLay, Iain M.             | Should medicinal chemists do molecular modelling?   | 2012 | Drug Discovery T...         | Sep. 26 |
| ★ | Johnstone, Craig; Pairaudeau, Garry; Pe...      | Creativity, innovation and lean sigma: A controversial combination?                       | 2011 | Drug Discovery T...         | Sep. 26 |

Details Notes Contents

Type: Journal Article

**The Applicability of Lean and Six Sigma Techniques to Clinical and Translational Research**

Authors: S. Schweikhart, A. Dembe

View research catalog entry for this paper

Journal: *Journal of Investigative Medicine*

Year: 2009

Volume: 57

Issue: 7

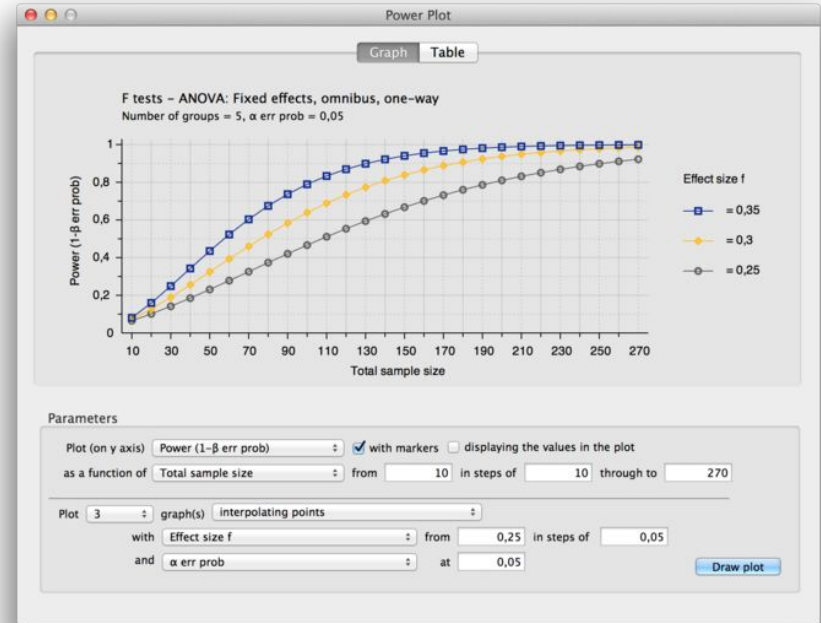
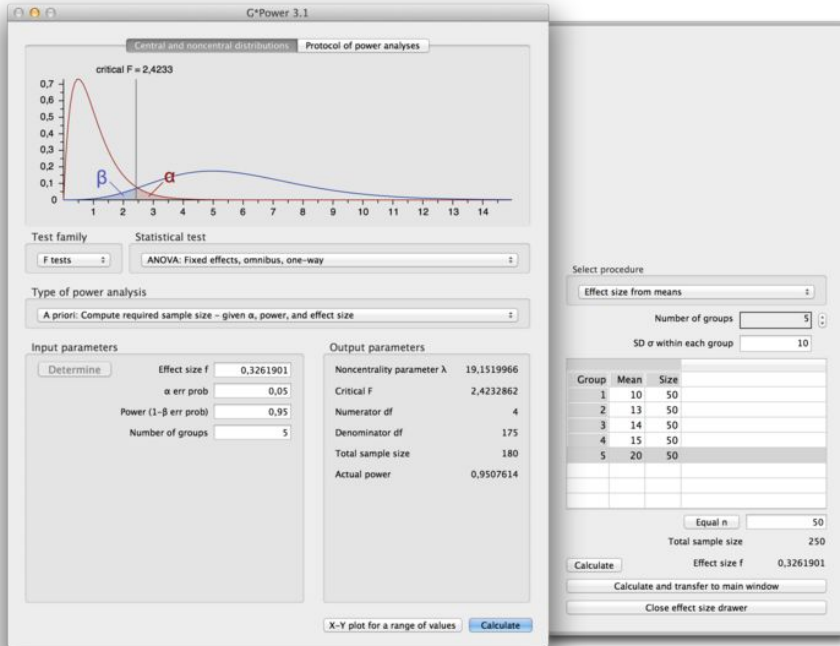
Pages: 748-755

**Abstract:**

BACKGROUND: Lean and Six Sigma are business management strategies commonly used in production industries to improve process efficiency and quality. During the past decade, these process improvement techniques increasingly have been applied outside the manufacturing sector, for example, in health care and in software development. This article concerns the potential use of Lean and Six Sigma in improving the processes involved in clinical and translational research. Improving quality, avoiding delays and errors, and speeding up the time to implementation of biomedical discoveries are prime objectives of the National Institutes of Health (NIH) Roadmap for Medical Research and the NIH's Clinical and Translational Science Awa...

**Tags:**

# Estimate Needed Sample Size with Power Analyses





## Present Your Plans Early and Search for Failure Points



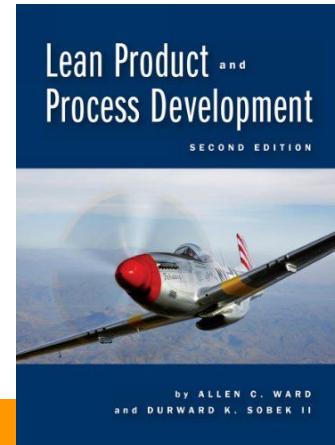
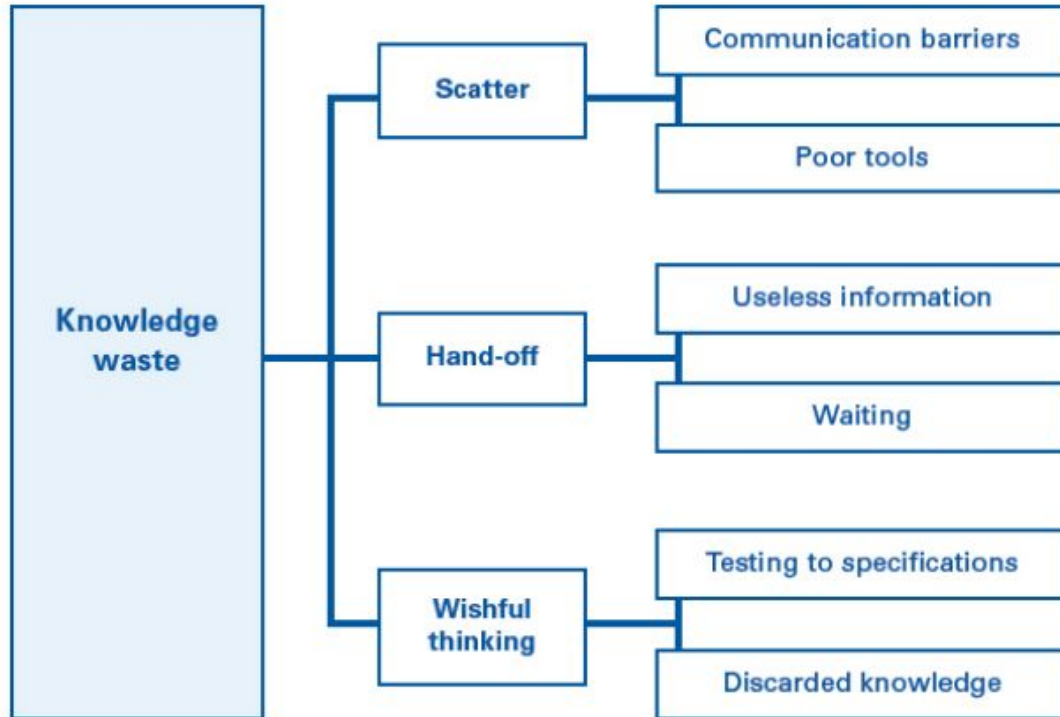
## Discussion: More Ways to Maximize Exploration Time

- 1.
- 2.
- 3.
- 4.
- 5.

**Eventually, you'll come to  
a consensus...**

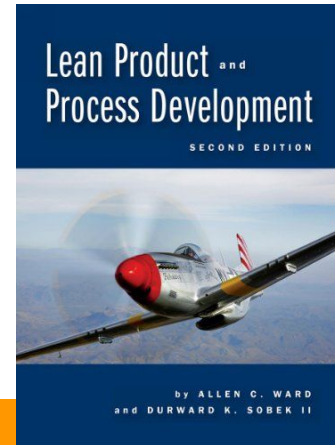
Bayes Demo Time!

## But Stay Efficient: Beware of Knowledge Waste



## Solutions for Minimizing Scatter (quoted from book)

- Stop Reorganizing
- Reduce demands for information on short notice from subordinates.
- Respond to “fires” with the least disruptive but effective response. If it is someone’s job to put out the fire, let them do it.
- Stop sending out or replying to excessive email or voice mail.
- Think twice about adding more projects.
- Stop adding formatl structure (tasks, checks, reports) to your development process.

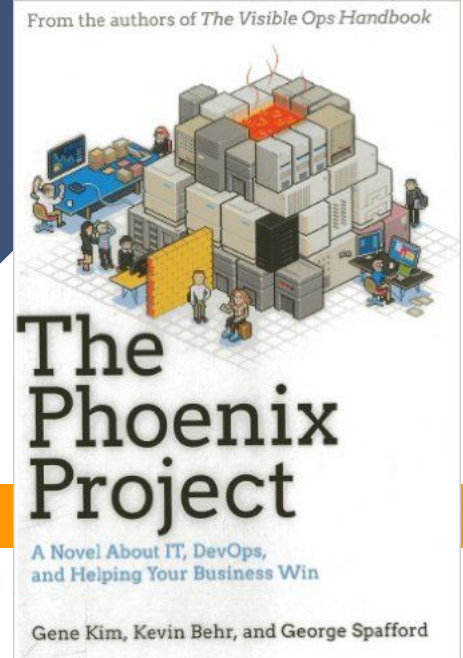


End of Part 1.  
Break!

Beginning of Part 2.  
Unbreak!

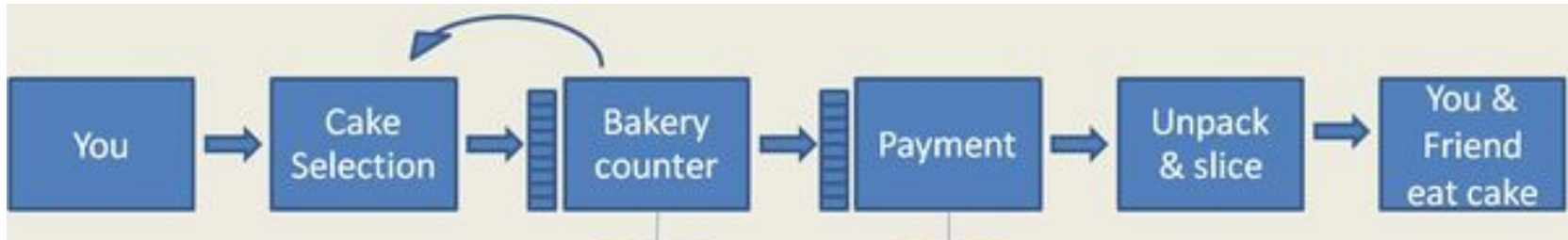


# Lean Experiments: Lessons from Toyota and DevOps



## Value-Stream Mapping: Visualizing Lead Time

- **Exercise:** Make an experiment value stream map, using an example from your laboratory or department.



<http://www.johngoodpasture.com/2015/11/value-stream-mapping.html>

## Lean Operations Minimize Waste

**Brainstorming Exercise:** Identify as many sources of wasted time in this value stream map as possible.

Feel free to adjust the value stream map if you see places to add more detail.

## Lean Operations Minimize Waste

1. **Waste of Overproduction:** creating things that don't add value
2. Waste of Time on Hand / Waiting
3. Waste of Transportation
4. Waste of Processing Itself
5. Waste of Stock at Hand
6. Waste of Movement
7. Waste of Making Defective Products
8. Waste of Underutilized Workers

## Lean Operations Minimize Waste

**Brainstorming Exercise:** Identify as many sources of wasted time in this value stream map as possible.

Feel free to adjust the value stream map if you see places to add more detail.

## Minimizing Overproduction Waste

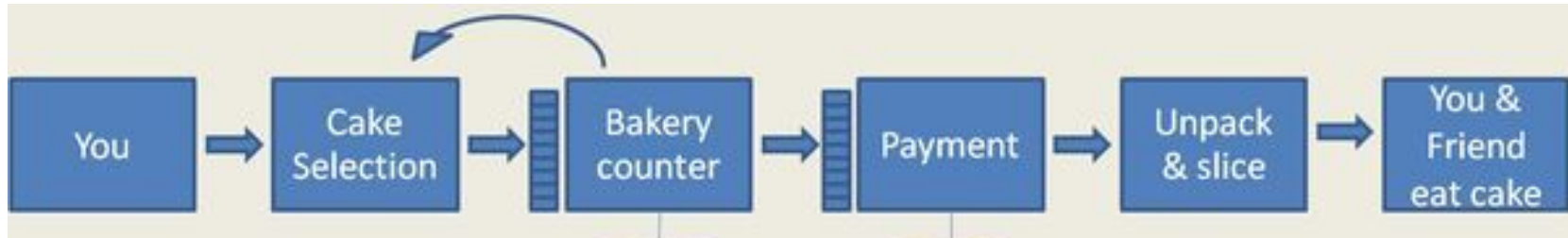
- ▷ Test-Driven Development (Demo)
- ▷ Minimally-Viable Product



## **“The First Way”**

### **Create a Constant Feed-Forward Flow**

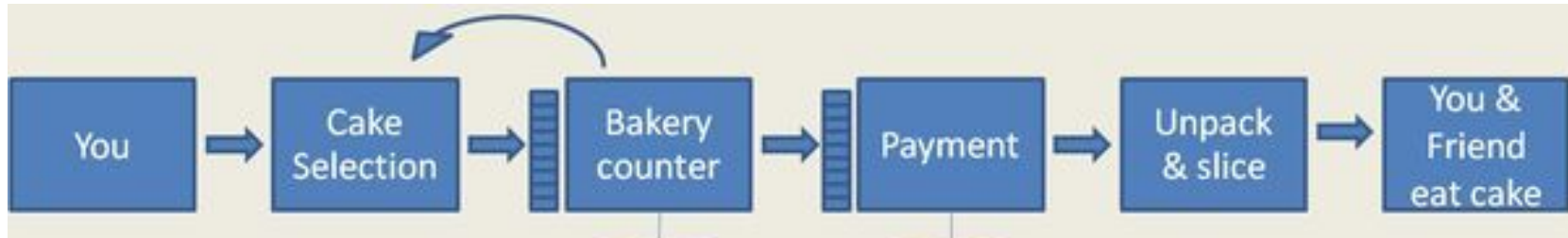
- Waste is Often Spent Waiting.
  - ▷ High “Work in Progress”
  - ▷ Ignoring this aspect creates a Push System
  - ▷ Wastes Effort, Decreases Responsiveness of System



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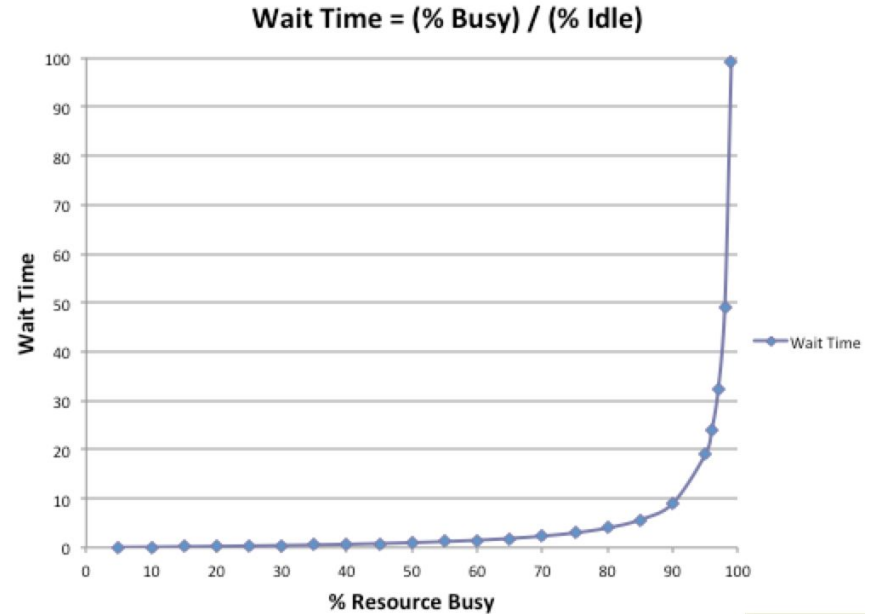
“The First Way”

Create a Constant Feed-Forward Flow

- ▶ **Exercise:** Pushing and Pulling Paper Airplanes

## “The First Way” Create a Constant Feed-Forward Flow

- ▷ Toyota's Solutions
  - ▷ “Andel Cords/Buttons”
  - ▷ “Swarming” Problems
  - ▷ Slack Time

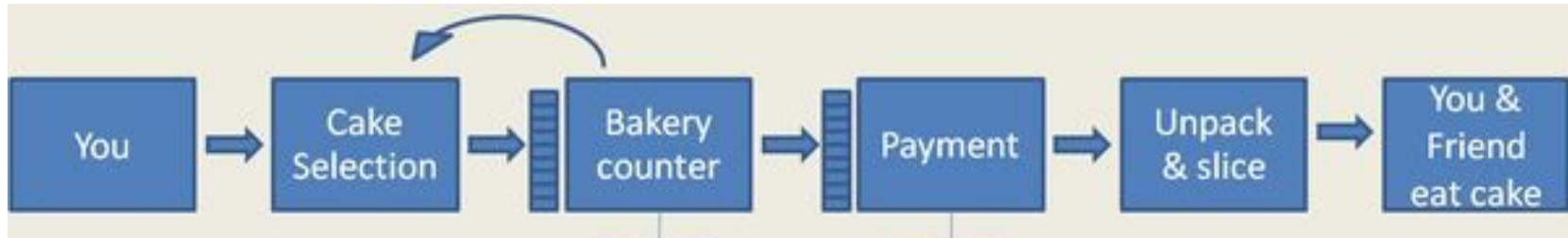


- ▷ **Discussion:** How can we apply this to our research?

## “The Second Way”

### Maximize Flow with Feedback Systems

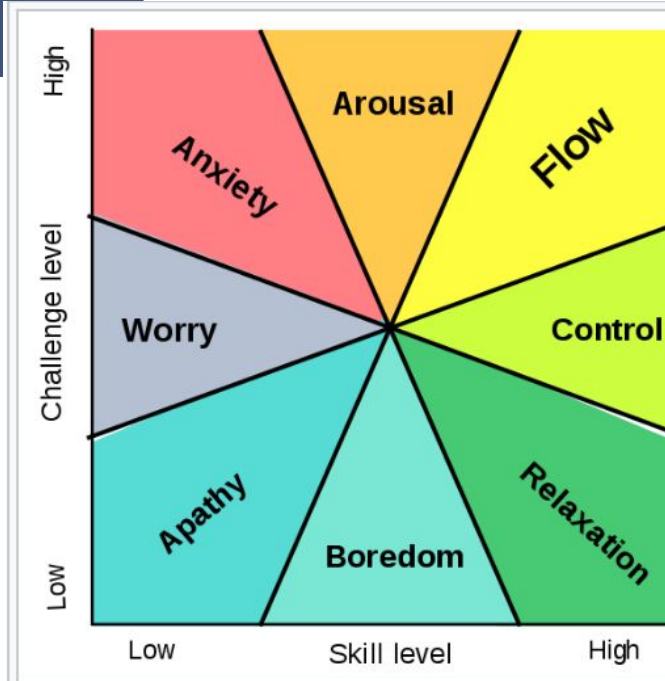
- Work that moves backwards:
  - ▷ Creates Unplanned Work.
  - ▷ Indicates unknown root problems
  - ▷ Increases Bottlenecks



## Note: Flow in Psychology seems somehow related to me

**Flow theory (psychology)** postulates three conditions that have to be met to achieve a flow state:

1. One must be involved in an activity with a clear set of goals and progress. This adds direction and structure to the task. [\[14\]](#)
2. The task at hand must have clear and immediate feedback. This helps the person negotiate any changing demands and allows them to adjust their performance to maintain the flow state. [\[14\]](#)
3. One must have a good balance between the *perceived* challenges of the task at hand and their own *perceived* skills. One must have confidence in one's ability to complete the task at hand. [\[14\]](#)



Mental state in terms of challenge level and skill level, according to [Csikszentmihalyi's flow model](#). [\[9\]\[page needed\]](#) (Click on a fragment of the

(wikipedia entry on Flow)



## “The First Way” Create a Constant Feed-Forward Flow

- ▷ Toyota’s Solution:
  - ▷ Single-Piece Flow
- ▷ Devops Solution:
  - ▷ Continuous Deployment
- ▷ **Discussion:** How can we apply this to our research?

# KanBans: Keeping Your Value Stream Visible



# Trello.com Example: PyData Munich Org Team

The screenshot shows a Trello board for the PyData Munich Org Team. The board is organized into six columns, each representing a different stage of event planning. Each column contains one or more cards with event details, dates, and team member avatars. The columns are:

- Event Team Needs Assigning**: Contains a card for "Event Template (copy me)" and a list of monthly events from November to March.
- Event Space Needs Booking**: Contains a card for "Mid-November Event" with a calendar icon and a team member avatar.
- Speakers Need Confirming, Talk Topic Needs Confirmation**: Contains a card for "October 22nd Event at JetBrains" with a calendar icon, a team member avatar, and a "6" in a speech bubble.
- Speakers Need First Rehearsal**: Contains a card for "October 22nd Event at JetBrains" with a calendar icon, a team member avatar, and a "1" in a speech bubble.
- Event Space Needs Final Confirmation, Meetup Event needs Announcement**: Contains a card for "October 22nd Event at JetBrains" with a calendar icon, a team member avatar, and a "1" in a speech bubble.
- Speakers Need Second Rehearsal**: Contains a card for "October 2nd Event at Burda Bootcamp" with a calendar icon, a team member avatar, and a "17" in a speech bubble.

“ *The Third Way: Cultivate a Culture  
of Experimentation and  
Innovation.*

## Conclusions

- We are motivated to be good researchers.
- Productive research creates research products.
- Finding innovative approaches requires thinking like a product developer.
- Committing to an experiment requires thinking like a manufacturer.
- Reducing waste is essential to being lean.
- Slack time is essential for productivity.
- Pull-feedback systems create smoother flow and higher quality.