

Welcome to UMSI106 Programs, Information, and People

Jackie Cohen
Lecturer
School of Information

Paul Resnick
Professor and Associate Dean
School of Information

What's the Course About?

- Programs
 - How to read and write them
- Information
 - Unpredictable signals...
 - ...that trigger actions
- People
 - How they are (not) like computers
 - How they can write programs (together)

Programming

Powerful



Employable

THE INSTRUCTIONAL TEAM

Paul Resnick

- Call me “Professor Resnick”
- Individual Office hours
 - Fridays 1:30-2:00 PM
 - Or catch me right after class most days (not today)
 - Career advice; academic counseling
 - Stuff you don’t want overheard



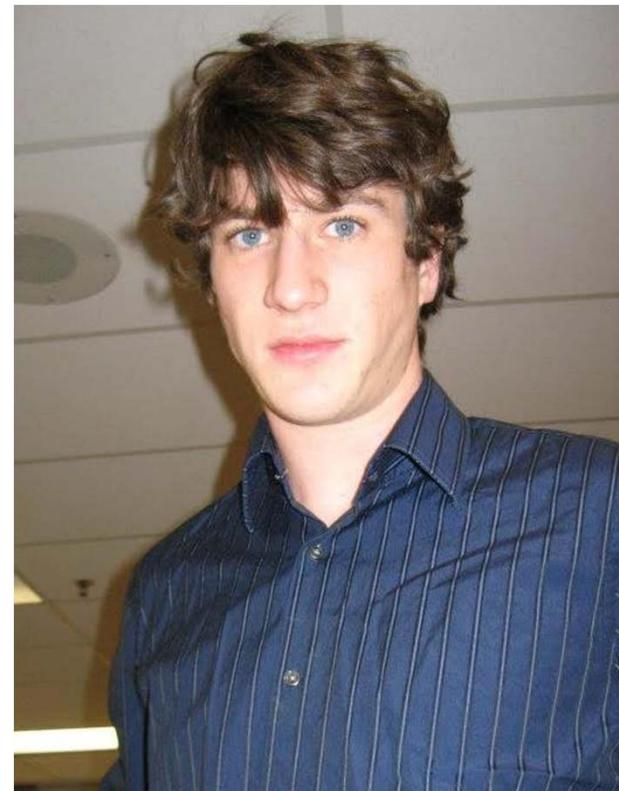
Jackie Cohen



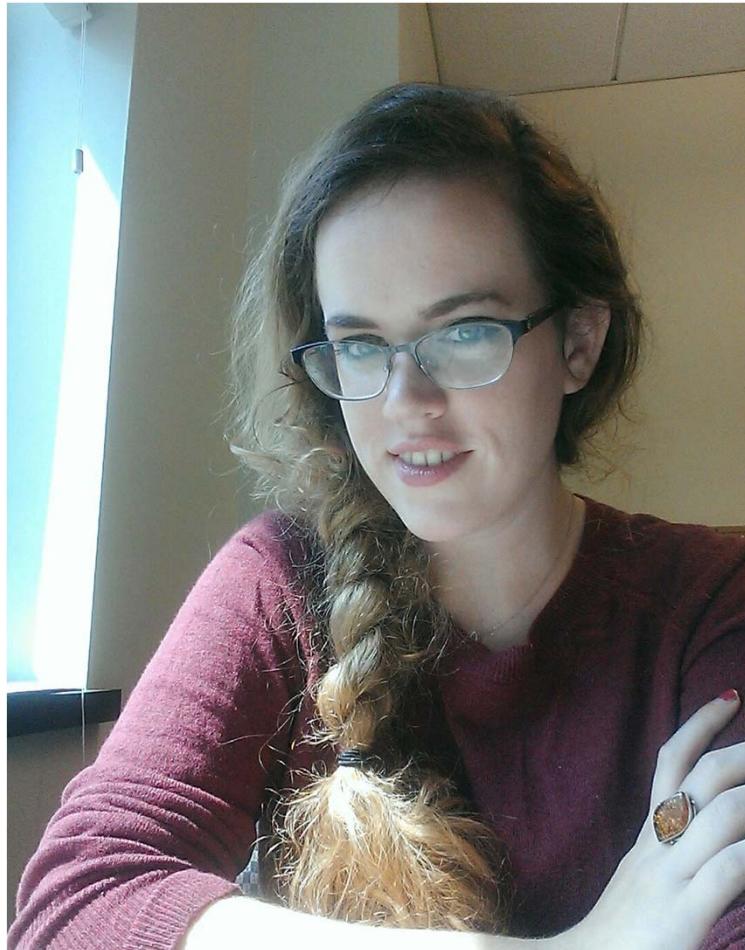
- Call me “Jackie”
- Lecturer (co-instructor for this course)
- Individual Office hours
 - Wednesdays 4:15-5:05 PM (right after lecture, but in North Quad), or email
 - Advice, questions, concerns, stuff you don’t want overheard

Sam Carton

- GSI
 - Thursdays 10:30
 - Thursdays 1:00
 - Thursdays 2:30
- PhD student
- Research interests
 - Data mining
 - Machine learning



Chanda Phelan



- GSI
 - Thursdays 10:30
 - Thursdays 1:00
 - Thursdays 5:00
- PhD student
- Research interests:
 - Behavioral economics
 - Health behavior change

Tera Reynolds

- GSI
 - Thursdays 9:00
 - Fridays 10:30
- PhD student
- Research interests
 - Health informatics
 - Public health

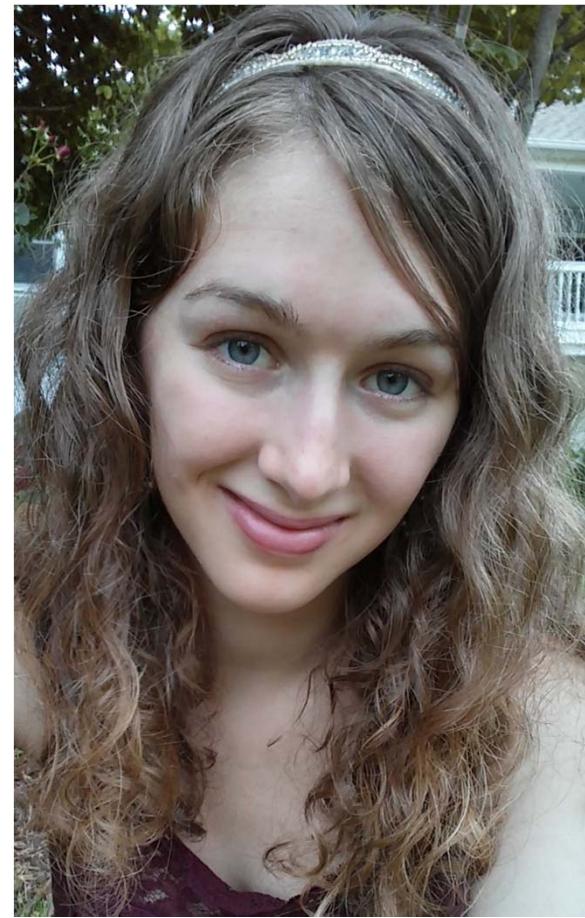


Instructional Assistants

- Students who did well in this course previously
- Roles
 - Assist in sections
 - Assist in office hours
 - Grade



Ayo Akinokun (W14)



Natalie Wysocki (F14)



Lauren Murphy (W15)



Salvatore (Sal) DiGioia (F15)

Information Theoretic Applications

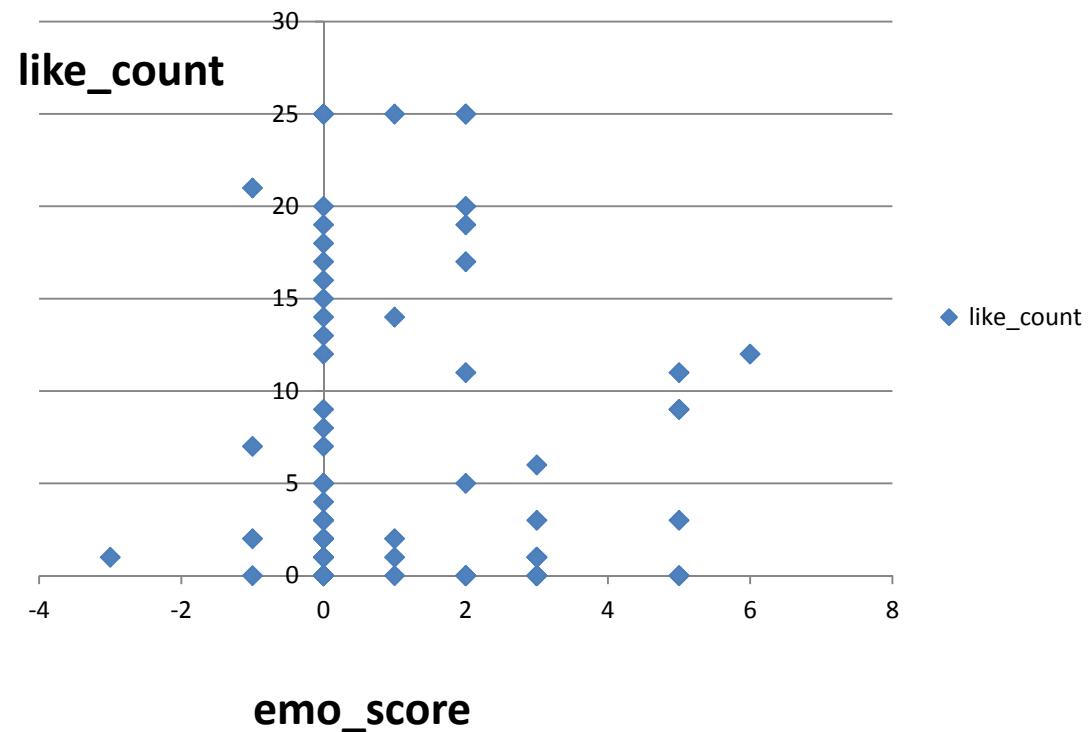
- Guess letters
 - Hangman
 - The Shannon Game
- Compress text by reducing redundancy
- Calculate sentiment scores for Facebook posts

Demo

- Hangman game

Data Analysis Applications

- Basic Structure
 - Extraction
 - Aggregation
 - Output
- Facebook or Twitter
 - Who posts the most?
 - Who gets the most replies?
 - Whose text is the least predictable?
 - Do more positive or negative posts get more likes?
- Flickr
 - Which tags co-occur frequently?



Interactive Applications

- Write programs that react based on input
 - Games: Pong, Hangman
 - Other interactions: put in your Twitter username and discover something
 - Output that changes based on user input via keyboard

Demo

- Pong → Breakout

Just Like Other Intro Programming Courses

- Data structures
- Variables
- Functions
 - Parameter passing
- Conditionals
- Iteration
- Classes

We Cover Stuff They Don't

- REST APIs
- List comprehensions, map, filter, reduce
- How people are (un)like computers
- Information theory
- How open source projects work

We Skip Stuff They Cover

- Implementing data structures
 - Linked lists
 - Queues
 - Trees
- Implementing sorting algorithms
- Efficiency
 - Minimizing running time
 - Minimizing memory usage

We Make it Less Painful

- Gradual set up of programming environment
 - Start with program execution in browser
 - Learn unix command line over several weeks
 - Then install python interpreter and text editor
- Lots of support
 - Discussion sections
 - 6 hours/week of group office hours
- Encouraged to work in groups

Where this course fits

- Required pre-req for BSI
- Option for LS&A Statistics Minor
- Also useful for other students who want an intro to programming, but not to CS
- Alternative
 - EECS 183 (C++; CS intro)

Who Shouldn't Take This Class

- Not willing or able to put in the time
 - learning to program (and taking this class) takes a lot of time, studying and practicing
- Know Too Much
 - Aced EECS 183 or AP CS
 - Passed EECS 280

Formal Languages

- Limited vocabulary
- Strict syntax
- Well-defined semantics
 - Meaning is not in the eye of the beholder
- Demonstration: robot dancing

Robot Dancing

Maybe More Like This

Instruct Us

- Give us commands
 - If part of our formal language, we'll do it
 - Otherwise, not

The Programming Language

- Left
 - forward
 - back
 - side
 - behind
 - tap
- Right
 - forward
 - back
 - side
 - behind
 - tap
- Rotate clockwise
- Rotate counter-clockwise

The Electric Slide

- Right side
- Left behind
- Right side
- Left tap

- Left side
- Right behind
- Left side
- Right tap

- Right back
- Left back
- Right back
- Left tap

- Left front
- Right tap
- Right back
- Left tap

- Left forward
- Rotate counter-clockwise

Abstraction

- **def grapevine(dir):**
 - if dir == 'right':
 - Right side
 - Left behind
 - Right side
 - Left tap
 - else:
 - Left side
 - Right behind
 - Left side
 - Right tap
- **def back-3():**
 - Right back
 - Left back
 - Right back
 - Left tap
- **def rock(dir):**
 - if dir == 'forward':
 - Left front
 - Right tap
 - else:
 - Right back
 - Left tap

The Electric Slide

- grapevine('right')
- grapevine('left')
- back-3()
- rock('forward')
- rock('back')
- left forward
- rotate counter-clockwise

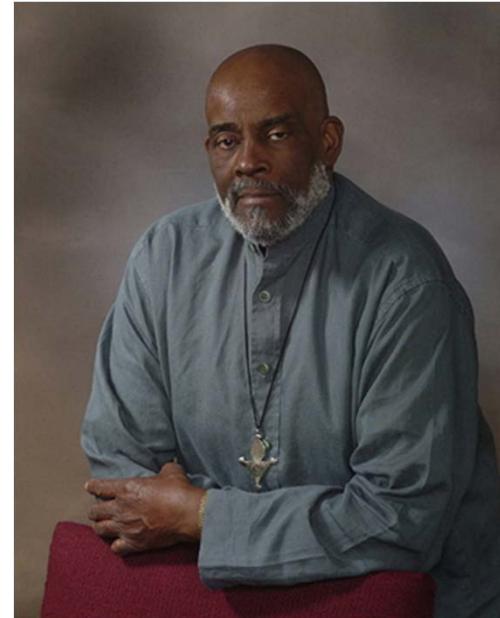
MY STORY: PROF. RESNICK

Ph.D. MIT CS 1992

- HyperVoice: Groupware By Telephone



Tom Malone



Mel King

GroupLens: An Open Architecture for Collaborative Filtering of Netnews

Paul Resnick, Neophytos Iacovou**, Mitesh Suchak*, Peter Bergstrom**, John Riedl***

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50 Memorial Drive
Cambridge, MA 02139
617-253-8694
Email: presnick@mit.edu

** University of Minnesota
Department of Computer Science
Minneapolis, Minnesota 55455
(612) 624-7372
Email: riedl@cs.umn.edu

ABSTRACT

Collaborative filtering allows users to find other users who share their opinions of other items. In a collaborative filtering system, users rate articles they wish to recommend to others. News readers can then make it easy for users to find other users who have rated the same articles. News readers can also make it easy for users to rate articles. Rating servers, which disseminate the ratings, can then make it easy for users to find other users who have rated the same articles. Based on the experience of the GroupLens research group, we believe that rating servers will probably aggregate user ratings by entering ratings into a database and then publishing the effectiveness of the system.

The GroupLens system is open: alternative software for news clients and Better Bit Bureaus can be developed independently and can interoperate with the components we have developed.

The Most Cited CSCW Paper: GroupLens

GroupLens: an open architecture for collaborative filtering of netnews (CSCW 1994)

Resnick, P., Iacovou, N., Suchak, M., Bergstrom, P., Riedl, J.

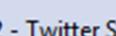
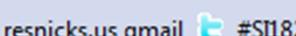
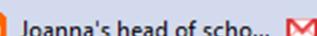
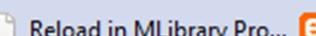
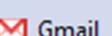
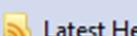


11:00-12:10

The authors will re-present the original papers using their original slides, and then discuss developments in the field since then.

works. System administrators depend on netnews to keep in touch with the latest development work, the latest security holes, and the latest bug fixes. Researchers depend on

[Link to video clip](#)



Hello, Paul Resnick. We have recommendations for you. (Not Paul?)



Paul's Amazon.com

| Today's Deals

| Gifts & Wish Lists

| Gift Cards

Shop All Departments

Search Books

Books

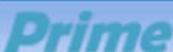
Advanced
Search

Browse
Subjects

New
Releases

Bestsellers

The New York
Times® Bestsellers



Member: Paul Resnick

Get it tomorrow, Friday, Oct 30 Get it Saturday, Oct 31



Order within 3hr 26min



Order within 1hr 56min

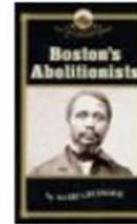
Ship to:
Personal

Customers Who Bought This Item Also Bought



[The Shoemaker and the Tea Party: Memory and the American Revolution](#) by Alfred F. Young

(7) \$12.96



[Boston's Abolitionists \(New England Rememb...\) by Kerri Greenidge](#)

\$10.32



[Boston's Immigrants, 1790-1880: A Study in Americanization](#) by Oscar Handlin

(2) \$24.10

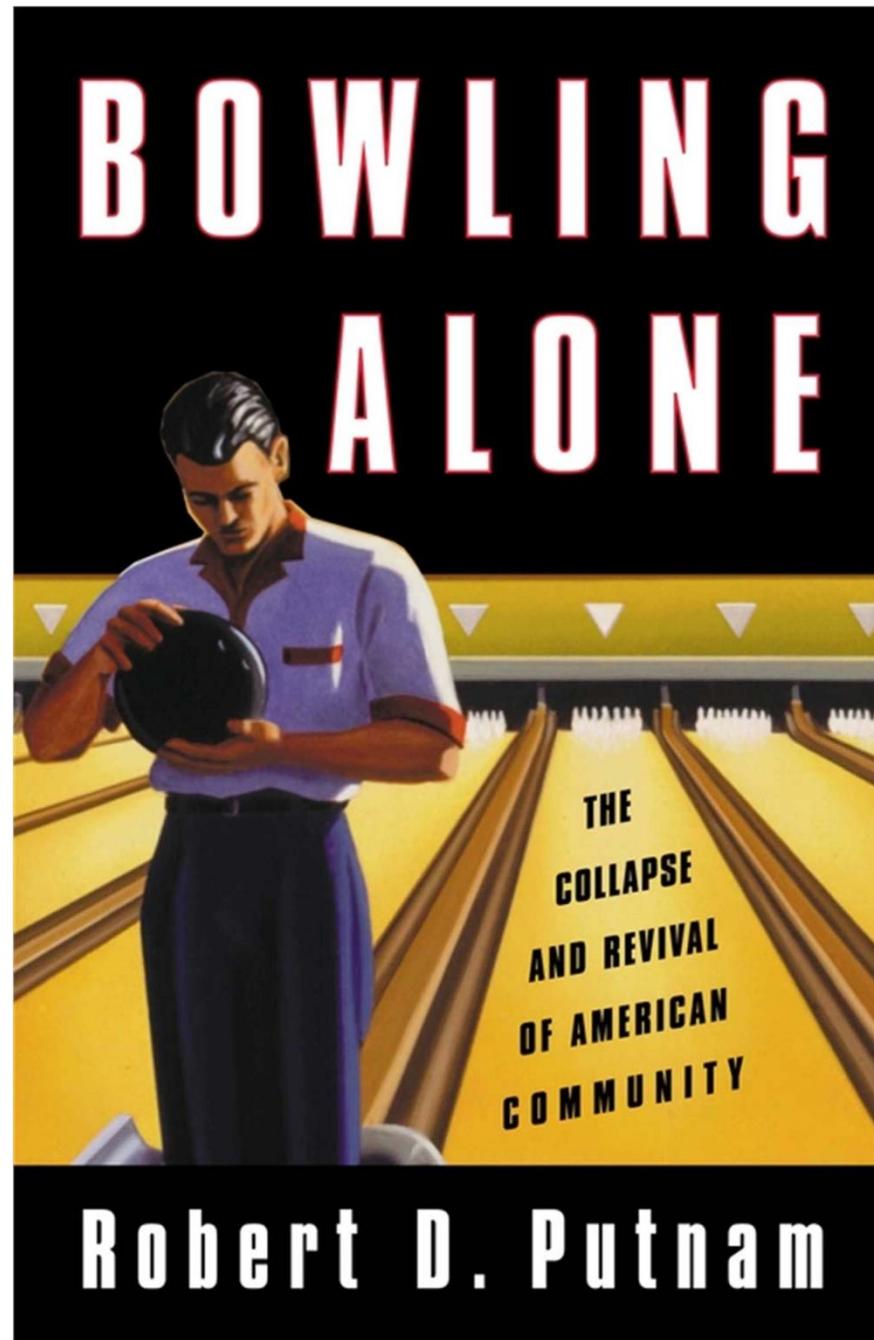


[A Short History of Boston](#) by Robert J. Allison

(2) \$10.17

ACM Software Systems Award

- 2011 Eclipse
- **2010 GroupLens**
- 2009 VMWare Workstation
- 2003 Make
- 2002 Java
- 1999 Apache
- 1998 Mosaic/WWW
- 1991 TCP/IP
- 1987 Smalltalk
- 1986 Tex



Saguaro Seminar 1997



Saguaro Seminar 1997



Saguaro Seminar 1997



Saguaro Seminar 1997



photo © Martha Stewart

facebook Home Profile Friends Inbox 2 Paul Resnick Settings Logo



Paul Resnick First trip to Korea next week. Seoul and KAIST. Any advice on what do and not to do, or how to deal with jetlag, would be appreciated. [Comment](#) on Saturday [Share](#)

Wall **Info** **Photos** **Boxes** +

View Photos of Me (11)

Edit My Profile

Write something about yourself.

Information

Networks:
Michigan Faculty

Relationship Status:
Married to
Caroline Richardson

Friends

207 friends [See All](#)

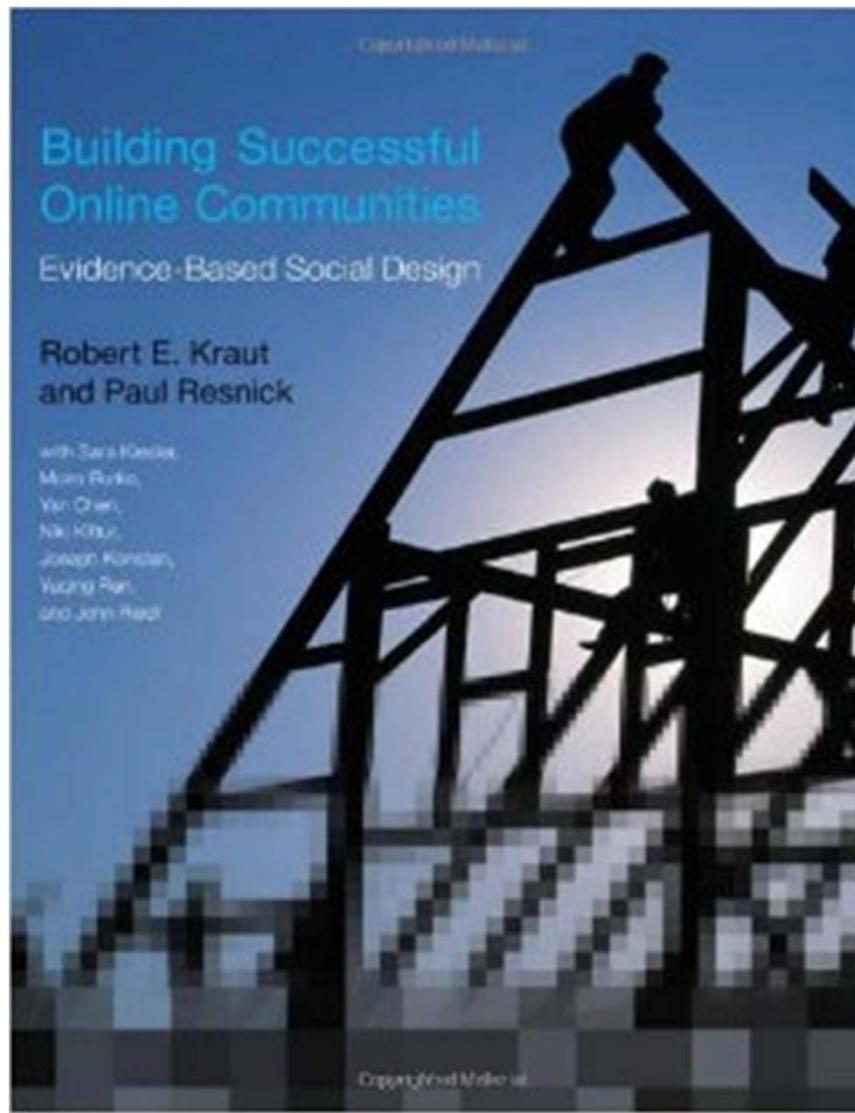
What's on your mind?

Attach: Share [Options](#)

 **Paul Resnick** First trip to Korea next week. Seoul and KAIST. Any advice on what to do and not to do, or how to deal with jetlag, would be appreciated. [Comment](#) · Like

 **Tejaswi Peesapati** To avoid Jetlag: just follow the timezone when you land in Korea. Make sure you plan your sleep during journey based on the time of arrival in Korea. If you are arriving by night, then don't plan to sleep during flight. That makes you easily adjusted to the timezone. [Comment](#) · Delete

Online Communities



Current Projects

- RumorLens
- Commit to Steps
- Balance
- MTogether

MY STORY: JACKIE

Types of questions I'm interested in

- Among others:
 - How can people use data they collect to learn what they want to learn about their business/org/the world around them?
 - What are the fastest, easiest, or most precise, ways to get a lot of, and then start to understand, representative data of different types?
 - How can people build tools that help others learn stuff like what we hope to teach in this course?

How I got here: Step 1

- I went to U-M too (now a while ago...)
- I thought I would do history research (I changed my mind)
- My first degree was in linguistics
 - My first programming class was in a different language, C++ (used in EECS 183)
 - Then I started working with Python
- I moved to New York City to do programming work

How I got here: Step 2

- I wanted to learn more about statistics and information theory, join this community...
- I came back here to grad school!
 - GSI in 106 since it started
- After graduating, I took a job at **Local Orbit**
 - we write software that helps small local vendors and farms sell food to big institutional buyers
- Small team, so we all do it all: solve problems, build new features

Getting to Know You

- Fill out the form online
 - Link from the Textbook
 - Include some interesting factoid about yourself
 - Optional (encouraged): upload a picture of yourself
 - mug shot preferred
 - Please no one else in the picture
 - we use a flashcard app to learn your names
- Visit office hours
- Introduce yourself after class

COURSE ADMIN

Class Meetings

- Mondays and Wednesdays 2:30-4:00
 - Lecture with lots of “try it yourself”
 - Discuss readings about programs, information, and people
 - Collective note-taking via HackPad
 - Use devices only for “try it yourself” and Hackpad
- Discussion Sections
 - Work through exercises together
 - Great prep for the HWs
 - Sections **are meeting tomorrow**

Overrides and Swaps

- Some spaces may open up
- Please attend the section you'd like to attend
- If not too full
 - GSI will record name and arrange for override
- If it's too full
 - Go to the one you're signed up for
 - Or find another that isn't so full

Office Hours

- Individual appointments with Professor Resnick and Jackie
- Group Office hours, 2185 NQ
 - Fridays 2-6 (starting next week)
 - Sundays 1-3 (starting next week)

Canvas Site

- Link to login to online textbook
 - From the Assignments section
- Resources
 - Syllabus
 - Some other things later
- Assignments

Interactive Textbook

- Access from Canvas each time
 - To get credit for session prep
 - To be able to save your code, for exercises and problem sets
 - To see your grades
- Tour
 - Table of Contents
 - Weekly activities page
 - Chapters and sections
 - Running code
 - Stepping through code with Codelens
 - Answering multiple choice questions
 - How session preps get graded
 - Progress page

www.facebook.com/groups/1683212485235313/requests/

Dashboard • Healthi... Gmail - Inbox (20) - ... Jenkins Create GQueues Task Applicant Selection ... ByCommittee - Intern... JIRA Evernote Web Information Visualiz... User account | Evidence... A suc

SI 106 - Fall 2015 Paul Home 20+ 1 6

Paul Resnick
Edit Profile

FAVORITES
News Feed
Messages 11
Events
UMSI 106 - Winter ...
Saved 1

PAGES
Three Good Things 1
Pages Feed 20+
Like Pages
Create Ad
Create Page

GROUPS
SI 106 - Fall 2015
CHI Meta 1
Ashokan Northern ... 7
HCIC 20+
SI 106 - Fall 2014
UMSI Teacher Talk 2

Personalize Your Group
Did you know that you can add a photo here?
Pick one that shows off your group's personality.
Upload Photo Choose Photo ▾

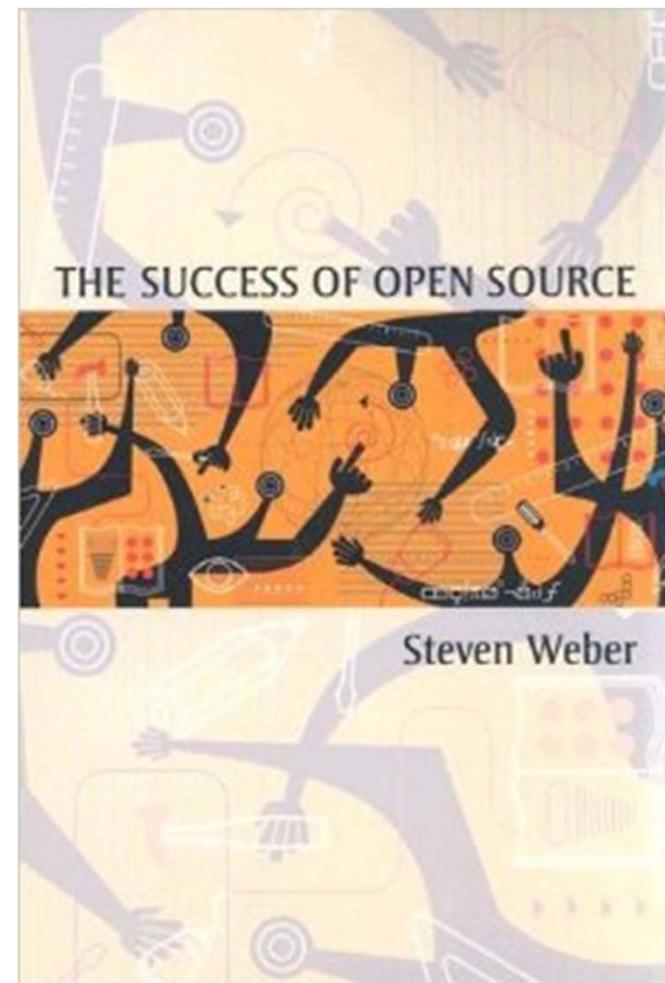
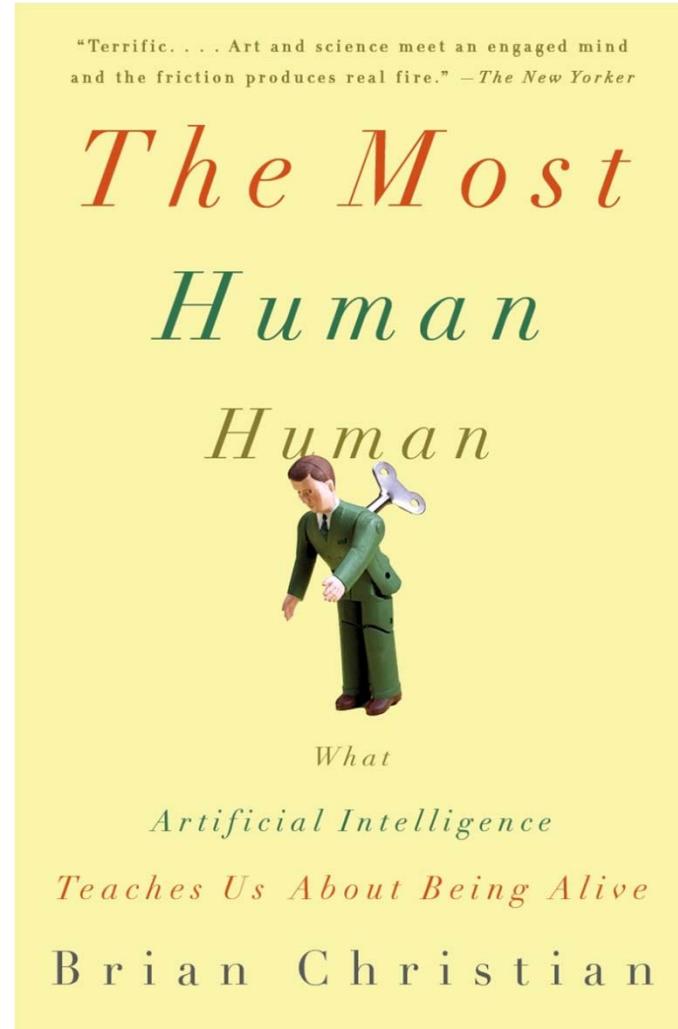
SI 106 - Fall 2015
Closed Group
Joined Message Notifications ***

Discussion Members Events Photos Files Search this group

Member Requests
Reported to Admin
Group Information 1
Request Notifications

Member Requests
Approve All Ignore All

Books to Buy



Homework Assignments

- Weekly Problem sets (10,000 points)
 - Due Sundays at 5PM, starting next week
 - 12 of them; drop lowest grades, keep 10.
- Demonstrate Your Understanding (1,000 points)
 - Due Sundays at 6PM, starting next week
 - 12 of them; drop lowest grades, keep 10.
- Weekly responses to readings (1,000 points)
 - Due the night before the lecture, starting next week
 - 12 chances to earn 10 checkmarks, 100 points each
- Lecture prep (1,000 points)
 - Complete before each class session; grading starts next week
 - 22 chances to earn 20 checkmarks, 50 points each
- Discussion participation (1,000 points)
 - 13 chances to earn, 100 points each
- Capstone project (2,000 points)

Exams (Mark Your Calendars!)

- Midterm Tuesday 2/23, 7PM (4,000 points)
- Second-chance midterm, Thursday 3/10, 7PM
 - Skip if you do well on regular midterm
 - Earn $\max(1^{\text{st}} \text{ score}, 90\% \text{ of } 2^{\text{nd}} \text{ score})$
- Final 4/20 1:30-3:30 (7,000 points)

Helping Others Bonus

- In group office hours, or on Facebook group
- Corrections, answers
- Up to 250 bonus points

Grading

- Straight scale, no curve
 - see syllabus
- Median grades
 - W2014: B
 - F2014: B+/B
 - W2015: B+
 - F2015: B+/B
 - I aim for B median...

Making the Grade

- Exams are hard!
 - Median grades 65-75%
- Aim for 100% on problem sets, final project, reading responses, lecture prep, etc.
 - 84% on exams → A
 - 51% on exams → B-

Collaboration Policy

- Please ask for and/or give help
- Remember that your purpose is to learn
- Note in assignments when you get help
- Ask the Facebook group-- post code bits -- it is OK
 - We will coach you on how to ask and answer “the right way”
- Demonstrate Your Understanding **solo**
- Reading responses **solo**

Behavior Guide

- Encouraged
 - Be present!
 - Questions, corrections, answers
 - Helping other students
 - Using laptop in class to do something related to lecture
 - Office hours visits, with agenda or without
- Acceptable *if not disruptive*
 - Coming late or leaving early
 - Stepping out for bio break
 - Eating or drinking
- Unwise
 - Skipping lecture
- Disrespectful or disruptive
 - Using laptop in class for other things (email, Facebook, problem sets)
 - Skipping or sleeping and then asking for repeat in office hours or section

Tips for Success

- An hour a day, plus a few hours for problem set
 - Don't try to do it all at once
- Master textbook; problem set will be easy
- Go back and do old assignments, not looking at the answers
- If stuck, don't keep trying same thing
 - Review
 - Read
 - Code, predict, run, analyze, repeat
 - Try a different (related) problem
 - Search on the web
 - Communicate
 - To FB group
 - Or to your friends
 - Take a break and come back later

No Experience
Required

Beware of Overconfidence

Welcome to the course...

- Any questions?

Section Tomorrow

- Bring laptops for check on environment setup
 - Textbook login
 - Textbook features
 - How to do problem sets
 - What to do where in Canvas
- Python basics

Preview

The Basics

- Programs perform **computation** on **data**
- **Variables** provide temporary locations to store data while the program is running
- **Statements** are the instructions for performing computations on data

Variables

- A variable provides a location to store a **value**
- Examples:
 - $x = 3$
 - $y = \text{'Prof. Resnick'}$



Variables

- A variable provides a location to store a **value**
- Examples:
 - $x = 3$
 - $y = \text{'Prof. Resnick'}$
- Subsequent statements can change a variable's value by storing a new value
 - $x = 4$



~~y = 'Prof. Resnick'~~

Variables (cont)

- Each variable has:
 - A **name** (uniquely defines each variable)
 - A **value** (which can be changed)
- Each value has
 - A **type**, which defines:
 - A range of possible values
 - The set of operations that can be done to that variable

Assignment statements

- A statement can assign a value to a variable:
 - Syntax: **<variable name> = <value>**
 - Example: `class_name = '106'`

Expressions

- Compute a value from other values
 - $2 + 3$
- Can include variables, whose values are looked up
 - $x + 3$

Types

- Some examples of data types:
 - 3, 5 Integer (whole numbers)
 - 4.0, -1.345 Floating point (rational numbers)
 - 'SI 106' String
 - These are all **atomic** types
- Composite types also possible
 - [1, 2, 3]: a list of integers
- In time, you'll define your own complex types

Aside: Static vs. Dynamic Typing

- Python is **dynamically-typed**
 - An assignment may change the type of a variable
 - `x= 3` (type is integer)
 - `x= "Hello, there!"` (type is string)
 - I recommend you don't do this!
- Other languages (e.g., C) are **statically-typed**
 - Must declare variable's type before using it
 - `int x= 3` (declares type as integer)
 - `x= "Hello, there!"` (illegal statement)

Expressions and Assignment

- A statement can assign the value of an **expression** to a variable:
 - $x = 3 + 4$
- An expression can contain variables:
 - E.g., $(x + 2) * 2$
- The assigned variable can be in the expression
 - $y = y + 1$

Incrementing

- $x = 10$
- $x = x + 1$

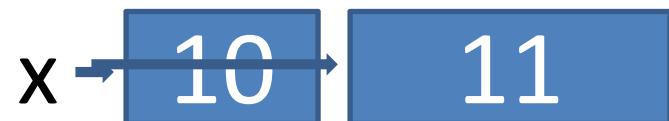
Incrementing

- $x = 10$
- $x = x + 1$

$x \rightarrow$  10

Incrementing

- $x = 10$
- $x = x + 1$



Bye