

A black and white aerial photograph of a massive concrete dam. The dam is a thick, curved wall with a walkway and railings along its top edge. Two small figures of people are visible on the walkway, emphasizing the enormous scale of the structure.

AUGUST 24, 2016

INTRO TO PS239T

WHY ARE WE HERE?

MOTIVATION

WHY ARE WE HERE?



WHY ARE WE HERE?

THE DREAM

- ▶ There is a lot **more** data available to researchers now than ever before [thanks, internet]
- ▶ The data is a lot easier to **find**, **acquire**, and **store** than ever before [thanks, computers]
- ▶ The data is more **varied**, and in many cases, **higher quality**, than ever before [thanks, science]



MOTIVATION

THE REALITY



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- ▶ "Every day, scholars all over the world waste time wrestling with computers. Tasks that should take a few moments take hours or days, and many things never work at all. When scholars try to get help, they are inundated with unhelpful information, and give up." - Rochelle Terman, creator of PS239T



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- ▶ "Some other time"
- ▶ Too many options
- ▶ Inefficient to learn on your own

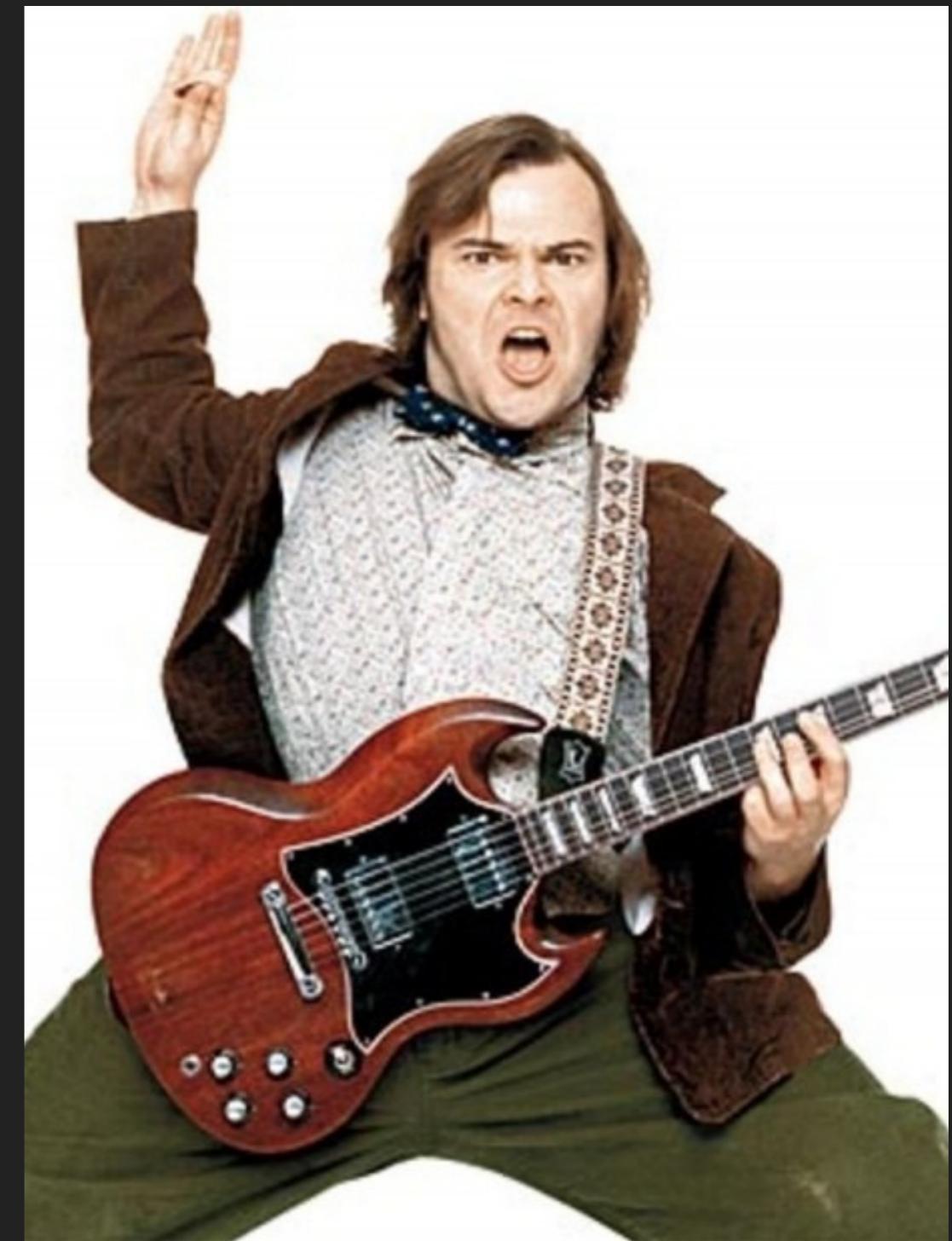


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- ▶ Shaming

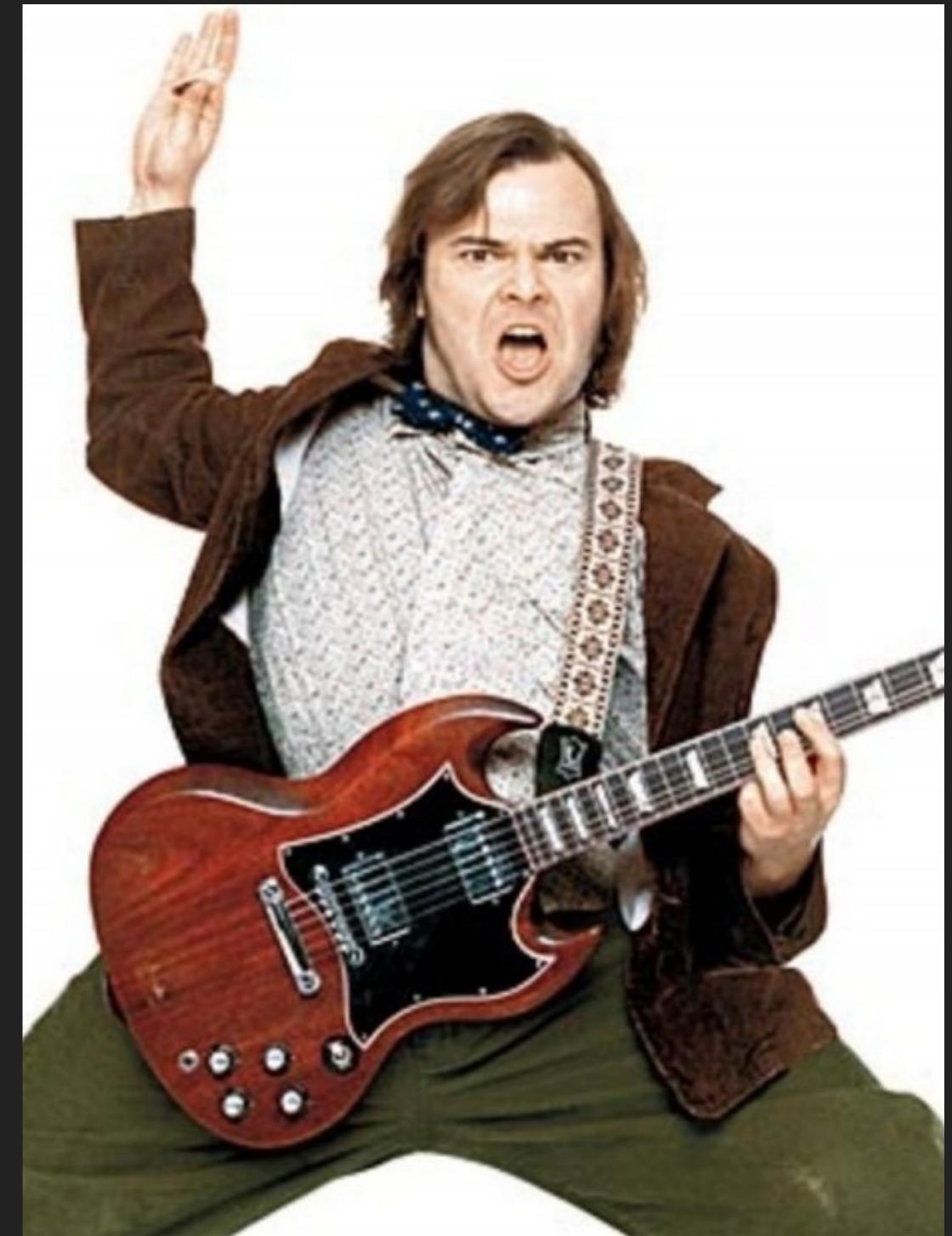


SO, WHY BOTHER?



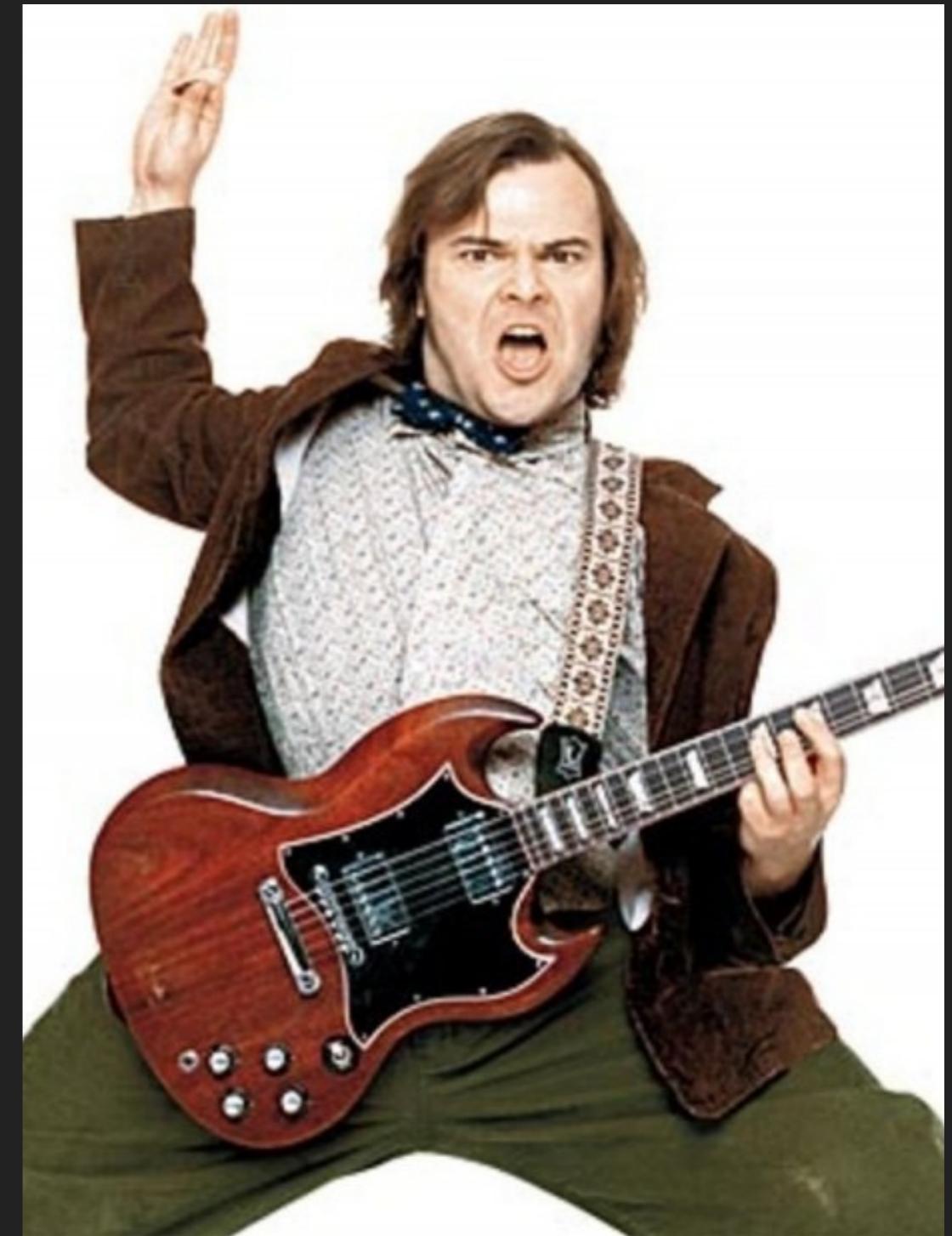
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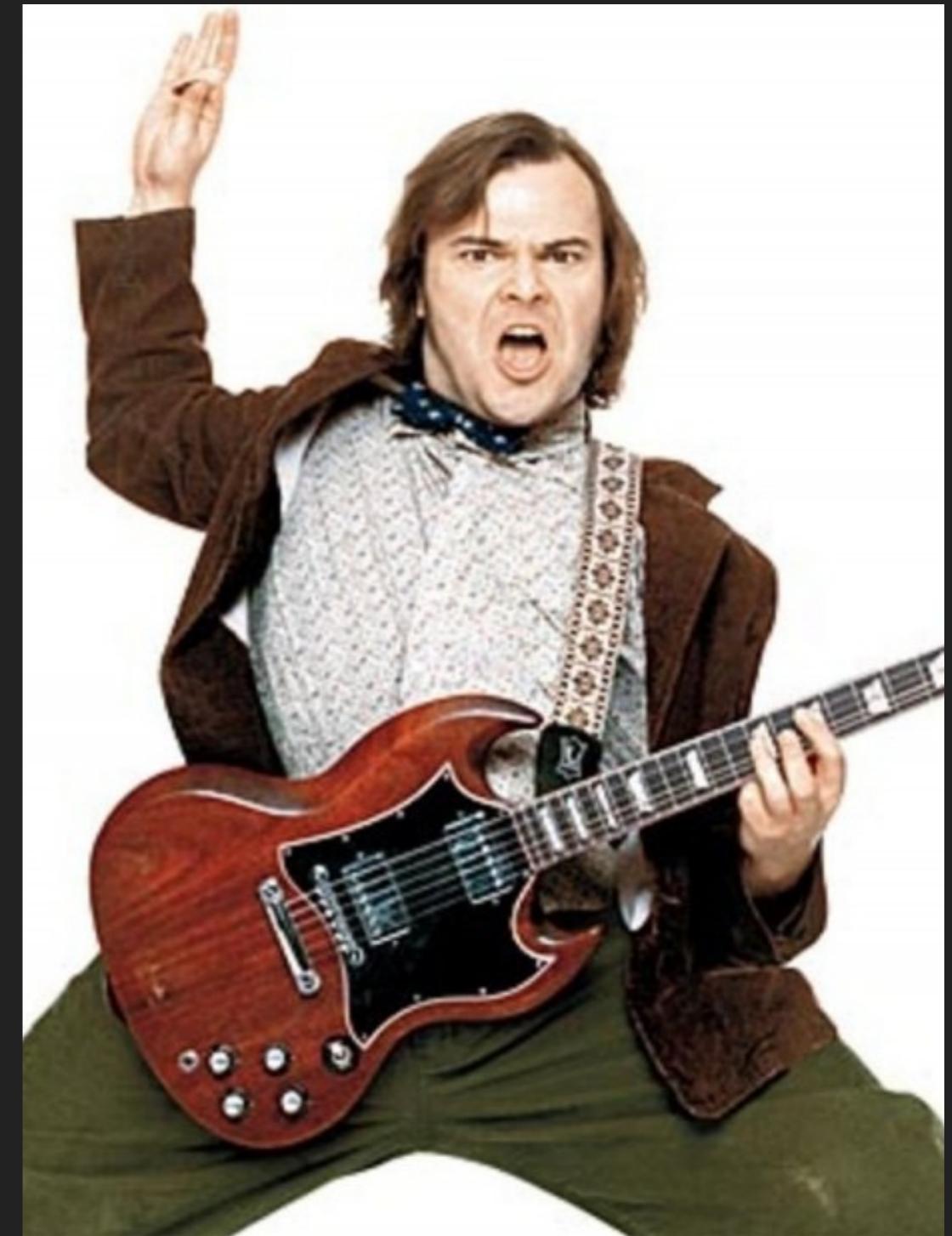
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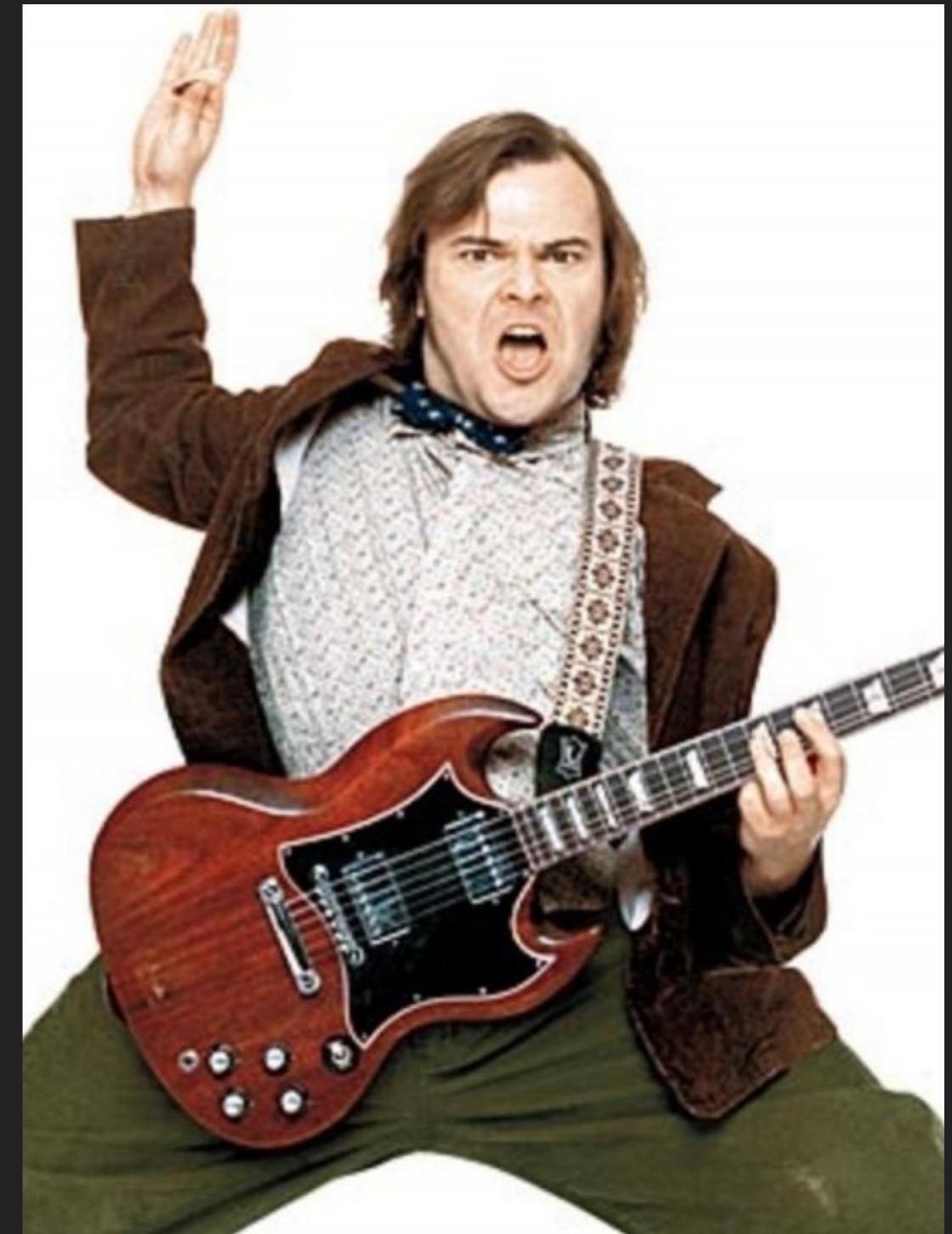
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- ▶ Plus...
 - ▶ Better scholarship.



OBJECTIVES

MY PITCH

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Coding is like learning any other language

AIMS OF THE COURSE

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- ▶ Skills (the grammar)
 - ▶ Bash, Python, R, Git
 - ▶ Transfers between many languages
 - ▶ Relies on shared logics and structures
 - ▶ Constrains what can and can't be done
 - ▶ Used to make sense of things: shaping, analyzing, plotting

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 - ▶ Used to **make sense** of things: shaping, analyzing, plotting
- ▶ **Applications** (the vocabulary)
 - ▶ APIs, webscraping, packages in Python and R, etc.
 - ▶ Used to **observe** and **obtain** things—in our case, data

AIMS OF THE COURSE

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 - ▶ Write, execute, and debug R code for statistical analysis
 - ▶ Master the fundamentals of good data visualization and how to plot them in R
 - ▶ Find answers to things we won't cover in this class

OBJECTIVES

(NOT THE) AIMS OF THE COURSE



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- ▶ What won't you learn?



(NOT THE) AIMS OF THE COURSE

- ▶ What won't you learn?
 - ▶ Professional programming or software development



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 - ▶ Professional programming or software development
 - ▶ Formal statistics or computer science



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- ▶ What won't you learn?
 - ▶ Professional programming or software development
 - ▶ Formal statistics or computer science
 - ▶ All the answers



(NOT THE) AIMS OF THE COURSE

- ▶ What won't you learn?
 - ▶ Professional programming or software development
 - ▶ Formal statistics or computer science
 - ▶ All the answers
 - ▶ And that's okay...coding wizardry is **not** about knowing everything ahead of time. It's about being able to **adapt** to challenges when you encounter them.



MEASURING CANDIDATE GENDER

8 Candidates | Republican Candidates

United States Senator



**Mark
Callahan**

Republican

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Leadership, Integrity, Character, Honor & Trust

Stand Against Government Infringement:

We must stop our government from violating our constitutional protections. From the NSA spying us, to them attacking our 2nd Amendment rights, to the IRS targeting political correctness destroying our religious freedom. Our nation's sovereignty is under attack with the implementation of Agenda 21 and Common Core. As your constitutionally conservative Senator, I will stand strong, with Senator Ted Cruz for the rights of all Americans.

On the Economy:

As your Senator, who believes in the free market, I will work to make America's economy strong again, beginning with the Full Repeal of ObamaCare a.k.a "MerkleyCare".

Balance Budget: Reduce Spending:

As your fiscally conservative Senator, and a believer in limited government, I will reduce wasteful spending and push for a balanced budget amendment.

Help Americans:

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 - ▶ Estimated time:
 - ▶ 14 elections (and counting) x
 - ▶ 800 pages of PDFs per year x
 - ▶ 2 candidates a page x
 - ▶ 10 mins a page to get pics and parse info =
 - ▶ 1.8 YEARS coding eight hours a day, five days a week, just to get the data

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PRACTICAL EXAMPLES

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- ▶ The new task:
 - ▶ Write code in Python to scrape the PDFs, pulling pictures out and parsing the text into a dataset

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Leadership, Integrity, Character, Honor & Trust

Government Infringement:

We must stop our government from violating our constitutional protections. From the NSA spying on us, to them attacking our 2nd Amendment rights, to the IRS targeting, to political correctness destroying our religious freedom. Our nation's sovereignty is under attack with the implementation of Agenda 21 and Common Core. As your constitutionally conservative Senator, I will stand strong, with Senator Cruz for the rights of all Americans.

Economy:

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Campaign website: www.CallahanForOregon.com

(This information furnished by Callahan For Oregon.)

United States Senator

**Timothy
Crawley**

Republican

Occupation: Attorney

Occupational Background: Nichols & Associates

Educational Background: U.C. Hastings, J.D.; Stanford College, B.A.

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I was born and raised in Cottage Grove where my family still resides. I consider it a personal obligation to help maintain its natural beauty and a healthy ecology while continuing to enjoy the benefits of a free market, without monopolistic power. I have travelled to nearly thirty countries and explored a multitude of foreign cultures and environments, but Oregon has always remained my home. That is why, after completing my legal education in California, beginning my professional career there, I have returned to Oregon.

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As a U.S. Senator, I would help restore self-determination to our local communities by ending intransigent party politics and righting our capsized political system. The ideal democratic financial system must be revived in practice. We must return to a saner foreign policy, halting an unnecessary drain of American blood and treasure abroad while pursuing more effective strategies for peace. Perhaps most importantly, we must secure our sacred individual rights to life, liberty, and the pursuit of happiness – free of unwarranted government interference.

(This information furnished by Crawley for Oregon.)

PRACTICAL EXAMPLES

MEASURING CANDIDATE GENDER

- ▶ The new task:
 - ▶ Write code in Python to scrape the PDFs, pulling pictures out and parsing the text into a dataset
 - ▶ Total time:
 - ▶ 3 months (not full time)
 - ▶ *Time saved: 1.5 years*

8 Candidates | Republican Candidates

United States Senator

**Mark
Callahan**

Republican

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- ▶ The new task:
 - ▶ Write code in Python to scrape the PDFs, pulling pictures out and parsing the text into a dataset
 - ▶ Total time:
 - ▶ **3 months** (not full time)
 - ▶ *Time saved: 1.5 years*
 - ▶ Plus: now when future elections' PDFs come out, new data can be extracted right away

8 Candidates | Republican Candidates

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Against Government Infringement:

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WORKING WITH RAs

Name	Date Modified
2016 president primary 2.jpg	Apr 15, 2016
clinton 2016 5.jpg	Apr 22, 2016
clinton democrat 1.jpg	Apr 22, 2016
clinton democrat 7.jpg	Apr 22, 2016
clinton msnbc 6.jpg	Apr 22, 2016
clinton pbs 3.jpg	Apr 22, 2016
clinton pbs 5.jpg	Apr 22, 2016
clinton pbs 7.jpg	Apr 22, 2016
clinton president 2.jpg	Apr 22, 2016
clinton president 7.jpg	Apr 22, 2016
clinton primary 10.jpg	Apr 22, 2016
clinton wpost 2.jpg	Apr 22, 2016
clinton wpost 7.jpg	Apr 22, 2016
co bernie sanders 2016 7.jpg	Apr 18, 2016
co bernie sanders 2016 12.jpeg	Apr 18, 2016
co bernie sanders 2016 13.png	Apr 18, 2016
co bernie sanders 2016 17.jpeg	Apr 18, 2016
co bernie sanders abc 12.jpg	Apr 17, 2016
co bernie sanders democrat 5.jpeg	Apr 18, 2016
co bernie sanders fox news 6.png	Apr 15, 2016
co bernie sanders pbs 1.jpeg	Apr 17, 2016
co bernie sanders pbs 16.jpg	Apr 17, 2016
co bernie sanders president 4.png	Apr 18, 2016
co bernie sanders president 5.jpeg	Apr 18, 2016
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PRACTICAL EXAMPLES

WORKING WITH RAs

▶ The task:

- ▶ RAs had to find specific photos of presidential candidates using different search terms
- ▶ Different RAs used different labeling schemes, and pictures for all candidates were saved into one big folder
- ▶ Needed consistent labeling scheme and separate folders

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 - ▶ RAs had to find specific photos of presidential candidates using different search terms
 - ▶ Different RAs used different labeling schemes, and pictures for all candidates were saved into one big folder
 - ▶ Needed consistent labeling scheme and separate folders
- ▶ Time to fix by hand:
 - ▶ 200 candidate photos ✗
 - ▶ 5 presidential candidates ✗
 - ▶ 15 seconds a photo to re-label and move =
 - ▶ 4.2 hours fixing

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WORKING WITH RAs

- ▶ The new task:
 - ▶ Create consistent labeling scheme for filenames and move into separate folders using Bash

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WORKING WITH RAs

- ▶ The new task:
 - ▶ Create consistent labeling scheme for filenames and move into separate folders using Bash
- ▶ Total time:
 - ▶ 1.25 hours coding
 - ▶ 3 hours saved (again, not accounting for human error or fatigue)

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PRACTICAL EXAMPLES

FINAL PROJECTS

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- ▶ Previous final projects include:
 - ▶ Using R to merge and analyze multiple datasets on the juvenile justice system in California
 - ▶ Using Python to scrape news articles about 9/11, and R to perform textual analysis on them and generate word cloud plots
 - ▶ Using APIs in R to post a survey about local elections to MTurk, and analyzing and plotting the results in R

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 - ▶ Using APIs in R to post a survey about local elections to MTurk, and analyzing and plotting the results in R
- ▶ Your mileage will vary depending on how much coding experience you already have and how advanced your research agenda is

GETTING THE MOST OUT OF THE CLASS

OBSTACLES TO LEARNING

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- ▶ Copy-and-pasting instead of typing (ctrl+c is not your friend)

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- ▶ Expecting to be Gandalf (10-20 lines a day)

GETTING THE MOST OUT OF THE CLASS

CLASS =

- ▶ Participation (25%)
 - ▶ Be kind to your classmates. We're all learning. Even me.
(Especially me.)
- ▶ Homework (50%)
 - ▶ Every week. Don't be late. (You wouldn't like me when I'm angry.)
- ▶ Final project (25%)
 - ▶ Feasibility is your friend. Nov. 7, Dec. 7.

LOGISTICS

▶ Lecture and section

- ▶ “Workshop style:” you will be programming every class, so bring your laptop
- ▶ You will often be pair-programming on in-class challenges
- ▶ Section focuses on review of lecture materials/covering challenges we were not able to get to, plus working on homework in groups
- ▶ If you are struggling in the class, I expect you to attend section before you come to office hours

▶ Next assignments:

- ▶ Everything is on bCourses
- ▶ Assignment 1 - get software installed (instructions on bCourses/github)
- ▶ Assignment 2 - learn command line on codecademy
- ▶ Longer assignments worth more points (see bCourses), so start those early

THANKS

SPECIAL THANKS FOR COURSE MATERIALS ARE
DUE TO **ROCHELLE TERMAN**, THE CREATOR OF
PS239T AND INNOVATRIX EXTRAORDINAIRE.