PSYC 2530: Judgment and Decision-making

and cognitive biases

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Reminders from last class

There are no textbook chapter readings for this learning module.

Assigned empirical article is on blackboard

- Shen, O., Rabinowitz, R., Geist, R. R., & Shafir, E. (2010). Effect of Background Case Characteristics on Decisions in the Delivery Room. Medical Decision Making, 30(4), 518–522. https://doi.org/10.1177/0272989X09353451

PRO's | CON's

JUDGMENT AND DECISION MAKING

Judgment and Decision-making questions

- How do people judge, evaluate, and assess information in their environment?
- How do people make choices?
- What influences peoples judgments and decisions?

Everyday examples

How do you go about making judgments and decision in everyday life?

Buying a new X

- Research options on the web
- Watch informative youtube videos
- Ask friends
- list pros and cons
- buy the one that is right for you

Buying a new Y

- had a spur of the moment feeling
- liked the thing
- bought it for no good reason

Distinctions

Judgments and decisions can be made in more or less controlled ways

Controlled

- Slow, effortful
- Deliberate
- Employs a reasoning process

Automatic

- Fast, easy
- potentially unconscious
- habitual

Cognitive Biases

There are many biases that shape our judgments and decisions

- Check out the wikipedia list of cognitive biases

Issues with Cognitive Biases

- Useful to be aware of potential biases to our personal judgment and decision making processes
- Biases are not necessarily bad or wrong
- Biases can reflect the operation of basic cognitive processes
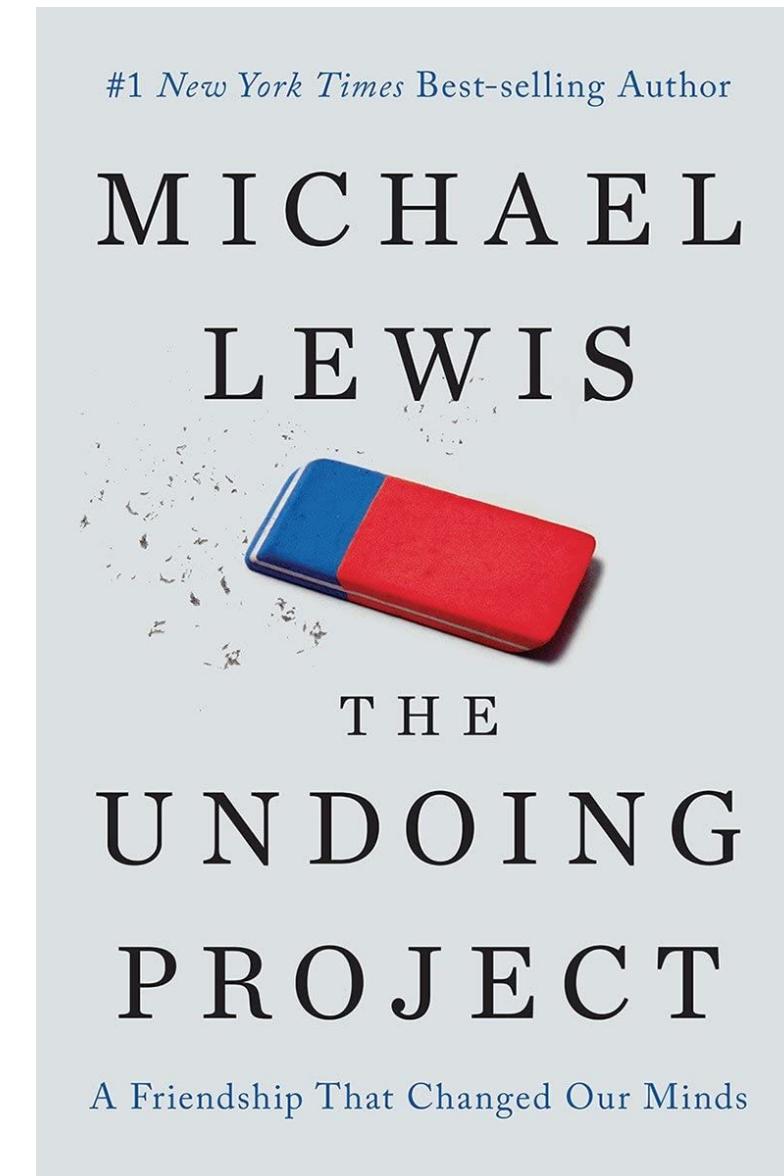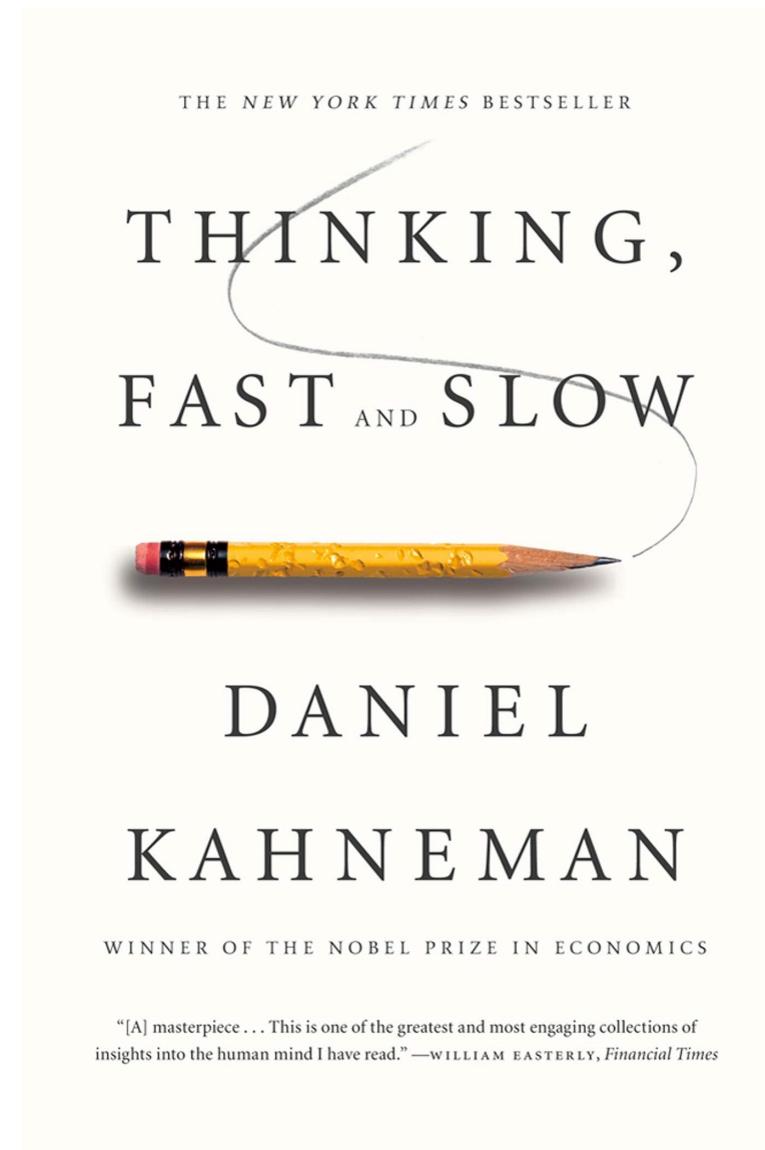
Heuristics

- Rules of thumb that give close approximations

- Availability Heuristic
- Representativeness Heuristic

A tale of two papers

- Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. Cognitive Psychology, 3(3), 430–454. https://doi.org/10.1016/0010-0285(72)90016-3

- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. Cognitive Psychology, 5(2), 207–232. https://doi.org/10.1016/0010-0285(73)90033-9

Kahneman & Tversky

THE NEW YORK TIMES BESTSELLER

THINKING, FAST AND SLOW

DANIEL KAHNEMAN

WINNER OF THE NOBEL PRIZE IN ECONOMICS

"[A] masterpiece . . . This is one of the greatest and most engaging collections of insights into the human mind I have read." —WILLIAM EASTERLY, *Financial Times*

#1 *New York Times* Best-selling Author

MICHAEL LEWIS

THE UNDOING PROJECT

A Friendship That Changed Our Minds

Judgments of frequency and probability

- How many words do you know?
- What are the chances you will receive more than two calls from a telemarketer today?

- How do people make judgments of frequency and probability?

Kahneman and Tversky (1972)

Subjective Probability: A Judgment of Representativeness

DANIEL KAHNEMAN AND AMOS TVERSKY[1]

The Hebrew University, Jerusalem

This paper explores a heuristic—*representativeness*—according to which the subjective probability of an event, or a sample, is determined by the degree to which it: (*i*) is similar in essential characteristics to its parent population; and (*ii*) reflects the salient features of the process by which it is generated. This heuristic is explicated in a series of empirical examples demonstrating predictable and systematic errors in the evaluation of uncertain events. In particular, since sample size does not represent any property of the population, it is expected to have little or no effect on judgment of likelihood. This prediction is confirmed in studies showing that subjective sampling distributions and posterior probability judgments are determined by the most salient characteristic of the sample (e.g., proportion, mean) without regard to the size of the sample. The present heuristic approach is contrasted with the normative (Bayesian) approach to the analysis of the judgment of uncertainty.

Big Question and Idea

- **Question:** How do people judge frequencies and probabilities?

- **Idea:** People use heuristics that are usually good approximations

- **Representativeness heuristic**: People judge frequencies and probabilities of events, or sample, based on:
- similarity to parent population
- whether the event has salient stereotypical features

Logical implications

- If people use the representativeness heuristic, then decisions about frequency and probability should be biased by representative examples

Empirical Demonstrations

- Kahneman and Tversky (1972) presented several examples where simple judgments about frequency and probability were biased by representativeness

Similarity of Sample to Population

Similarity of Sample to Population

The notion of representativeness is best explicated by specific examples. Consider the following question:

All families of six children in a city were surveyed. In 72 families the exact order *of births of boys and girls was G B G B B G.*
What is your estimate of the number of families surveyed in which the exact order *of births was B G B B B B?*

The two birth sequences are about equally likely, but most people will surely agree that they are not equally representative. The sequence with five boys and one girl fails to reflect the proportion of boys and girls in the population. Indeed, 75 of 92 Ss judged this sequence to be less likely than the standard sequence ($p < .01$ by a sign test). The median estimate was 30. Similar results have been reported by Cohen and Hansel (1956), and by Alberoni (1962).

Looking more random

On each round of a game, 20 marbles are distributed at random among five children: Alan, Ben, Carl, Dan, and Ed. Consider the following distributions:

	I		II
Alan	4	Alan	4
Ben	4	Ben	4
Carl	5	Carl	4
Dan	4	Dan	4
Ed	3	Ed	4

In many rounds of the game, will there be more results of type I or of type II?

The uniform distribution of marbles (II) is, objectively, more probable than the nonuniform distribution (I), yet it appears too lawful to be the result of a random process. Distribution I, which departs slightly from an equitable partition, is more representative of random allocation. A significant majority of Ss (36 of 52, $p < .01$ by a sign test) viewed distribution I as more probable than distribution II. The presence of

Tversky & Kahneman (1973)

Availability: A Heuristic for Judging Frequency and Probability[1,2]

AMOS TVERSKY AND DANIEL KAHNEMAN

The Hebrew University of Jerusalem and the Oregon Research Institute

This paper explores a judgmental heuristic in which a person evaluates the frequency of classes or the probability of events by availability, i.e., by the ease with which relevant instances come to mind. In general, availability is correlated with ecological frequency, but it is also affected by other factors. Consequently, the reliance on the availability heuristic leads to systematic biases. Such biases are demonstrated in the judged frequency of classes of words, of combinatorial outcomes, and of repeated events. The phenomenon of illusory correlation is explained as an availability bias. The effects of the availability of incidents and scenarios on subjective probability are discussed.

Big Question and Idea

- **Question:** How do people judge frequencies and probabilities?

- **Idea:** People use heuristics that are usually good approximations

- **Availability heuristic**: People judge frequencies and probabilities of events, or sample, based on:
- how easy particular examples can be brought to mind
- more available instances are thought to be more likely

Logical implications

- If people use the availability heuristic, then decisions about frequency and probability should be biased by availability
- people should also be sensitive to self-assessments of availability

Empirical Demonstrations

- Tversky and Kahneman (1973) presented several examples where people were sensitive to availability, and where availability biased judgments of frequency and probability

Assessments of Availability 1

Question: Are people sensitive to their own ability to generate examples?

Method: Show participants 9 letters (TAPCERHOB or XUZONLCJM)

- **Estimate condition:** How many words can you make in 2 minutes
- **Construct condition:** Make as words as you can in 2 minutes

Result: Very high positive correlation between estimate and actual number of words generated

Assessments of Availability 2

Question: Are people sensitive to their own ability to generate examples?

Method: Generate items from categories (flowers, Russian novelists)

- **Estimate condition:** How many examples can you generate in 2 minutes
- **Construct condition:** Generate as many examples as you can in 2 minutes

Result: Very high positive correlation between estimate and actual number of examples generated

Inference so far

- People appear to be sensitive to example availability

- People can quickly estimate whether they can produce many or few examples

- Estimates of availability correlated well with how many examples people actually produced

Judgment of Word Frequency

Study 3: Judgment of Word Frequency

Suppose you sample a word at random from an English text. Is it more likely that the word starts with a K, or that K is its third letter? According to our thesis, people answer such a question by comparing the availability of the two categories, i.e., by assessing the ease with which instances of the two categories come to mind. It is certainly easier to think of words that start with a K than of words where K is in the third position. If the judgment of frequency is mediated by assessed availability, then words that start with K should be judged more frequent. In fact, a typical text contains twice as many words in which K is in the third position than words that start with K.

Results

A typical problem read as follows:

"Consider the letter R.

Is R more likely to appear in

— the first position?
— the third position?
(check one)

My estimate for the ratio of these two values is _____: 1."

Subjects were instructed to estimate the ratio of the larger to the smaller class. For half the subjects, the ordering of the two positions in the question was reversed. In addition, three different orderings of the five letters were employed.

Results. Among the 152 subjects, 105 judged the first position to be more likely for a majority of the letters, and 47 judged the third position to be more likely for a majority of the letters. The bias favoring the first position is highly significant ($p < .001$, by sign test). Moreover, each of the five letters was judged by a majority of subjects to be more frequent in the first than in the third position. The median estimated ratio was 2:1 for each of the five letters. These results were obtained despite the fact that all letters were more frequent in the third position.

Fame, Frequency and Recall

Study 8: Fame, Frequency, and Recall

The subjects were presented with a recorded list consisting of names of known personalities of both sexes. After listening to the list, some subjects judged whether it contained more names of men or of women, others attempted to recall the names in the list. Some of the names in the list were very famous (e.g., Richard Nixon, Elizabeth Taylor), others were less famous (e.g., William Fulbright, Lana Turner). Famous names are generally easier to recall. Hence, if frequency judgments are mediated by assessed availability, then a class consisting of famous names should be judged more numerous than a comparable class consisting of less famous names.

Four lists of names were prepared, two lists of entertainers and two lists of other public figures. Each list included 39 names recorded at a rate of one name every 2 sec. Two of the lists (one of public figures and one of entertainers) included 19 names of famous women and 20 names of less famous men. The two other lists consisted of 19 names of famous men and 20 names of less famous women. Hence, fame and frequency were inversely related in all lists. The first names of all personalities always permitted an unambiguous identification of sex.

Results

Results. (a) Recall. On the average, subjects recalled 12.3 of the 19 famous names and 8.4 of the 20 less famous names. Of the 86 subjects in the four recall groups, 57 recalled more famous than nonfamous names, and only 13 recalled fewer famous than less famous names ($p < .001$, by sign test).

(b) Frequency. Among the 99 subjects who compared the frequency of men and women in the lists, 80 erroneously judged the class consisting of the more famous names to be more frequent ($p < .001$, by sign test).

General Takeaway

- Cognitive processes such as learning and memory can influence judgment and decision-making
- Basic memory processes make some examples easier to bring to mind, and people can be biased by the examples they are thinking about

Cognitive Biases

Try the optional writing assignment for this learning module as a way to explore more cognitive biases

- Check out the wikipedia list of cognitive biases

Read the empirical paper

- Shen, O., Rabinowitz, R., Geist, R. R., & Shafir, E. (2010). Effect of Background Case Characteristics on Decisions in the Delivery Room. Medical Decision Making, 30(4), 518–522. https://doi.org/10.1177/0272989X09353451

What's next
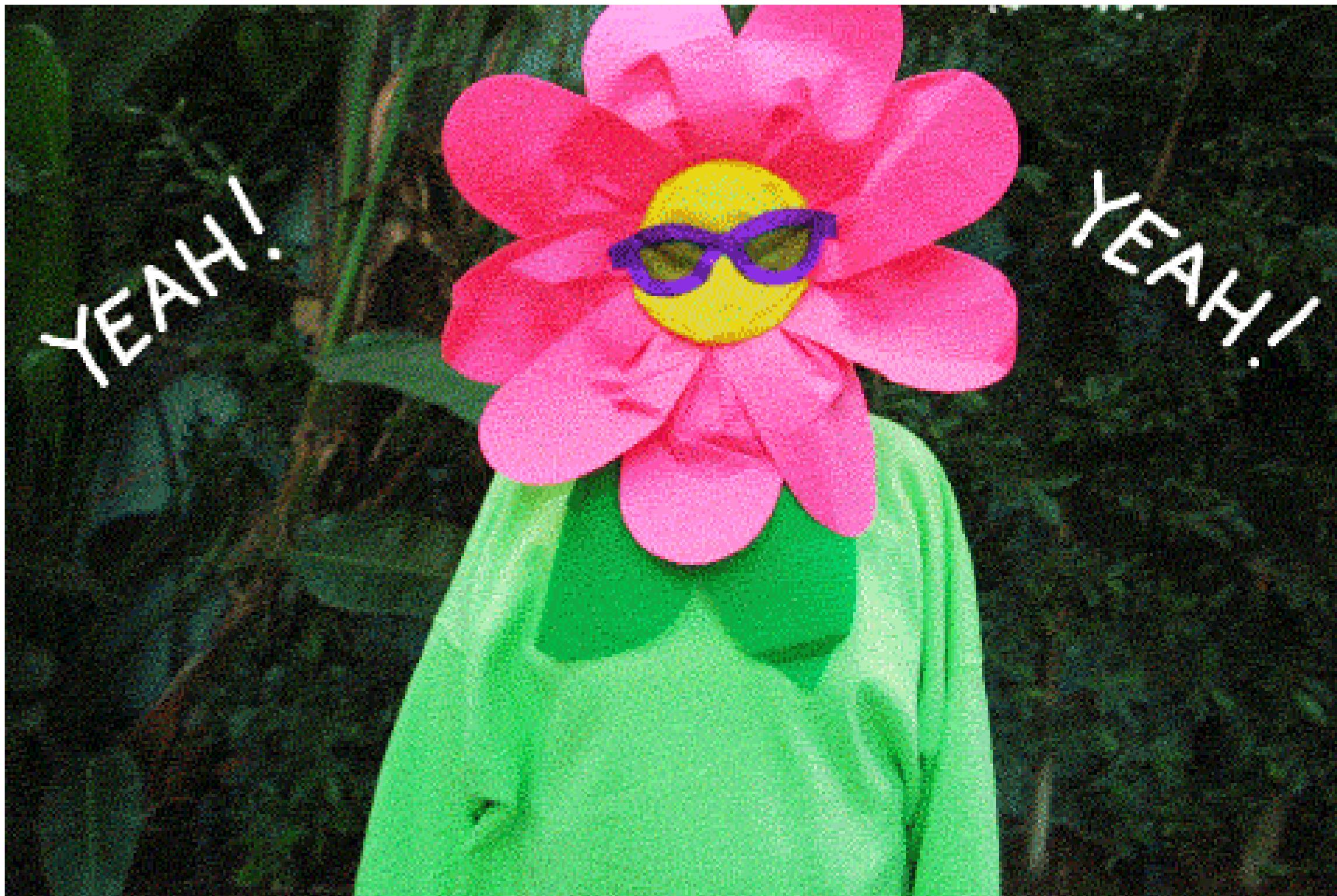
Take the quiz and complete any additional assignments

This is the last learning module of the semester!

The final exam will occur during final exam week, see blackboard for more information

Congratulations

First, give yourself a congrats for getting this far in the course:

Clapping for you

I was really impressed with your hard work and thoughtful reactions to the writing assignments

Last Words

I hope to meet y'all in person, keep up the hard work, and all the best in your future endeavors!!