CS 007: SESSION 1

PERSONAL FINANCE FOR ENGINEERS
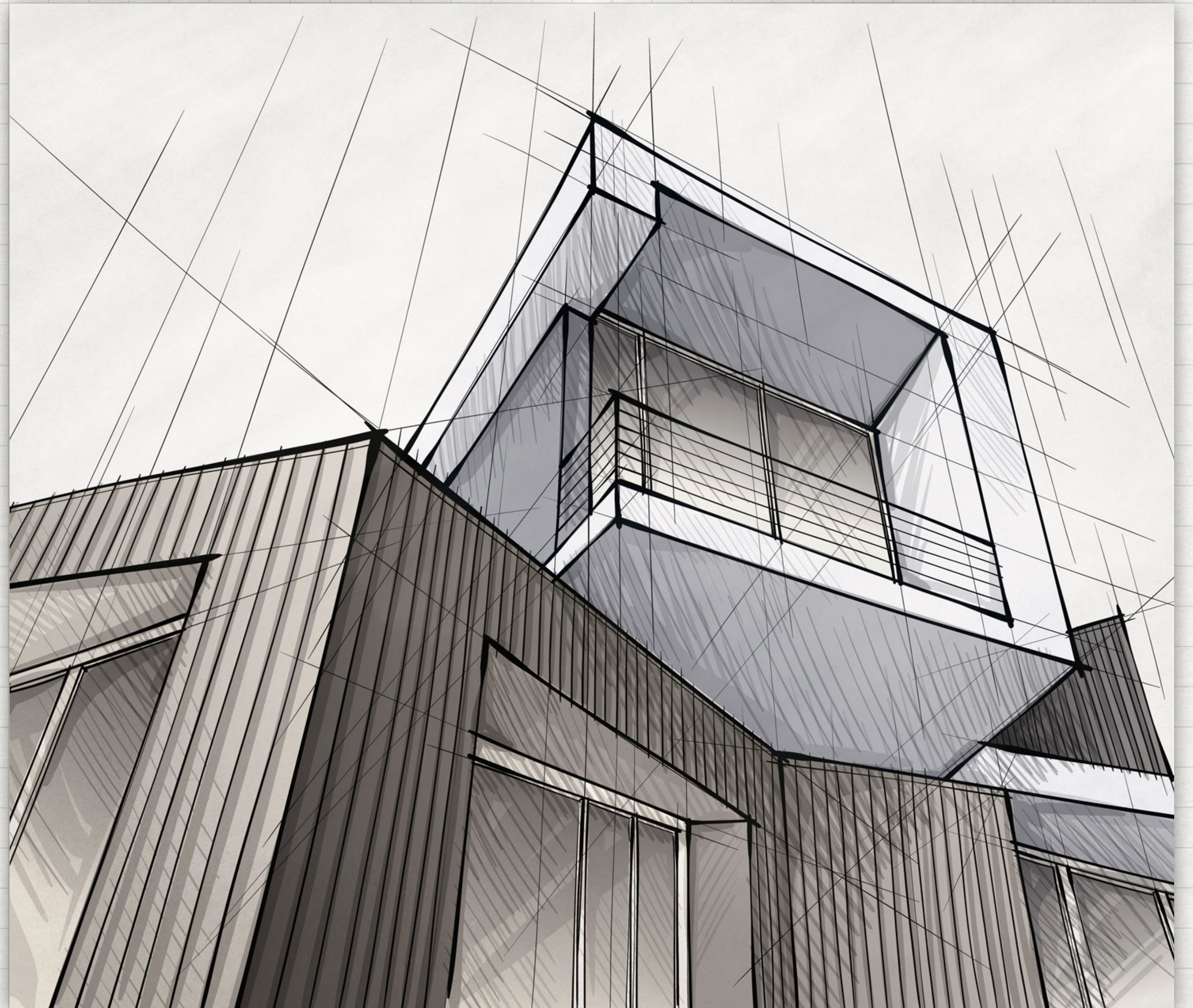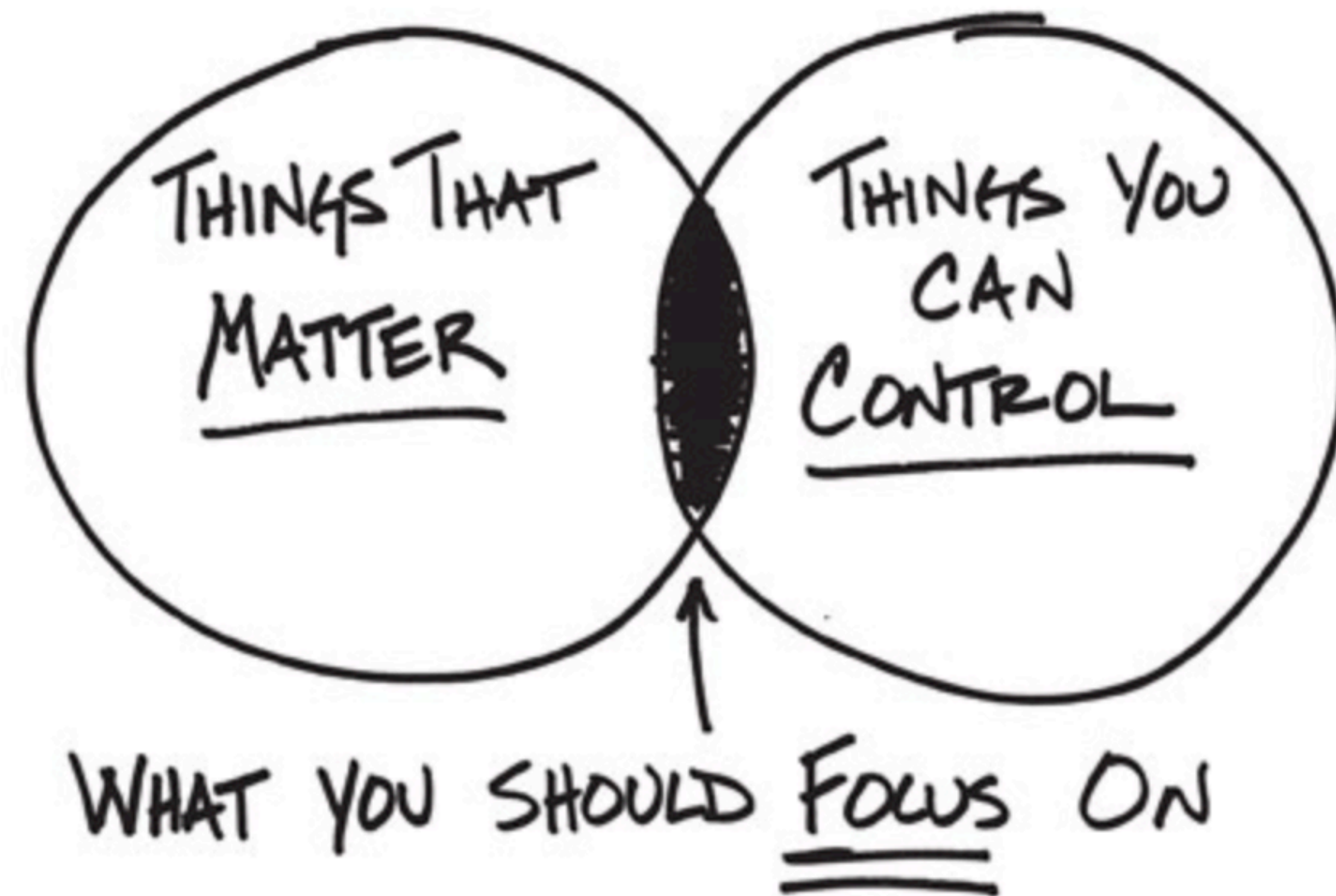
DISCLOSURES

- These slides are provided as-is and do not necessarily match the exact version of the content provided in classroom for students formally enrolled in the class at Stanford University.

- This presentation is intended to provide information and frameworks to assist the additional research and education of individuals. This presentation is not financial advice, nor is it intended to provide advice for specific financial decisions.

- These slides are provided publicly to be used for non-commercial purposes only. All material derived from this content must include appropriate citations to Adam Nash & Stanford University.
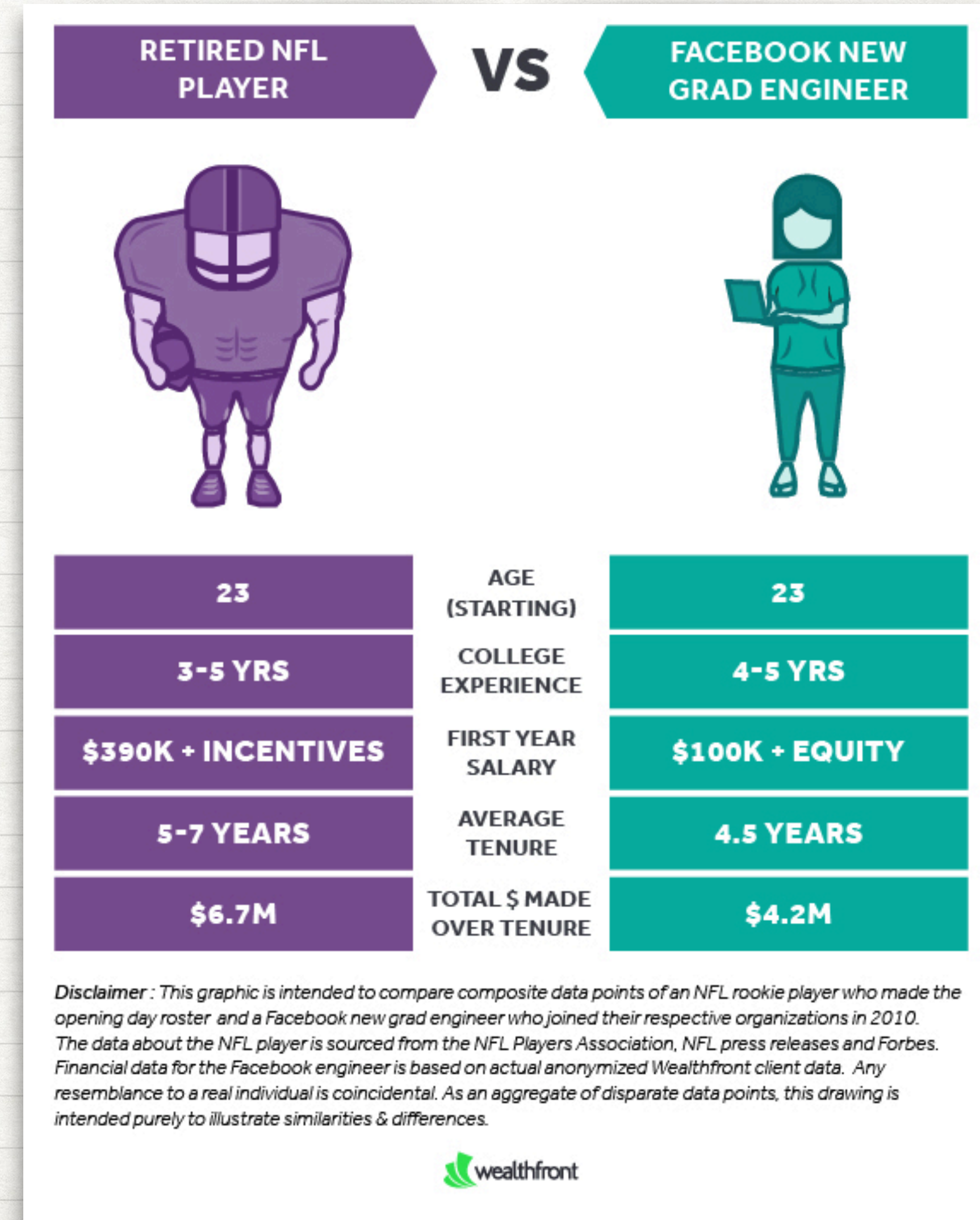
WHY PERSONAL FINANCE?

- Poorly covered in secondary school & university curricula, even at top schools.

- Not technically difficult, but the signal-to-noise ratio is terrible.

- Massive impact on your life.

- Affects **everyone**.

* Please note: many of the hand-made drawings in this presentation are sourced from Carl Richards, behaviorgap.com

WHY FOR ENGINEERS?

- Engineers are typically well educated in math, and enjoy it.

- Engineers face significant financial decisions early in life.

- Engineers tend to believe that they are rational decision makers.

- Engineers create products that can affect the finances of billions.

RETIRED NFL PLAYER		FACEBOOK NEW GRAD ENGINEER
23	AGE (STARTING)	23
3-5 YRS	COLLEGE EXPERIENCE	4-5 YRS
$390K + INCENTIVES	FIRST YEAR SALARY	$100K + EQUITY
5-7 YEARS	AVERAGE TENURE	4.5 YEARS
$6.7M	TOTAL $ MADE OVER TENURE	$4.2M

VS

Disclaimer : This graphic is intended to compare composite data points of an NFL rookie player who made the opening day roster and a Facebook new grad engineer who joined their respective organizations in 2010. The data about the NFL player is sourced from the NFL Players Association, NFL press releases and Forbes. Financial data for the Facebook engineer is based on actual anonymized Wealthfront client data. Any resemblance to a real individual is coincidental. As an aggregate of disparate data points, this drawing is intended purely to illustrate similarities & differences.

wealthfront

REAL QUESTIONS, REAL DATA

- Most adults do not feel comfortable talking about money & financial decisions with friends & colleagues.

- Bad data can lead to bad decisions

- This class will be based, whenever possible, on real data

- Please push yourself to share openly, and ask the questions you really want answers to.

SOCIAL CONTRACT: BUILD TRUST

- Students in this class come from a wide variety of financial situations

- We are lucky, because this diversity can help educate us on a broader set of potential financial decisions

- Assume your classmates deserve privacy about the financial information they choose to share

- Do everything you can to earn & deserve their trust
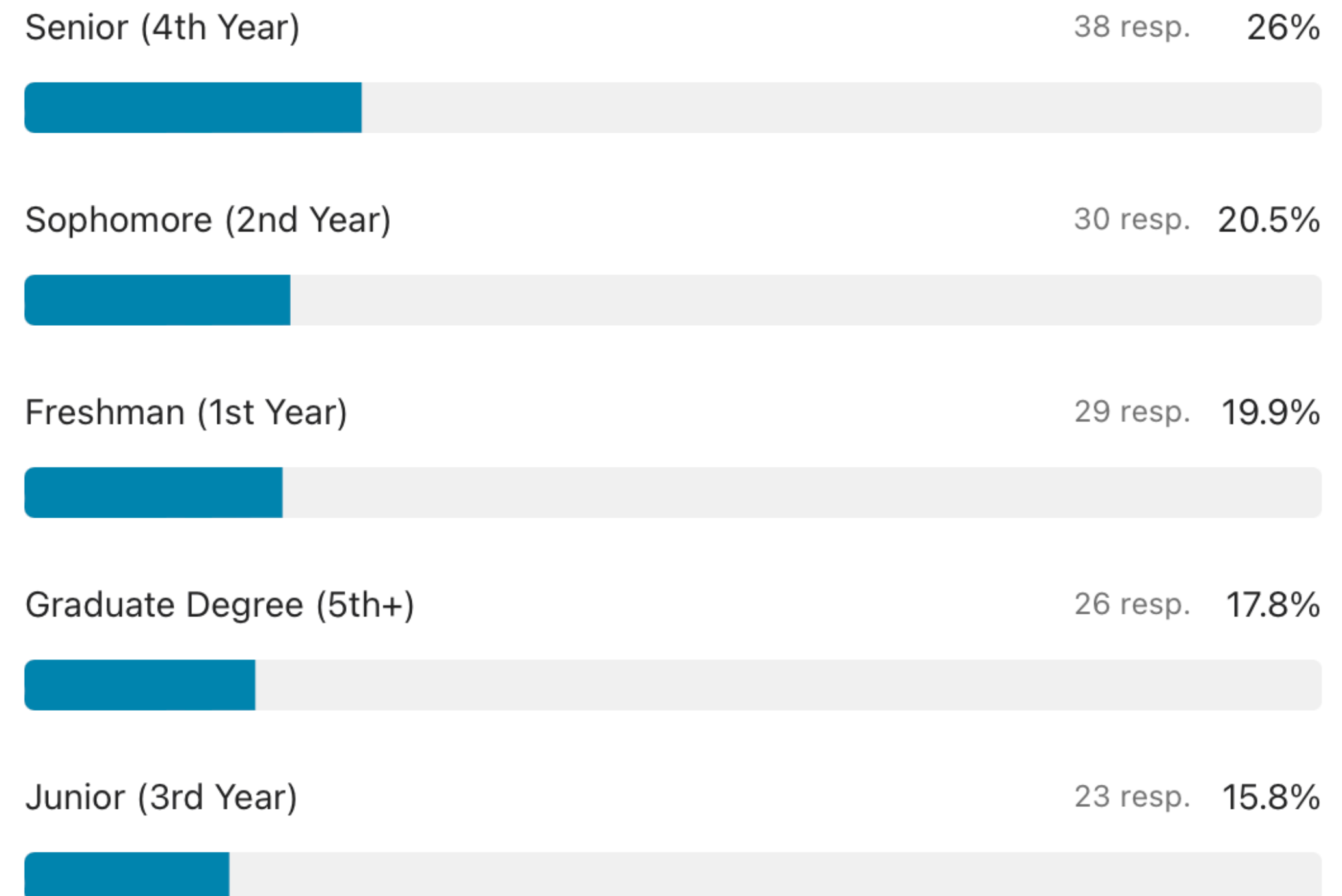
CS 007
CLASS SURVEY
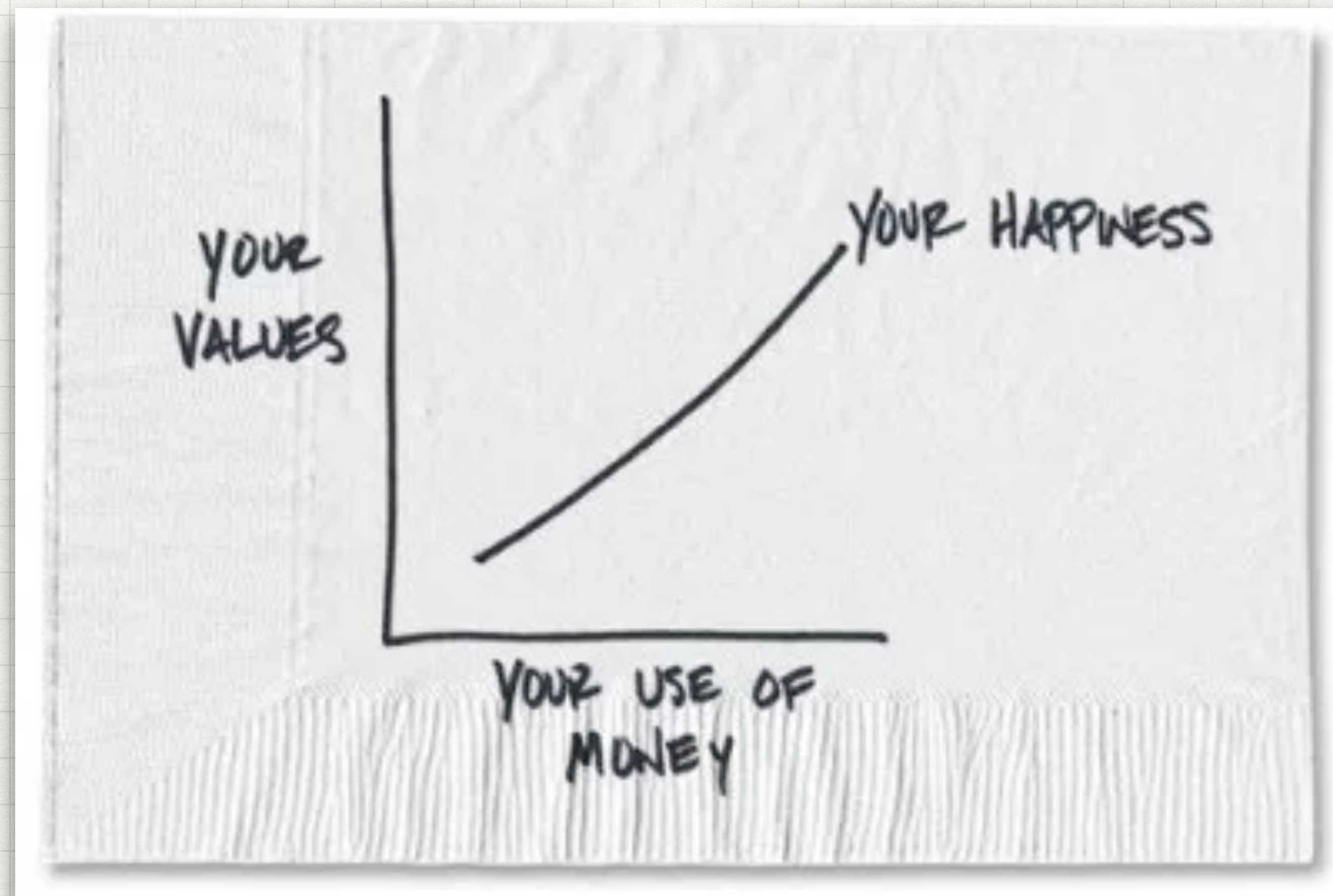
1: WHAT YEAR ARE YOU?

- This class is optimized for students who will be graduating soon.

- It is never too early to start learning about personal finance.

- My personal journey really started after my sophomore year, when I interned with Hewlett-Packard…

1 ✓ What year are you in school?

146 out of 146 people answered this question

Senior (4th Year)   38 resp.   26%

Sophomore (2nd Year)   30 resp.   20.5%

Freshman (1st Year)   29 resp.   19.9%

Graduate Degree (5th+)   26 resp.   17.8%
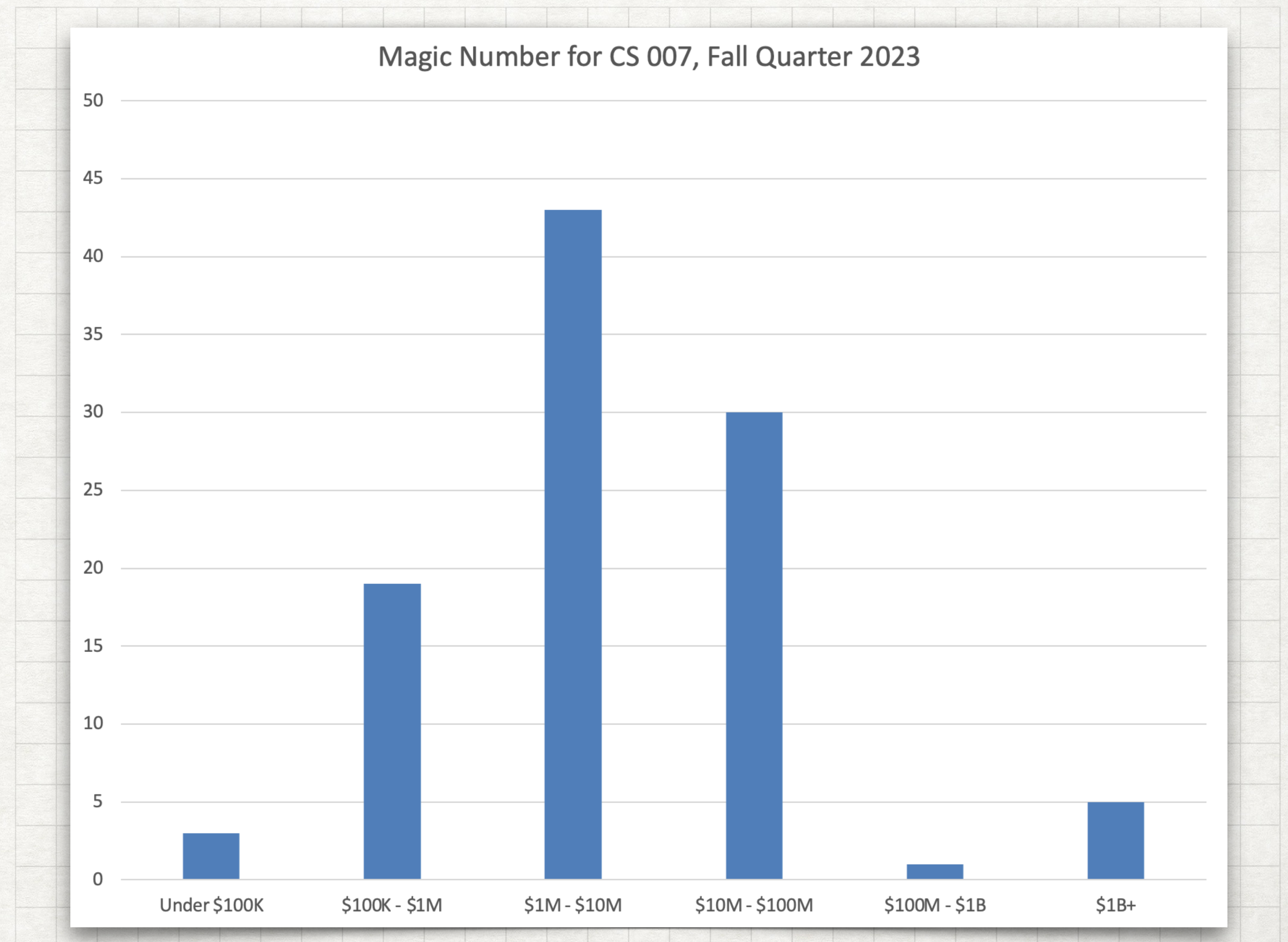
Junior (3rd Year)   23 resp.   15.8%

2: HOW DO YOU DEFINE WEALTH / SUCCESS?

- Is there a "magic number?"

- Expectations vary widely.

- Some people find success focusing on goals, others on running up a score.

- Your peers do not adequately describe the range of successful financial outcomes possible, nor the range of lifestyles that could make you happy.

Low: $10,000 🤔
High: $1 Trillion 🤯

Magic Number for CS 007, Fall Quarter 2023

- Many parents are conflicted about how to talk about money.

- This is not surprising, because money can be an uncomfortable reflection of values & behavior.

- Many parents are better prepared to discuss sex & drugs with their children than money.

- This class could be an opportunity for you to learn with your family.
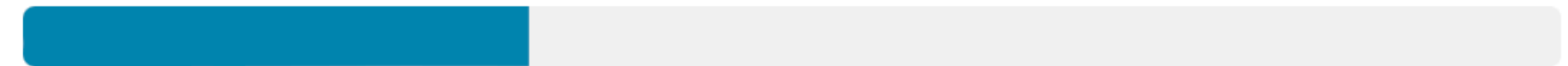
✓ 3 **How much do you know about your parents / guardians financial lives?**

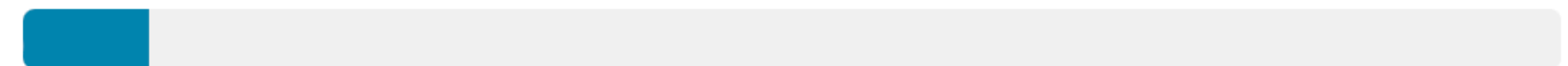146 out of 146 people answered this question

Some. They share limits around large expenses (like college education)

75 resp. **51.4%**
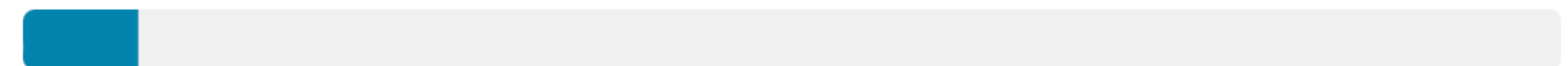
Quite a bit. I feel like I understand the family budget, income & spending.

48 resp. **32.9%**

Everything. I've been involved personally in our large financial decisions.

12 resp. **8.2%**

Not much. This information wasn't shared with me.

11 resp. **7.5%**

4: PURCHASED STOCK, ETF OR MUTUAL FUND?

- 64% of American households have Amazon Prime, but only 52% own stocks. (Source: Gallup)

- The top 1% of households by wealth own 56% of all company shares. (Source: Goldman Sachs, FT)

- Owning stock can be a path to learning about companies & investing.

- Investing in equities, ideally through an index fund, can be one of the best ways to build long term wealth.

✓ 4 Have you ever purchased a stock, a mutual fund or an exchange traded fund (ETF) in a brokerage account?

146 out of 146 people answered this question

No, I've never had a brokerage account.   75 resp.   51.4%

Yes, I have my own brokerage account & I have placed trades myself.   53 resp.   36.3%

Yes, my parents / guardians purchased securities in my name.   18 resp.   12.3%

5: FILED YOUR OWN TAXES?

- If you earn money from a job, you should be filing taxes.

- Many financial decisions are seriously impacted by taxes.

- Ignoring the after-tax value of a financial decision can lead to serious financial mistakes.

- An irrational fear of taxes can also lead to poor financial decision making.

⬗ 5 **Have you ever filed your own taxes?**

146 out of 146 people answered this question
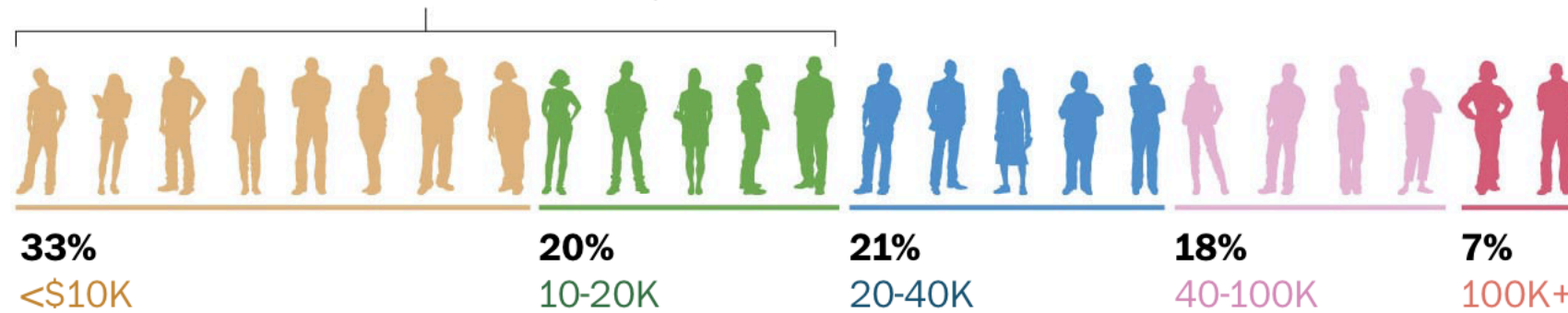
Yes   47 resp. **32.2%**

No   99 resp. **67.8%**

6: STUDENT LOANS THAT YOU ARE RESPONSIBLE FOR?

- National student loan debt at $1.75T

- 45 million student loan borrowers.

- Average debt for per borrower in 2021 was $39,351.

- 25% of borrowers default in 1st five years of repayment.

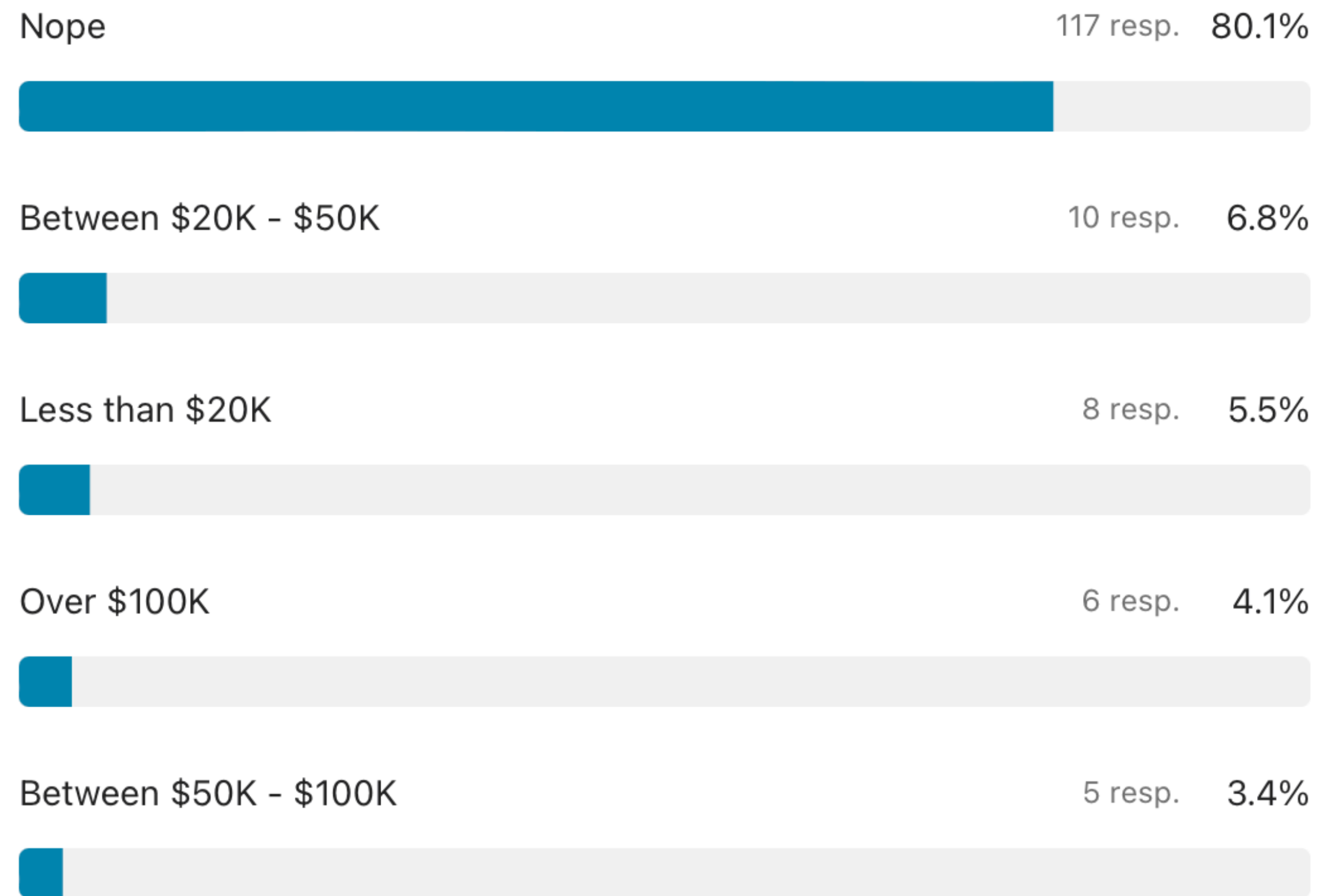About **13%** of federal student debt is held in loans with $20K or less still owed…

5%	8%	17%	32%	38%
<$10K	10-20K	20-40K	40-100K	100K+

…but **53%** of borrowers owe less than $20K

33%	20%	21%	18%	7%
<$10K	10-20K	20-40K	40-100K	100K+

* *https://fred.stlouisfed.org/series/SLOAS*
* *https://www.nerdwallet.com/article/loans/student-loans/student-loan-debt*
* *https://www.washingtonpost.com/education/2022/05/22/student-loan-borrowers/*

✓ 6 **Do you have student loans that you will be responsible for after college?**

146 out of 146 people answered this question

Nope   117 resp.   80.1%

Between $20K – $50K   10 resp.   6.8%

Less than $20K   8 resp.   5.5%

Over $100K   6 resp.   4.1%

Between $50K – $100K   5 resp.   3.4%

- Spend less than you make.

- 10% is not the right answer.

- There is no magic rate of savings, but when you save you win two ways.

  - Saving means learning to live on less, which lowers your goal.

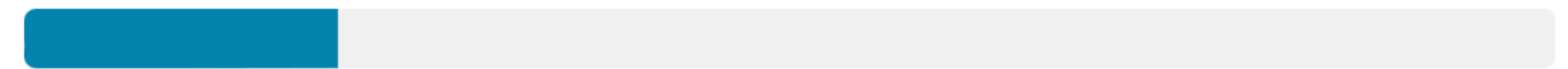 - Saving means more capital to invest to reach your goals.

✓ 7 **When you graduate, what percentage of your salary do you believe you should save every month?**

146 out of 146 people answered this question
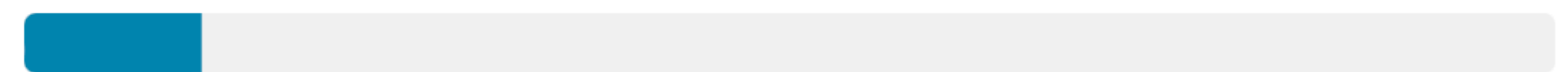
20%+   98 resp.   67.1%

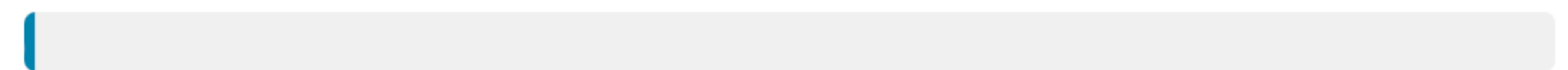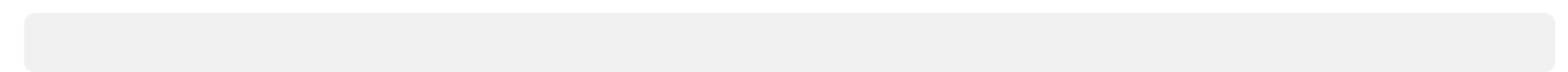15%   30 resp.   20.5%

10%   17 resp.   11.6%

0%   1 resp.   0.7%

6%   0 resp.   0%

8: WHAT % OF AMERICANS HAVE $400 FOR EMERGENCIES?

- Commonly misquoted statistic.

- US Federal Reserve reported in 2023 that 37% of Americans do not have sufficient cash savings to cover a $400 emergency expense.

- Actual survey question reveals the number is 13% that self-reported that they couldn't cover the emergency through other means.

- Liquidity means having access to money when you need it.

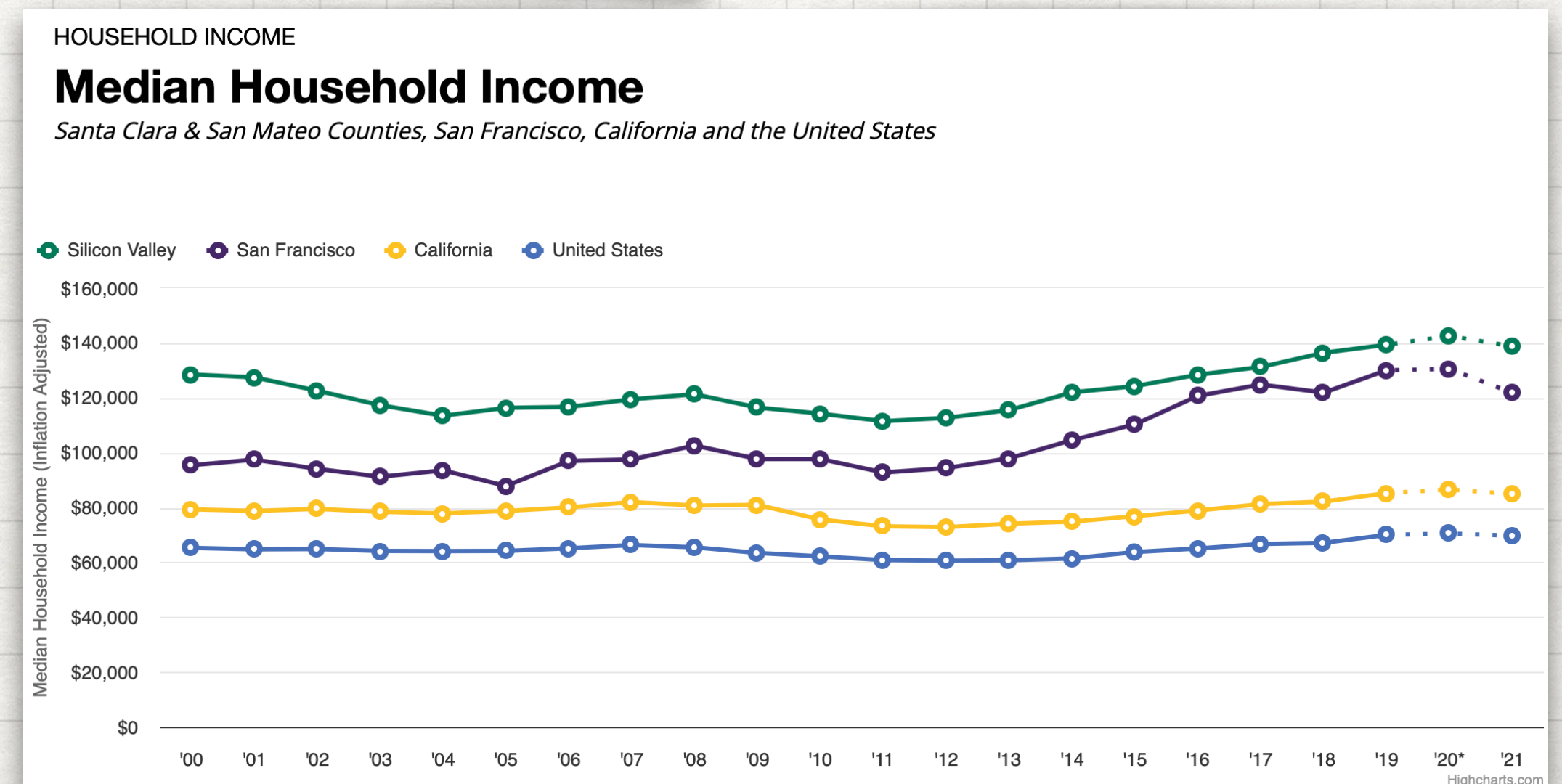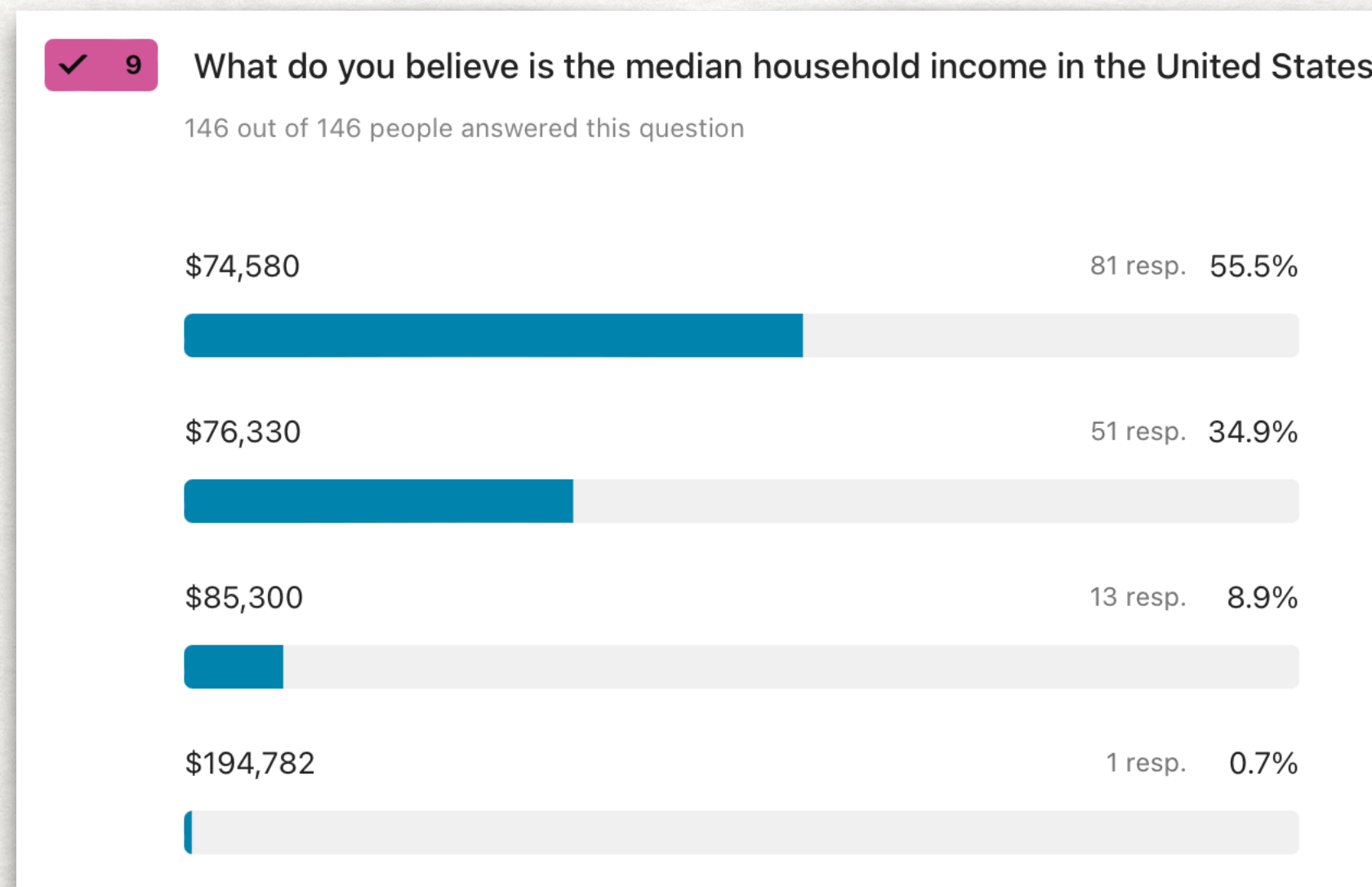- Don't underestimate the value of liquidity. Liquidity matters.

The $400 Question
The majority of Americans say they would be able to come up with emergency funds if they had to

⟋ Would cover a $400 emergency expense completely using cash or its equivalent
⟋ Would not be able to pay for that expense right now

Source: US Federal Reserve

Bloomberg Opinion

✓ 8 — What percentage of American households would not be able to cover a $400 unexpected expense in cash? (answer to the best of your knowledge)

146 out of 146 people answered this question

37%	65 resp.	44.5%
43%	58 resp.	39.7%
23%	18 resp.	12.3%
13%	5 resp.	3.4%
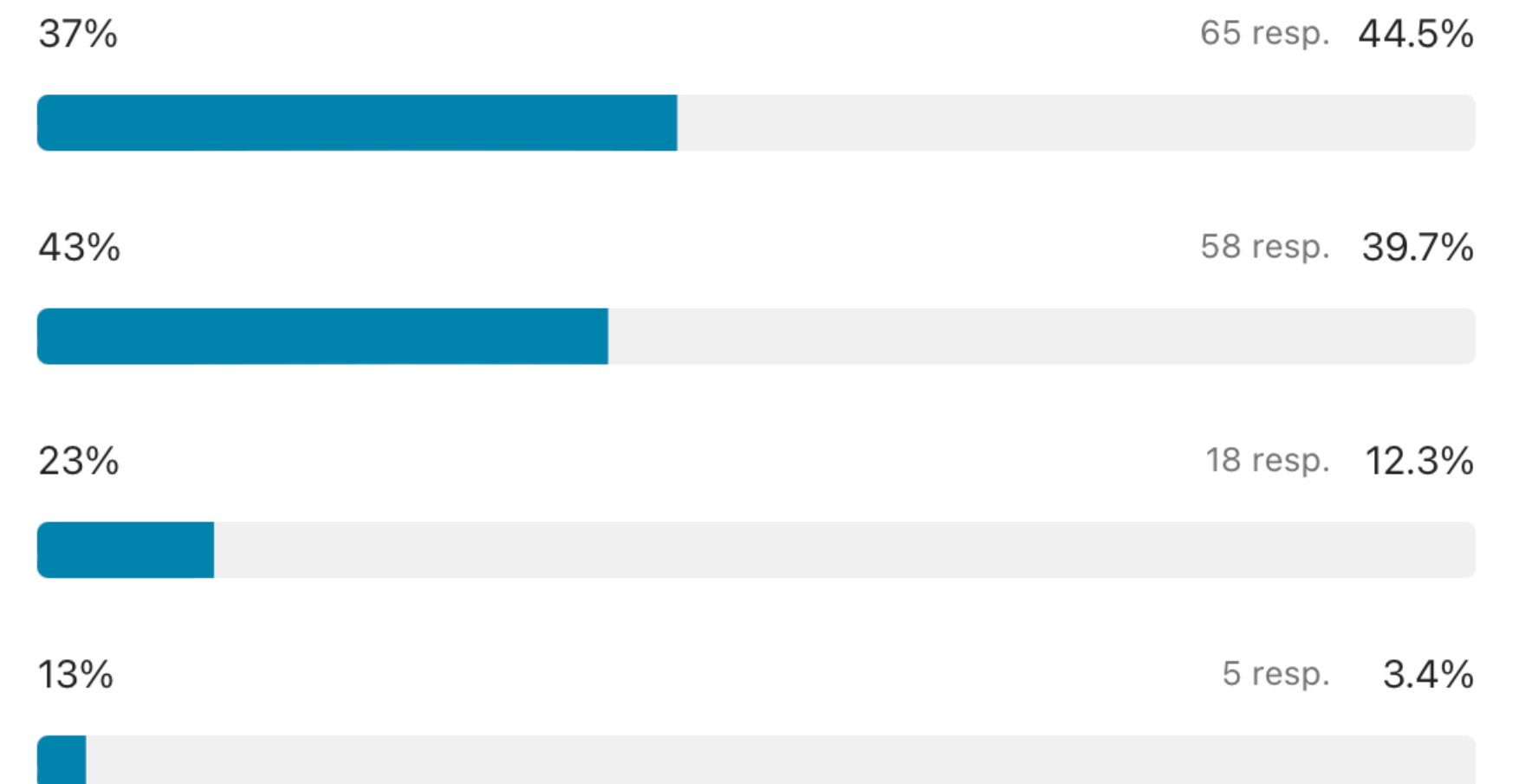
9: WHAT DO YOU BELIEVE IS MEDIAN INCOME IN US?

- Financial statistics can be confusing, because the time period, data set and questions vary dramatically.

- US Census reported median household income at $74,580 for 2022. It was $76,330 in 2021.

- US Census reported median household income in California at $85,300 in 2022.

- Median household income in Palo Alto, CA was $194,782 in 2022.

* _https://www.census.gov/library/publications/2023/demo/p60-279.html_
* _https://www.statista.com/statistics/205778/median-household-income-in-california/_
* _https://www.point2homes.com/US/Neighborhood/CA/Santa-Clara-County/Palo-Alto-Demographics.html_
* _https://siliconvalleyindicators.org/data/economy/income/household-income/median-household-income/_

9 What do you believe is the median household income in the United States?

146 out of 146 people answered this question

$74,580	81 resp.	55.5%
$76,330	51 resp.	34.9%
$85,300	13 resp.	8.9%
$194,782	1 resp.	0.7%

HOUSEHOLD INCOME

Median Household Income

Santa Clara & San Mateo Counties, San Francisco, California and the United States

Silicon Valley • San Francisco • California • United States

- Good news: we will cover most of them in the prepared sessions

- Lots of questions about stocks, investing, and options

- Additional Topics from Last Year

  - Venture Capital / Private Equity

  - Derivatives

  - Crypto

CS 007
SYLLABUS

ADMINISTRATIVE DETAILS

- Email: adamnash@cs.stanford.edu

- Slides will be posted on the course blog: http://cs007.blog

- Everyone who wants to take this class can take this class…

- To register attendance:

  - Visit https://bit.ly/cs007-attend

  - Enter SUNET & Secret Word

  - Timestamp tells the tale

- As long as the timestamp for the magic word is before midnight, you are good.

WEEK 2: PREDICTABLY IRRATIONAL

- Behavioral Finance

- Cognitive Bias

- Impact on Financial Decisions
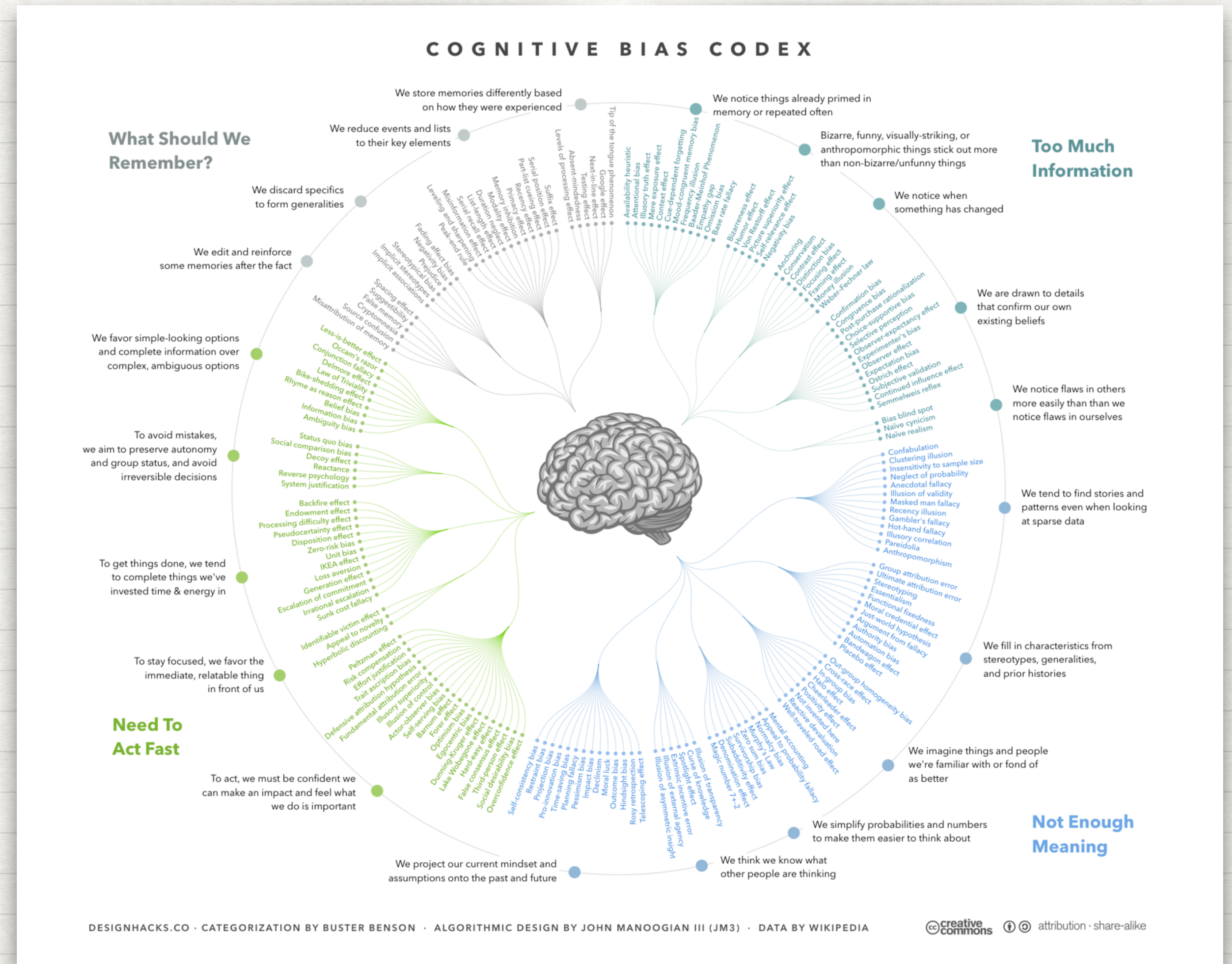
DesignHacks.co: 188 Known Cognitive Biases

WEEK 3: GETTING PAID

- Compensation

- Different models & methods

- Public vs. Private Companies

- Stock Options vs. Restricted Stock

- Understanding Equity Compensation

- Taxes

WEEK 4: SPEND LESS THAN YOU MAKE

- Income vs. Spending

- Time frames

- Budgets

- Savings Rates

- Personal Income Statement

WEEK 5: YOUR FINANCIAL PROFILE

- Assets & Liabilities

- Liquidity

- Emergency Funds

- Personal Balance Sheet

WEEK 6: CREDIT & DEBT. DIGGING OUT.

- Different types of Debt:
  Student Loans, Auto, Credit Cards, Mortgage

- Secured vs. Unsecured Loans

- Loans & Rates

- Credit Scores

- Compounding in Reverse

WEEK 7: GOOD INVESTING IS BORING

- The Magic of Compounding

- How to Calculate Returns

- Different Types of Investments: Stocks, Bonds, Commodities, Real Estate

- Diversification

- Modern Portfolio Construction

- Taxes Matter

If investing is entertaining, if you're having fun, you're probably not making any money.

Good investing is boring.

- George Soros

"Success in investing doesn't correlate with I.Q. Once you are above the level of 25, once you have ordinary intelligence, what you need is the temperament to control the urges that get other people into trouble in investing."

- Warren Buffett
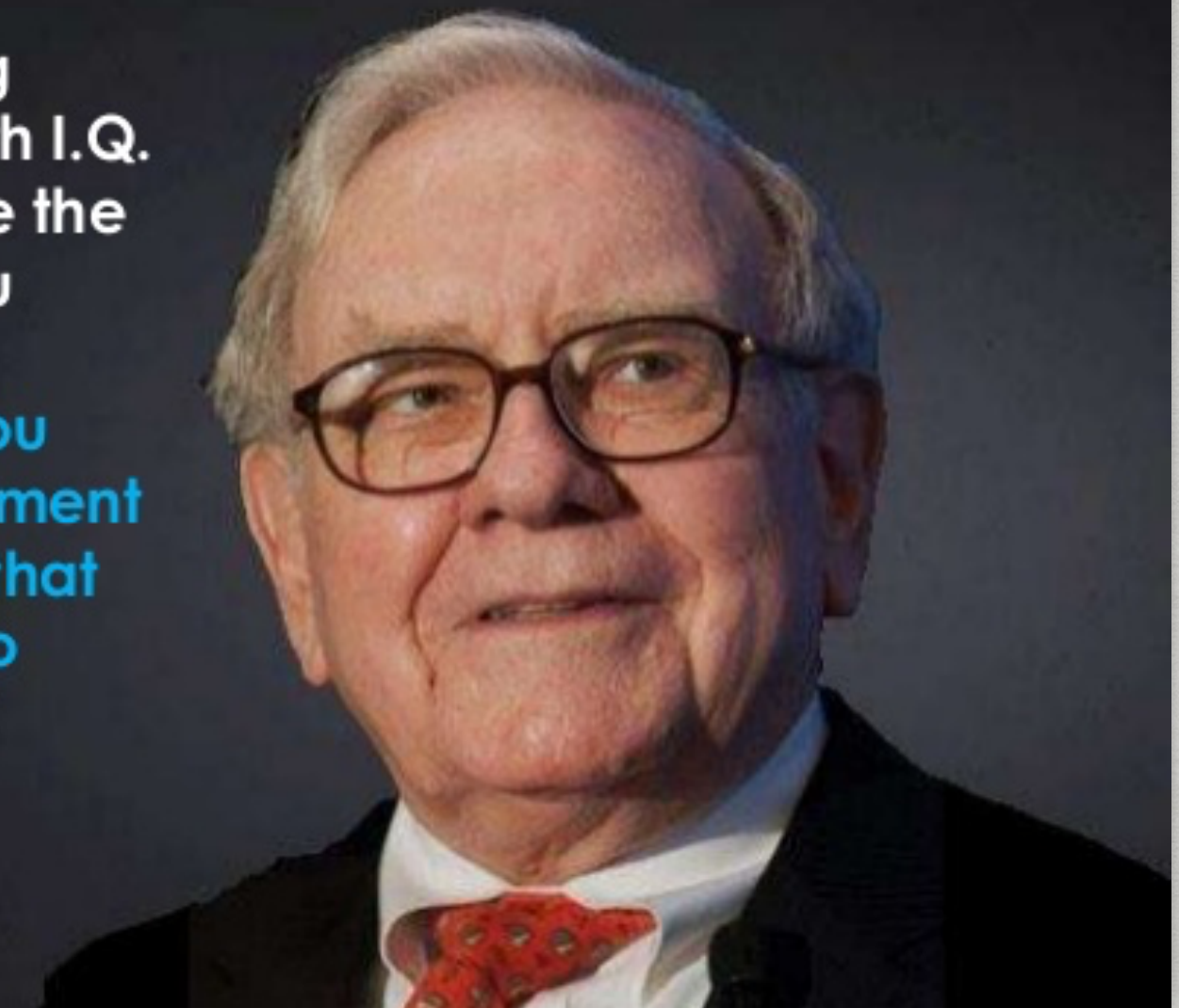
WEEK 8: FINANCIAL GOALS

- How to Plan for Financial Goals

- Different Types of Goals:
  Travel, Marriage, House, Children,
  College, Starting a Business,
  Retirement

- Life Insurance

- Couples & Financial Decisions

WEEK 9: LOCATION, LOCATION, LOCATION

- Real Estate

- Rent vs. Buy

- The Home as an Investment

- Rental Properties / Passive Income

- REITs & Partnerships

- Tax Benefits

WEEK 10: PEOPLE'S CHOICE

- Student Selected Topics
  - Derivatives
  - Venture Capital
  - Crypto!

- Final Thoughts

- CS 007 Alumni

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QUESTIONS