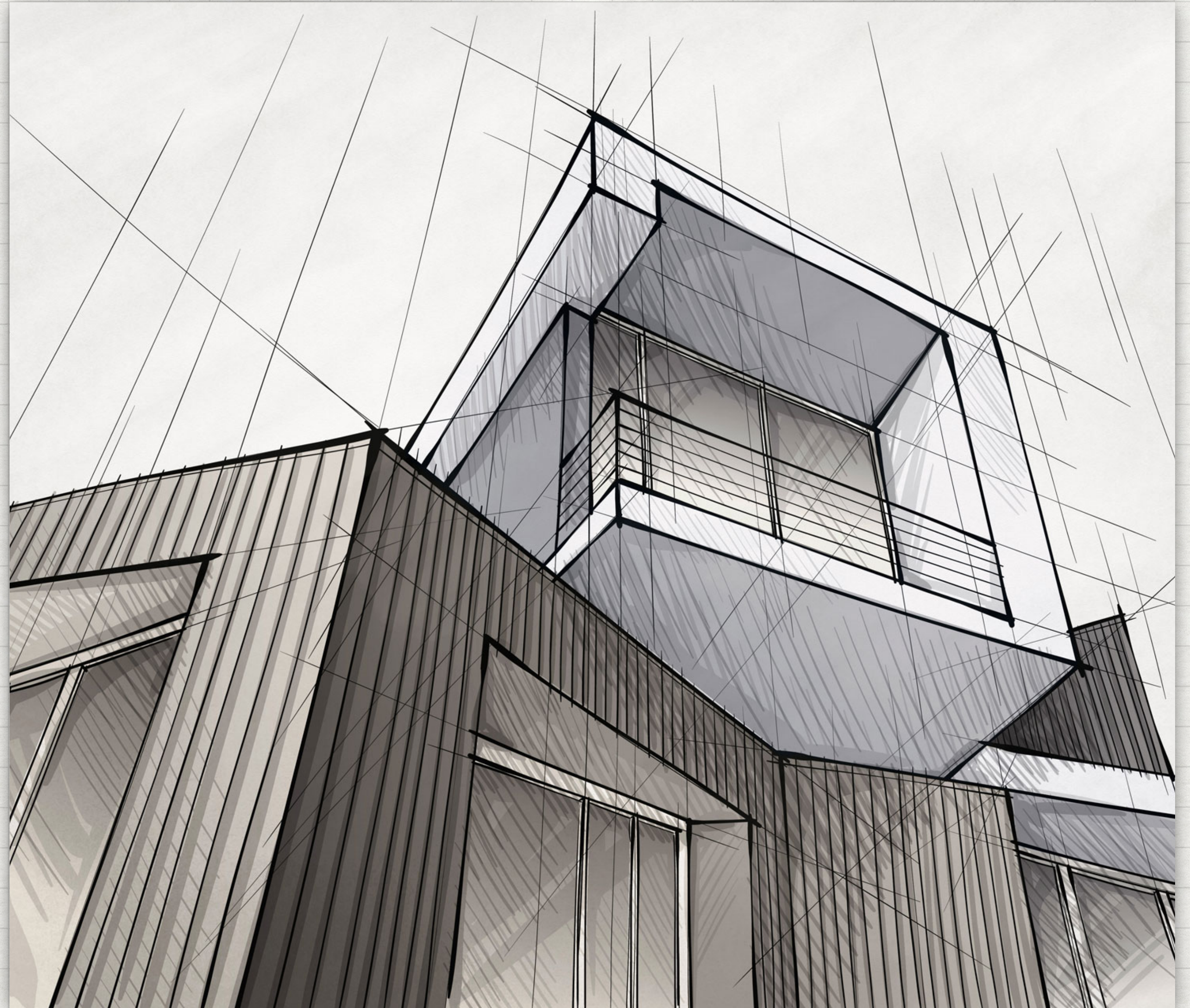


CS 007: SESSION 1

# PERSONAL FINANCE FOR ENGINEERS





# DISCLOSURES

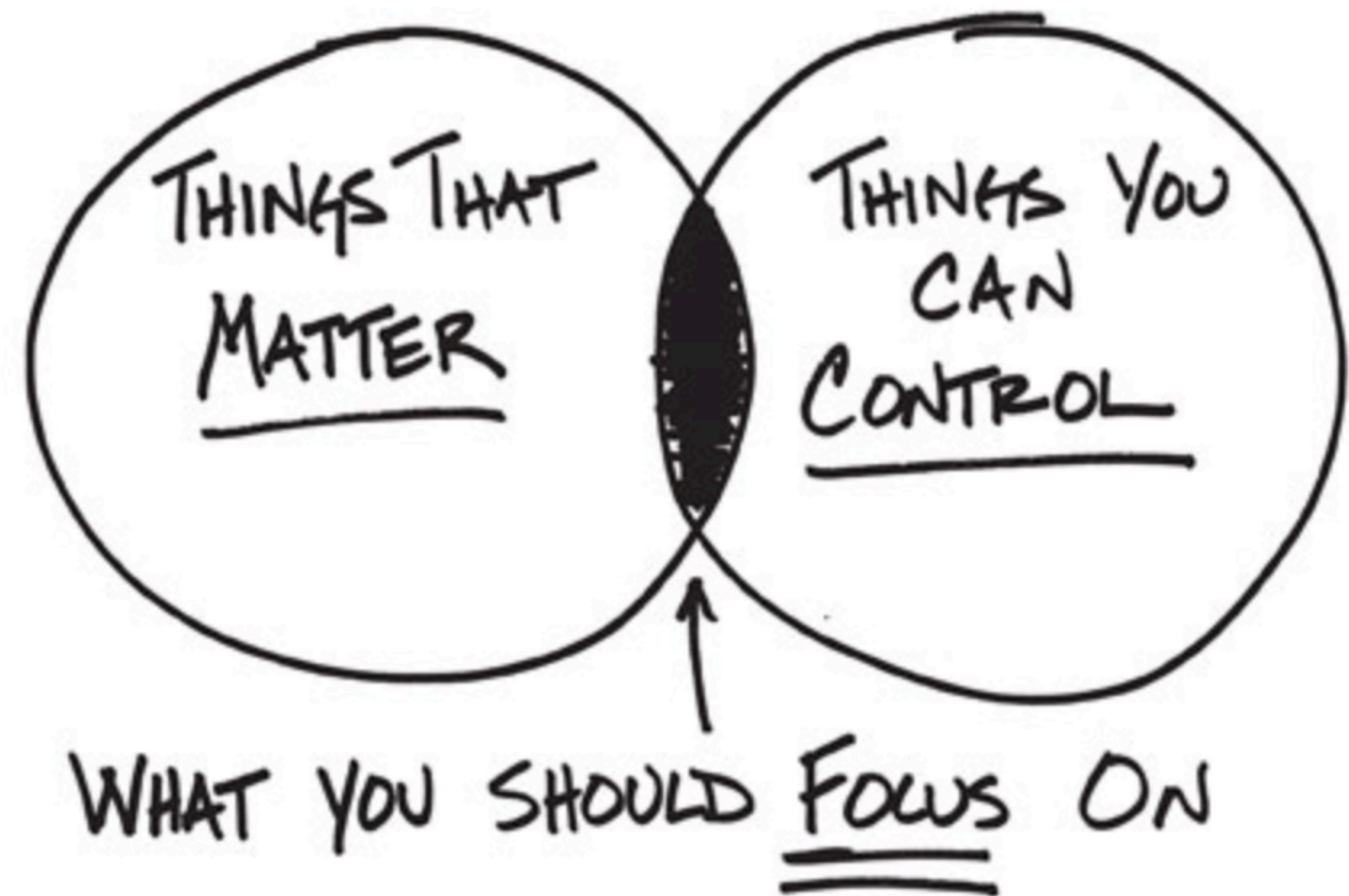
STANFORD UNIVERSITY • COURSE MATERIAL • CS 007 • FALL 2018-9

- 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.

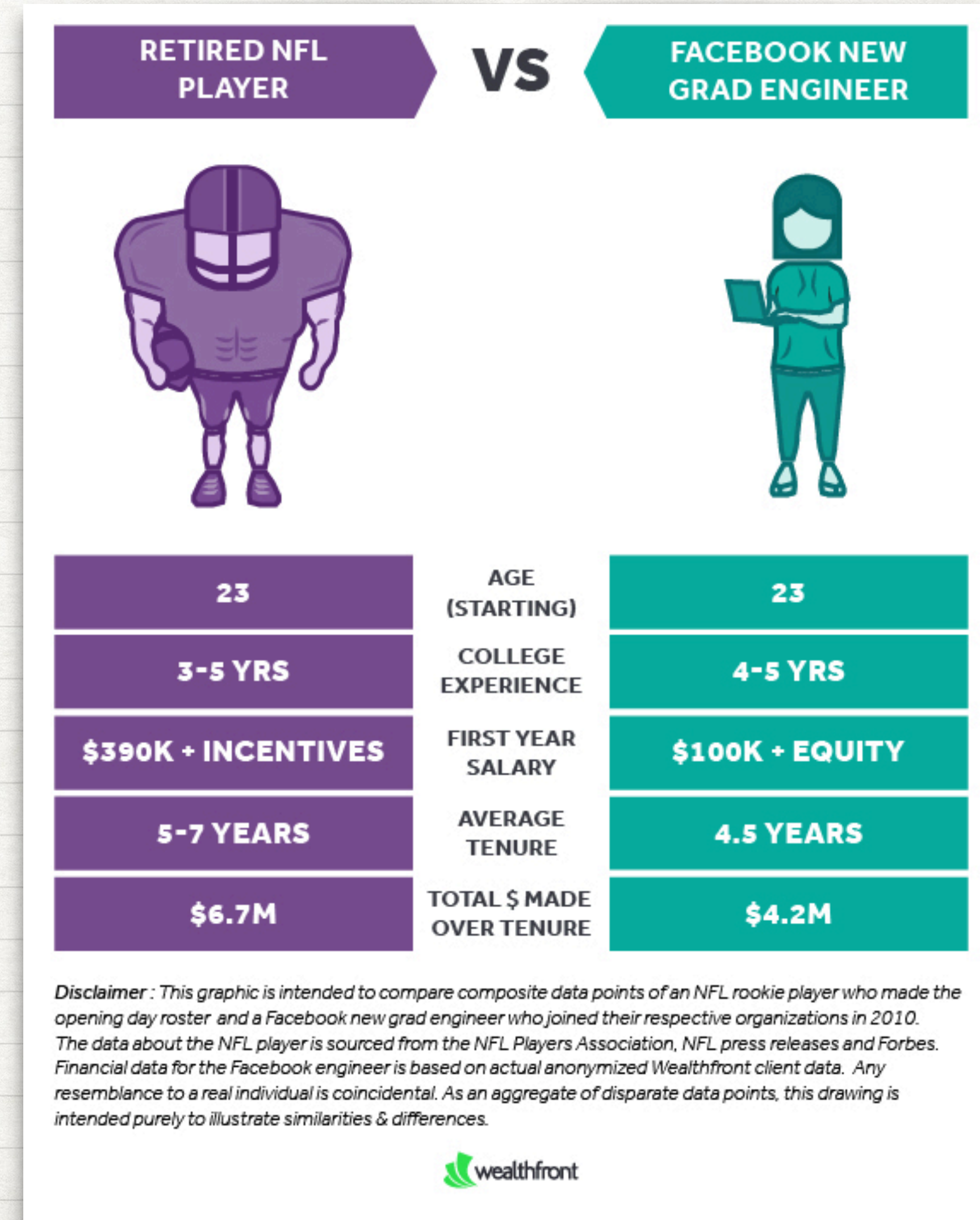


BEHAVIORGAP.COM



# 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.





# 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





# CLASS MECHANICS: PIECE OF CAKE

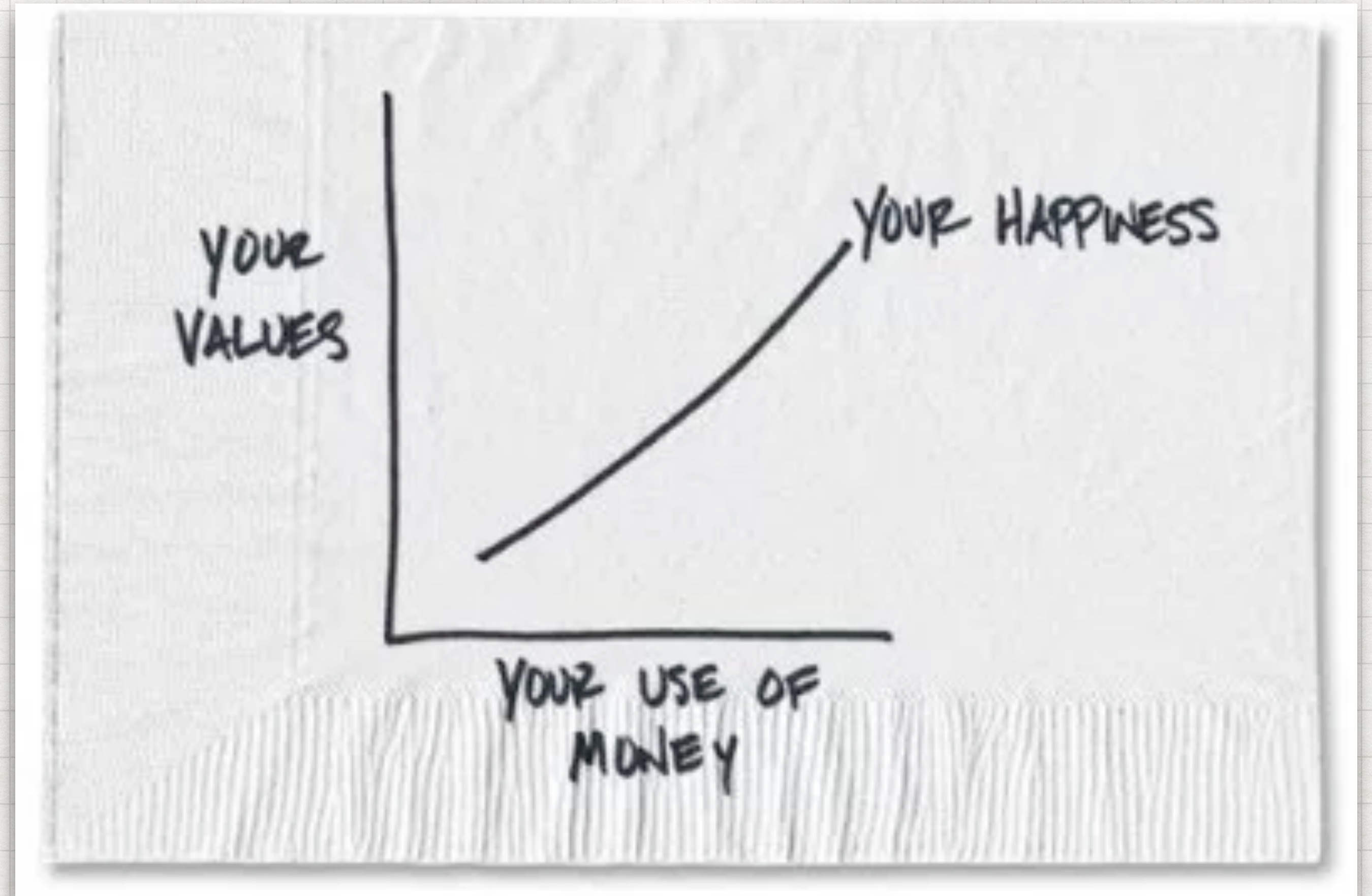
- Email:  
[adamnash@cs.stanford.edu](mailto:adamnash@cs.stanford.edu)
- Slides will be posted. Will send out URL when it is ready.
- Seminar is Pass / Fail.
- Attendance is mandatory. Students who miss two classes will not pass.
- Students will be let in off the waitlist, but only if they send an email request.
- Feedback is appreciated.





CS 007

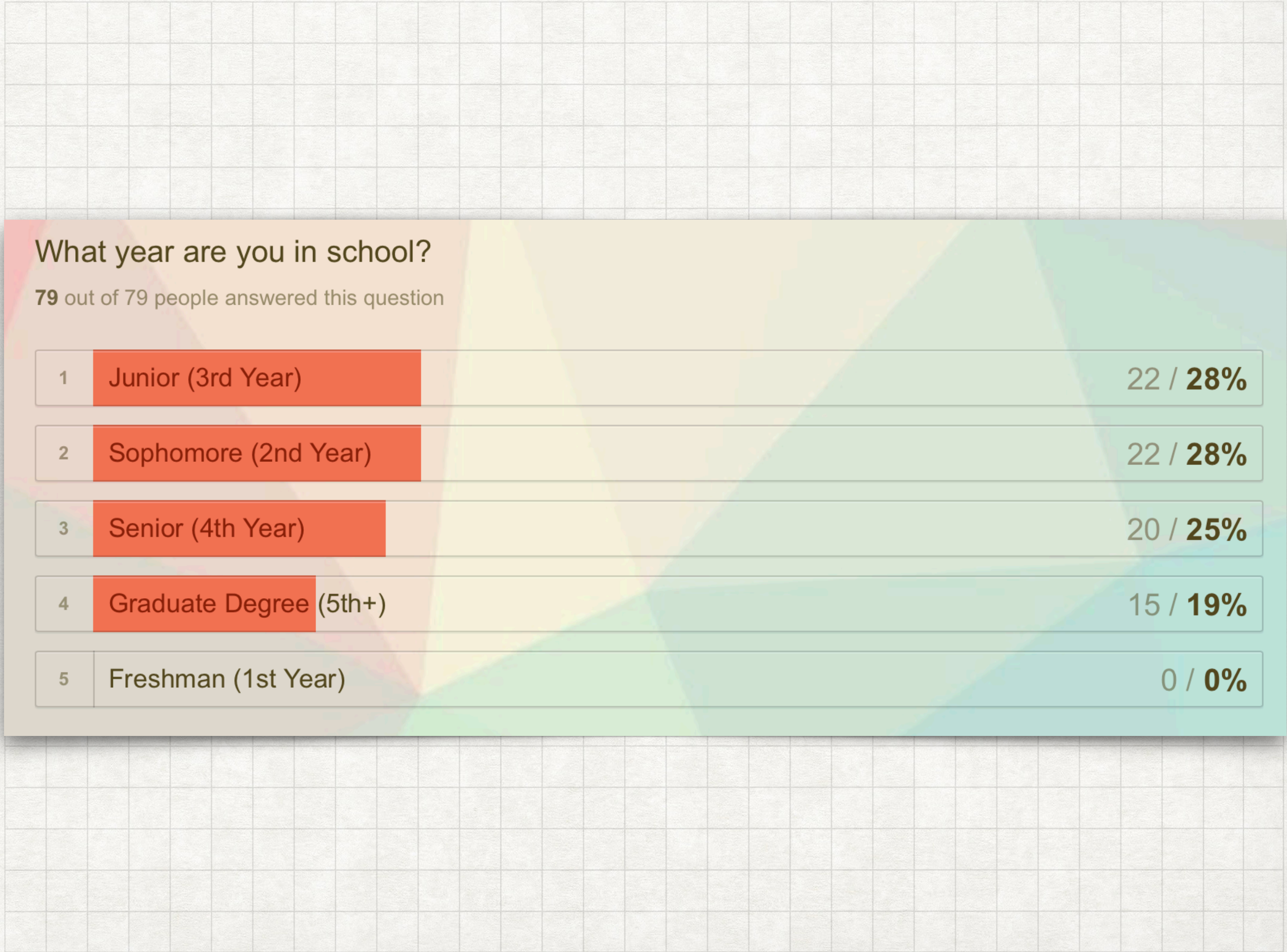
# CLASS SURVEY





# 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...

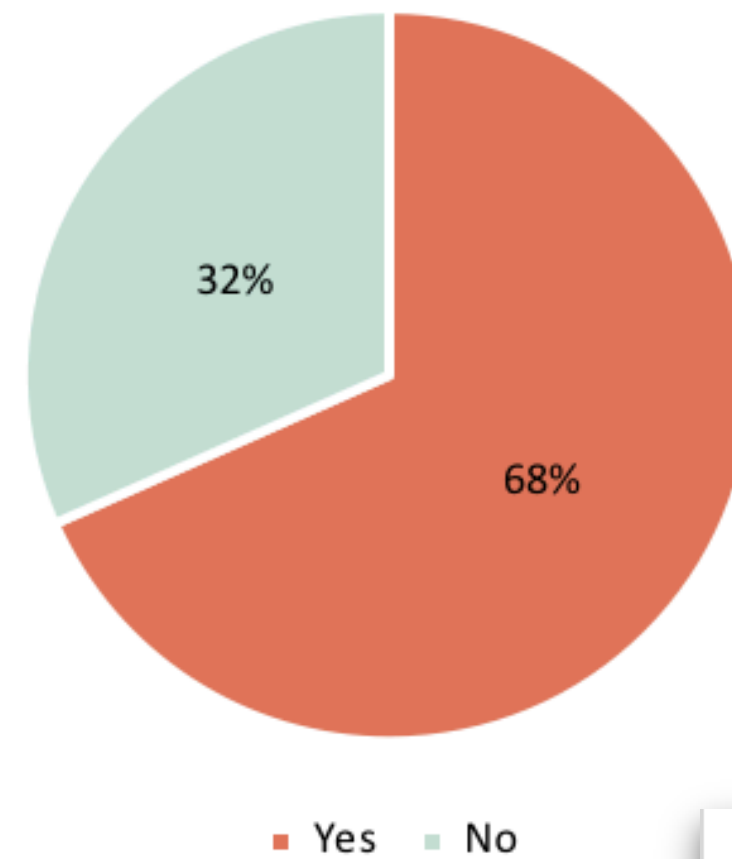




## 2: HOW DO YOU DEFINE WEALTH / SUCCESS?

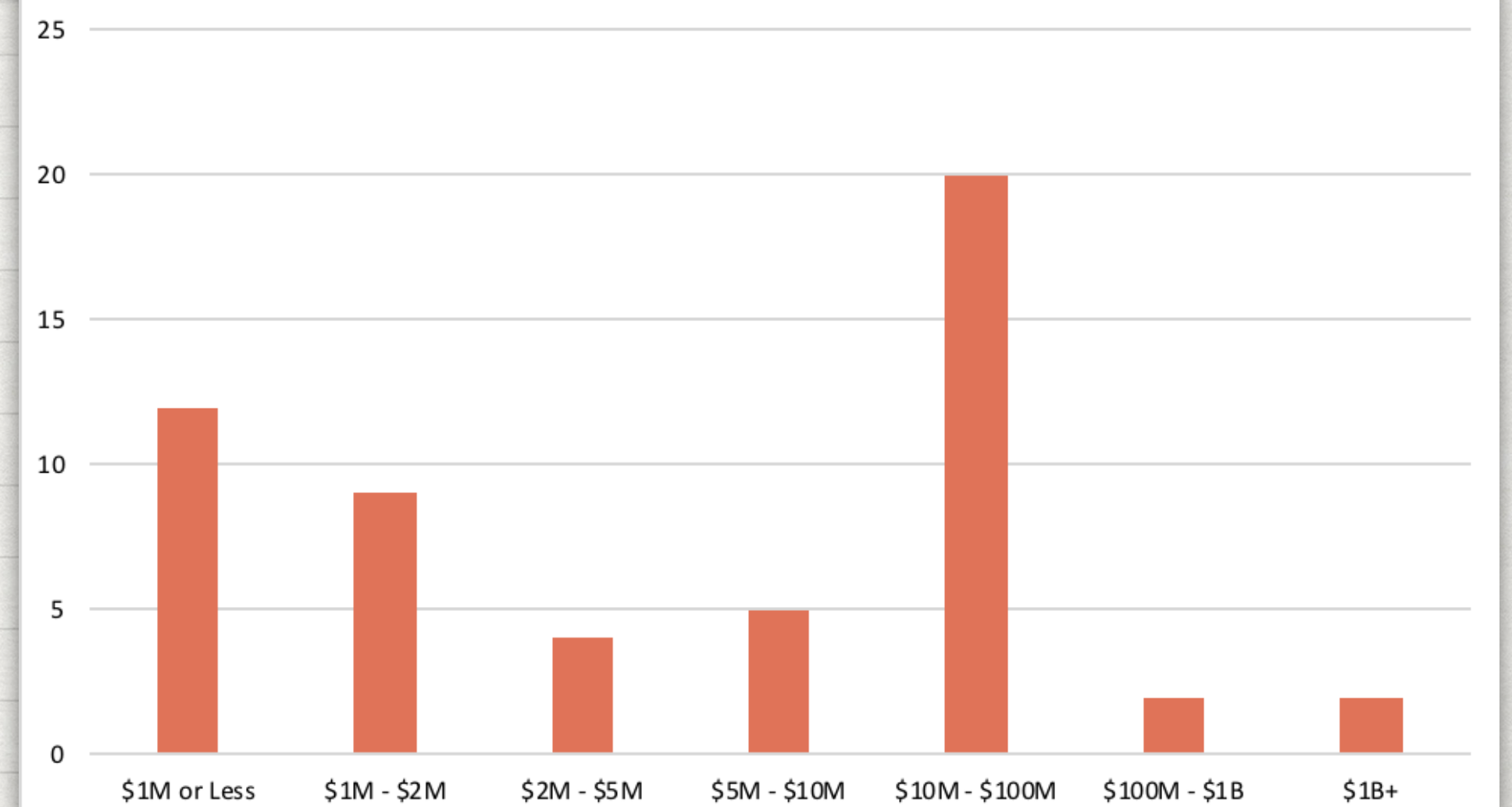
- Is there a “magic number?”
- Expectations vary widely.
- Some people find success focusing on goals, others on running up a score.
- Your peers do not adequately describe the range of successful financial outcomes possible, nor the range of lifestyles that could make you happy.
- None of you think you can beat Jeff Bezos? 🤔

Do you have a magic number for success?



Low: \$80,000  
High: \$5B

Magic Number for Wealth / Success



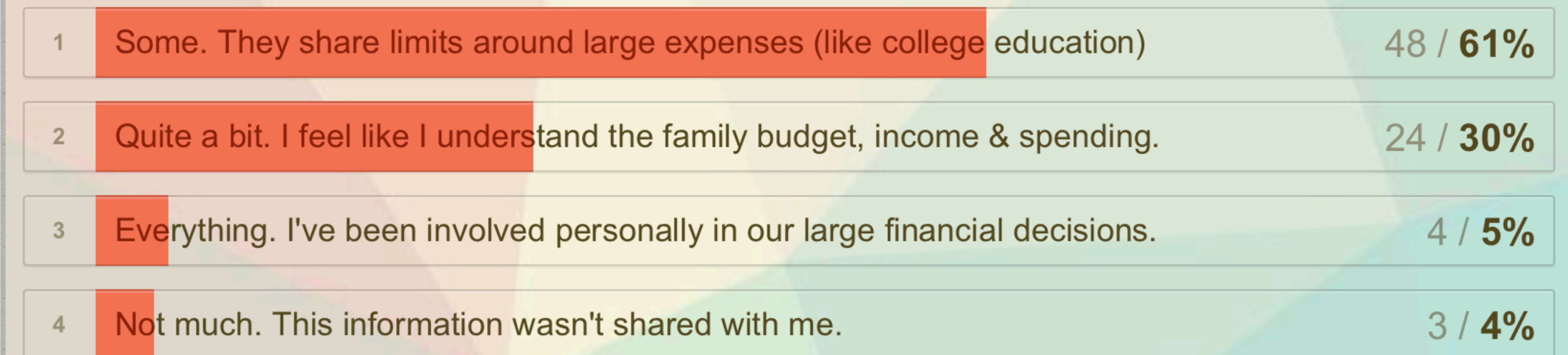


### 3: HOW MUCH DO YOU KNOW ABOUT YOUR PARENTS 💰

- 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.

How much do you know about your parents / guardians financial lives?

79 out of 79 people answered this question



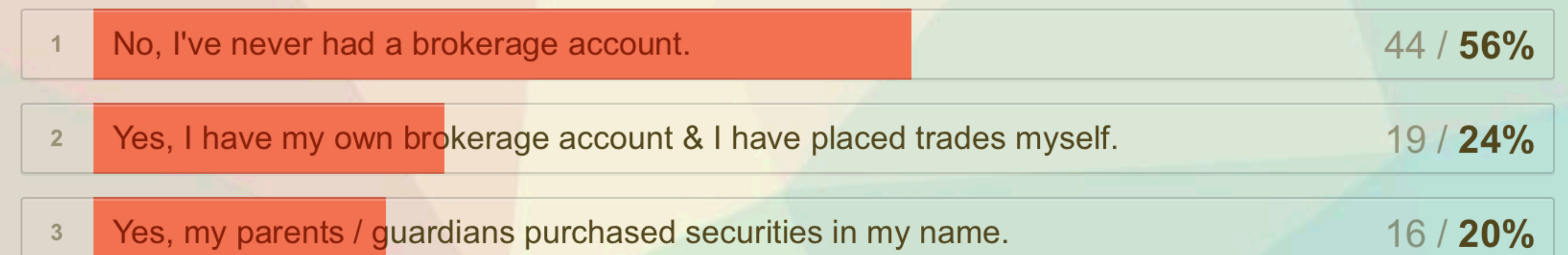


## 4: PURCHASED STOCK, ETF OR MUTUAL FUND?

- 64% of American households have Amazon Prime, but only 52% own stocks. (Source: Gallup)
- The top 1% of households by wealth own 38% of all company shares. (Source: Wolff)
- 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.

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

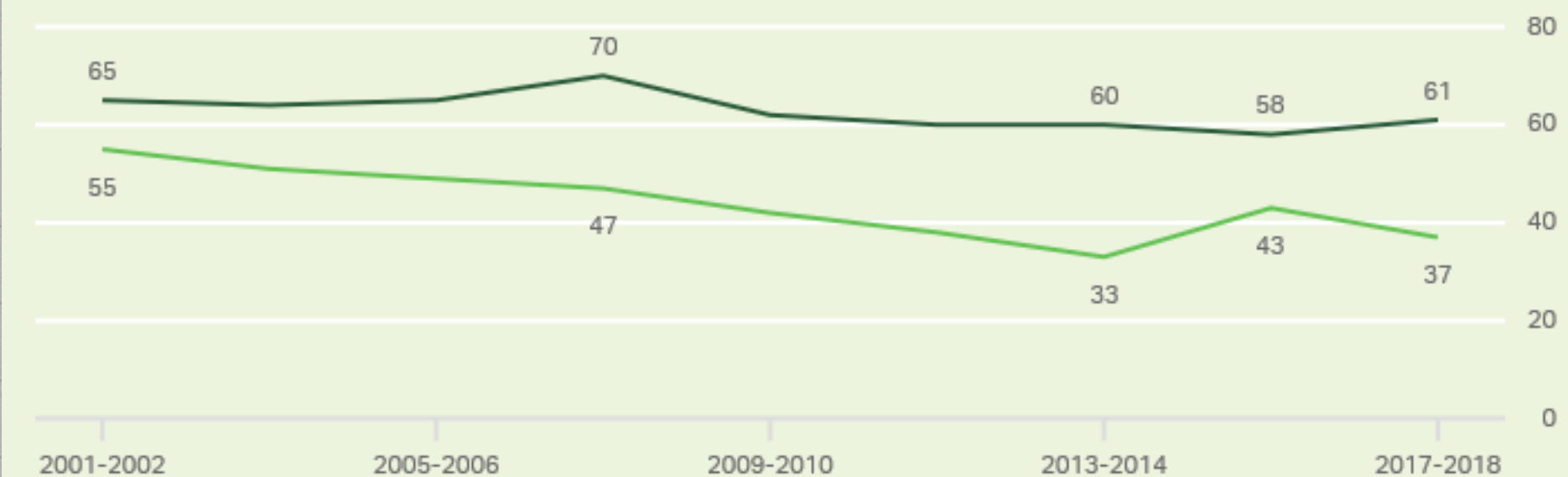
79 out of 79 people answered this question



### Americans Younger Than 35 Less Likely to Invest in Stocks

Percentage who have money invested in the stock market, either personally or jointly with a spouse

■ % 18- to 34-year-olds ■ % 35 and older



Two-year averages from 2001-2002 through 2017-2018

GALLUP

\* <https://www.cnbc.com/2018/05/16/gallup-why-younger-americans-arent-investing-in-the-stock-market.html>



## 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.

Have you ever filed your own taxes?

79 out of 79 people answered this question

1

No

56 / **71%**

2

Yes

23 / **29%**



# 6: STUDENT LOANS THAT YOU ARE RESPONSIBLE FOR?

- National student loan debt at \$1.5 Trillion. And climbing.
- Average debt for Class of 2016 borrower was \$31,172.
- Student default rate is 10.7%

Student Loan Balance	Number of Borrowers
Less Than \$5,000	8,769,700
\$5,000 - \$10,000	7,554,100
\$10,000 - \$25,000	12,368,200
\$25,000 - \$50,000	8,483,600
\$50,000 - \$75,000	3,539,000
\$75,000 - \$100,000	1,503,800
\$100,000 - \$150,000	1,238,200
\$150,000 - \$200,000	554,500
\$200,000+	521,600



\* Federal Reserve Bank of New York Consumer Credit Panel / Equifax

\* <https://studentloans.net/debt-per-graduate-statistics/>

\* <https://www.forbes.com/sites/zackfriedman/2018/06/13/student-loan-debt-statistics-2018/#7a93df7c7310>

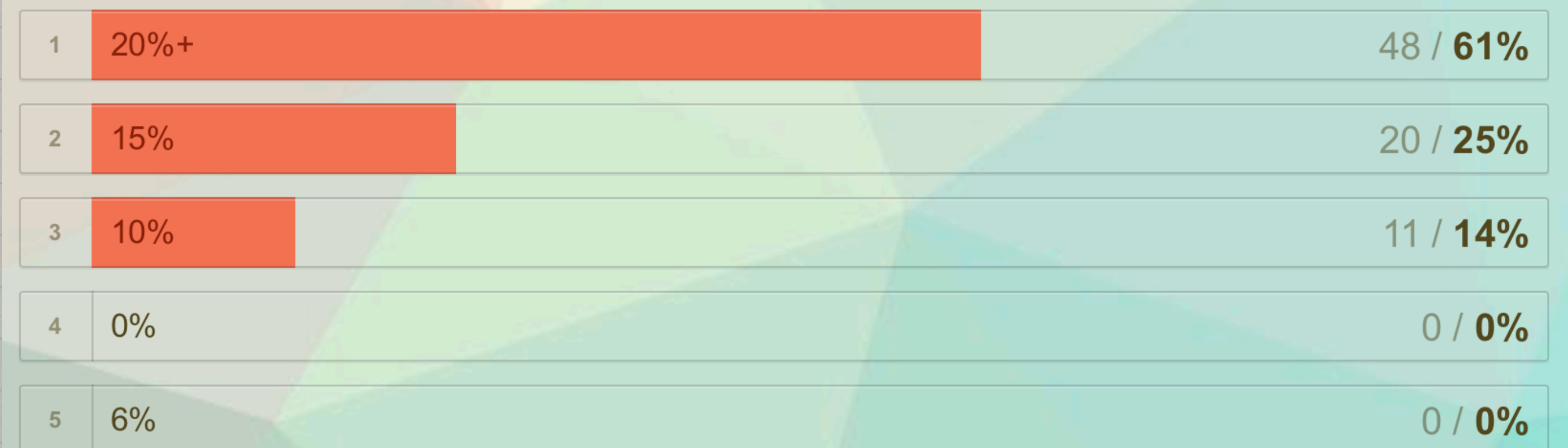


# 7: WHAT % OF YOUR SALARY SHOULD YOU SAVE?

- 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.

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

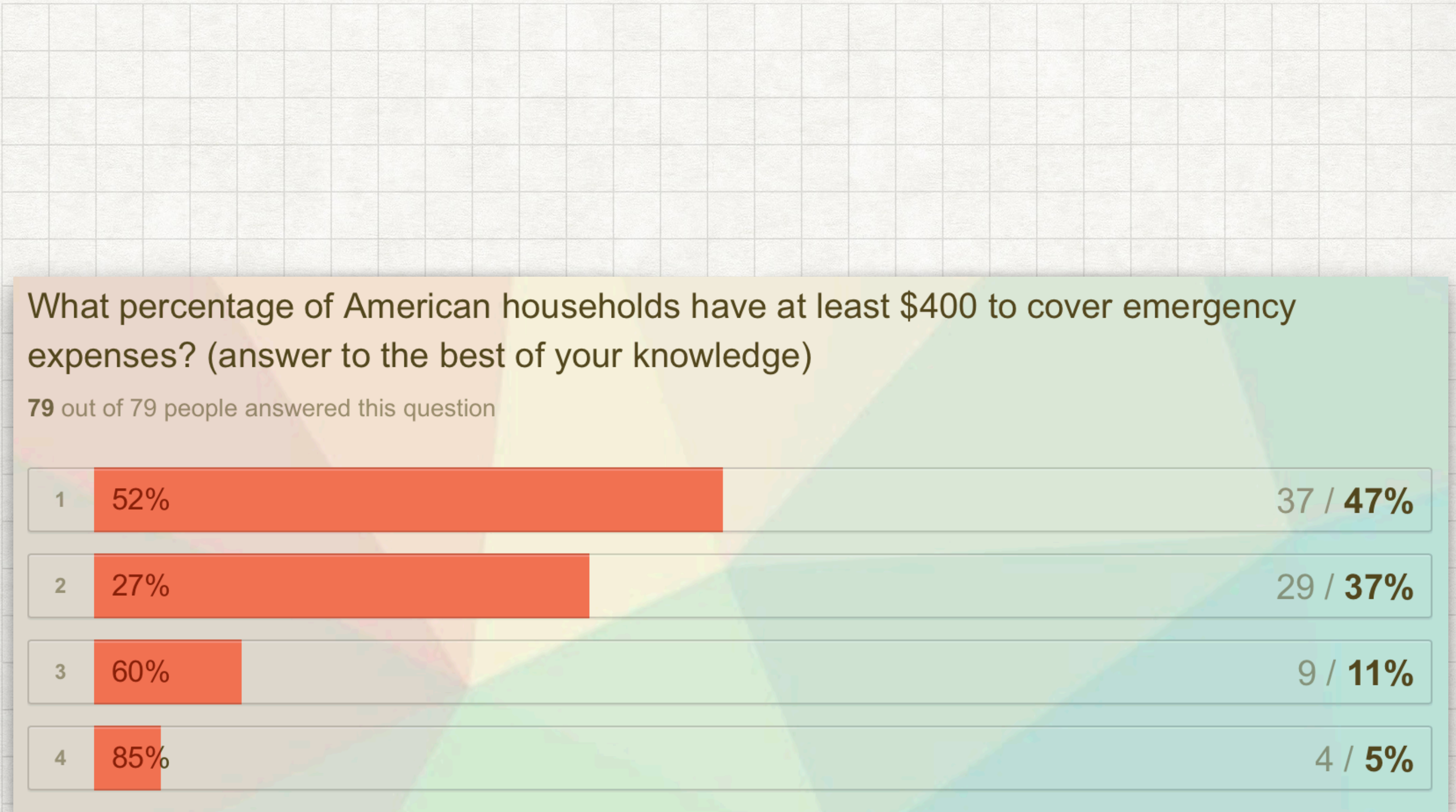
79 out of 79 people answered this question





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

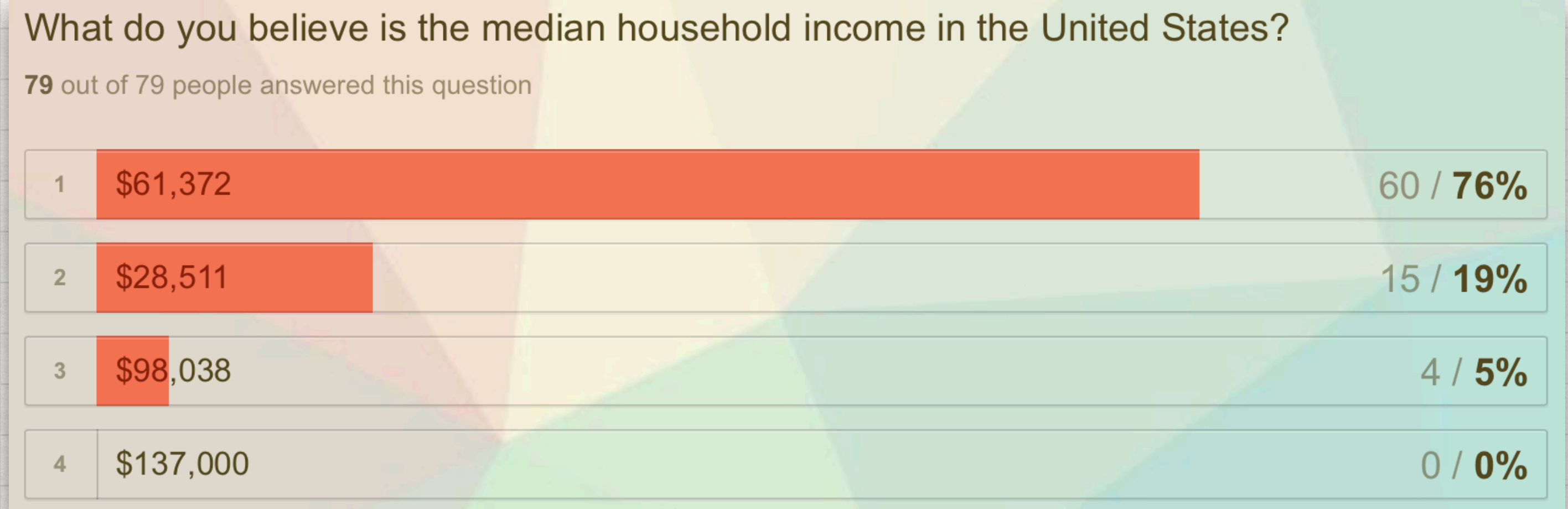
- US Federal Reserve reported in 2017 that 40% of Americans do not have sufficient savings to cover a \$400 emergency expense.
- Liquidity means having access to money when you need it.
- Don't underestimate the value of liquidity. Liquidity matters.





# 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 initially reported **median household income** at \$61,372 in 2017.
- US Census reported median household income for households with less than high school education at \$28,511. College educated at \$98,038.
- In 2017, median household income in Palo Alto is \$137,000.



\* <http://www.deptofnumbers.com/income/us/>

\* <http://www.deptofnumbers.com/income/california/>

\* <http://siliconvalleyindicators.org/data/economy/income/median-household-income/>



# 10: WHAT FINANCIAL DECISIONS DO YOU WANT TO COVER?

- Good news: we will cover most of them in the prepared sessions
- Lots of questions about stocks, investing, and options
- Additional interesting ideas:
  - How to maximize your human capital / career earning power
  - How to finance a startup
  - Marriage & children





# CS 007

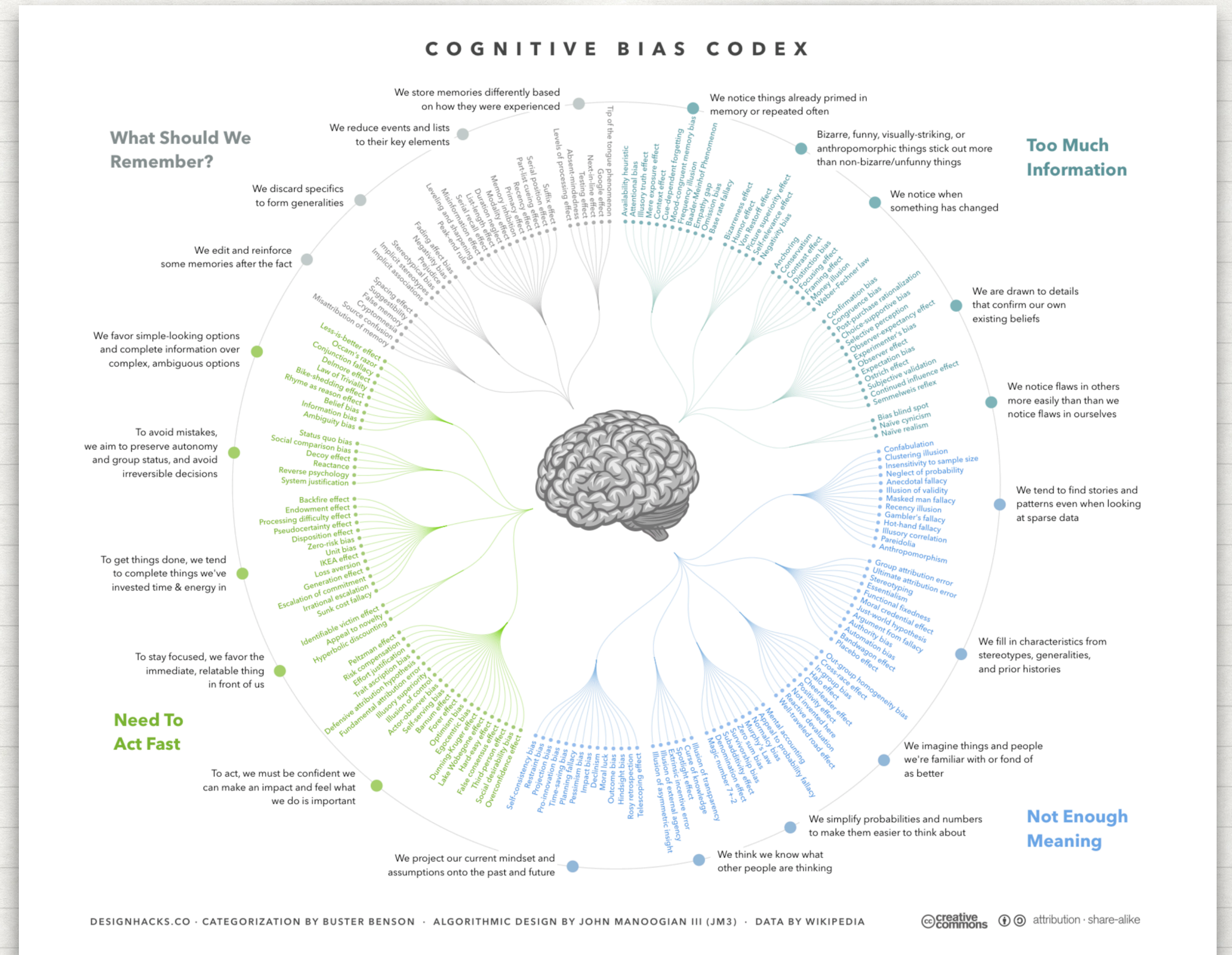
# SYLLABUS





# WEEK 2: PREDICTABLY IRRATIONAL

- Behavioral Finance
- Cognitive Bias
- Impact on Financial Decisions



\* [DesignHacks.co](https://www.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: KNOW YOUR WORTH

- Assets & Liabilities
- Liquidity
- Emergency Funds
- Personal Balance Sheet





# WEEK 6: ALL ABOUT DEBT

- 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



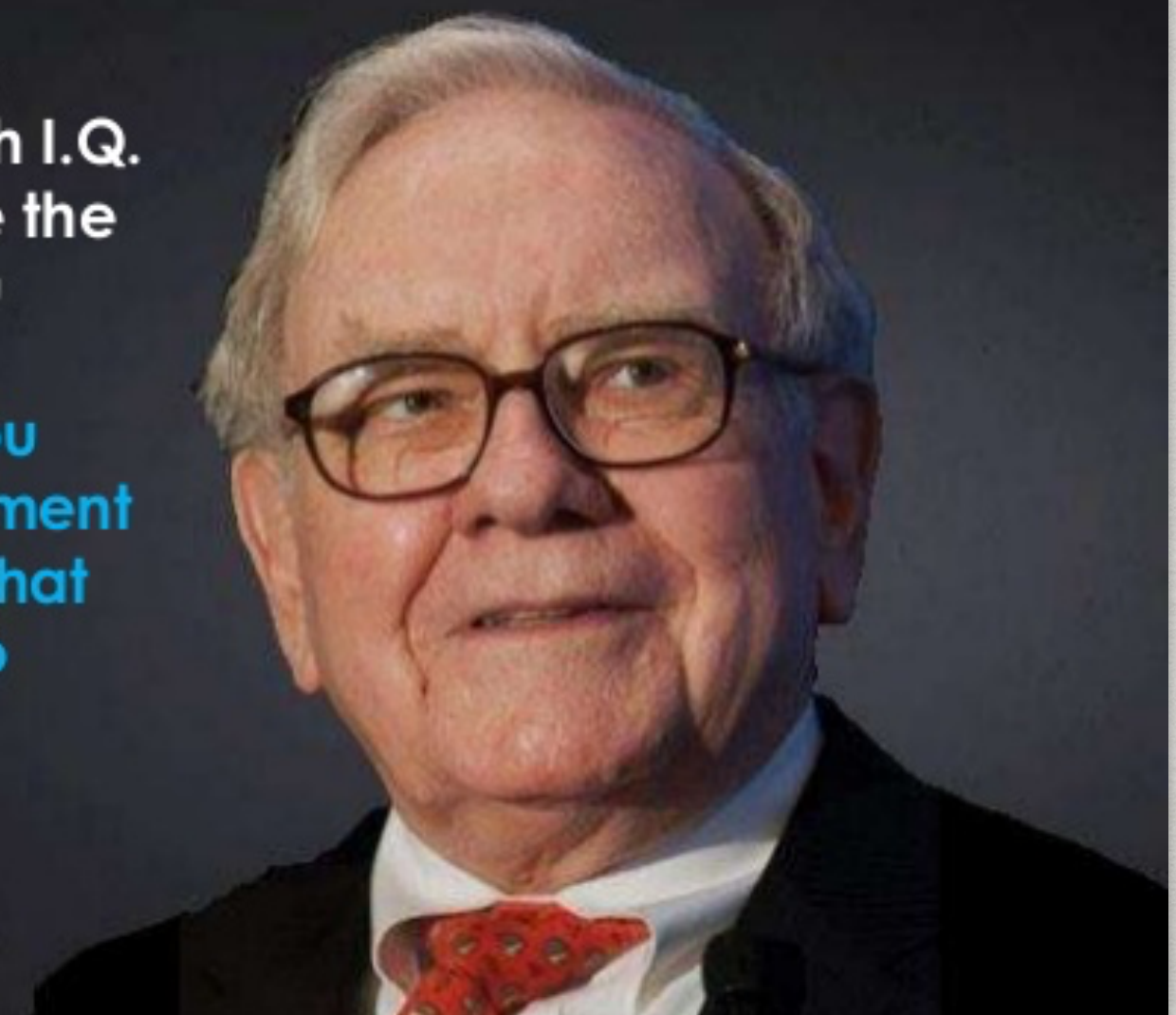
*If investing is entertaining,  
if you're having fun,  
you're probably not making  
any money.*

*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 PLANNING & 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: REAL ESTATE

- Real Estate
- Rent vs. Buy
- The Home as an Investment
- Rental Properties / Passive Income
- REITs & Partnerships
- Tax Benefits





# WEEK 10: ADDITIONAL TOPICS

- Student Selected Topics
- 2017 Topics
  - Cryptocurrency
  - Derivatives
  - Venture Capital
- Final Thoughts
- CS 007 Alumni





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# QUESTIONS

