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CS349

UNINTENDED CONSEQUENCES

PRESENTATION: SYSTEM OF ETHICS

WHY DO ETHICAL FRAMEWORKS FAIL?

- ▶ Thousands of years to examine the topic of ethics
- ▶ Many very smart people dedicated to helping others and improving the world through ethics
- ▶ Why can't we get it right?

SYSTEMS ARE COMPLEX

- ▶ The world and society are complex
 - ▶ Changes to a system can have unpredictable outcomes
 - ▶ Individual actions can have very little or very large impact on these systems
- ▶ Humans are complex
 - ▶ Humans are not rational
 - ▶ Humans will not always do what is in their best interest

A COMPLICATED WORLD

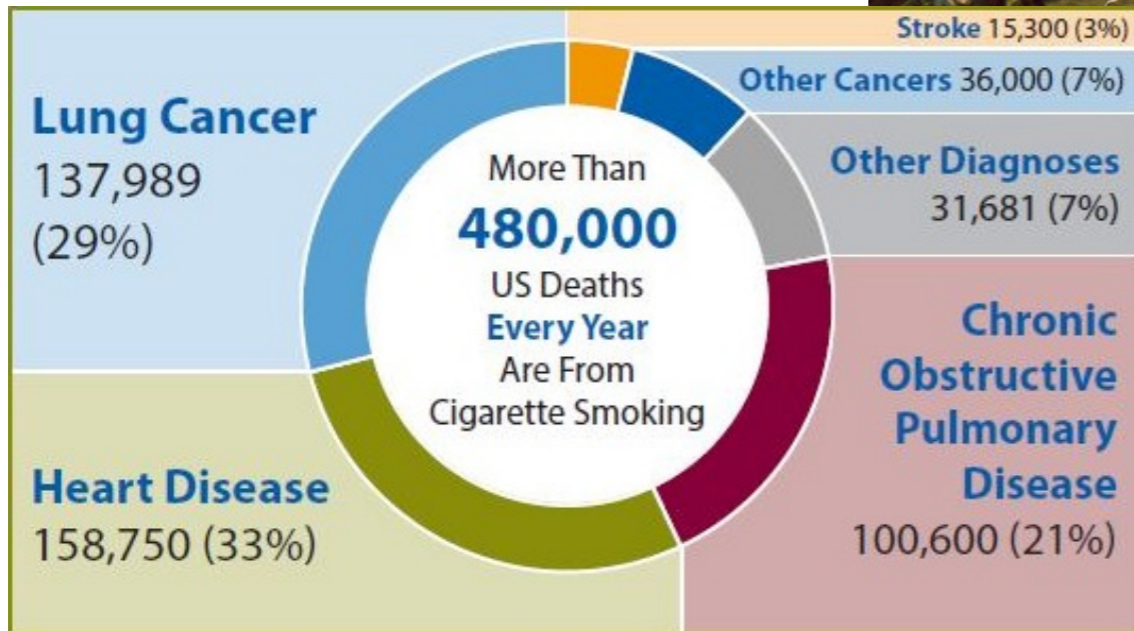
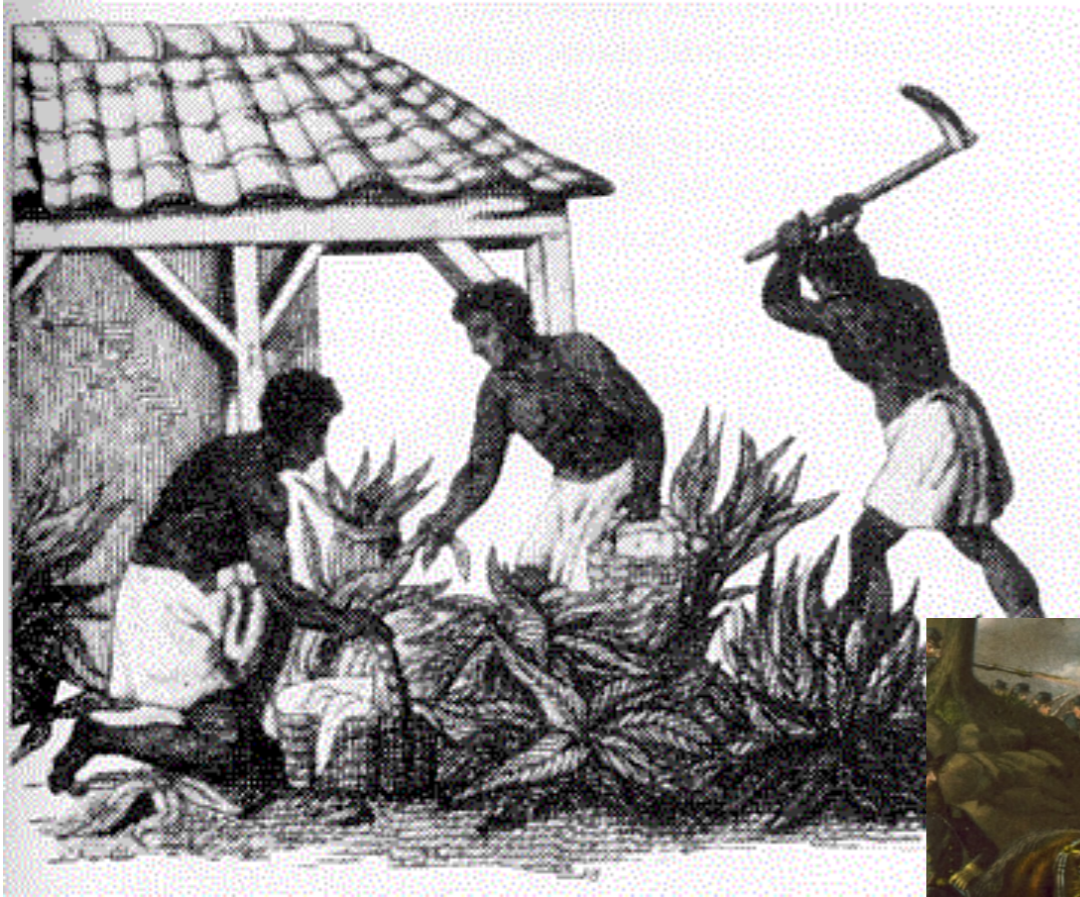


WHO IS THIS PERSON AND WHY DO WE CARE?



JOHN ROLFE

- ▶ Married Pocahontas, daughter of the chief of the Powhatan
 - ▶ Brought peace between the colonists and the tribes
 - ▶ Led to Pocahontas' death several years later
- ▶ Successfully cultivated tobacco in the New World
 - ▶ Helped Jamestown prosper
 - ▶ Helped enable triangular trade, which led to demand for African slaves to use as cheap labor



any other unintended consequences?

UNANTICIPATED CONSEQUENCES

- ▶ Outcome cannot be easily predicted
 - ▶ Too many unknown variables
- ▶ Impact cannot be easily predicted
 - ▶ Weights of unknown variables also unknown!
- ▶ Result:
 - ▶ Expected outcome does not happen
 - ▶ Expected outcome happens but other things happen as well

MALARIA NETS

- ▶ Cheap mosquito netting distributed throughout Africa to prevent Malaria
- ▶ Work well as nets for catching fish
- ▶ Result:
 - ▶ Finer nets leads to overfishing
 - ▶ Insecticide-treated nets may poison fish
 - ▶ Higher rates of malaria in areas where net fishing is feasible
 - ▶ Violent conflict between net fishermen and traditional fishermen

OVERWATCH

- ▶ Blizzard created Overwatch to be an inclusive team-based first-person shooter
- ▶ Introduction of competitive mode led to a notoriously toxic community
- ▶ Why?
 - ▶ Competitive ranking based on match performance
 - ▶ Wide base of players seeking few spots on professional teams
 - ▶ Team-based play and anonymity makes it easy to blame others during pick up games

A COMPLICATED SPECIES



GAME THEORY

- ▶ Mathematical area modeling competition and cooperation between multiple players
- ▶ Formalized by John von Neumann
- ▶ Studied extensively in the 1940s and 50s for developing nuclear strategies



War Games (1983)

BASIC IDEAS

- ▶ Game can model expected outcomes in political science, economics, computer science, and sociology arenas
- ▶ Assumes players are rational and intelligent
- ▶ Cooperative/non-cooperative games:
 - ▶ Players can form/not form binding alliances
- ▶ Zero-sum/non-zero-sum games:
 - ▶ Total resources won equals/not equals zero

PRISONER'S DILEMMA

- ▶ Introduced by Merrill Flood and Melvin Dresher in 1950
- ▶ Formalized by Albert Tucker in 1952:
- ▶ Two members of a criminal gang are arrested and imprisoned. Each prisoner is in solitary confinement with no means of communicating with the other. The prosecutors lack sufficient evidence to convict the pair on the principal charge. They hope to get both sentenced to a year in prison on a lesser charge. Simultaneously, the prosecutors offer each prisoner a bargain. Each prisoner is given the opportunity either to: betray the other by testifying that the other committed the crime, or to cooperate with the other by remaining silent. The offer is:
 - ▶ If A and B each betray the other, each of them serves 2 years in prison
 - ▶ If A betrays B but B remains silent, A will be set free and B will serve 3 years in prison (and vice versa)
 - ▶ If A and B both remain silent, both of them will only serve 1 year in prison (on the lesser charge)

THE BOARD

	B cooperates	B defects
A cooperates	A: 1 year B: 1 year	A: 3 years B: goes free
A defects	A: goes free B: 3 years	A: 2 years B: 2 years

WHY A DILEMMA?

- ▶ Dominant strategy is defection
 - ▶ Player will always do worse (have lower payoff) by cooperating
- ▶ Nash equilibrium is when no player can benefit from changing strategy while the other player's strategy remains unchanged
- ▶ Best payoff (mutual cooperation) is therefore inaccessible when played unilaterally

TIT FOR TAT

- ▶ Strategy developed for iterated prisoner's dilemma (players play multiple times and remember other players' previous actions)
 - ▶ Cooperate in first game then replicate opponent's actions in subsequent games
- ▶ Highly successful strategy that results in larger population of cooperators (versus defectors) at end of game
- ▶ Side note: a really nice game/interactive piece going into more details about this topic: <https://ncase.me/trust/>

BEHAVIORAL GAME THEORY

- ▶ Does not assume players are rational
- ▶ Focuses on choices made in experiments to understand human decision-making in practice
- ▶ “Irrational” concepts:
 - ▶ Cognitive bias
 - ▶ Fairness
 - ▶ Altruism

COGNITIVE BIAS

- ▶ Framing effect: the way an issue is presented (perceived risk versus reward) affects a person's response
- ▶ From Amos Tversky and Daniel Kahneman: Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs are as follows:
 - ▶ If Program A is adopted, 200 people will be saved
 - ▶ If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved
 - ▶ If Program C is adopted, 400 people will die
 - ▶ Program D is adopted, there is 1/3 probability that nobody will die, and 2/3 probability that 600 people will die

FAIRNESS

- ▶ Ultimatum game:
 - ▶ First player determines how to split money between themselves and second player (must be $> \$0$)
 - ▶ Second player can accept offer (both parties receive something) or reject the offer (no one receives anything)
- ▶ Results:
 - ▶ 70/30 splits are often rejected
 - ▶ Shared social groups often offer 50/50 split
 - ▶ Wide variations depending on set up, amount and culture

ALTRUISM

- ▶ Much debate on nature of altruism (hardwired vs social, egoistic vs empathetic, etc)
- ▶ Studies suggest all of these play a role in altruistic acts:
 - ▶ Human brains are hardwired to support altruistic behavior
 - ▶ Increasing empathy increases altruism
 - ▶ Community-oriented environments increase altruism
- ▶ Compassion is linked to human happiness

SO HOW SHOULD WE LIVE?

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- ▶ <Amos Tversky and Daniel Kahneman, "The Framing of Decisions and the Psychology of Choice", *Science*, Vol. 211, No. 4481 (Jan. 30, 1981), pp.453-458. >
- ▶ <Roth, Alvin, Vesna Prasnikar, Masahiro Okuno-Fujiwara and Shmuel Zamir (1991) "Bargaining and Market Behavior in Jerusalem, Ljubljana, Pittsburgh and Tokyo: An Experimental Study," *Amer. Econ. Rev.*, 81, 1068–1095.>