

KNOWLEDGE AND TECHNOLOGY

1. digital technology and you
2. praising the free
3. video gaming: distraction or medicine?
4. Tic-Tac-Toe
5. Artificial intelligence
6. Trolley problems
7. Gorillaz, Robots and ..
8. Existential threats
9. To limit



DIGITAL TECHNOLOGY AND YOU

Attendance question: If you run a company, would you hire a human or a robot?

DIGITAL TECHNOLOGY AND YOU

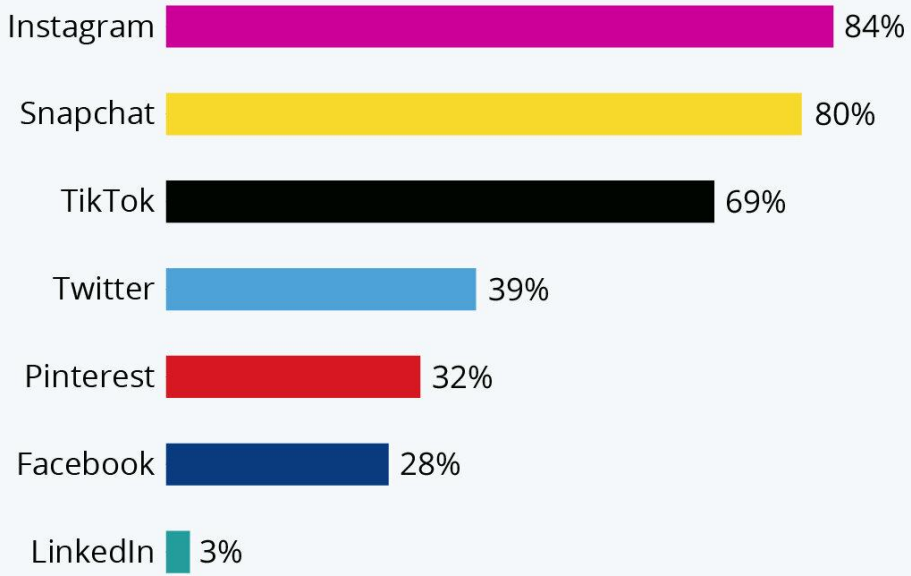
Close your laptops and phones (and your eyes) for a full, timed minute to reflect on your own relationship to your devices and various social media apps.



Can you identify all the icons? From the perspective of your own habitual usage, what's missing?

7 in 10 American Teens Use TikTok

% of U.S. teens who use the following social media platforms at least once a month



Based on a survey of 9,800 U.S. teens with an average age of 15.8 years conducted in Q3 2020

Source: Piper Sandler



statista



DIGITAL TECHNOLOGY AND YOU



Work in groups of three to peruse the findings in the Millennials and Tech at Home study by Excel + Quatrics. Appoint a scribe who will later report back to the full class.

1. Do you look at your own smartphone about 150 times a day? Echoing the study findings: if you look first thing in the morning; is it before or after you pee?
2. Be honest: after remote learning during the COVID lockdown what is your opinion of Zoom?
3. How do you listen to music? What platforms do you use to watch movies?
4. Do you listen to podcasts? Name your favorites.
5. Do you buy things online? Do you mostly purchase on Amazon? Did you find yourself doing this more often during COVID lockdown?
6. What social media apps do you use? How frequently?
7. Overall do you think the internet is making you personally smarter or dumber?
8. What's missing here? Formulate your own interesting question about digital technology use that could be used to generate whole class discussion?

Allow a full 15 minutes for group conversations. Invite the scribes to report back to the whole class and facilitate orderly discussion as points of interest emerge. Since there is so much dross and tawdriness online, mention to the scribes that they should use their discretion when reporting back.

SEVEN PROVOCATIVE INTERNET QUOTES



Quotes

Look for the person(s) who have the same quote as you



Thoughts

What do you think of your quote?

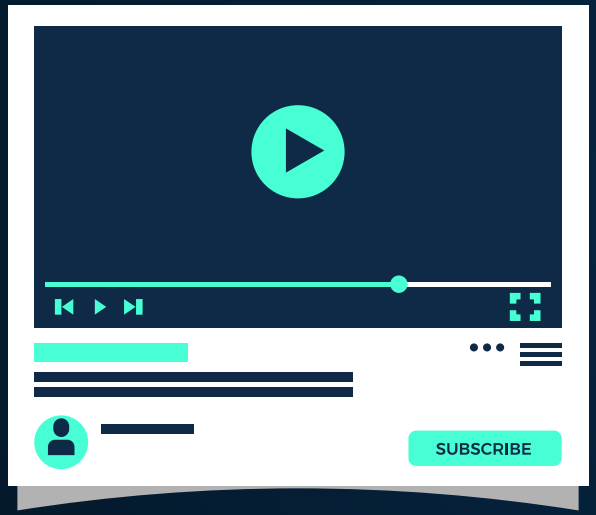


Possible extension

1. To what extent does the quote resonate with you? Explain briefly.

2. In what ways has the quote infected or prodded your opinions about the pros and cons of the internet?

THE SOCIAL DILEMMA



Read You Are the Product and answer the questions that follow it.

The origin of the phrase “you are the product” in, so-called, free media is a 1973 video installation by Carlota Fay Schoolman and Richard Serra. This example of early video art consists of a repetitive scrolling text and intentionally inane elevator music. The video and sound quality are clunky and make zero effort to entertain.

here



2

PRAISING THE FREE

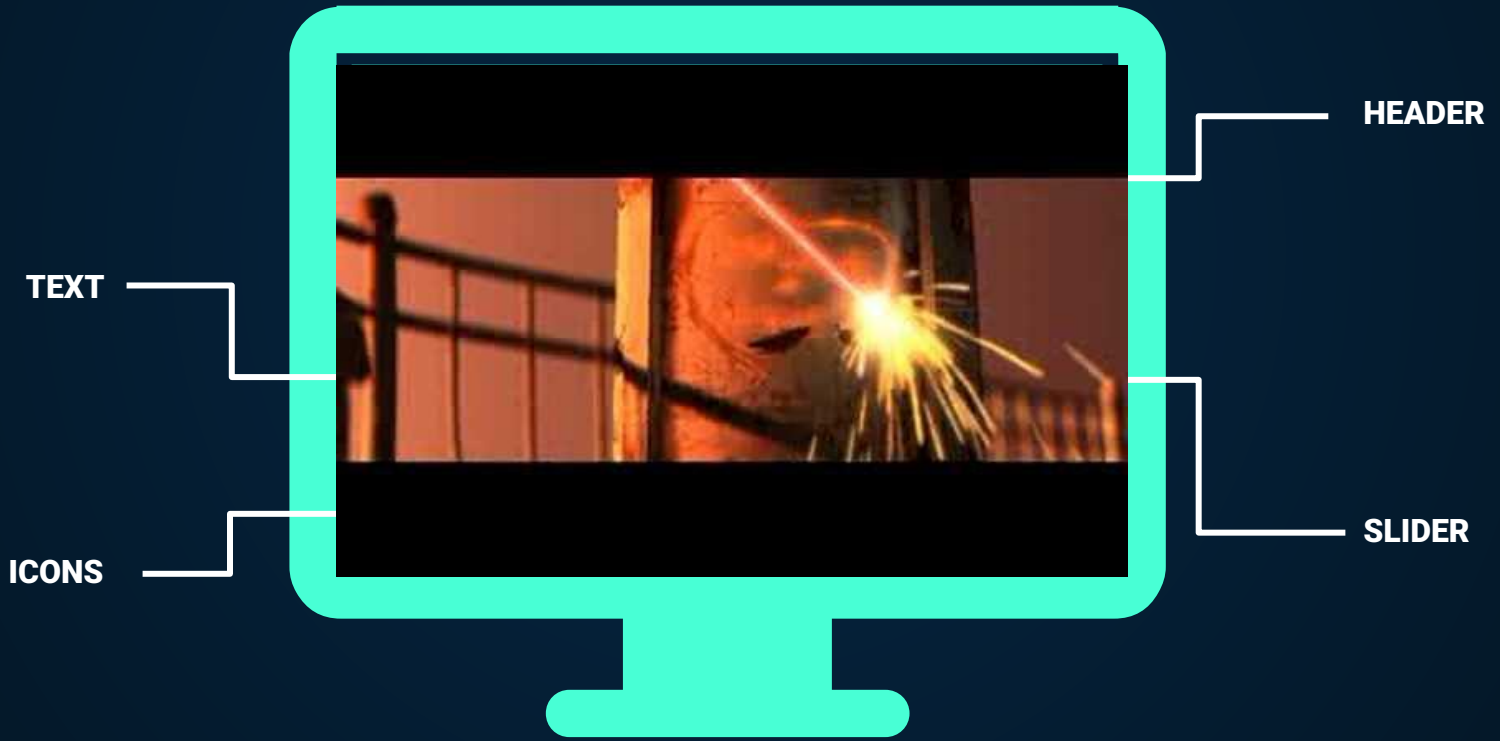
Social media and its impact

Attendance Question

Are you the product?

Gap task:
23 | How important are material tools in the production or acquisition of knowledge?

What was the name of this movie?



Answer the following questions

The name WALL ·E is an acronym
What is it short for?

01



The WALL ·E name includes a unusual centralized dot
What is the formal name for this special character?

02



In the movie
who is WALL·E's robot love interest?

03





04

What sources
did you use?



05

How did you
conduct your search?



06

Did you double check your findings
with additional sources?



07

What conclusions just emerged
about fact finding on the internet?

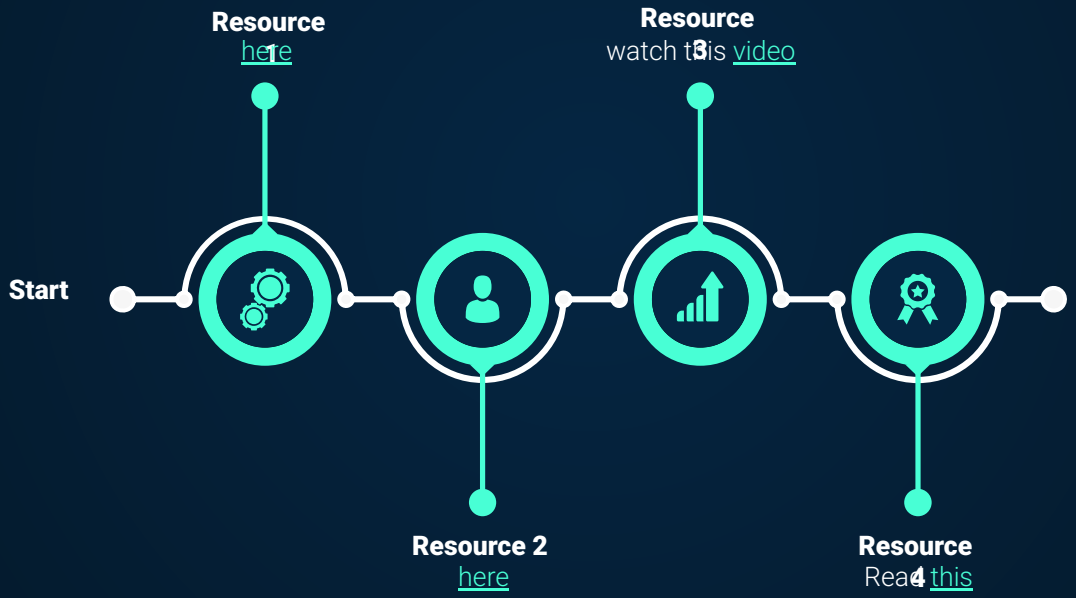
NOW

- **Wikipedia has been around the whole time you have been alive**
- **They have all used it privately and as part of their formal education**
- **To what extent is Wikipedia an acceptable source for academic research? Justify your responses.**



Jimmy Wales, the founder of Wikipedia. *Photo credit: Herman Bredehorst/Polaris/Eyevine.*

Your Resources



1. Was there anything strange or surprising here?
2. Did you learn anything new?
3. Imagine you were asked to write the official guidelines for the use of Wikipedia at your school—what would your bullet points be?

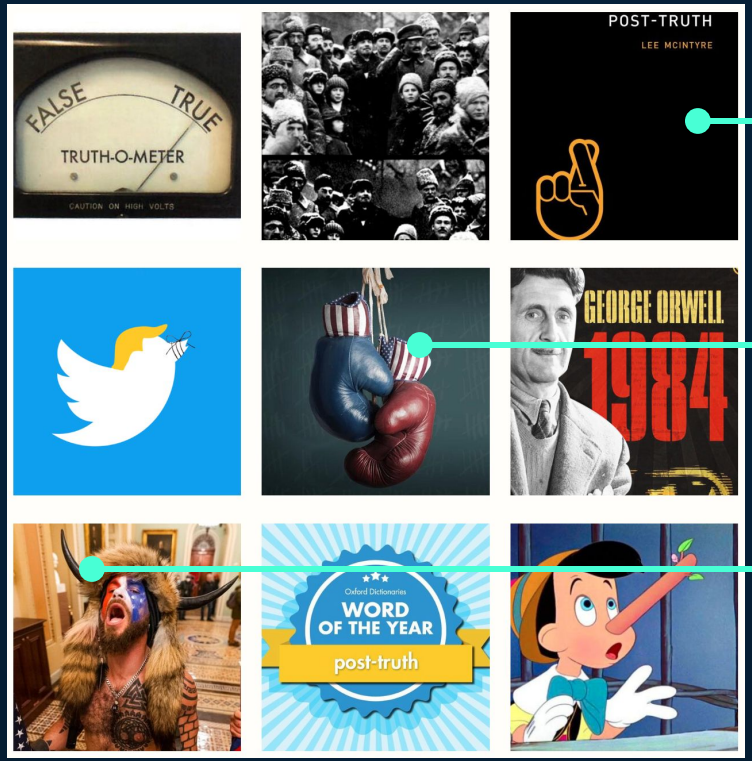
Wikipedia Rules

1. They have to have some background knowledge about the topics they are writing about
2. they have to cite
3. they have to be peer reviewed
4. make sure you’re unbiased, objective
5. no opinions or comments
6. include several resources



A protest in New York against Trump's science spending cuts.
Photograph: Erik McGregor/Barcroft Images

How is this relevant?



WILL STEPHAN TED TALK

Post Truth

Post truth, the Oxford Dictionaries word of 2016, defines a phenomenon where beliefs, formed through exposure to media or campaigns' use of cherry-picked data, seem more important than informed expert testimony. Its emergence has led it to occupy the minds of scholars, political journalists, politicians, policy makers and others who shape the world in which we live. In particular we have seen political campaigns exploit, manipulate and reinforce strongly held beliefs, distorting reality to encourage the disavowal of contrasting facts to shape attitudes and undermine support for the arguments of opponents. Such manifestations of post truth politics are a brutal reminder that we find ourselves in a time when politics, politicians and institutions are being undermined, which in turn poses a threat to the fundamental principles of democracy.



VIDEO GAMING: DISTRACTION OR MEDICINE?

Social media and its impact

Attendance Question

Does technology expand human understanding or make us intellectually passive?

Are we the product?

Gap task
23 | How important are material tools in the production or acquisition of knowledge?

EPISTEMIC HUNGER

Arrange yourselves into groups of three. Each person in the trio will read aloud to the rest of the group, one of the paragraphs from Adam Gazzaley and Larry Rosen's recent book, The Distracted Mind.

one appointed spokesperson will report back

"

"Multitasking" [is] defined as the act of attempting to engage simultaneously in two or more tasks that have independent goals. The word "attempting" is used here because… multitasking is the behavior you decide to engage in, but when it comes to what actually occurs in your brain, the term "task switching" is a better description...

Novelty is associated with reward processing in our brains. This is not surprising as novelty seeking is a powerful force to explore new environments, and this offers clear survival advantages. The novelty load is undoubtedly higher when frequently switching between new tasks than when just staying put, so it is logical that the overall reward gains, and thus the fun factor as well, are heightened when multitasking...

Humans seem to exhibit an innate drive to forage for information in much the same way that other animals are driven to forage for food, we need to consider how this 'hunger' is now fed to an extreme degree by modern technological advances that deliver highly accessible information."

— Gazzaley, Adam and Rosen, Larry D. (2016) The Distracted Mind: Ancient Brains in a High-tech World. MIT Press, Cambridge, MA.

Rewiring the Brain

GENERATIVE QUESTIONS

1. When doing homework or on social media with friends how many windows or apps do you tend to have open at once?
2. Be specific—what is your own experience with multitasking?
3. How often do you find yourself being distracted by screens because in the moment it seems more interesting than schoolwork; hanging out with friends or loved ones; or getting out to participating in sports or exercising?

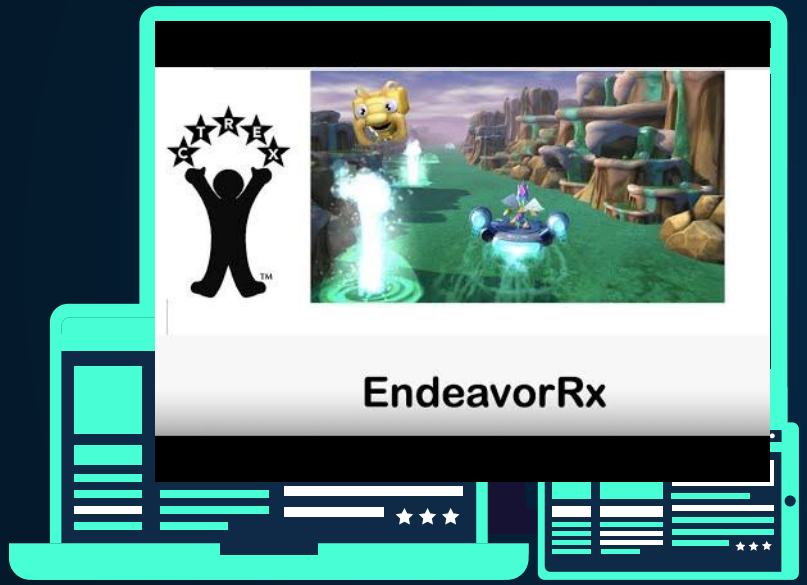
Rewiring the Brain

The consequences for learning and selfhood are enormous, and certainly include subtle changes to the wet-wiring of our brains in response to sustained interactions with digital technology.

Digital technology extends our phenotype (biological body).



EndeavorRx



Fill out the following **form**

Watch the EndeavorRX video

How would you rate the EndeavorRx video game?

EndeavorRx



Bullfight

- Is the traditional Spanish bullfight a game or a sport? If you think it something else entirely—what is it?



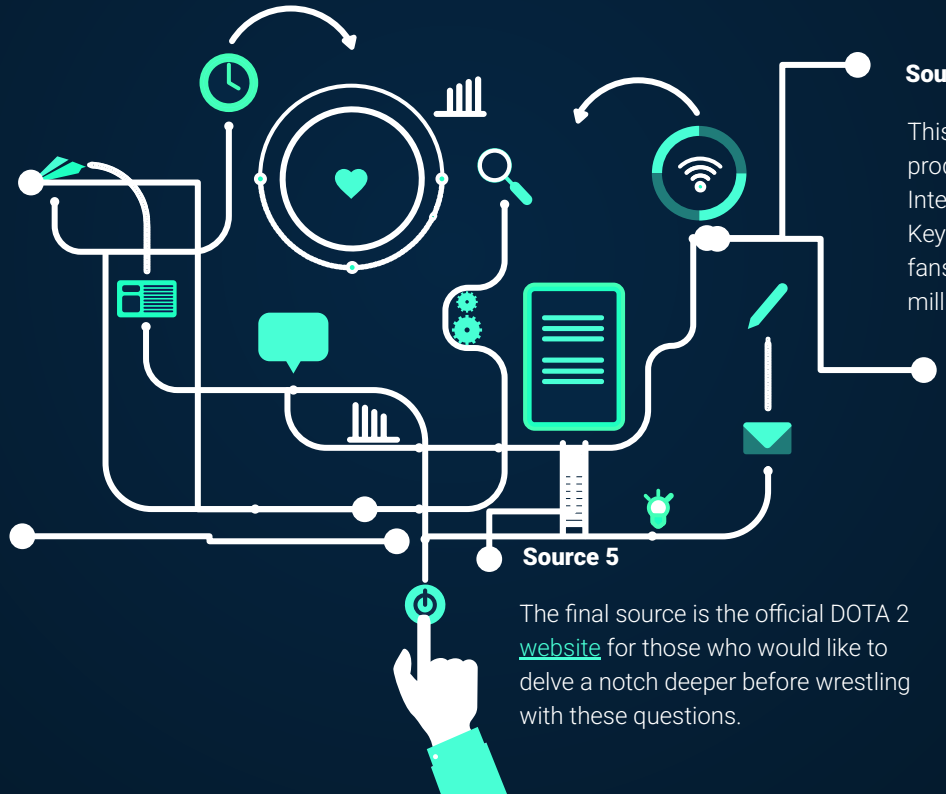
Getting into the Game

Source 1

This first video source introduces the original DOTA (Defense Of The Ancients) game, before its spectacular upgrade to DOTA 2

Source 2

This video was created in China using the Source Filmmaker (SFM) movie-making tool—that allows the user to craft movies inside a specific game engine. This video illustrates the enhanced graphics and greater sophistication of the DOTA 2 sequel.



Source 3

This photo conveys the scale and production values of the 2014 Dota 2 International championship hosted in The KeyArena in Seattle. There were 10,000 fans in attendance and almost $11 million in prize money.

Source 4

This video outlines the latest refinements to the DOTA Pro Circuit (DPC). The need for increased stratification is a response to the increased popularity of esports generally, and DOTA 2 in particular. The imagery in the video includes glimpses of fired up TI championship teams.

Source 5

The final source is the official DOTA 2 website for those who would like to delve a notch deeper before wrestling with these questions.

GENERATIVE QUESTIONS

1. So, are esports games, sports, or something else entirely?
2. Esports are currently being considered for inclusion in the Olympic Games—what is your own perspective on the validity of this proposal?
3. What are some of the fundamental differences between games like DOTA 2 and more explicitly violent games like Grand Theft Auto, Red Dead Redemption, and Call of Duty?
4. What are some of the emergent ethical concerns that come to mind as a consequence of increased global participation in video gaming and esports?
5. To what extent do the skills required for video gaming, piloting fighter jets and controlling military drones overlap?



The fighter jet era has passed… drone warfare is where the future will be.

— Elon Musk during a fireside chat with U.S. Air Force Lt. Gen. John Thompson at the Air Warfare Symposium in Orlando, Florida, February 2020.



4

TIC-TAC-TOE

Attendance question: Is AI smarter than you?

Who 's Unbeatable?

Pair Up

find a partner and get ready to play tic-tac-toe (noughts and crosses) for at least five minutes. Using pencil and paper as the did as children. When the time is up, ask if anyone is unbeaten? The next task is to formulate a succinct algorithm (rule) that, if implemented tirelessly, will ensure that a player never loses at tic-tac-toe.

In groups of four

1. In what other ways could checkmate in four moves be described?
2. To what extent is the game of chess a mathematical algorithm?
3. Is it possible to create an algorithm for chess that would ensure that a player never loses (analogous the one we just attempted for tic-tac-toe*)? Explain your response.
4. No machine could beat a chess master until IBM's Deep Blue beat Garry Kasparov under standard tournament time controls in 1997. What advantages do you think the supercomputer had over the human brain?

Yes

This gif always ends in a draw!



FROM DEEP BLUE TO ALPHAZERO

...as AI continues to improve, even jobs that demand high intelligence and creativity might gradually disappear. The world of chess serves as an example of where things might be heading.

For several years after IBM's computer Deep Blue defeated Garry Kasparov in 1997, human chess players still flourished; AI was used to train human prodigies, and teams composed of humans plus computers proved superior to computers playing alone.

Yet in recent years, computers have become so good at playing chess that their human collaborators have lost their value and might soon become entirely irrelevant. On December 6, 2017, another crucial milestone was reached when Google's AlphaZero program defeated the Stockfish 8 program.

Stockfish 8 had won a world computer chess championship in 2016. It had access to centuries of accumulated human experience in chess, as well as decades of computer experience. By contrast, AlphaZero had not been taught any chess strategies by its human creators—not even standard openings. Rather, it used the latest machine-learning principles to teach itself chess by playing against itself. Nevertheless, out of 100 games that the novice AlphaZero played against Stockfish 8, AlphaZero won 28 and tied 72—it didn't lose once…

Can you guess how long AlphaZero spent learning chess from scratch, preparing for the match against Stockfish 8, and developing its genius instincts?

Four hours.

For centuries, chess was considered one of the crowning glories of human intelligence. AlphaZero went from utter ignorance to creative mastery in four hours, without the help of any human guide.

So if chess is our canary in the coal mine, we have been duly warned that the canary is dying. What is happening today to human-AI teams in chess might happen down the road to human-AI teams in policing, medicine, banking, and many other fields.
— Yuval Noah Harari: Why Technology Favors Tyranny. The Atlantic, October 2018.

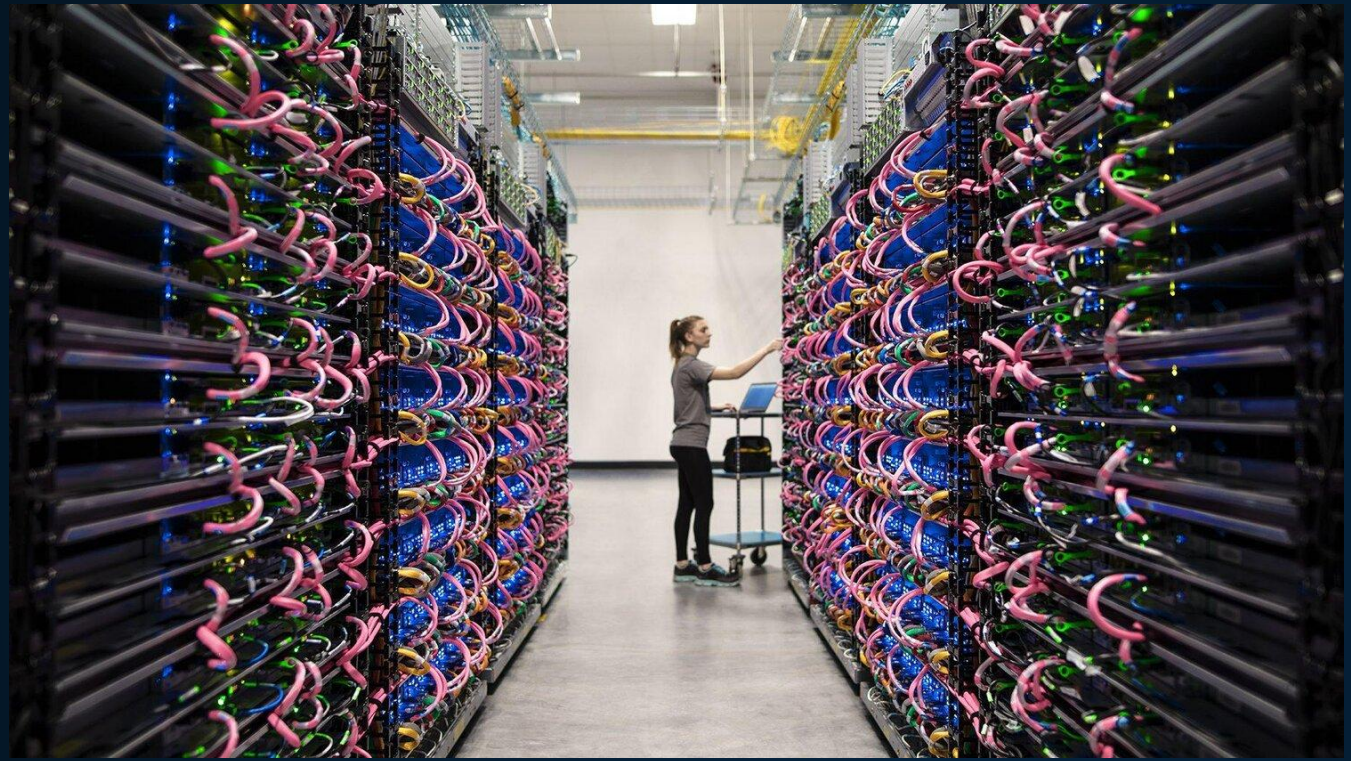


GENERATIVE QUESTIONS

1. Explain the "canary in the coal mine" metaphor.

2. What would AI policing, medicine and banking look like? To what extent is it already happening?

3. What might be some of the long term societal implications for AI replacing human workers on a large scale?





CODA: BLACK BOX BOTS

Rows of Google second generation TPUs (Tensor Processing Units) AlphaZero was trained by "self-play" using 5,000 first-generation TPUs to generate the games and 64 second-generation TPUs to train the neural networks.

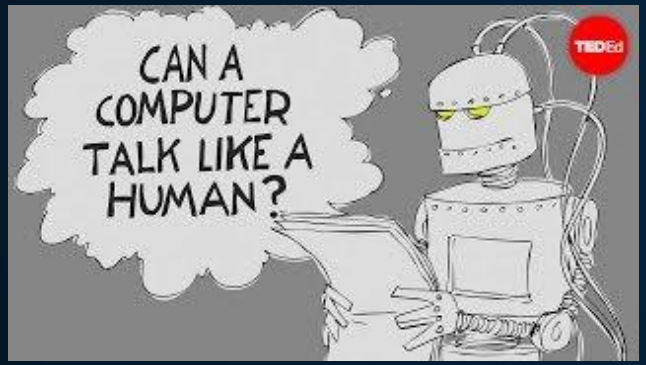


Dangerous Intelligence

Is intelligence about knowing answers or asking the right questions?

THE TURING TEST AND THE CHINESE ROOM

You may be familiar with Alan Turing via the ***The Imitation Game* (2014)** and the placement of his portrait on the Bank of England £50 note.



Next is a BBC recreation of philosopher John Searle's Chinese Room thought experiment.



Finally—meet Cassie from **Agility Robotics.**



FOUR GENERATIVE TASKS…

1. Describe the Turing Test in Tweet form (up to 280 characters—don't forget a whimsical hashtag#).

2. Complete the following task after using first using Google Translate to translate it from Samoan into English:

Fa'amatala le Potu Saina i se Tweet

3. Using only mental arithmetic calculate how many hours in a week?

4. Now use pen and paper to organize your thoughts, calculate how many picoseconds* in a leap year. Write down your answer, so you don't forget it. Next, use the electronic calculator app on your phone or laptop to determine the accuracy of your response.



SIX GENERATIVE QUESTIONS

5. To what extent does your calculator understand math?

6. To what extent does does Google Translate speak Chinese?

7. To what extent does Cassie know how to walk?

8. Closely reread the instructions for Task #4—what underlying assumptions were being made?

9. Is the Chinese Room a subset of the Turing Test?

10. Quickly research online the difference between “syntax” and “semantics.” How does this demarcation play into the Chinese Room thought experiment?



Harkness table to answer the RQ

In what sense, if any, can we assert that a machine can know something?

CAN A MACHINE KNOW?

ARTIFICIAL GENERAL INTELLIGENCE (AGI)

The most eminent neuroscientists and philosophers do not agree on the nature of consciousness. The inescapable fact that, as sentient beings, we are each in the—ultimately, incommunicable—bubble of our own subjectivity plays into the difficulty of addressing whether, or not, machines will eventually become self aware.

Whilst the thorniness of the AI consciousness issue provides intriguing perspectives on what we can and cannot know, the various speculative arguments are beyond the scope of 100 hours of TOK!

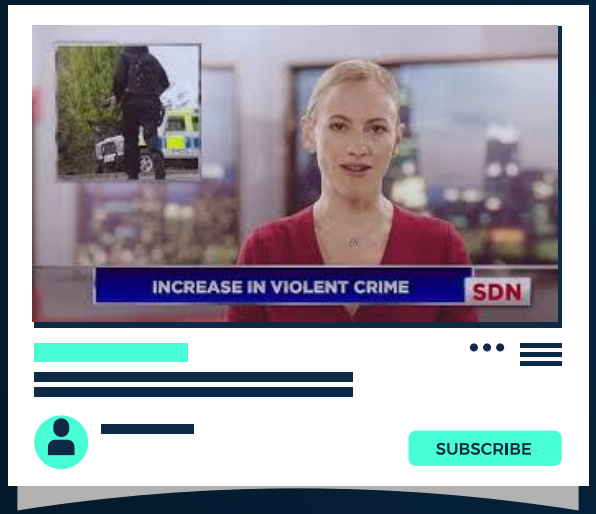
artificial general intelligence (AGI) is still hypothetical. It foretells of intelligent machines that will understand or learn any intellectual task that a human being can. The AGI concept in current usage does not require the complication of consciousness.

Weak (or narrow) AI is where where our technologies stand at the moment. Weak AI includes applications like Siri and Alexa, Google Translate, and advanced specialized programs that learn rapidly like AlphaZero.





AUTONOMOUS SWARMING SLAUGHTERBOTS— BE VERY AFRAID!



What is going on here?

2. Spend a few minutes reading some of the viewer comments posted under the YouTube video.
3. Visit the autonomousweapons.org homepage and respond to the website's generative question.

"What can be done?"
4. For decades Professor Stuart Russell has been a leading contributor in the field of AI. He appears in person at the very end of the Slaughterbots video.

Read aloud the Professor Russell's quotation on the next slide. Then, unpack the text line-by-line keeping the following generative question to the fore: According to Stuart Russell, what are some of the implications of misaligning human objectives with the objectives of superintelligent, autonomous machines?

Midas, a legendary king in ancient Greek mythology, got exactly what he asked for— namely, that everything he touched turned to gold. Too late, he discovered that this included his food, his drink, and his family members, and he died in misery and starvation. The same theme is ubiquitous in human mythology… Goethe's tale of the sorcerers apprentice, who instructs a broom to fetch water—but doesn't say how much water and doesn't know how to make the broom stop.

A technical way of saying this is that we may suffer from a failure of value alignment—we may perhaps inadvertently, imbue machines with objectives that are imperfectly aligned with our own. Until recently we were shielded from the potentially catastrophic consequences by the limited capabilities machines and the limited scope that they have to affect the world.

— Russell, Stuart (2019: 137) Human Compatible: Artificial Intelligence and the Problem of Control. Penguin Random House. New York.

Fantasía

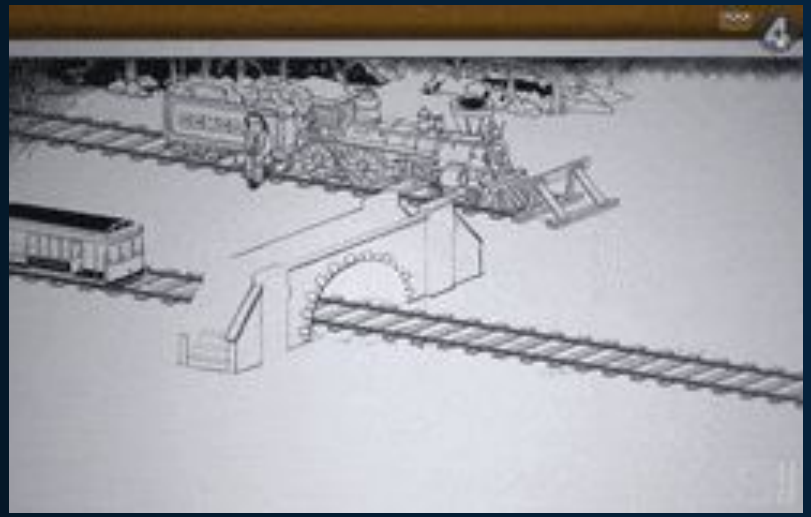


Trolley Problems

Is there ever a right choice in a moral dilemma?

CLASSIC TROLLEY PROBLEMS

[Absurd Trolley Problems]

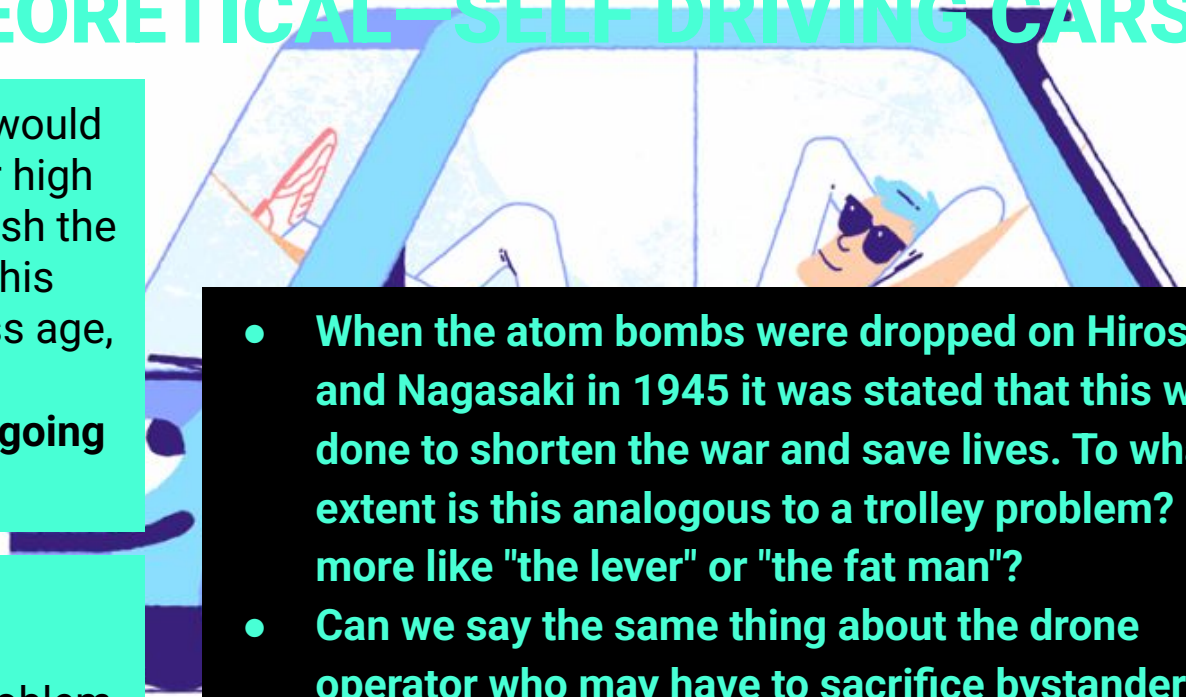




BEYOND THEORETICAL – SELF DRIVING CARS

So, around 90% of folks would pull the lever; and similar high percentage would n*ot* push the fat man onto the track. This seems to hold true across age, gender and cultural background. **So, what is going on?**

Do you find the trolley problems unrealistic? Versions of the trolley problem presumably will have to programed in self-driving cars.



- **When the atom bombs were dropped on Hiroshima and Nagasaki in 1945 it was stated that this was done to shorten the war and save lives. To what extent is this analogous to a trolley problem? Is it more like "the lever" or "the fat man"?**
- **Can we say the same thing about the drone operator who may have to sacrifice bystanders in a market place in order to kill a suspected suicide bomber.**

BEYOND THEORY

This time you are to imagine yourself to be a surgeon, a truly great surgeon. Among other things you do, you transplant organs, and you are such a great surgeon that the organs you transplant always take. At the moment you have five patients who need organs. Two need one lung each, two need a kidney each, and the fifth needs a heart. If they do not get those organs today, they will all die; if you find organs for them today, you can transplant the organs and they will all live. But where to find the lungs, the kidneys, and the heart? The time is almost up when a report is brought to you that a young man who has just come into your clinic for his yearly check-up has exactly the right blood-type, and is in excellent health. Lo, you have a possible donor. All you need do is cut him up and distribute his parts among the five who need them. You ask, but he says, "Sorry. I deeply sympathize, but no."

Would it be morally permissible for you to operate anyway? Everybody to whom I have put this second hypothetical case says, No, it would not be morally permissible for you to proceed.

Judith Jarvis Thomson: ***The Trolley Problem***. The Yale Law Journal, **94**: 6 pp. 1395-1415. May, 1985.



7

GORILLAS, ROBOTS AND ..

Is intelligence limited to humans?

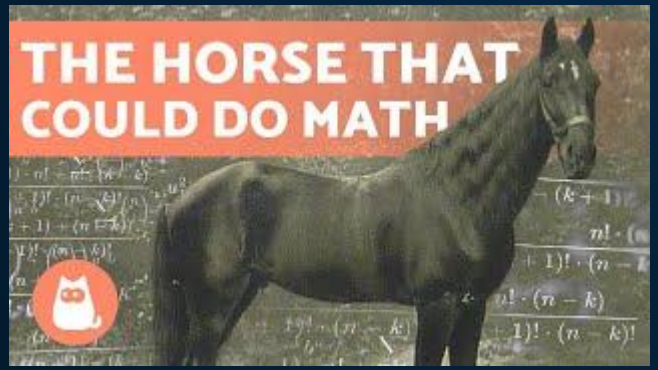
She laughs at her own jokes and those of others. She cries when hurt or left alone, screams when frightened or angered. She talks about her feelings, using words like ‘happy’, ‘sad’, ‘afraid’, ‘enjoy’, ‘eager’, ‘frustrate’, ‘mad’ and, quite frequently, ‘love’. She grieves for those she has lost—a favourite cat who has died, a friend who has gone away. She can talk about what happens when one dies, but she becomes fidgety and uncomfortable when asked to discuss her own death or the death of her companions. She displays a wonderful gentleness with kittens and other small animals. She has even expressed empathy for others seen only in pictures.
— From The Case for the Personhood of Gorillas by Francine Patterson & Wendy Gordon. In Paola Cavalieri & Peter Singer (eds.), The Great Ape Project, New York: St. Martin's Griffin, 1993.



Take 10 minutes to explore online **Project Koko at the Gorilla Foundation.**

THE “CLEVER HANS” EFFECT

Clever Hans was a German horse that amazed European crowds by apparently stamping out the answers to math problems. Subsequent scientific trials proved that Hans was reacting to the subconscious body cues of his trainer and audience members rather than actually counting. Recognition of the “Clever Hans effect” led to “double blind” testing in psychology experiments.



To what extent is Koko the gorilla’s sign language success free of the “Clever Hans effect”?

GENERATIVE QUESTIONS

1. What defines personhood?
2. Are human infants persons?
3. Are very severely mentally impaired people persons?
4. Was Koko a person?
5. Is an intelligent alien life form a distant planet a person?
6. Is your pet dog a person?
7. Are the enemy in a bloody foreign war persons?
8. Is a fetus in the third trimester a person?
9. Is an older person suffering from severe senile dementia—who previously had been living a productive and fulfilling life—a person?
10. Are there general rules or principles that can guide our thinking about moral status and individual rights?



In the future, self-aware machines may be developed. Can we imagine making the case for personhood for a sentient silicon-based machine?







8

EXISTENTIAL THREATS

human extinction



The sun is slowly expanding and brightening, and over the next few billion years it will eventually desiccate Earth, leaving it hot, brown and uninhabitable. About 7.6 billion years from now, the sun will reach its maximum size as a red giant: its surface will extend beyond Earth's orbit today by 20 percent and will shine 3,000 times brighter. In its final stage, the sun will collapse into a white dwarf.
David Appel in Scientific American September 1, 2008.
Image credit: NASA and Goddard

Existential risks threaten human extinction or the permanent collapse of civilization.

THREATS

All eight

Climate change catastrophe
Asteroid impact
Nuclear destruction
Global pandemic
AI singularity
Alien encounter
Our sun morphs into a red giant
What else?

1. Designate the three groups. Establish a volunteer facilitator for each group and hand them a set of strips. The facilitator hands out a strip to each group member randomly. Allow 8 timed minutes for each student to very briefly tell the group what is printed on their strip and to add some personal editorial. For example, a student with the asteroid strip could provide a one sentence mention of the dinosaur extinction 65 million years ago!

2. One strip says “What else?” This is an opportunity for a student to add an existential risk not on the original list.
3.

3. Next the group should collectively arrange the strips in order of the seriousness of existential threat; with the most serious first. The only rule for this part of the activity is that consensus must be reached. It is likely that students will debate amongst themselves more precise criteria for their list. The vagueness of the term “seriousness” was a deliberate choice for the activity.

4. Finally the facilitator finalizes the order of the strips and fixes them to the desk with a strip of clear tape. The whole class is then invited to amble around the three exhibition desks to take in the results of the other groups; before settling back to brief class discussion?

Existential Risk Gallery

Include images that represent risks to you on a slide here.
Then read this article. Where do you categorise your existential risks?



For thousands of years we have known the perils of getting exactly what you wish for. In every story where someone is granted three wishes, the third wish is always to undo the first two wishes.

What is existential risk?

“Existentialism” (think: Sartre, de Beauvoir and Camus) arose partially from the horrors of WWII.

To what extent do you find yourself thinking about existential ris
your everyday life?

How does existential risk play into you thinking about science a
technology?

Overall do you feel optimism or pessimism about our collective ability to navigate existential risk?

Can we overcome the “tragedy of the commons”?

As a young adult you have not perpetrated existential risk but your generation will be implicated in attempting to reduce them. Discuss?



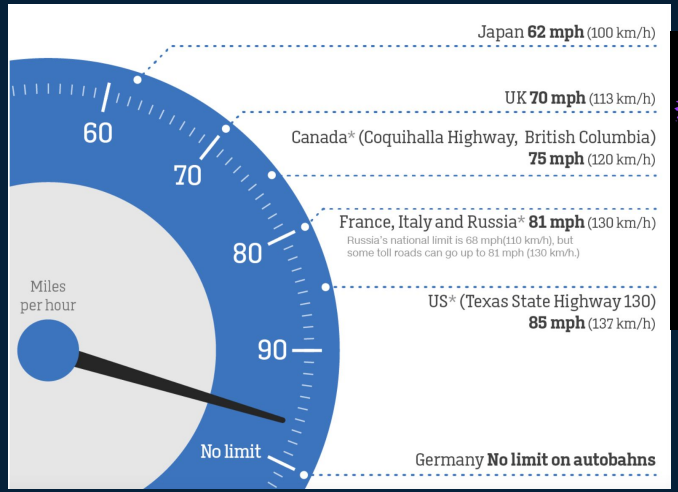


TO LIMIT

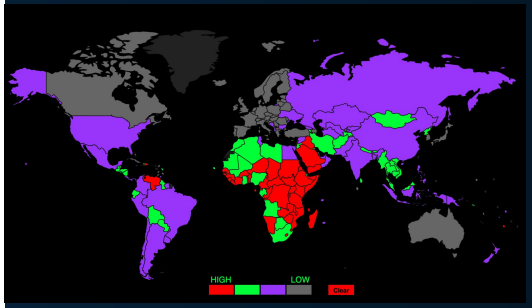
or not to limit

Germany's Autobahn





article



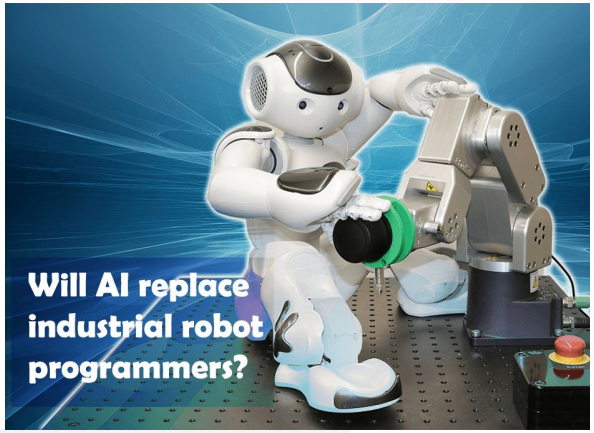
Interactive map

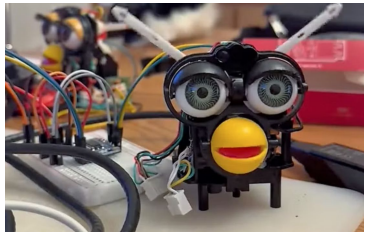
Does this make sense?

What conclusions can you draw from this presentation?

How is our knowledge limited?







Furby

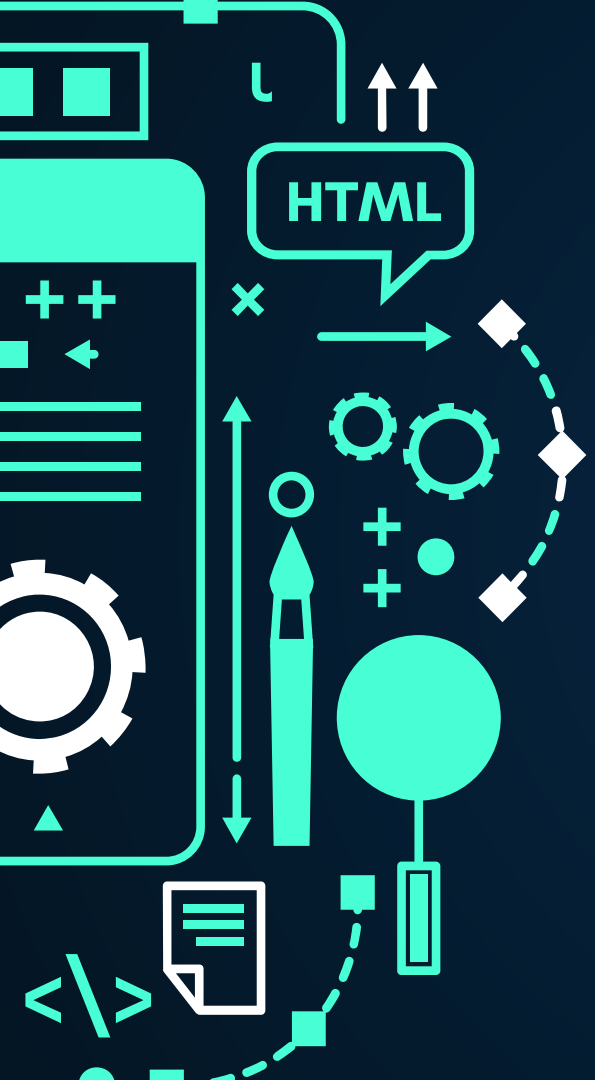




Should AI be banned?

Debate rubric here.

- I will randomly pick half the class to be with and the other half to be against. The group in favour will go first.
- `With your group, decide on a speaker or two. You will be given 5 minutes to prepare your points of debate.
- Each group will be given 2 minutes to talk then a minute to prepare for the next time you talk.
- Each group will go 3 times.
- At the end of the debate, write an answer ini your journal with both sides taken into consideration and then your own synthesis and conclusion.



THANKS!

Does anyone have any question?

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