# Human-Machine Teaming AI

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Kasparov's Law

The future of successful AI instead lies in the ability to design for human-machine collaboration. It was concluded by chess grandmaster Gary Kasparov (several years after having been beaten by IBM's Deep Blue chess computer) that the best performing chess player is a combination of human, machine and method (or process). The interesting thing is that in free-style chess competitions (where any arrangement of humans and computers are allowed) winners are often a team of human players that use the input from several computers. Amateur human teams use their strategic guidance combined with the computation power to consistently beat single human chess grandmasters and chess computers. **This is known as [Kasparov's Law](#) and it states that "Weak human + machine + better process" is superior to "Strong human + machine + inferior process".**

> "Process" here can refer to many things, but primarily, think about designing a collaboration between human and machine where the human is responsible for tasks that he does best, and the machine is responsible for tasks that it does best.
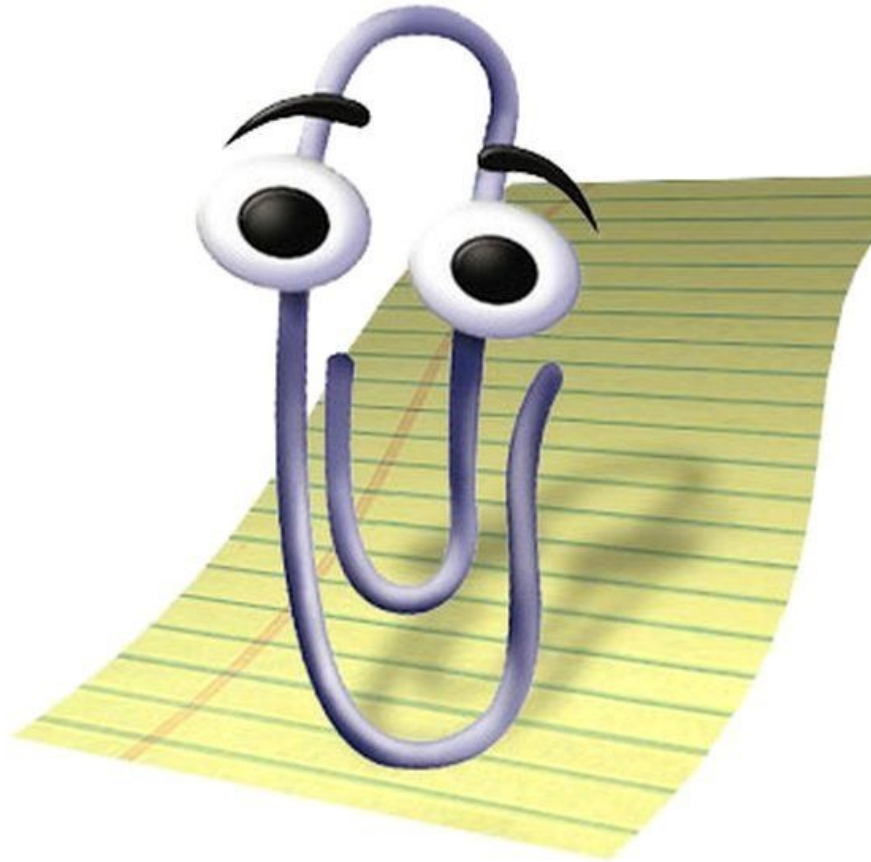
From "Why Human-Centered Design is Critical to AI-Driven Services" by Pontus Wärnestål, https://medium.com/swlh/why-human-centered-design-is-critical-to-ai-driven-services-e242a8067af
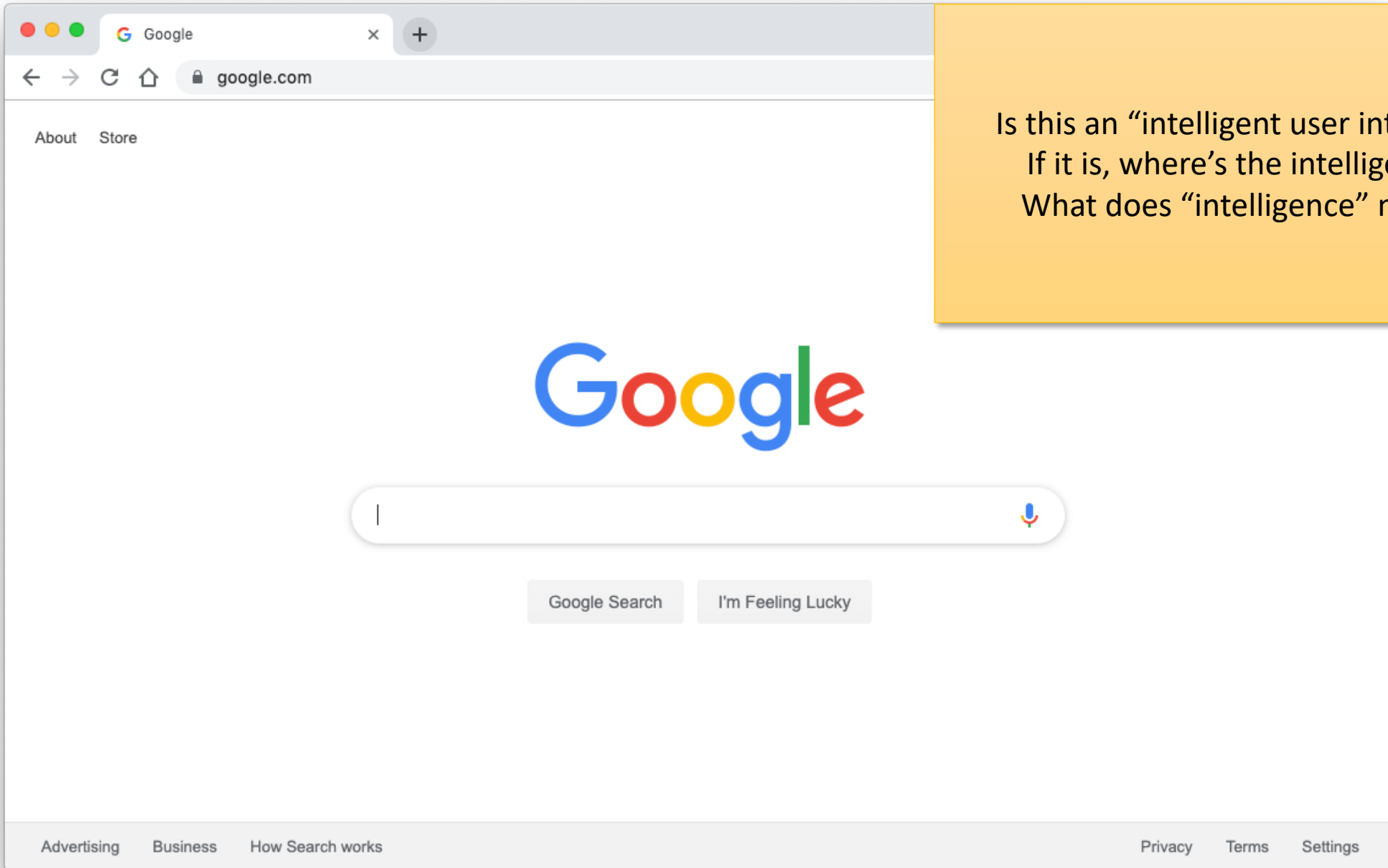
Is this an "intelligent user interface?
If it is, where's the intelligence?
What does "intelligence" mean?

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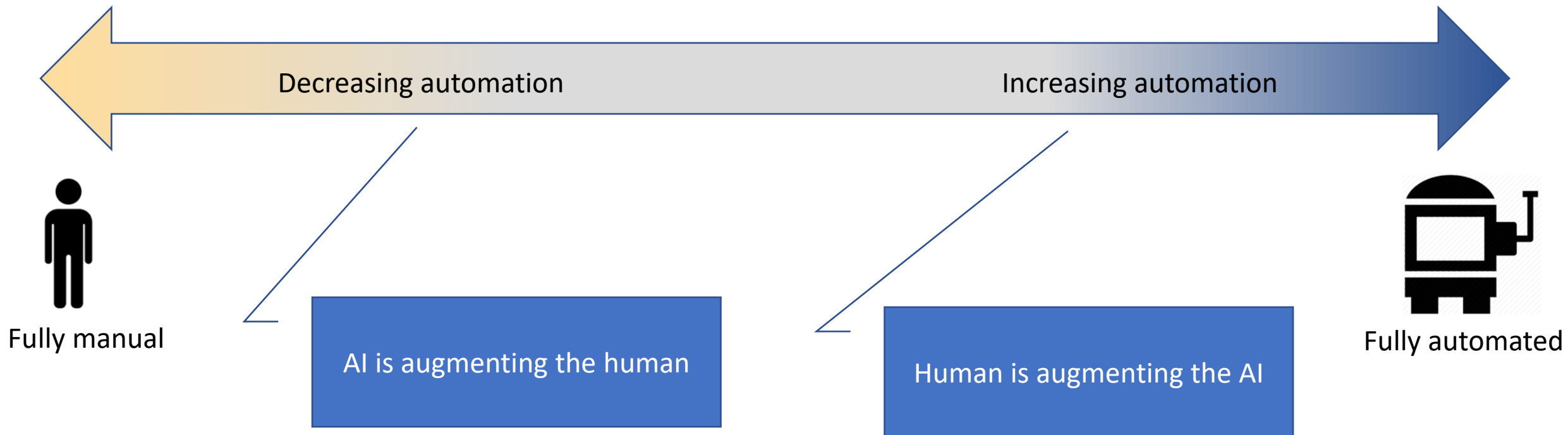
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Computing's Symbiotic Continuum

Decreasing automation

Increasing automation

Fully manual

Fully automated

AI is augmenting the human

Human is augmenting the AI

Human-Machine Teaming (UI + AI)

- Most of what we do is neither manual nor fully automated…it's somewhere in between

- Human-Machine teaming is finding the balance between what the human operator(s) has to do (or does better than a machine is currently capable) and what the machine can do better than the human …

- that maximizes the efficiency and capabilities of the overall system

The challenge is finding the right balance
The user should do what a human <u>has</u> to do
The computer should do the rest

Decreasing automation   Increasing automation

Fully manual   Fully automated

Do what you do best …

Computers …

- Calculate
- Compare
- Apply logic
- Don't mind doing something billions of times in a row
- Deal with very large data sets
- Require certainty, determinism (no context)
- Ask yourself… Is it computable?

Humans …

- Decide things
- Make judgements
- Empathize
- Have preferences (esthetics)
- Tire easily
- Get bored
- Can function in ambiguous situations (context)

Freestyle Chess (Cyborg Chess)

- Each human player uses a computer to assist during play

- Kasparov lost to Deep Blue in 1997.

- Anti-computer tactics develop…

- In 2005, two amateurs using three PCs, won a grandmaster-level tournament.

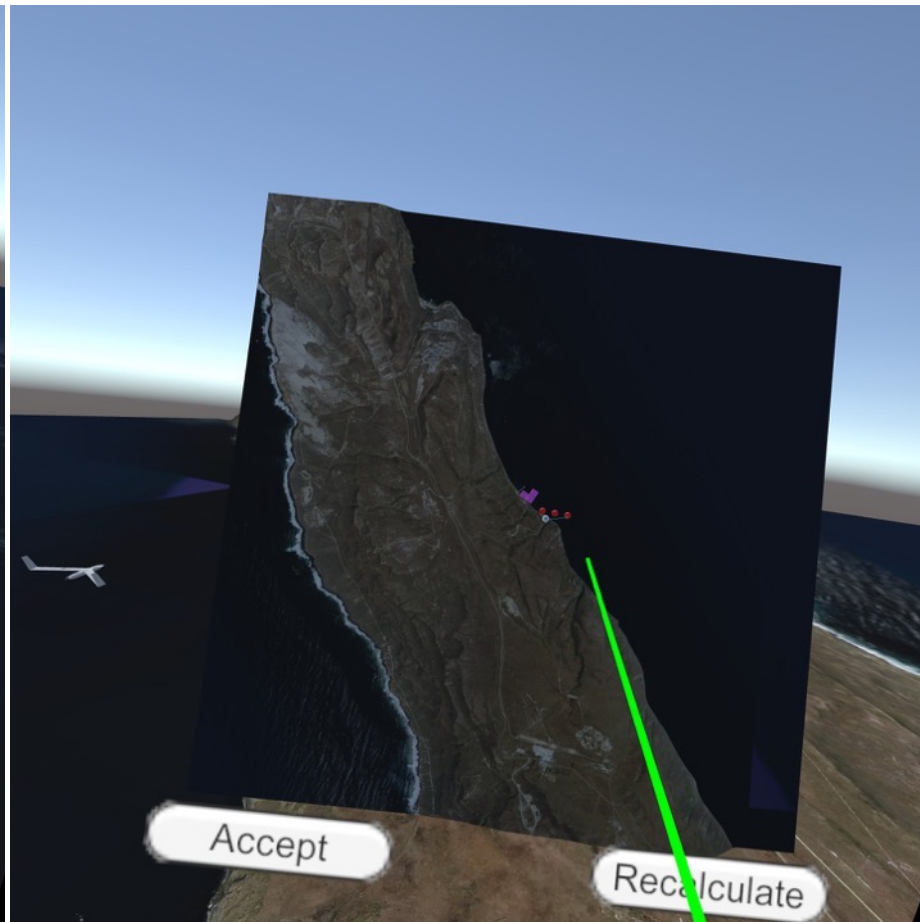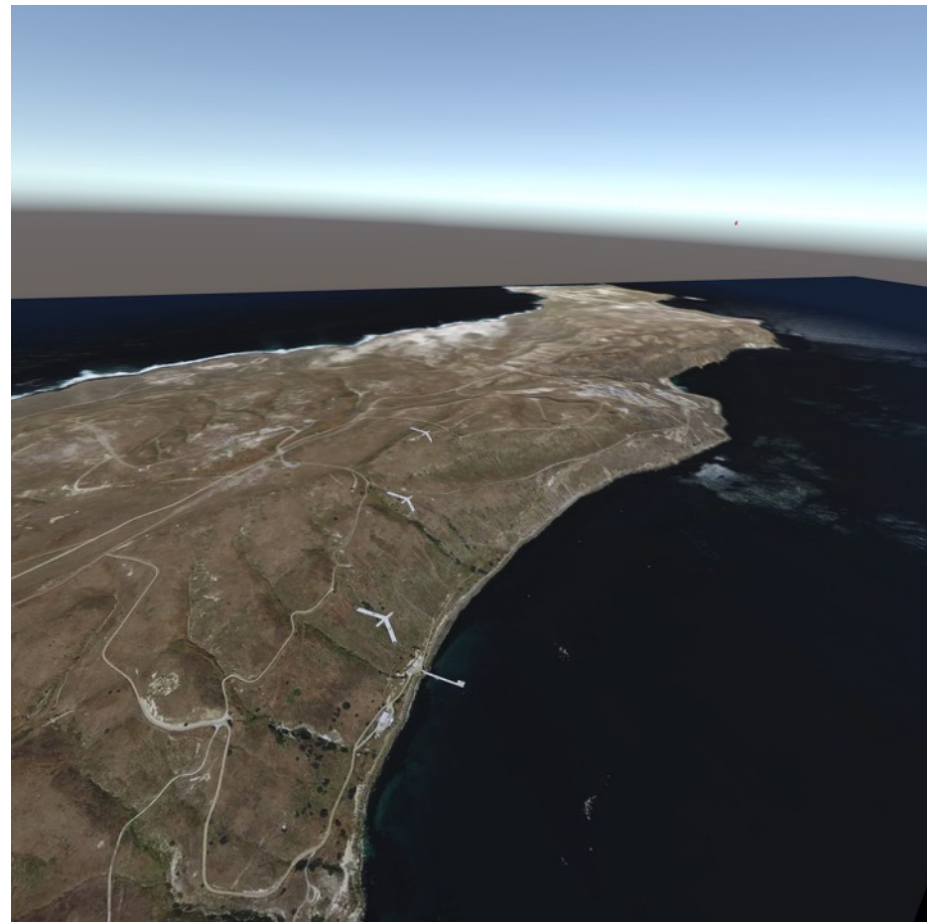# A Process for Designing Intelligent UIs

- Needs analysis
  - What is the purpose of the system being designed?
- Task analysis
  - Decompose into finite steps
- Functional analysis
  - Determine which parts have to be performed by the user, the rest should go to the computer
- Design (* we'll explore design principles for intelligent systems next…)
- Prototype
- User test
- Repeat until it works

Some principles of UI (UX) design in intelligent systems

1. Make clear what the system is capable of doing (i.e. what the user doesn't have to do)

2. Interrupt the user intelligently
   - The system knows what the user is doing, doesn't it?

3. Efficient invocation, correction and dismissal

4. Remember recent interactions, string into a dialog if possible

5. Learn from user behavior (adapt)

https://uxdesign.cc/guidelines-for-infusing-artificial-intelligence-to-products-bbbcf7b928f7

Accept   Recalculate

Maj Ryan Keller

Robot State: Waiting

What I hope you remember…

- Most "systems" include some combination of AI and UI where the human user does some things and the machine does the rest.

- To maximize the efficiency and capability of intelligent systems, you need to figure out what tasks have to be done and then assign each task to the best performer (human or computer)

- There is an interactive software design process that will help you answer these questions and make good design decisions that will lead to improved "system" performance and usability.
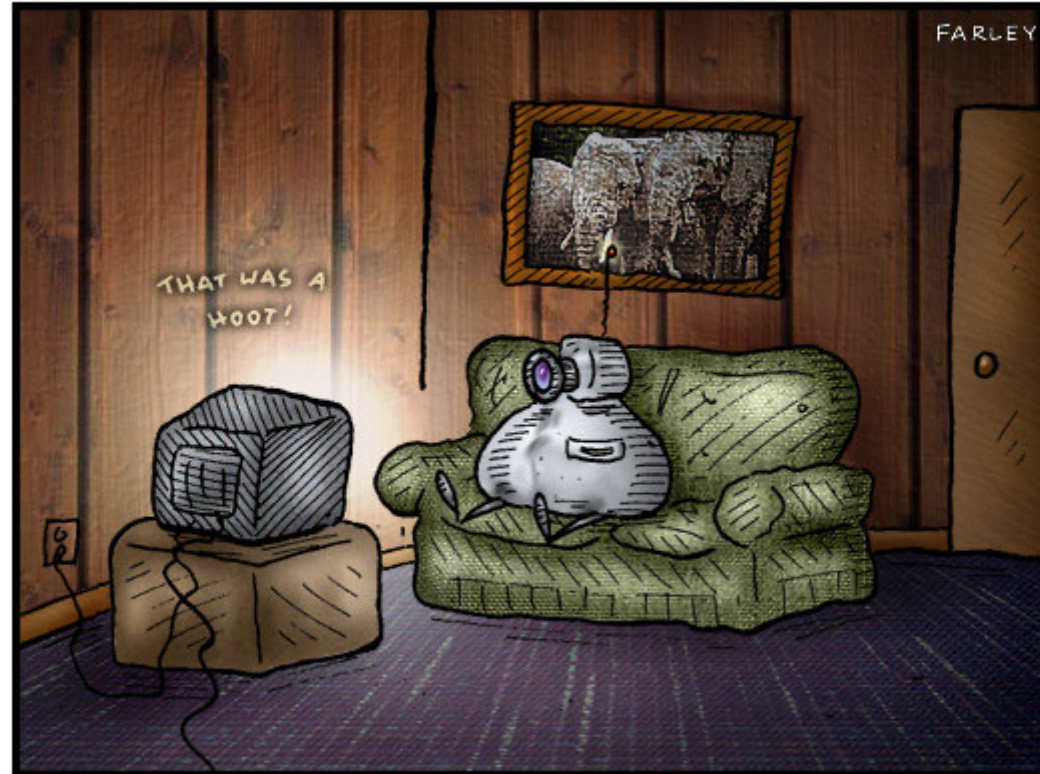
Questions?

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