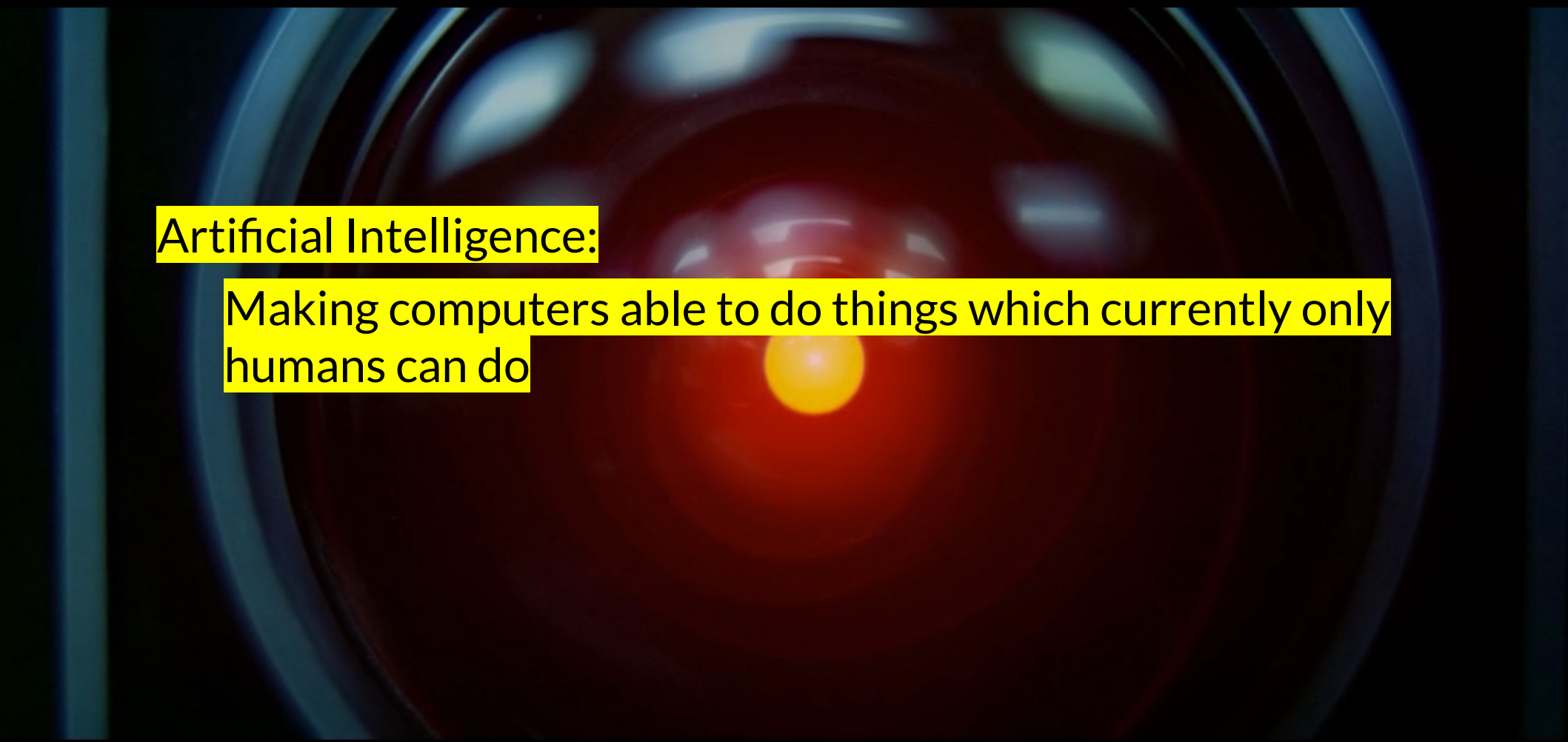
Games AI

Lecture 1.1

What is games AI?

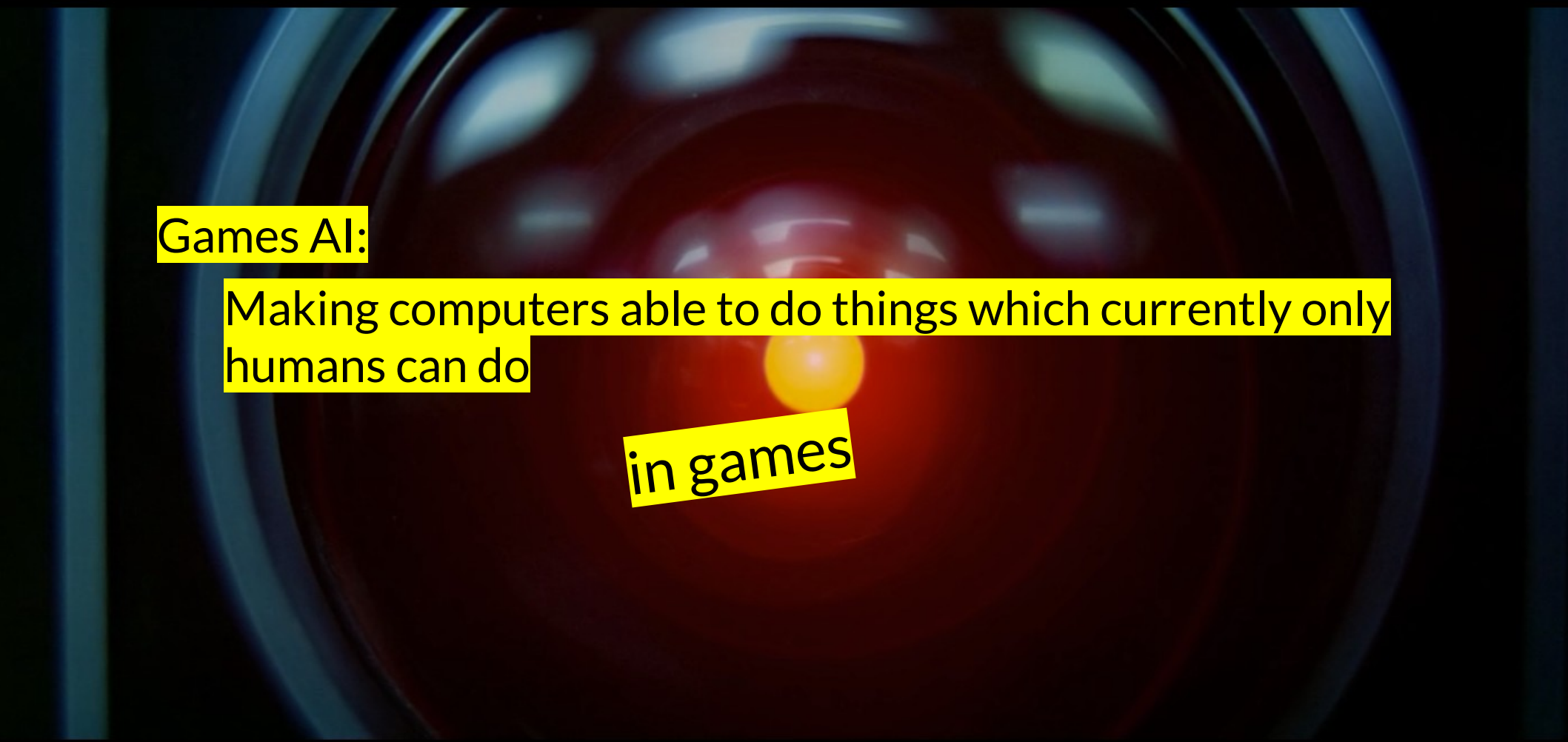
- We want to make good games AI
  - What is games AI?
  - What makes it “good”?

- What is good game AI?
  - go to YouTube
  - show us an example of good game AI
  - what makes it good?
  - what makes it AI?



Artificial Intelligence:

Making computers able to do things which currently only humans can do



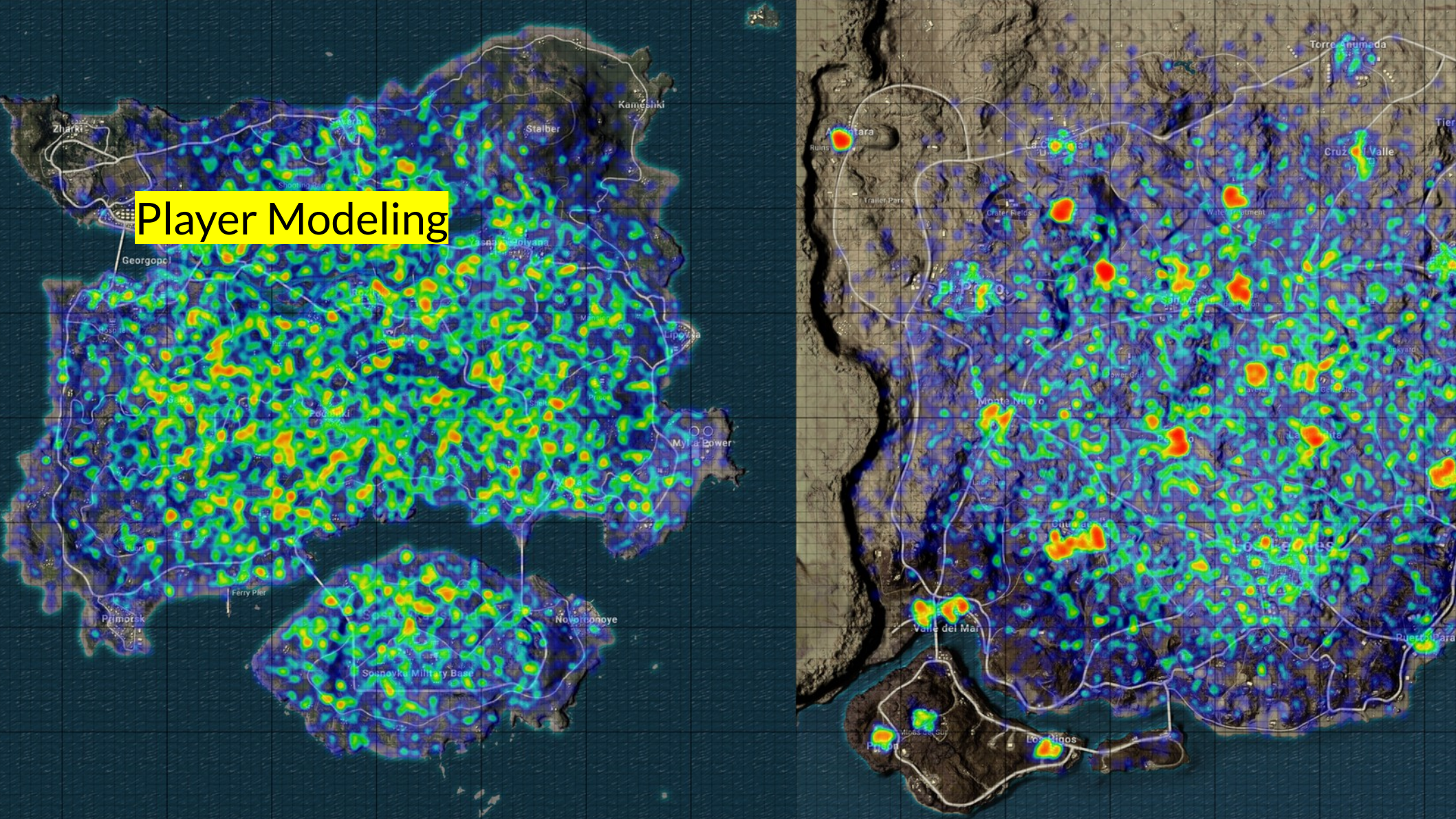
Games AI:

Making computers able to do things which currently only humans can do

in games

- Games AI:
  - Content Creation
  - Player Modeling
  - Game Playing


Content Creation


Player Modeling
Zharki
Stalber
Georgopol
Primorsk
Ferry Pier
Novorepnoye
Sosnovka Military Base
Torre Alumada
Cruz del Valle
Monte Nuevo
Valle del Mar
Los Pinos


Game Playing

- AI **for** games
- AI **in** games

AI for Games

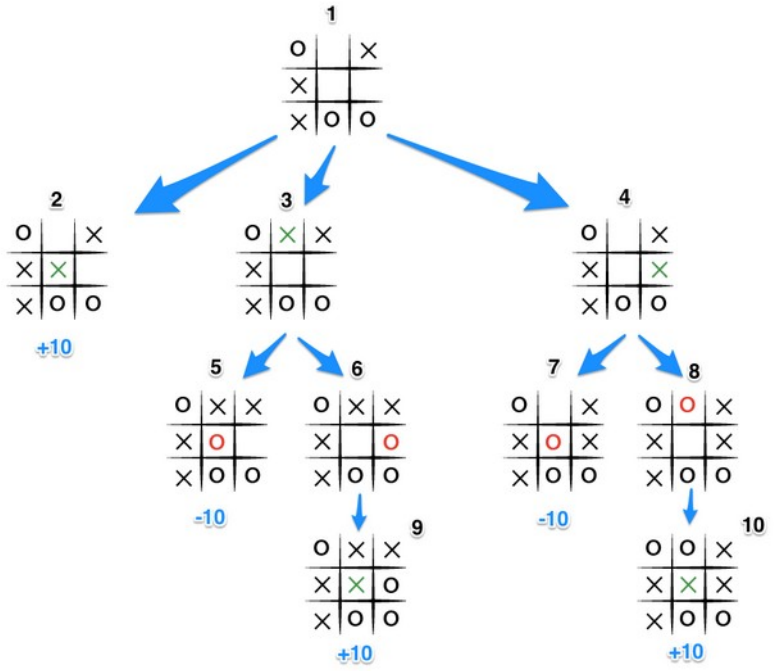
- Deep Blue beats Garry Kasperov 1997
  - Minimax algorithm with modifications
  - Highly tuned evaluation function
  - Custom supercomputer

- AlphaGo beats Lee Sedol 2016
  - Deep convolutional neural networks and MCTS
- OpenAI playing Dota2 at a professional level
  - Deep reinforcement learning


GAME STATS
20
36:37
23
Specators: 1
Directed Camera
No Broadcaster
Fog: Both Teams
Spectator Chat
Tsunderella
Death Travel Faster Than Sounds
HA HA!
+48
+48
PUDGE
852 / 2601
+15.2
714 / 715
+3.3
159+190
76+53
38+7
38+17
5
385
140
170
1536
SHOP
Shift-click shop items to set Quick Buy
K / D / A
10 / 4 / 8
LH / D
88 / 13
17
1279/1800

- Why do AIs play games?
  - To provide opponents
  - Because they are challenging tests
  - Prestige
  - Automatic testing and game balancing
    - e.g. for QA and content creation

- How do AIs play games?
  - Planning
  - Reinforcement Learning
  - Supervised Learning
  - ...cheating!



- So what *is* AI?

- Representing knowledge
- Assigning utility
  - Good actions
  - Good states

- Representing knowledge
  - Variables
  - Data
  - NPC “state”
  - Game “state”
  - Symbolic representation of the world

- Assigning Utility
  - What is a good action?
  - What is a good state?
    - Optimal chance of winning
    - Most informative


AI in Games
TALK
ジョニー
話す/見る/触れる/など
携帯をチェック
酒を飲む
席をたつ
START MENU

- Brainstorm:
  - What sorts of AI are there in games?
  - What roles does it take?
  - What makes it good/bad?
  - Get examples on the web/YouTube

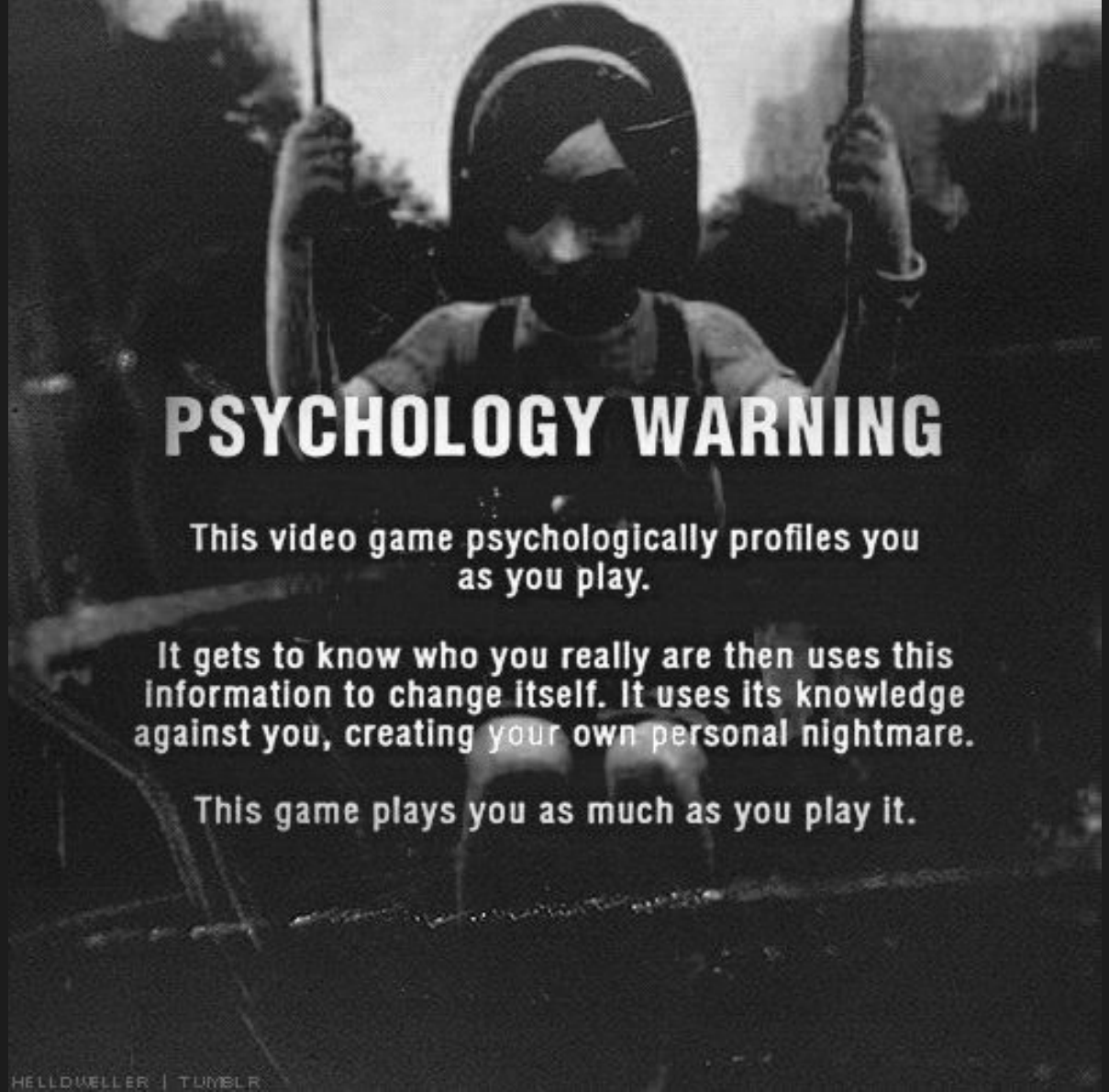
“Game AI should be about one thing and one thing only: enabling the developers to create a compelling experience for the player” (Kevin Dill 2014).

- Roles of AI in games
  - **Opponent**: providing challenge
  - **Character**: part of atmosphere or story
  - **Advisor**: assisting the player
  - **Trainee**: being taught by the player
  - **Director**: controlling the action
  - **Analyst**: interpreting the gameplay
  - **Designer**: creating the game
  - **Cameraman**: controlling what is on screen

- How do AIs work in games?
  - Rule-based approaches
    - Finite State Machines
    - Behaviour Trees
    - Utility-based AI
  - Planning
    - Tree search, e.g. A*
    - Symbolic planners, e.g. GOAP
  - Machine learning
    - Evolutionary algorithms
    - Supervised learning

- How do AIs work in games?
  - Showmanship

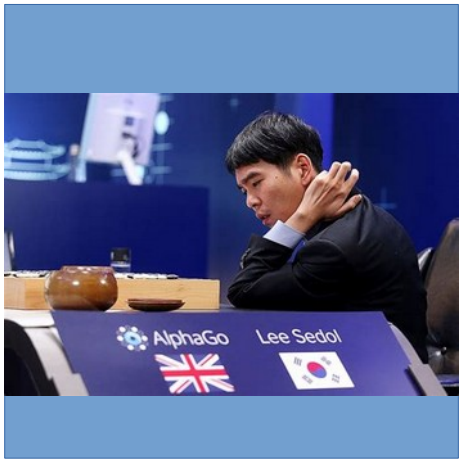
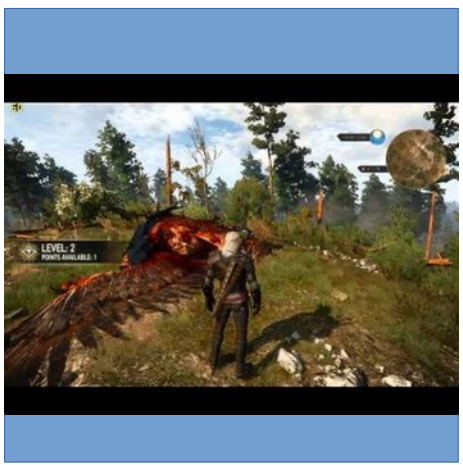

0.84
ATT
SUS
DEC
6
8
REVOLVER


PSYCHOLOGY WARNING
This video game psychologically profiles you as you play.
It gets to know who you really are then uses this information to change itself. It uses its knowledge against you, creating your own personal nightmare.
This game plays you as much as you play it.
HELLDWELLER | TUMBLR

- Challenges
  - Authorial control
  - Performance overhead
  - Development time
  - Required architecture
  - Game design constraints/opportunities

- Summary
  - AI can do a bunch of things

Summary

	AI Player	AI NPC
Play to win		
Create an experience		

- We’re going to be focusing on NPC AI to support the player experience
  - i.e. how most games AI is used in industry
  - “Cheating” is encouraged
  - We’ll discuss whole-game playing AI later in the course, mostly in the context of its uses for testing and content creation

- Recommended Texts
  - Steve Rabin (ed), *Game AI Pro* series (free!) www.gameaipro.com
  - *Steve Rabin (ed), AI Game Programming Wisdom* series.
  - Russell & Norvig, *Artificial Intelligence: A Modern Approach*, 3rd ed., 2010.

- Coming up:
  - **Finite State Machines**
  - What kind of game do you want to make?