GDC | March 21-25, 2022
San Francisco, CA

Choose Your Own Misadventure: The Future of AI for Game Design

Florence Smith Nicholls
Younès Rabii

Knives & Paintbrushes

#GDC22

Hello!

- We're members of *Knives & Paintbrushes*, an AI research collective.
- We're both Game AI PhD students.
- We want to use AI to change how people design games, and the kinds of games it's possible to design.

Florence Smith Nicholls
@florencesn

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@pyrofoux

Game AI Research

- Before “artificial intelligence” was coined, Alan Turing created a chess computer program in the late 1940s.
- Games as a test-bed for AI agents.
- Since the early 2000s, Game AI research has grown into its own subfield, covering more topics such as automated game design.

The Mechanical Turk, 1783

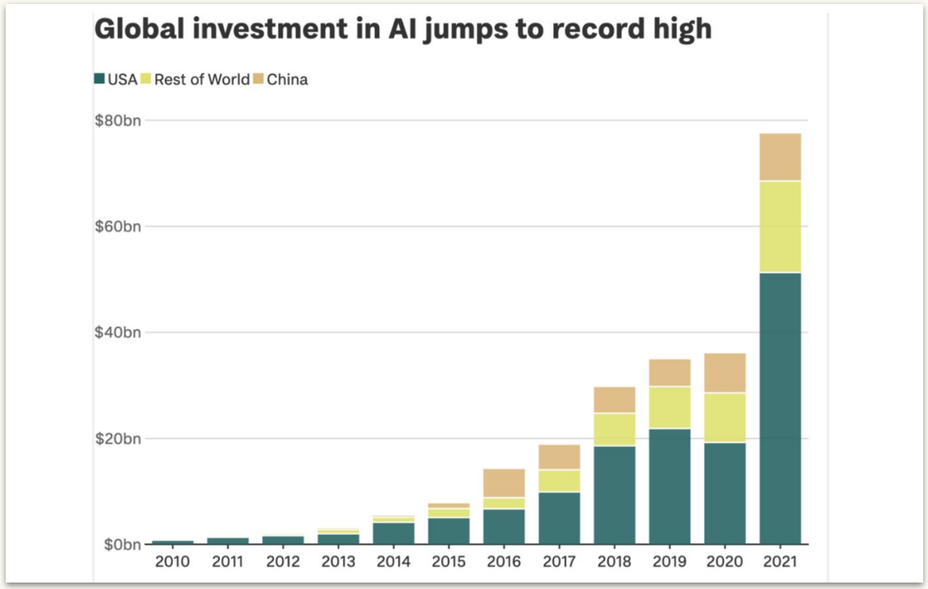
Façade (Stern/Mateas)

Infinite Mario AI (Baumgarten)

The AI Boom

- Since the early 2010s, AI research has experienced a massive boom, fuelled by big labs like OpenAI and DeepMind
- The AI boom has moved fast and broken things - in games, and everywhere else.
- Many private AI labs are now backing away from games research, leaving us to pick up the pieces.

Tortoise Global AI Index



DARPA Gamebreaker aims to train military AI systems on open world video games

by *Sebastian Moss* 5/6/2020

Why games may not be the best benchmark for AI

Après La Mort - La Vie De Nouveau

- What does AI mean for our future as game creators?
- In this talk we'll take you through:

I. Two examples of how AI can be used badly in games
II. Two examples of AI used for responsible innovation
III. Two visions of the future we can build together

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PART ONE — Ethical Failures

CHECK FAILURE

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Case #1

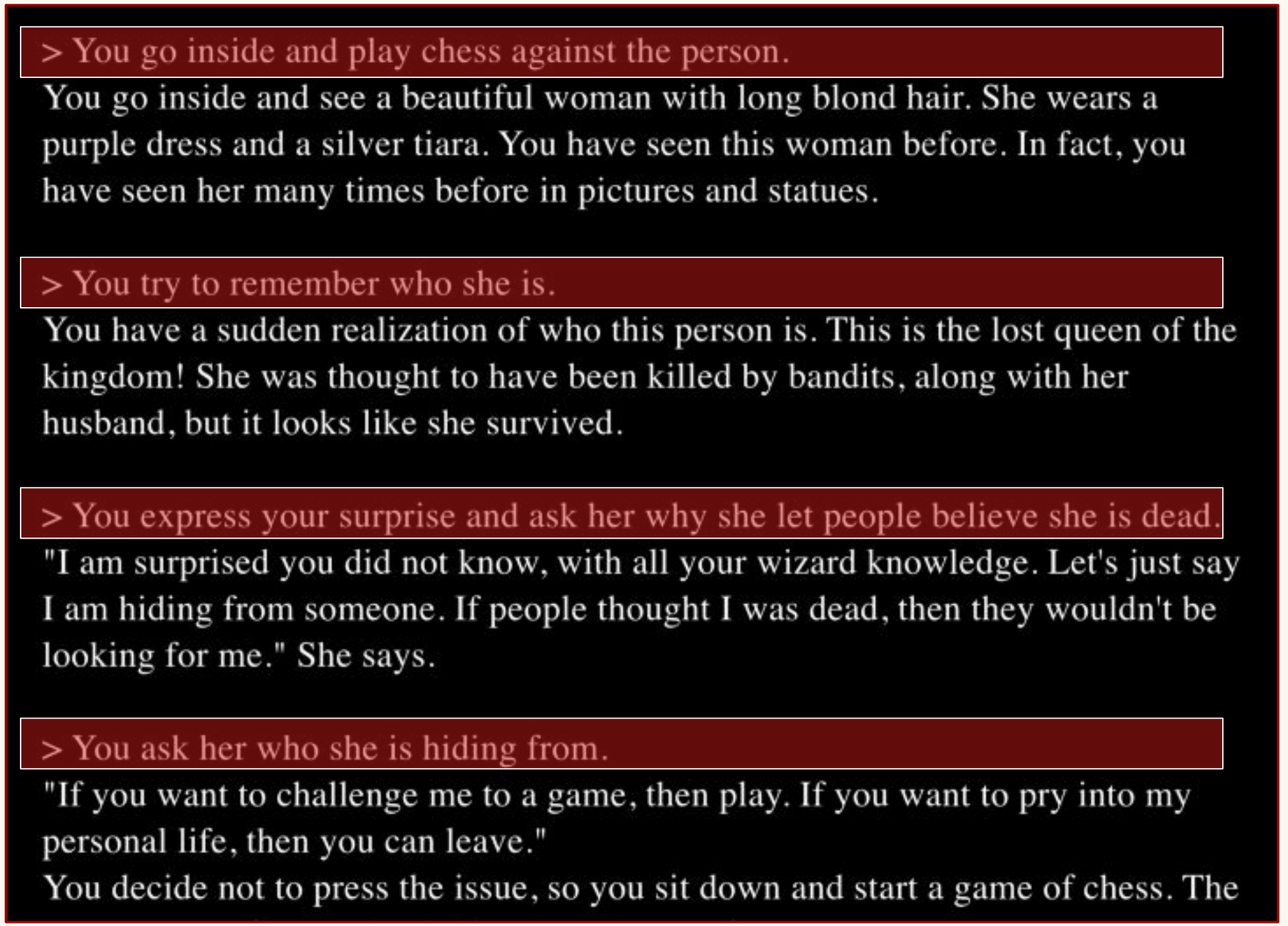
Concept

- Online platform to play text adventure games
- Computationally generated reactions to **players inputs**

Stats (Feb 2021)

- 1.5 million monthly active users
- $3.3 million in seed funding

Tech Crunch, February 4, 2021

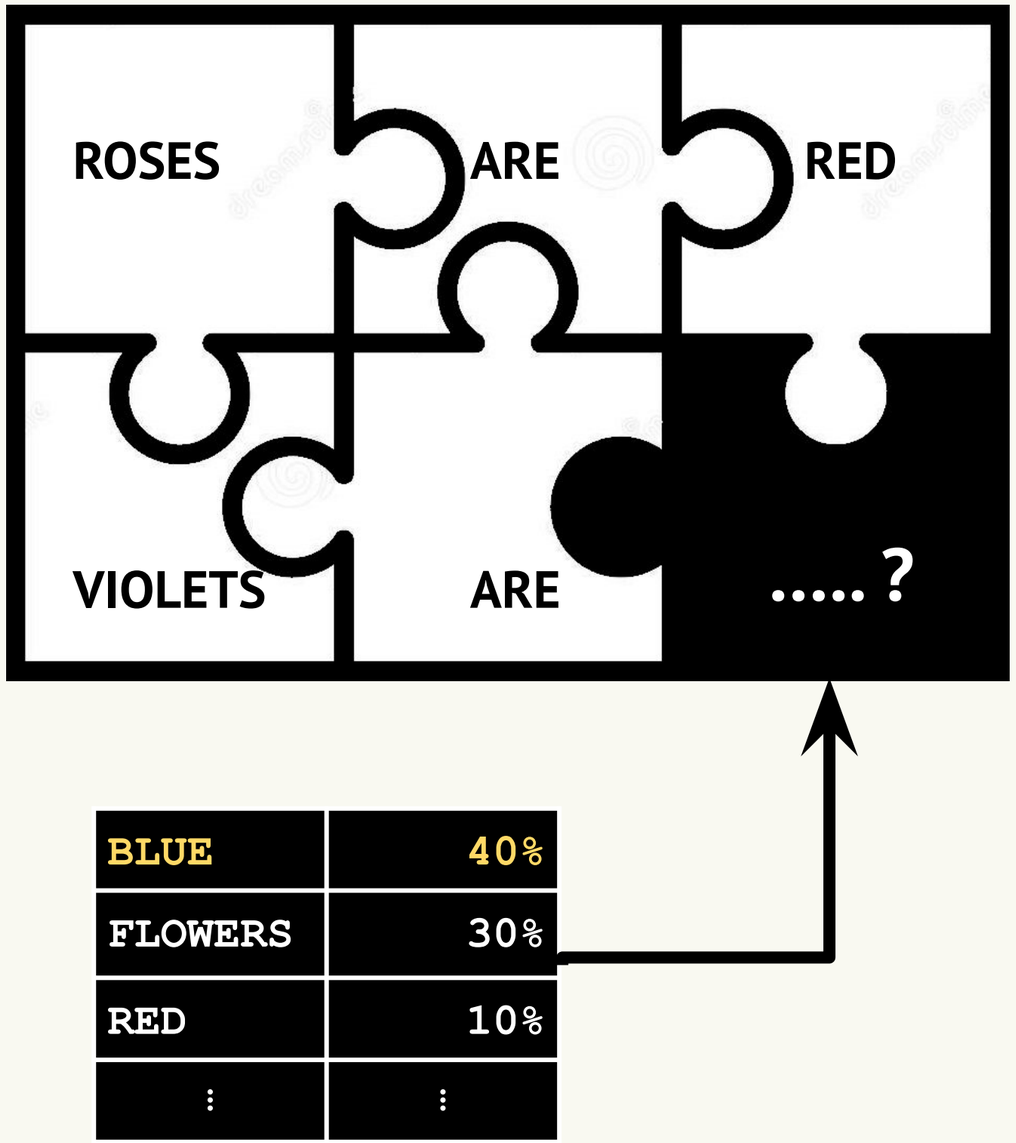


How does it work?

- GPT-2, then GPT-3 neural networks trained by OpenAI

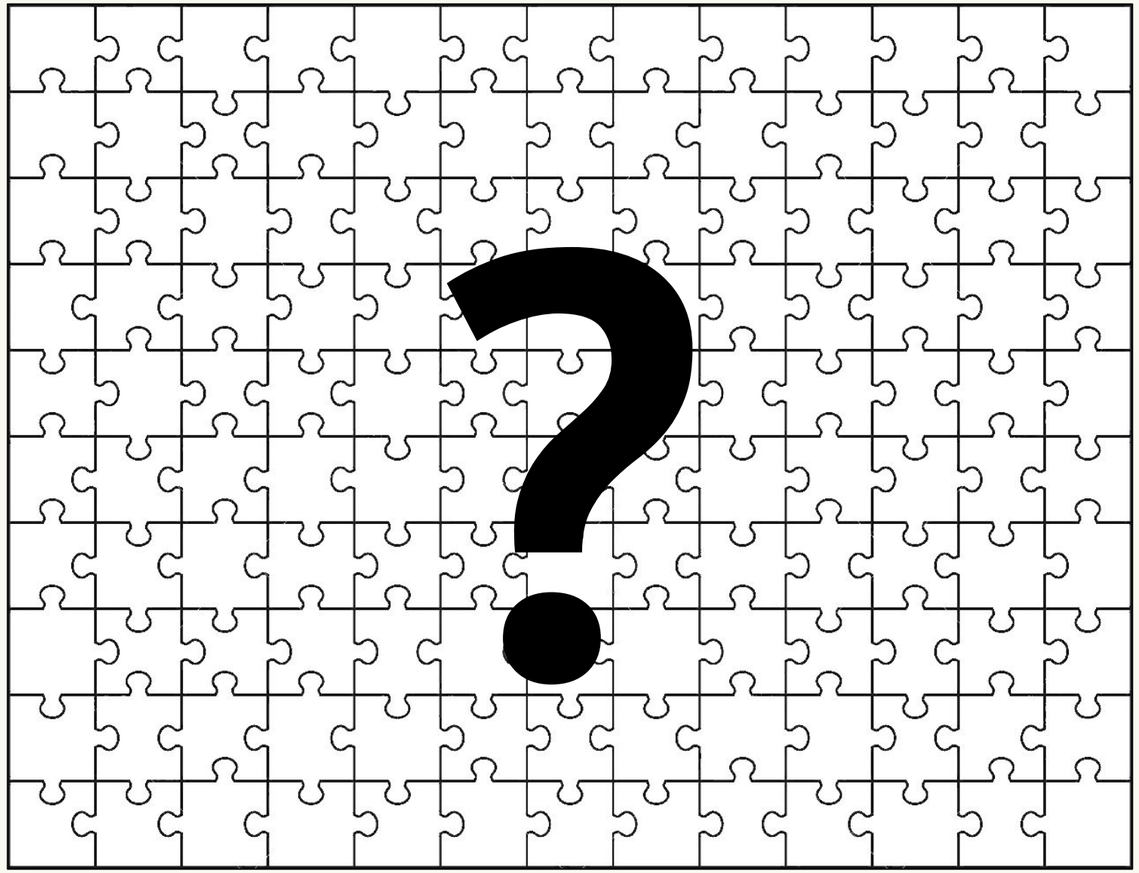
- Works like an autocompleter

- Need a **LOT** of example texts



What is in AI Dungeon?

Where do the stories in the training data come from?



What is in AI Dungeon?

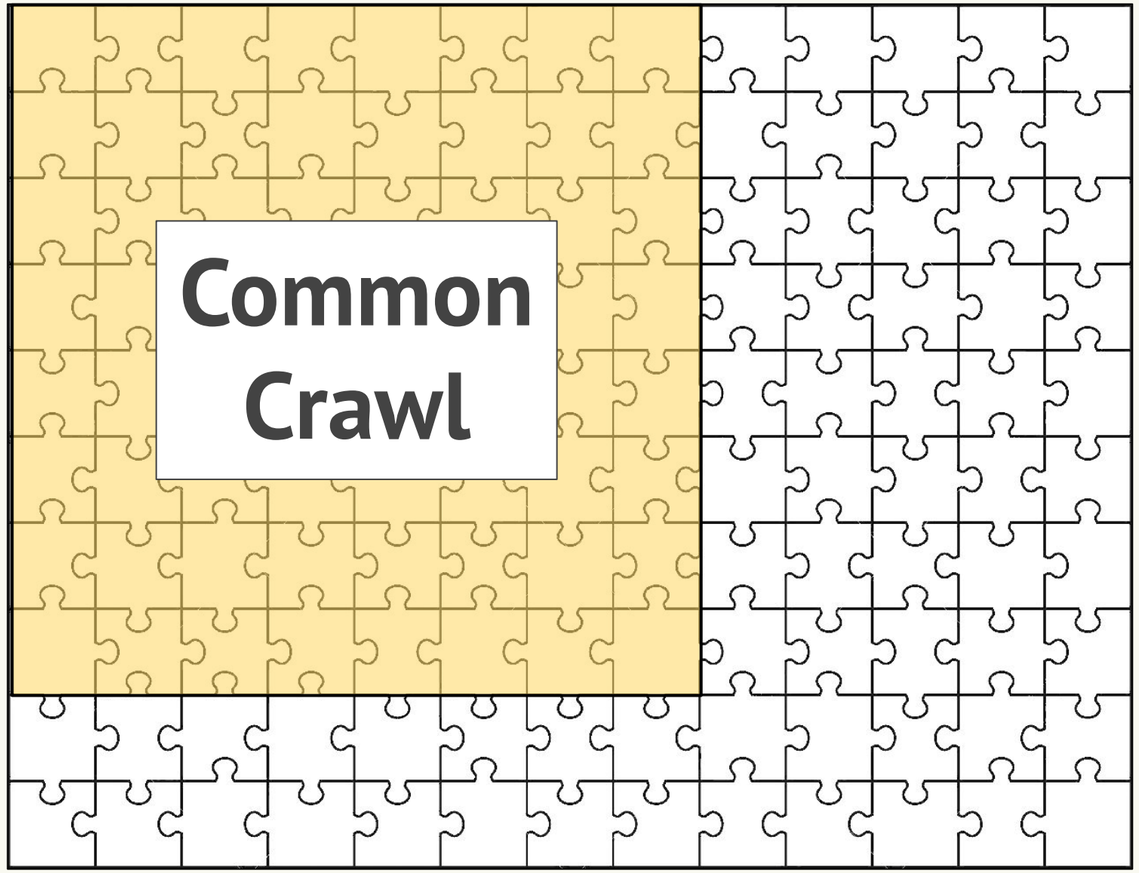
1. **Common Crawl "filtered"**
   - 156 billion *words*
   - 365 million domains (which ones?)

Removed identities

- Black, Hispanic authors
- mentioning LGBTQI+ identities

Disproportions

- US/UK military, Google patents
- Strong negative feeling against Arab people



Dodge, Jesse, et al. "Documenting large webtext corpora: A case study on the colossal clean crawled corpus." *arXiv preprint arXiv:2104.08758* (2021).

What is in AI Dungeon?

2. chooseyourstory.com

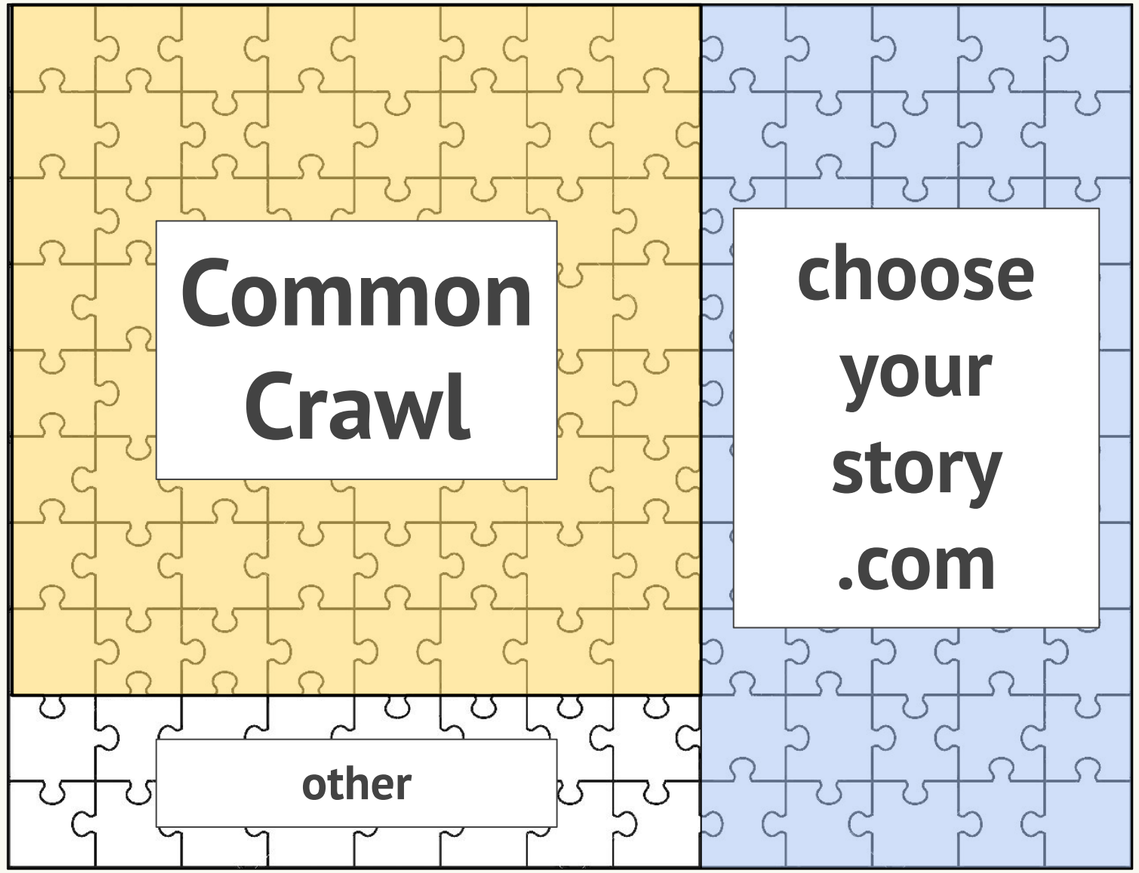
A community of textual CYOA game makers

- Downloaded and used without their consent

https://chooseyourstory.com/forums/the-lounge/message/26021

- Contains pornographic games including roleplaying sexually assaulting women

https://infinite-story.com/story/room.php?id=70466



Not only were half of an AI text adventure generator's sessions NSFW but some involved depictions of sex with children

And it was poorly secured, allowing someone to analyze players' private fantasies

Katyanna Quach

Fri 30 Apr 2021 // 10:35 UTC

https://www.theregister.com/2021/10/08/ai_game_abuse/

It began as an AI-fueled dungeon game. Then it got much darker

AI algorithm created disturbing stories, including sex scenes involving children.

TOM SIMONITE, WIRED.COM - 5/8/2021, 12:50 PM

https://www.wired.com/story/ai-fueled-dungeon-game-got-much-darker/

How not to train your Dragon: What happens when you teach an AI game sex-abuse stories then blame players

Next chapter in AI Dungeon saga: Banning gamers for what the bot said

Katyanna Quach

Fri 8 Oct 2021 // 00:04 UTC

AI Dungeon's new filter for stories involving minors incenses fans

'We know that our initial test was not perfect'

By Cass Marshall | Apr 28, 2021, 6:00pm EDT

https://www.polygon.com/22408261/ai-dungeon-filter-controversy-minors-sexual-content-censorship-privacy-latitude

Was it even possible to avoid?

No control over:

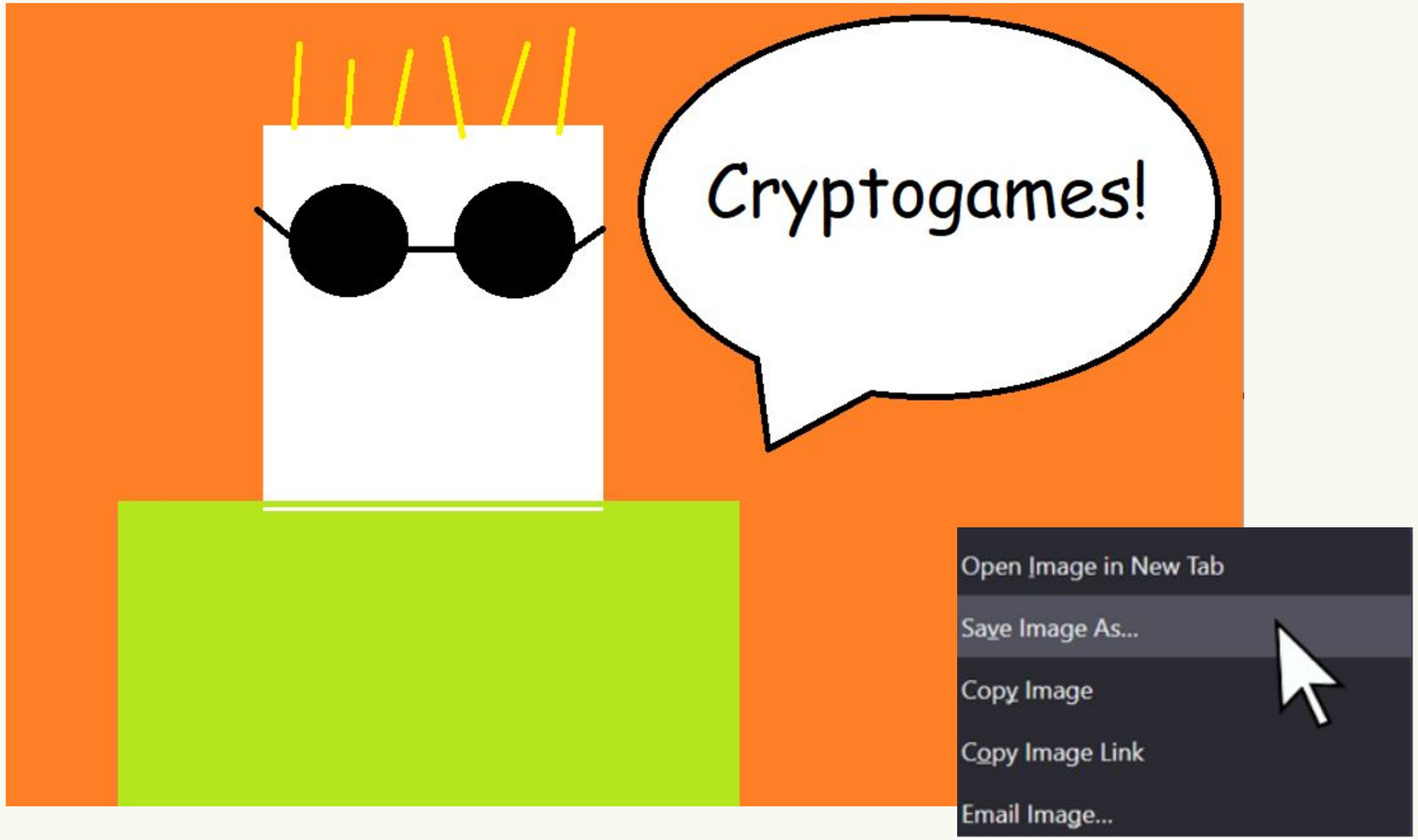
- Where the texts come from
- Who wrote them
- What they contain

No way to:

- Identify and credit creators
- Ask for their consent

A mindset that aims to produce **cheap new content** at the expense of both the involved creators and player communities – **especially oppressed ones**

Case #2


Cryptogames!
Open Image in New Tab
Save Image As...
Copy Image
Copy Image Link
Email Image...

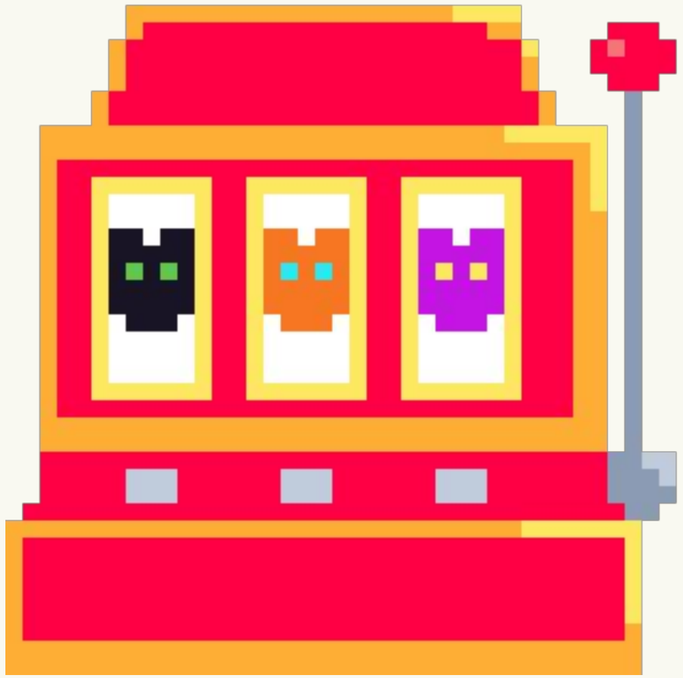
Why cryptogames?

- More covert, but important link between AI and cryptogames
- Cryptogames encourage players to gamble
- Link between gambling games and disordered gaming
- AI can be used to predict player behaviour in gambling games

Cryptogames and gambling

- “blockchains are mainly used for two types of games: online casinos and collectibles” (Serada et al 2021)

- “Unlike most free-to-play games, in crypto-games, the in-game currency is often exchangeable and can be used to pay for other goods and services outside gameplay” (Scholten et al 2019)

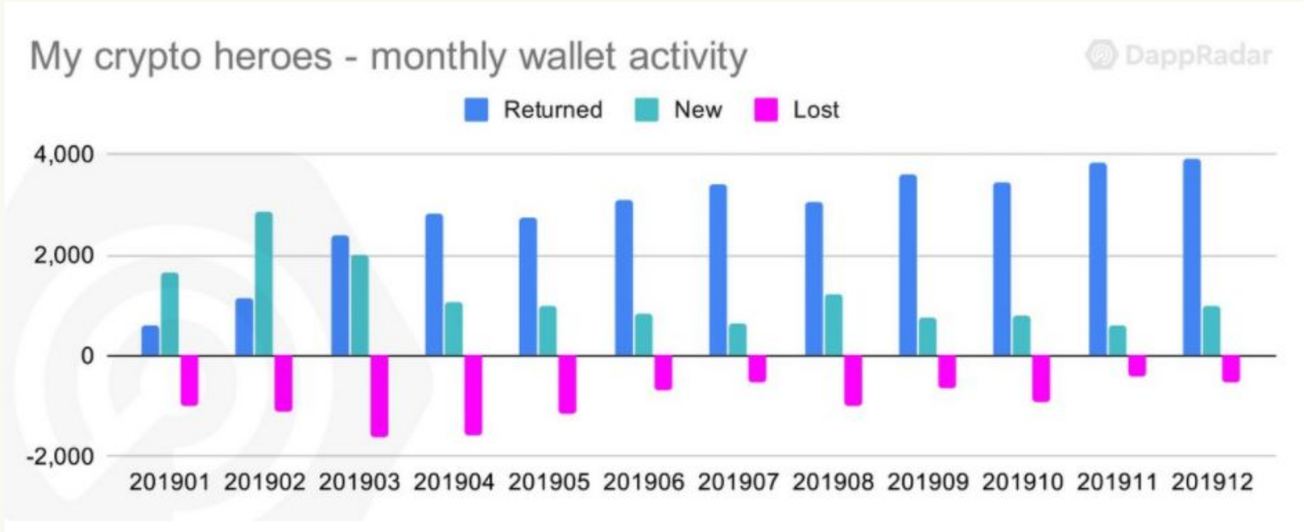


Serada, Alesja, Tanja Sihvonen, and J. Tuomas Harviainen. “CryptoKitties and the New Ludic Economy: How Blockchain Introduces Value, Ownership, and Scarcity in Digital Gaming.” *Games and Culture* 16, no. 4 (June 1, 2021): 457–80

Scholten, Oliver James, Nathan Gerard Jayy Hughes, Sebastian Deterding, Anders Drachen, James Alfred Walker, and David Zendle. “Ethereum Crypto-Games: Mechanics, Prevalence, and Gambling Similarities.” In Proceedings of the Annual Symposium on Computer-Human Interaction in Play, 379–89. Barcelona Spain: ACM, 2019. https://doi.org/10.1145/3311350.3347178.

Cryptogames and player wellbeing

- Disordered gaming: that which causes “significant impairment or distress” (Zendle 2020)
- Qualitative study of *Axie Infinity* players-students struggling during the pandemic (De Jesus et al 2022)
- AI predicting player churn or “play till you die” (Chen et al 2018)
  - ➢ Optimise player spending



Chen, Pei Pei, Anna Guitart, Ana Fernández del Río, and África Periáñez. “Customer Lifetime Value in Video Games Using Deep Learning and Parametric Models.” *2018 IEEE International Conference on Big Data (Big Data)*, December 2018, 2134–40.

De Jesus, Shealtielle Blaise, Daphne Austria, Daniela Marcelo, Ceejay Ocampo, April Joyce Tibudan, and Jhoselle Tus. “Play-to-Earn: A Qualitative Analysis of the Experiences and Challenges Faced By Axie Infinity Online Gamers Amidst the COVID-19 Pandemic” 12 (January 1, 2022): 391–424.

Zendle, David. “Beyond Loot Boxes: A Variety of Gambling-like Practices in Video Games Are Linked to Both Problem Gambling and Disordered Gaming.” *PeerJ* 8 (July 14, 2020)

The future of cryptogames?

- “That tradition for Benjamin is stifling and fascist, and he celebrates the way mechanical reproduction inevitably depreciates this value!” (Sleeper 2021)

GDC 2022 Game State of the Industry

Cryptogames are based around **gambling mechanics**, and player data can be leveraged through AI techniques for **exploitative purposes**

“ *Technical reproduction can put the copy of the original into situations which would be out of reach for the original itself* ”

- Walter Benjamin

Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction" (1935)

Sleeper, Ben. “The NFT’s Aura, or, Why Is NFT Art So Ugly?” 2021.https://www.stormingtheivorytower.com/2021/06/the-nfts-aura-or-why-is-nft-art-so-ugly.html.

Pipkin, Everest. “‘BUT THE ENVIRONMENTAL ISSUES WITH CRYPTOART WILL BE SOLVED SOON, RIGHT?’” *Medium* (blog), March 14, 2021. https://everestpipkin.medium.com/but-the-environmental-issues-with-cryptoart-1128ef72e6a3.

AI DUNGEON

A mindset that aims to produce **cheap new content** at the expense of both the involved creators and player communities – **especially oppressed ones**

Cryptogames are based around **gambling mechanics**, and player data can be leveraged through AI techniques for **exploitative purposes**

AI enforced on creators and players to extract value behind the scenes, in ways that aren't explained, to do things that people don't know about

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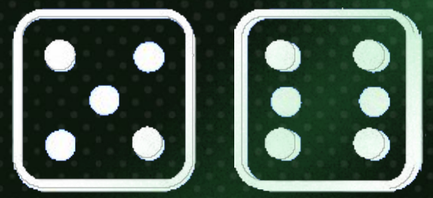
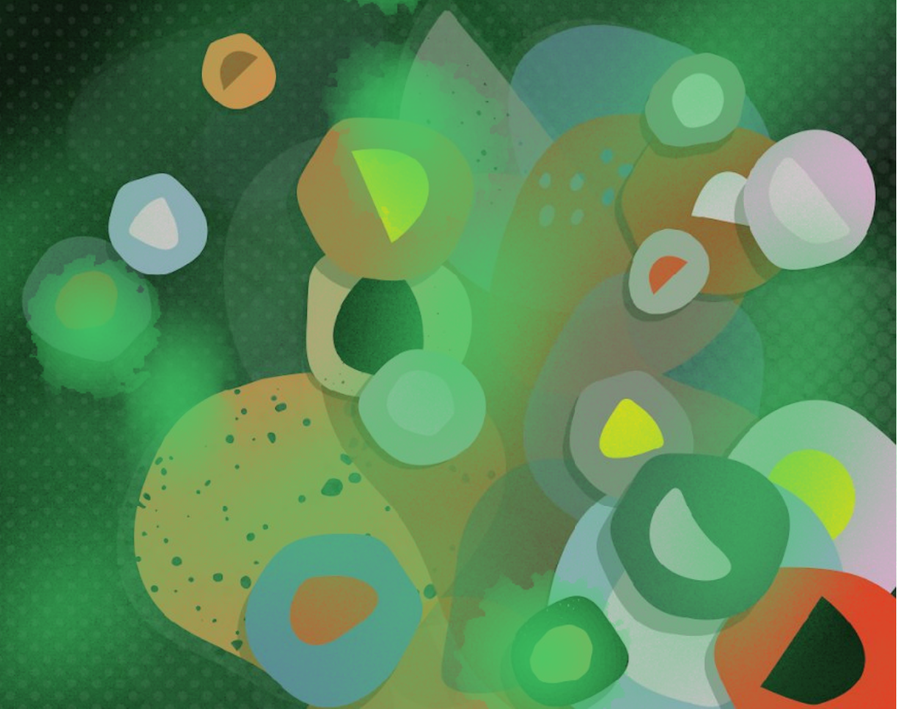
PART TWO — Overlooked Successes



CHECK SUCCESS



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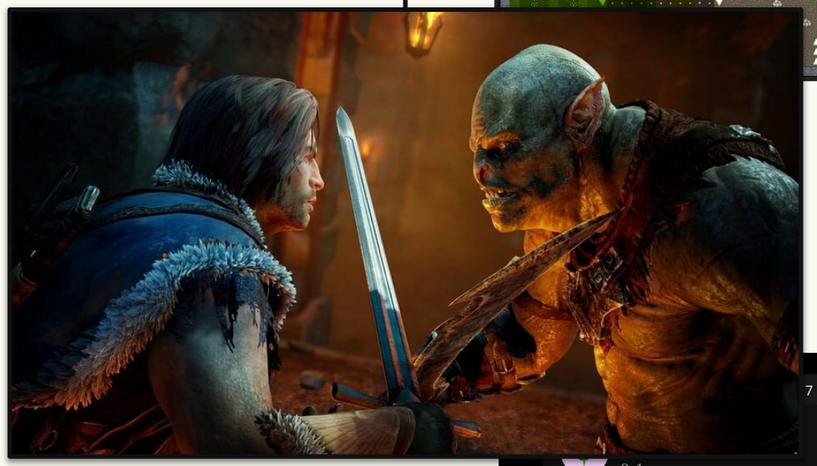
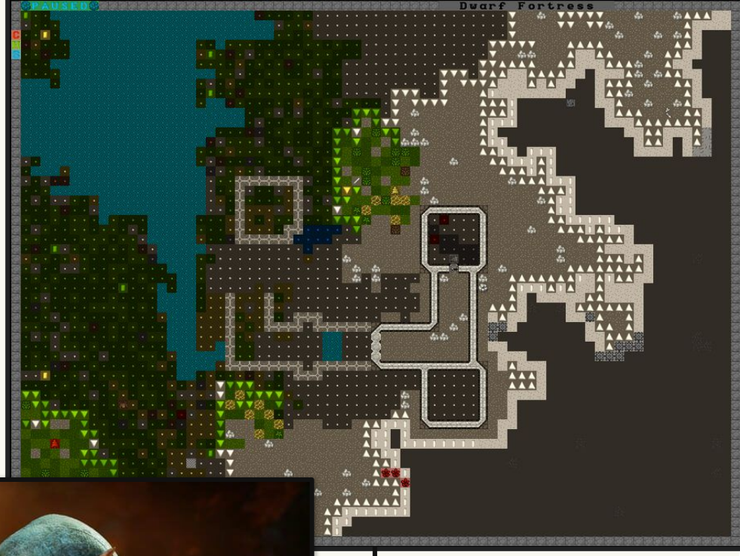
Case #3

Procedural Narratives

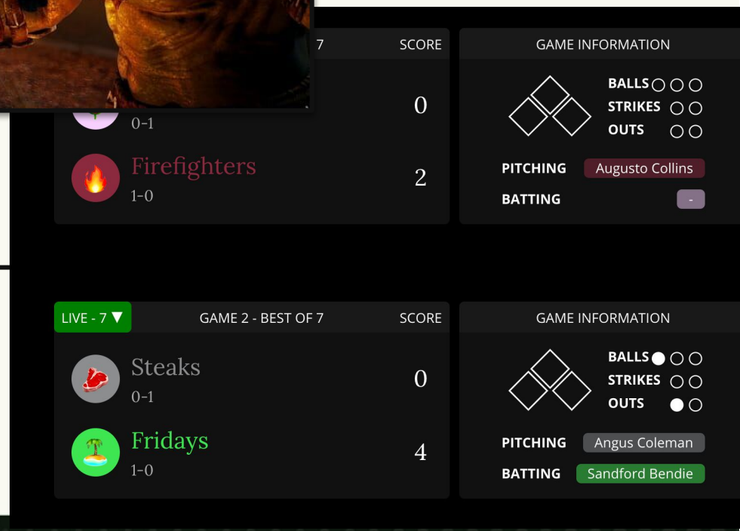
- “While the likes of *Wildermyth* are part of a long procedural storytelling tradition, the field as a whole still feels as if it’s only on act one — the potential is as vast and varied as stories themselves.” (Gordon 2021)

Middle-earth: Shadows of Mordor
(Monolith Productions)





Dwarf Fortress
(Bay 12 Games)



Blaseball (The Game Band)

“Procedural Storytelling Is Exploding the Possibilities of Video Game Narratives - The Verge.” Accessed March 11, 2022. https://www.theverge.com/2021/11/30/22807568/procedural-storytelling-video-games-dwarf-fortress-wildermyth-blaseball.

Library of Plays

- Wildermyth uses the “library of plays” model
- Heroes in the game are actors who can be cast
- The game will pick a play depending on the situation and what actors are available

Nate Austin | Procgen in Wildermyth: Storytelling | EPC2021, 2021. https://www.youtube.com/watch?v=A5BGDbLFRrE.

Developer Insight

- “A big goal of the game from the outset was to give the player a large amount of "expressive space" or freedom to build their own unique band of heroes.” (Nate Austin, *pers comm*)

- Takeaways:
  - Know what you’re generating from the outset
  - Don’t be afraid to mix methods
  - Combine PCG and hand-crafted content
  - Be prepared to prune the PCG

Independent Games Summit Session: Getting Players Emotionally Invested in Procedural Characters in 'Wildermyth'

Nate Austin (Co-Owner, Worldwalker Games, LLC)
Location: Room 2009, West Hall
Date: Monday, March 21
Time: 10:50 am - 11:50 am

PCG as labour

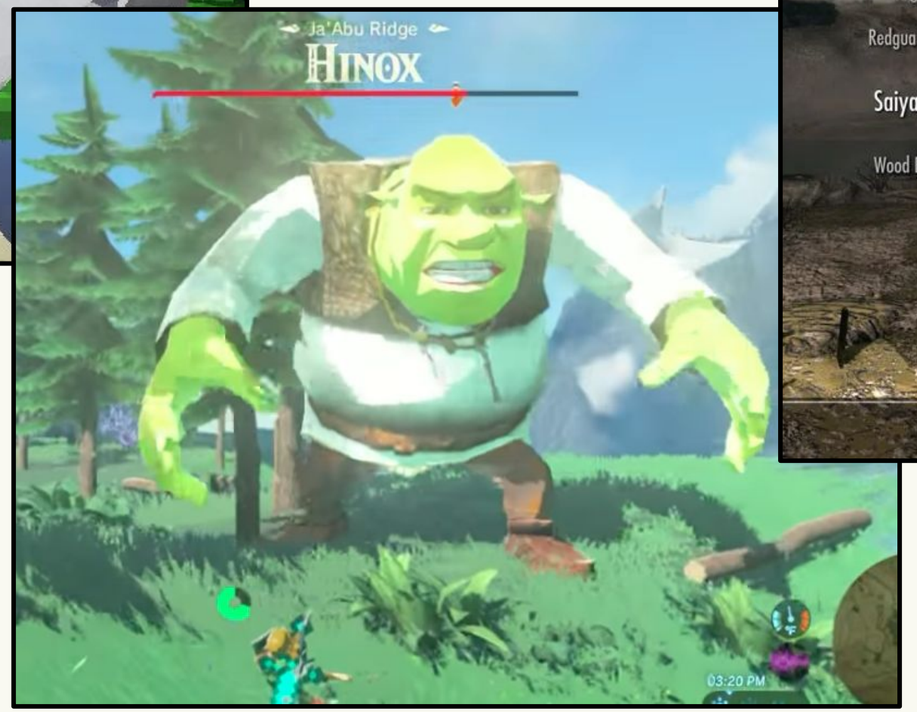
- “Framing PCG as a solution to a labour problem does more than justify mass layoffs as beneficial for a game studio’s bottom line – it devalues the work of digital artists, writers, and sound designers as manual forms of elaboration that are inferior to automated processes” (Chia 2022)

PCG is not a replacement for writing, it is a tool for **different kinds of storytelling in games**

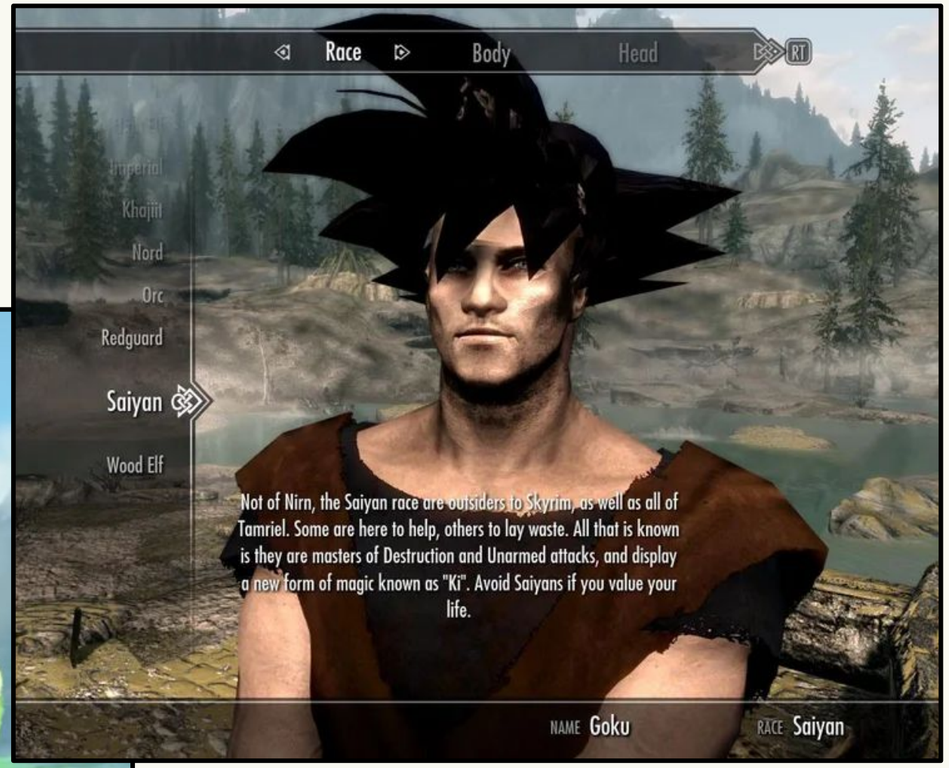
“The Artist and the Automaton in Digital Game Production - Aleena Chia, 2022

Case #4 Modding Communities

Pixelmon, Minecraft mod



Shrek Hinox, WilianZilv

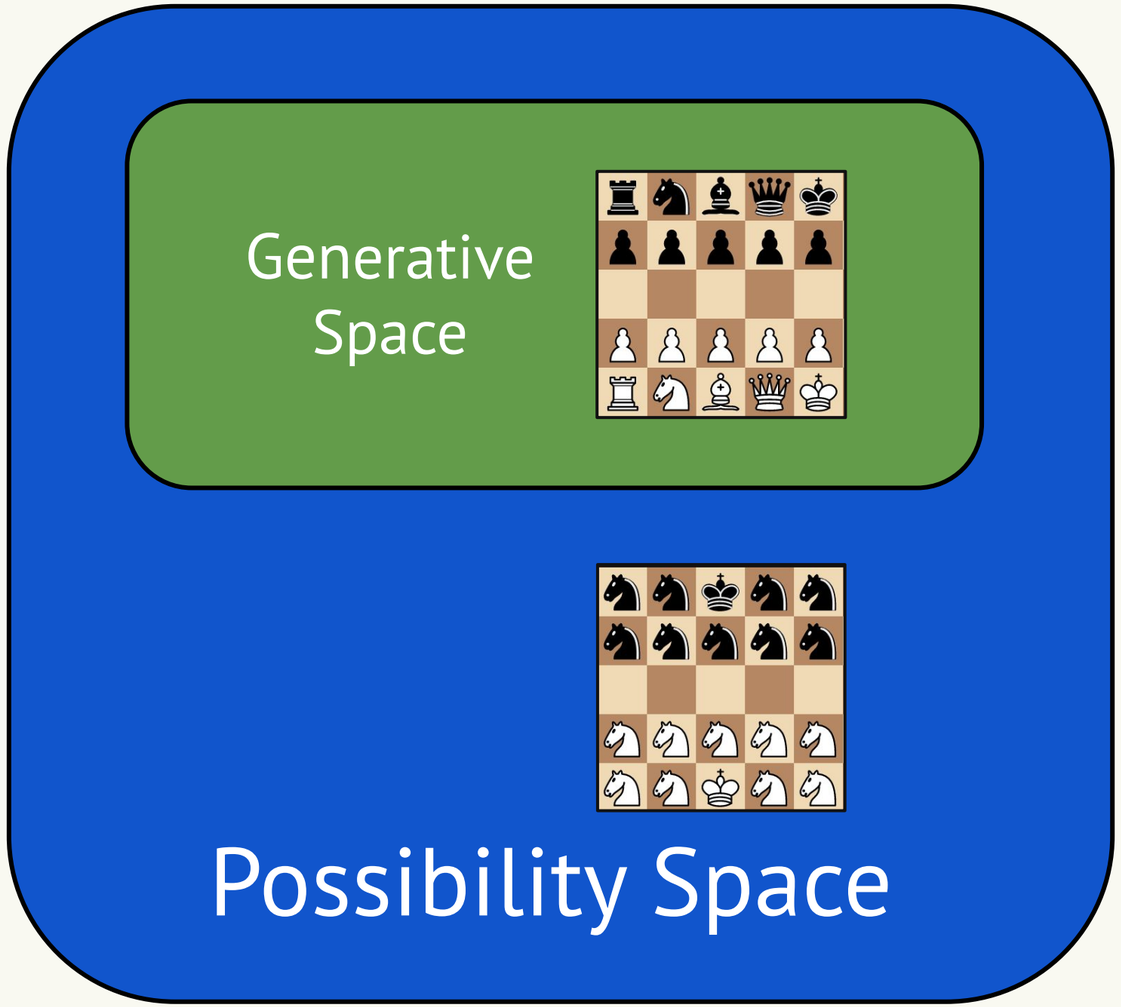


Dragon Ball Z Saiyan Race, Skyrim, Nexus Mods

Expanding Possibilities

- **Possibility Space**
  What the players could be experiencing in the game

- **Generative Space**
  What the game is programmed to do



Expanding Possibilities

Ways to expand Generative Space

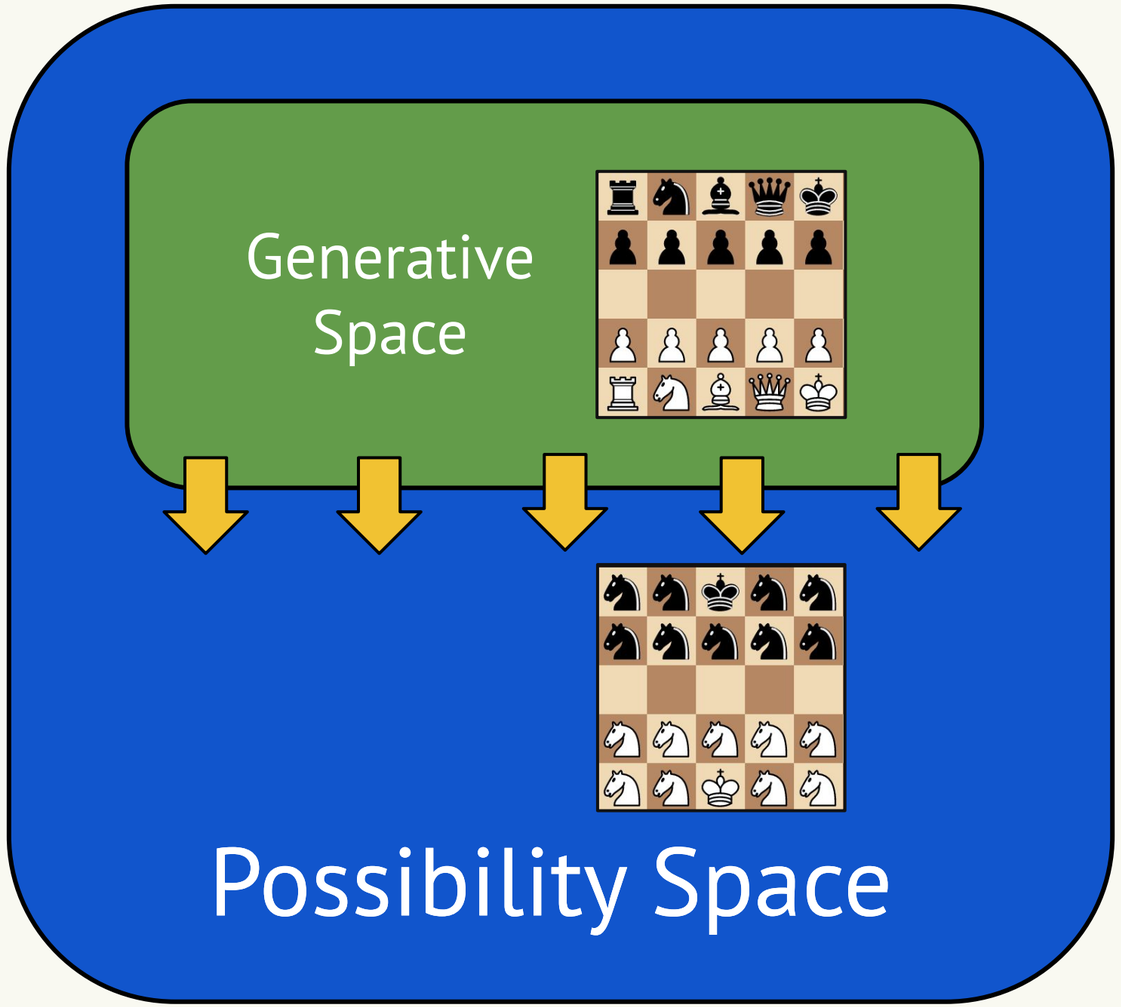
For game devs

#1 - Working on more content

#2 - Procedural Generation (see #1)

For players

⇒ Download a mod



Expanding Possibilities

- **Games known for their active modding community**
  - Stardew Valley (Farming Sim)
  - Doom (FPS)
  - Minecraft (PCG Sandbox)
  - Skyrim (Adventure RPG)

- **Mod contents**
  - UI tweaks
  - Balancing
  - New storylines
  - New monsters / dungeons / items
  - Graphical changes

Stardew Valley Expanded, fanmade expansion for *Stardew Valley*

Doom II Neural Upscale 2X

New ways of playing, not intended by designers but created by player communities

★ **Randomizers**
Ori and the Blind Forest, Zelda, Pokemon

➢ **Procedural Content Generation**

★ **Constraints / Accessibility**
Playing using only voice commands

➢ **Speech-to-Text**

★ **Speedrunning**
like, the whole speedrunning scene

➢ **Tool-Assisted Superplay**

★ **Assistance / Analysis**
Chess tournaments, Esport training

➢ **AI Evaluation**

TASBot SGDQ 2019 TAS block

Chess.com - Move Evaluation

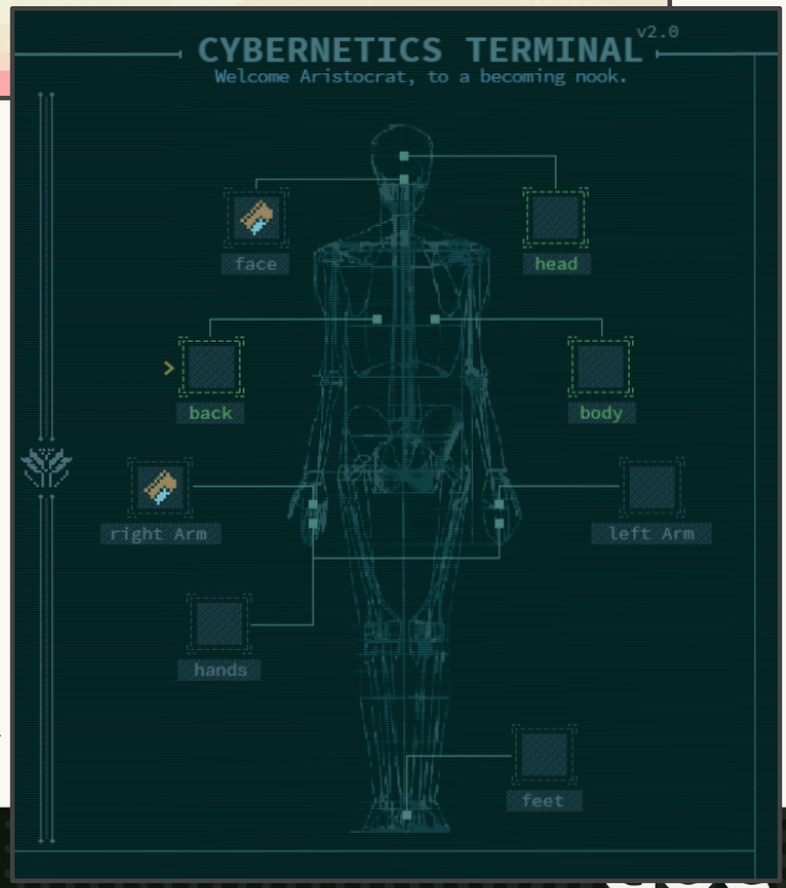
Supporting Modding Communities

- **Animal Crossing**
  > Give to players the tools to easily create content
  > ...and share it with others

- **Caves of Qud**
  > Data-Driven Engine (IRDC US 2015)
  > Shared documentation
  > Created collaboration spaces

Generative space is expanded not (only) thanks to cool tech, but because they **designed it around a creative community**

Custom Animal Crossing Hoodie, Kat



Polat Yarisci, UI Designs for Caves of Qud (edited))

Wildermyth

PCG is not a replacement for writing, it is a tool for **different kinds of storytelling in games**

Generative space is expanded not (only) thanks to cool tech, but because they **designed it around a creative community**

AI techniques designed for supporting a creative community that wants to design and explore games in a new way

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PART THREE — Conceptualizing a Desirable Future For Game AI

CHALLENGING

42%

+1 Listened to this talk
+2 Not a tech bro

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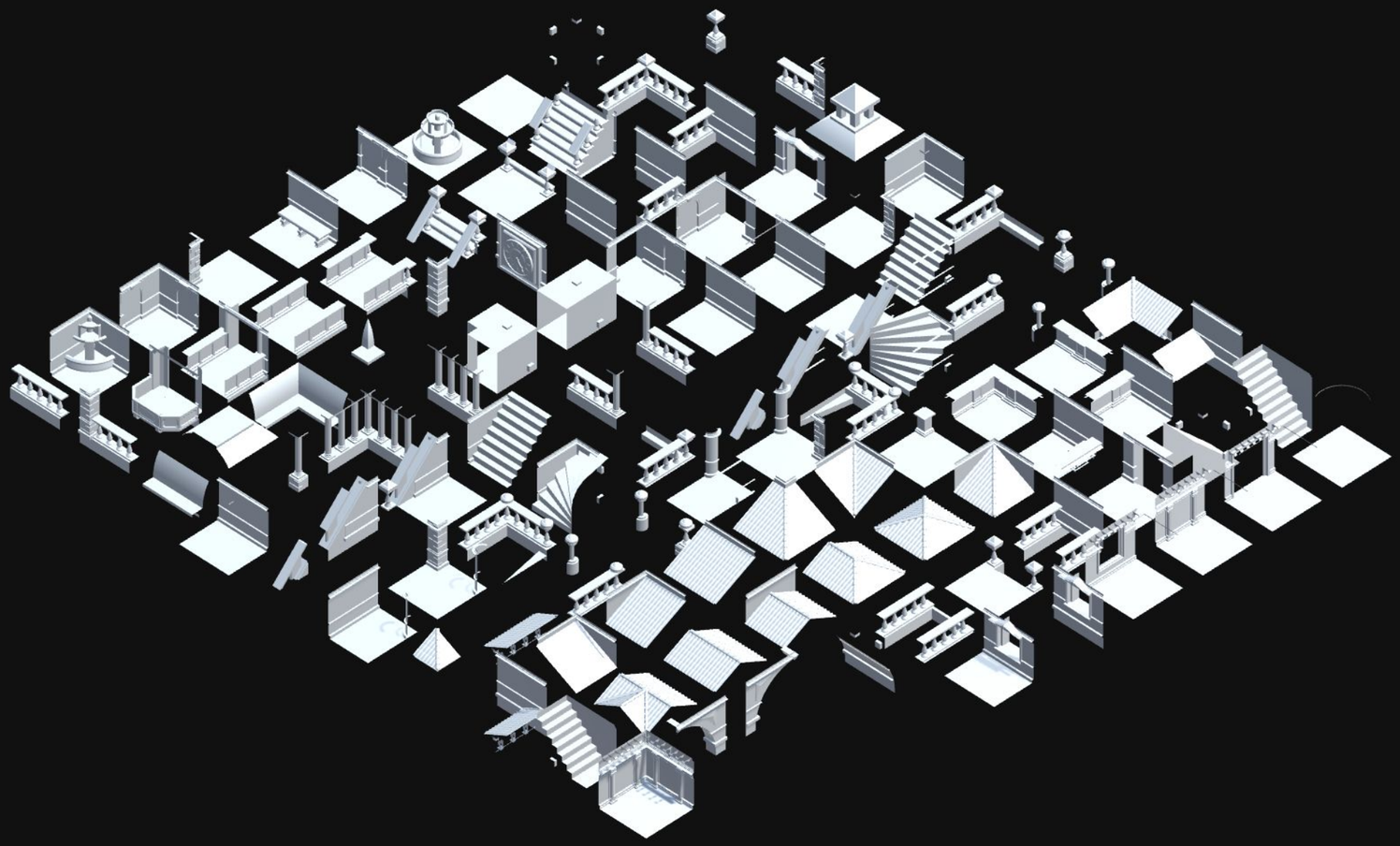
Disco Elysium (edited)

Vision #1

GENERATIVE ARCHAEOLOGY



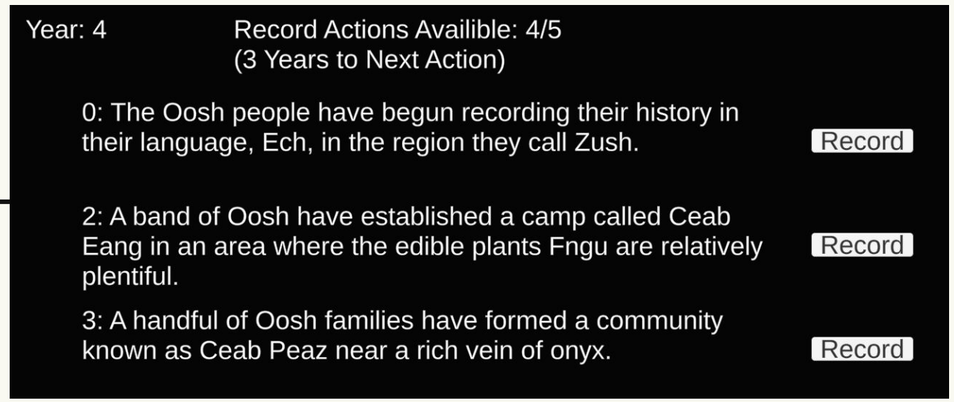
What is generative archaeology?

- Building on the concept of generative forensic games (Cook 2020)

- “Qualitative procedural generation seeks to generate sociological and anthropological concepts and structures in order to develop deep, rich and believable game worlds” (Johnson 2016)

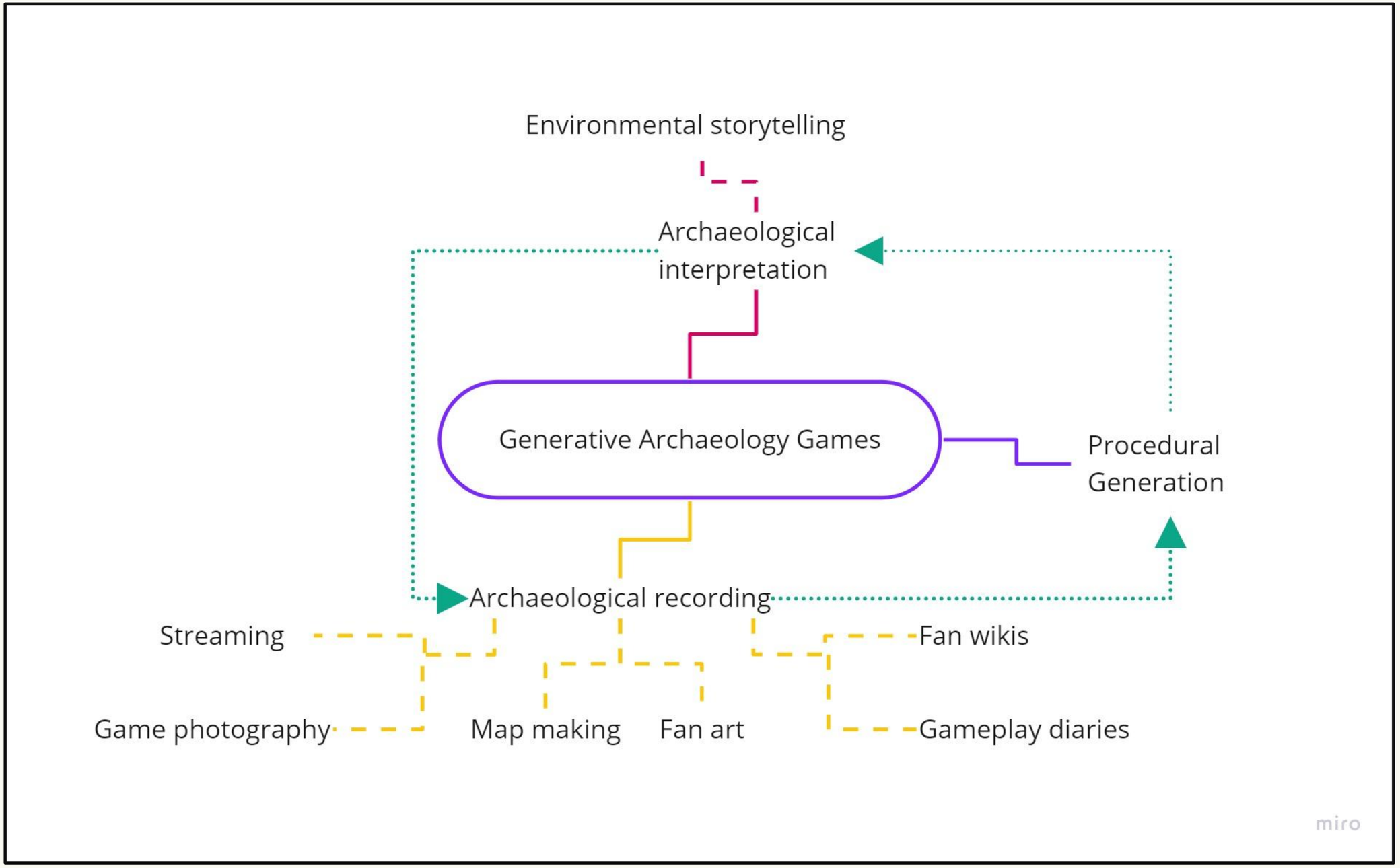
Ultima Ratio Regum (Mark Johnson)

The Wind and Rain (Rourke Bywater)



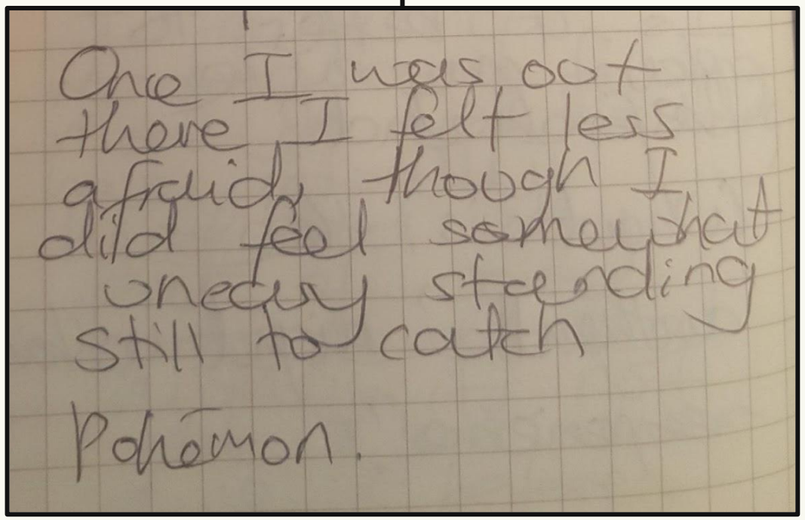
Cook, M. "Procedural Generation and Information Games," IEEE Conference on Games. 2020.

Johnson, M. R. Towards Qualitative Procedural Generation. In Computational Creativity and Games Workshop at the International Conference on Computational Creativity. 2016.


Environmental storytelling
Archaeological interpretation
Generative Archaeology Games
Procedural Generation
Archaeological recording
Streaming
Fan wikis
Game photography
Map making
Fan art
Gameplay diaries
miro

NieR:Automata (PlatinumGames)

Pokémon Go (Niantic)



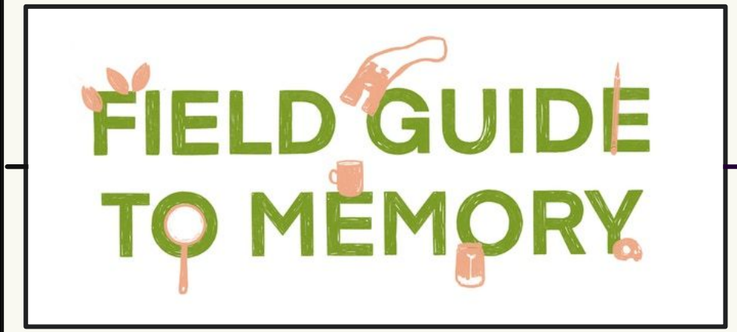
Queers in Love at the End of the World (Anna Anthropy)

Elden Ring (FromSoftware)

Keepsake Games

- “it is simple to create a vast variety of content, but harder to create meaningful content or to understand the qualities of generated content in terms of player experience.” (Smith 2015)

- Examples of analogue ‘keepsake games’: *A Mending* by Shing Yin Khor and *Field Guide to Memory* by Jeeyon Shim



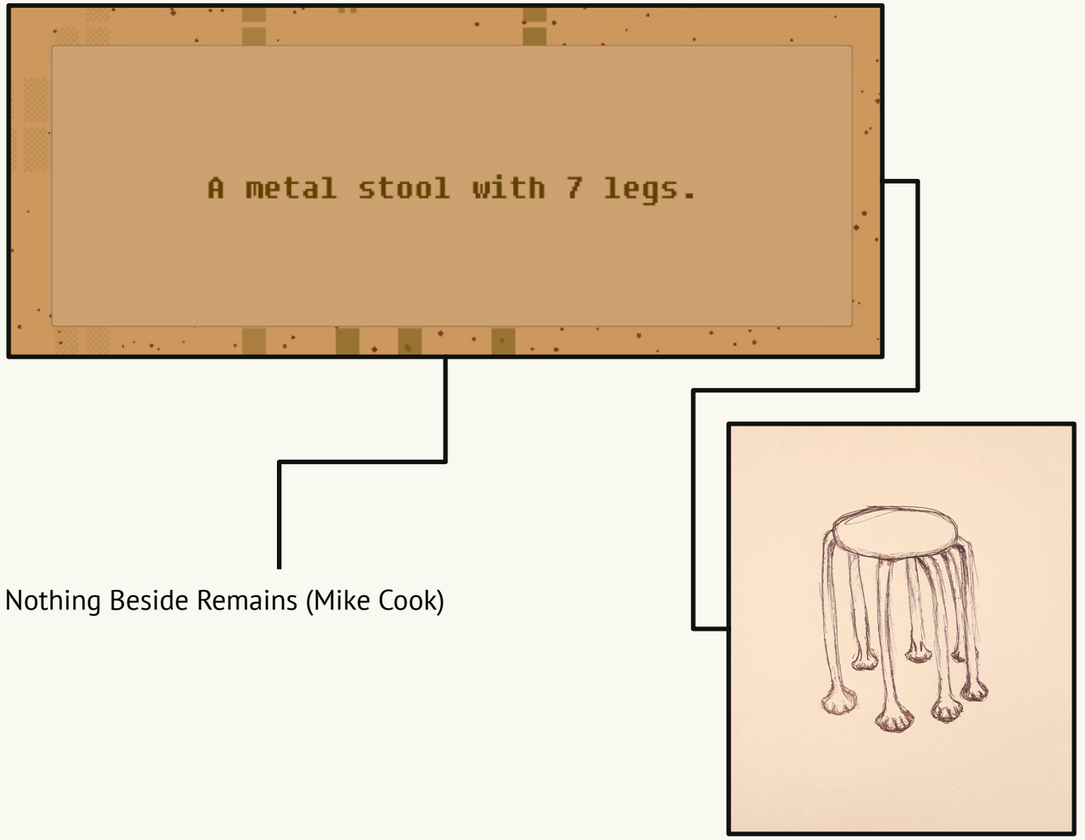
Smith, Gillian. *An Analog History of Procedural Content Generation*. Foundations of Digital Games 2015

Who gets to generate archaeology?

- “The development and derivative material, copies, and even references in other media – such as film, magazines, or online forums – contribute maintaining a video game’s aura” (Guay-Bélanger 2021)

- “Affective tuning resists documentation and is reserved for artists with technomasculine forms of cultural capital” (Chia 2022)

Generative archaeology games encourage the player to **creatively collaborate with the game through archaeological interpretation**



Nothing Beside Remains (Mike Cook)

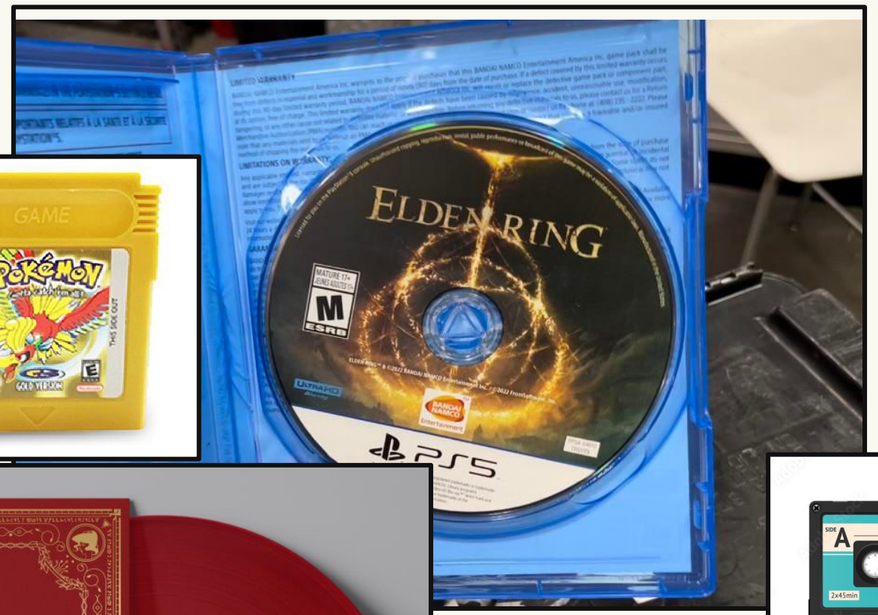
Guay-Bélanger, Dany. “Assembling Auras: Towards a Methodology for the Preservation and Study of Video Games as Cultural Heritage Artefacts.” *Games and Culture*, May 24, 2021,

“The Artist and the Automaton in Digital Game Production - Aleena Chia, 2022.

Vision #2

Timo Preece

Video Games as Recordings



Roleplay Games (TTRPG, ARG, LARP) as Live Performance

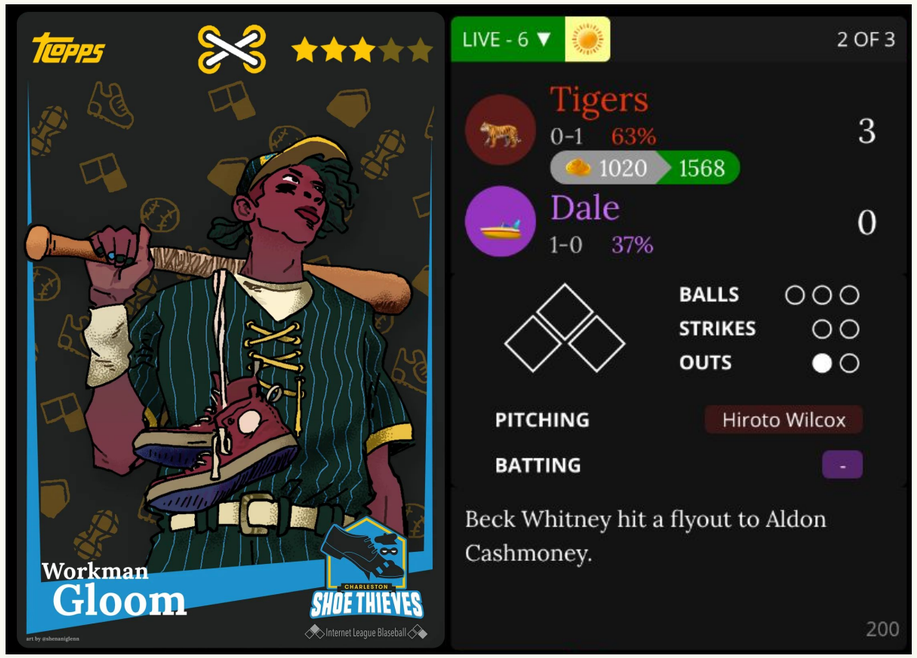
- **Reactive**
  Adapt narrative
  and gameplay *live*

- **Creative**
  All players are involved in
  the act of creation, design

RalfHuels, 2014, Wlkimedia

The Quiet Year (Buried Without Ceremony)

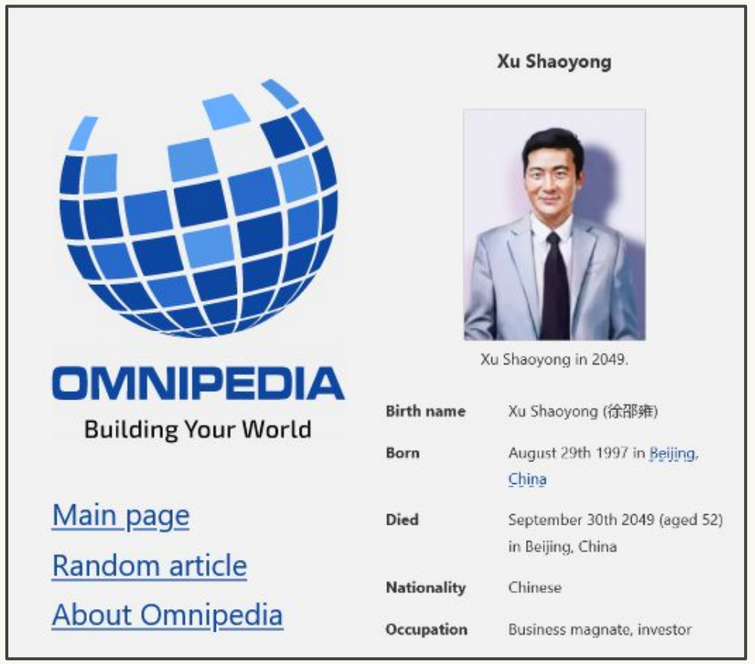
Dimension 20, Misfist & Magic Episode 1, Dropout



Blaseball

« The beautiful thing about Blaseball is that even if the game is not running online, it continues, because so much of the game is ***what the community is putting into it****. »*

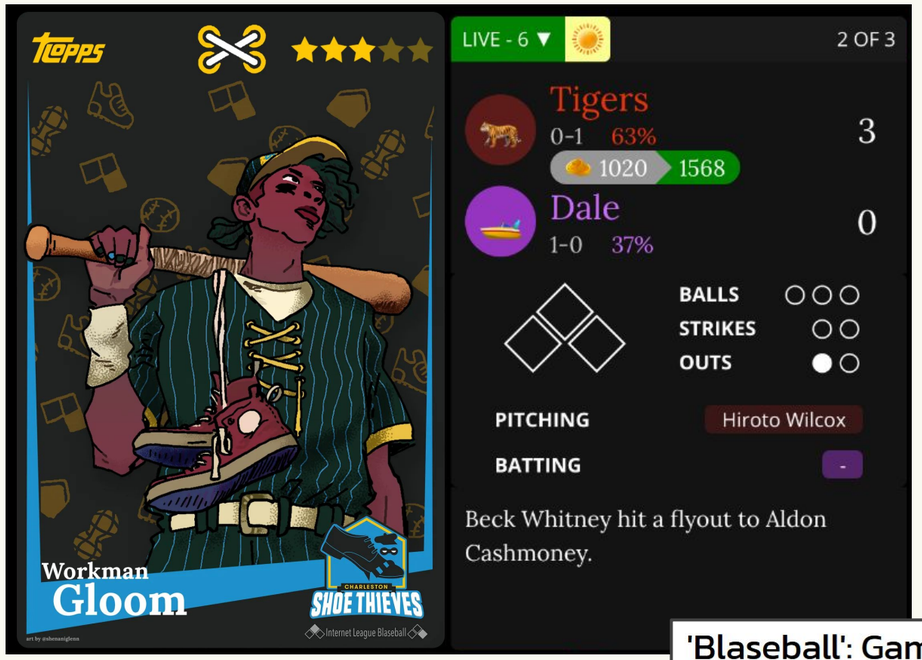
Sam Rosenthal, Fanbyte interview



Neurocracy

« Some of these theories would then ***feed back into the story itself****, with Truyens adjusting the story based on some of the community's responses. »*

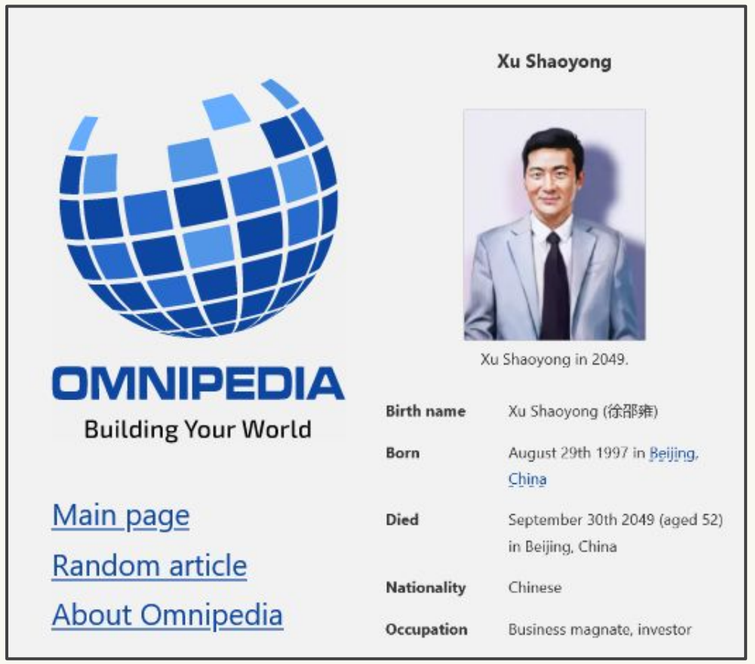
NME.com interview with Joannes Truyens



Blaseball

'Blaseball': Game Development as Performance

Gabe McGill (Product Designer, The Game Band)
Joel Clark (Game Design Lead, The Game Band)
Location: Room 2010, West Hall
Date: Thursday, March 24
Time: 11:30 am - 12:30 pm



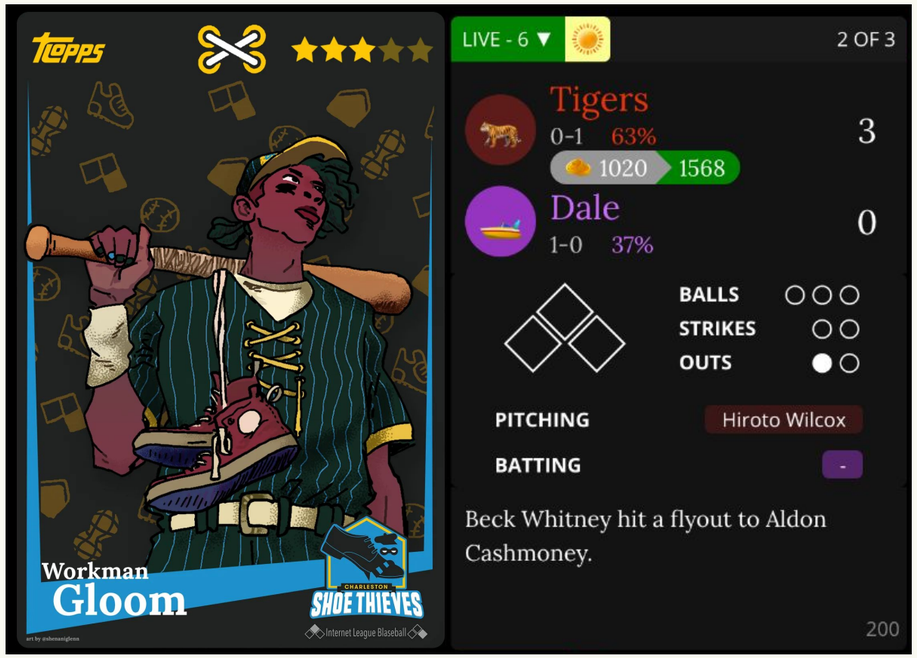
Neurocracy

Live Performance

★ Game masters that are not the sole source of creation

★ Letting players fill the blank and make it part of the whole

★ A feedback loop where both players and designers are surprised



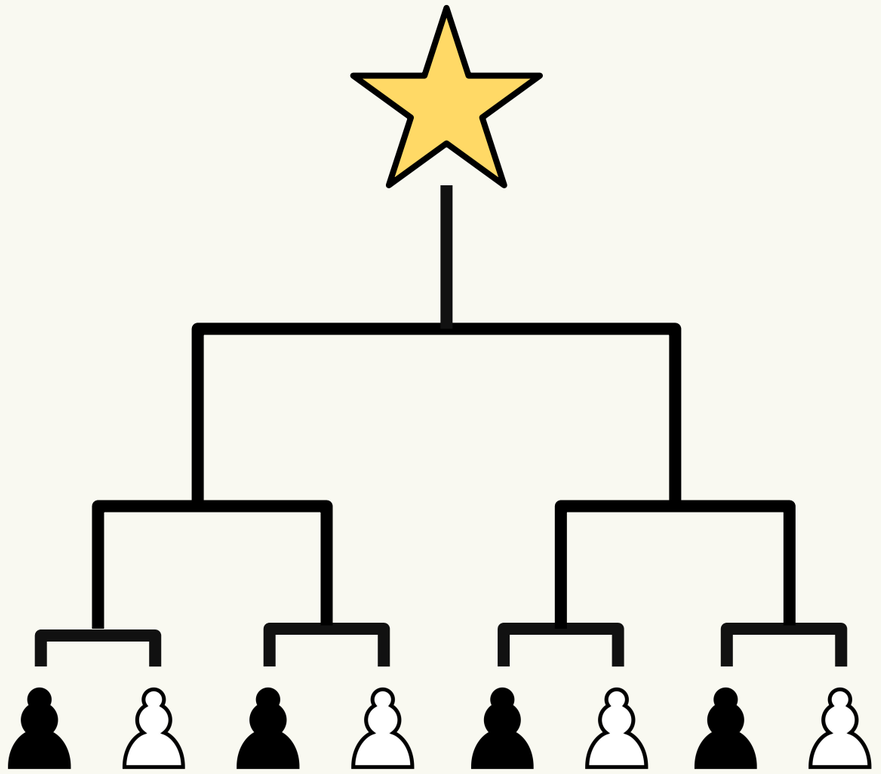
Blaseball

*« It impose a crunch-like workload on themselves (when asked **how many hours a day they were working**, Rosenthal paused to think before half-jokingly guessing **"All of them?"**)»*
Sam Rosenthal, Fanbyte interview

Neurocracy

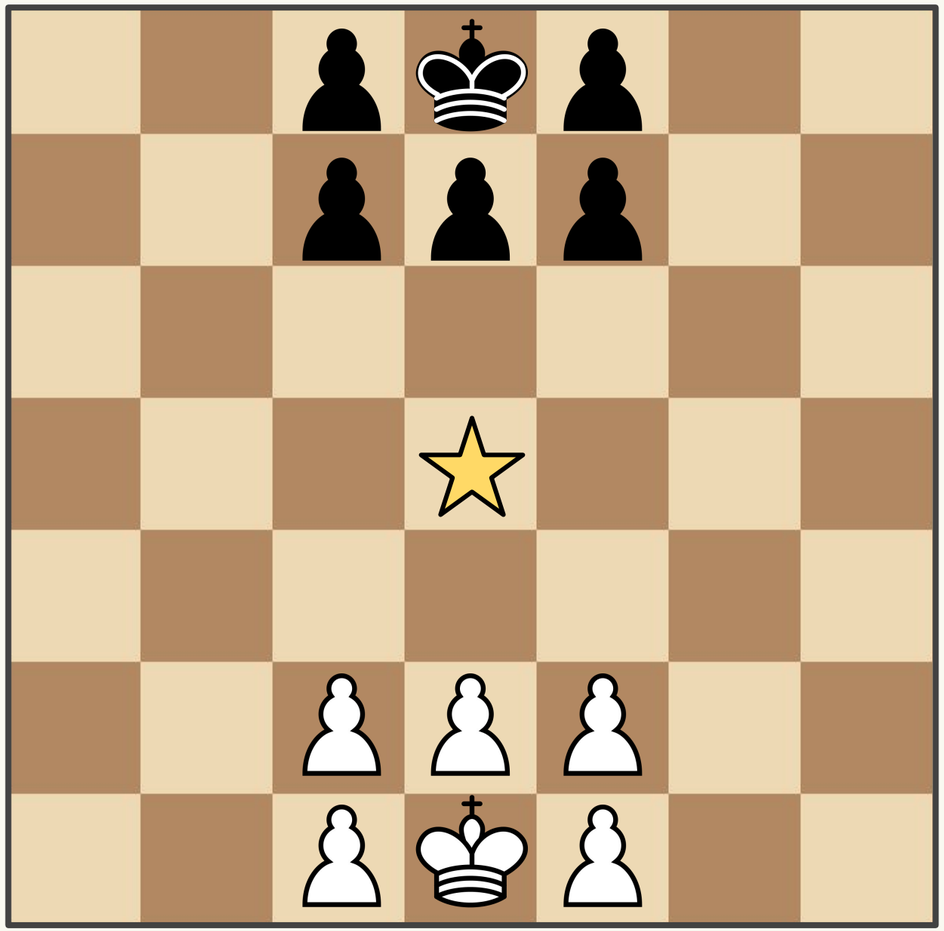
*« The weekly updates and adjustments after the initial launch were **almost exclusively done by him, and this took a toll on his physical health** that took several months to fully recover from. »*
NME.com interview with Joannes Truyens

Miracle Chess a first concept for Live Automated Game Design



ChessCraft, Stuart Spence

Miracle Chess a first concept for Live Automated Game Design



ChessCraft, Stuart Spence

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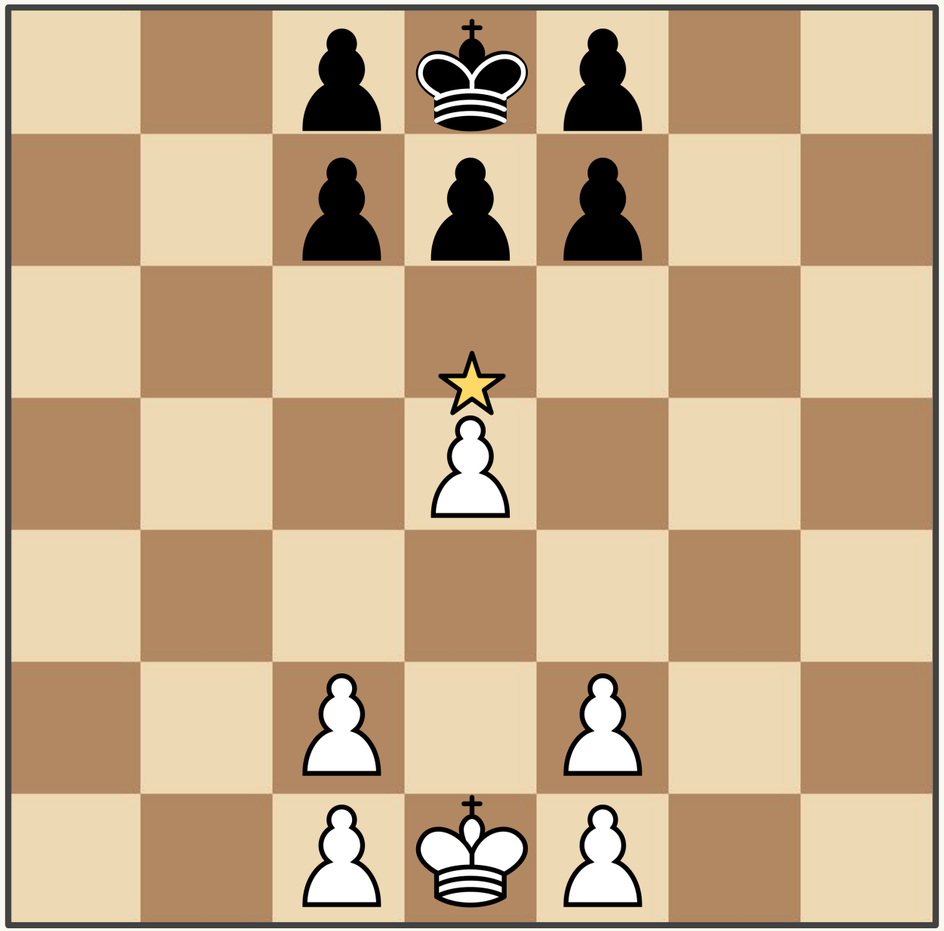

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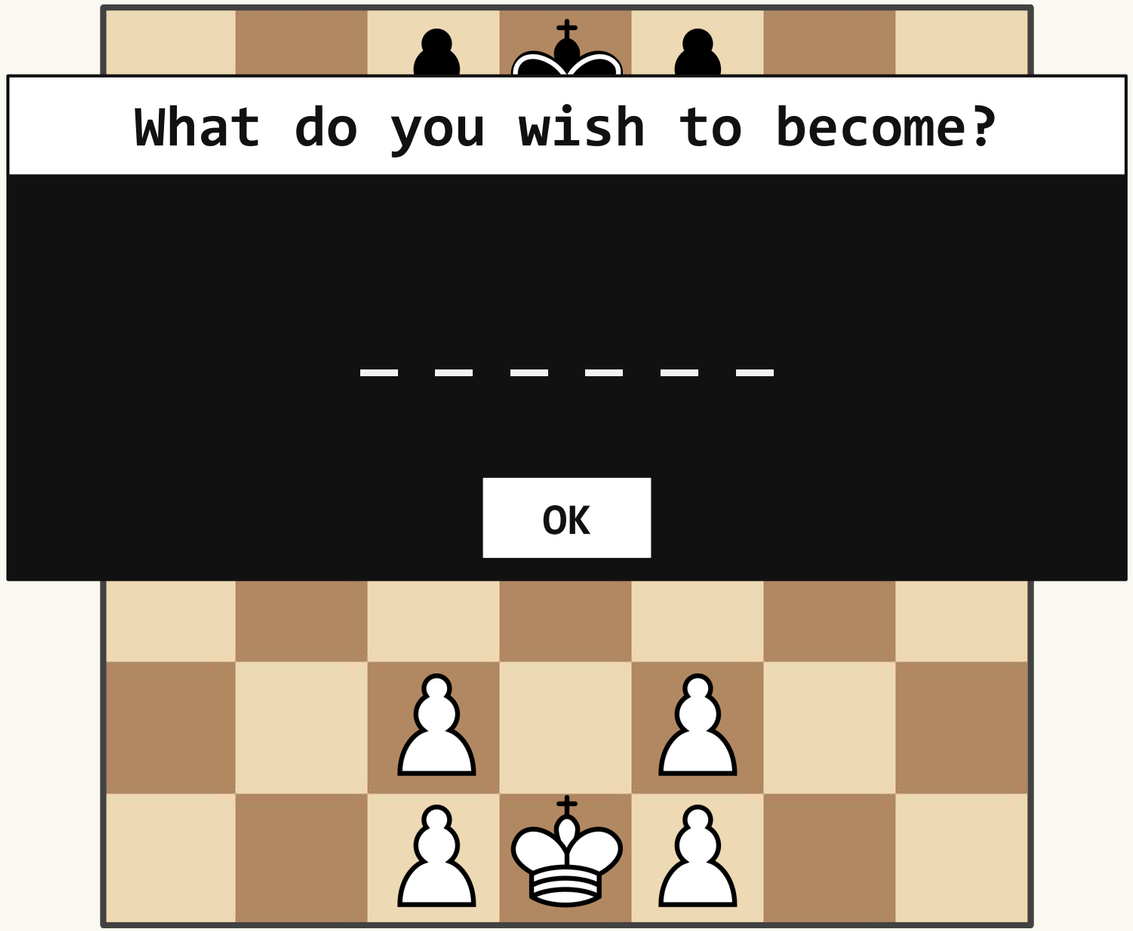

ChessCraft, Stuart Spence

Miracle Chess a first concept for Live Automated Game Design

ChessCraft, Stuart Spence

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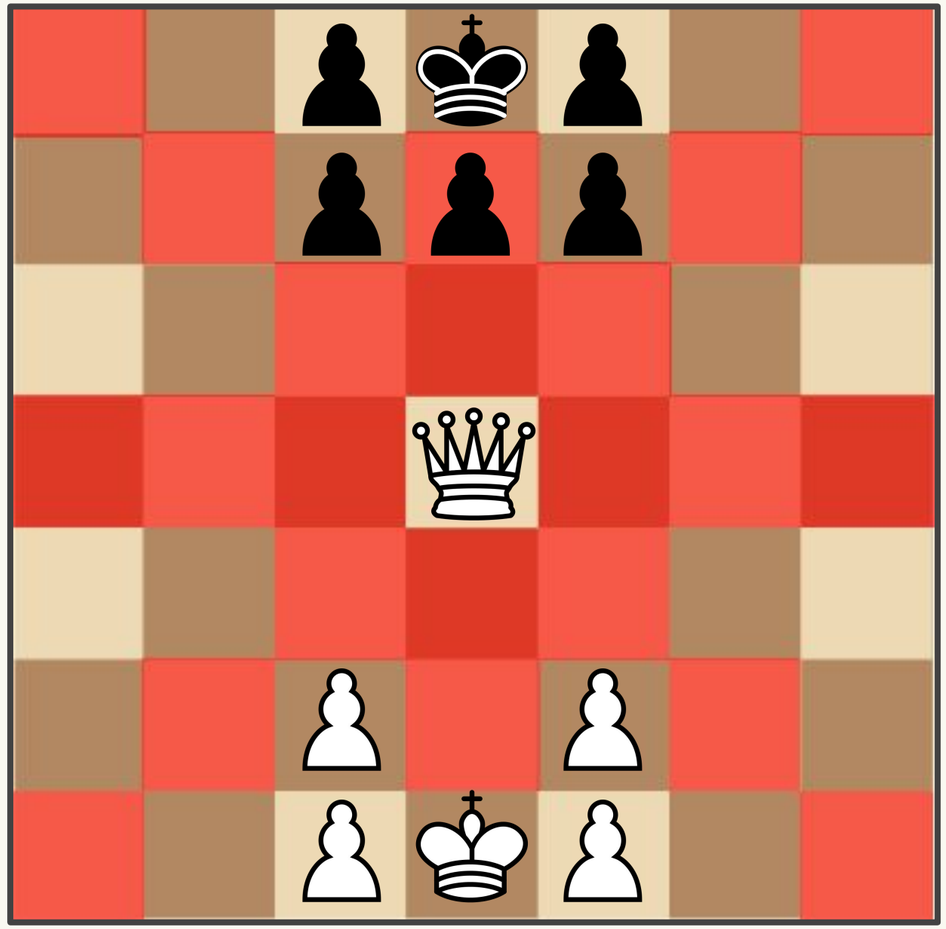

Queen
Can move any number of cells in all 8 directions.

ChessCraft, Stuart Spence

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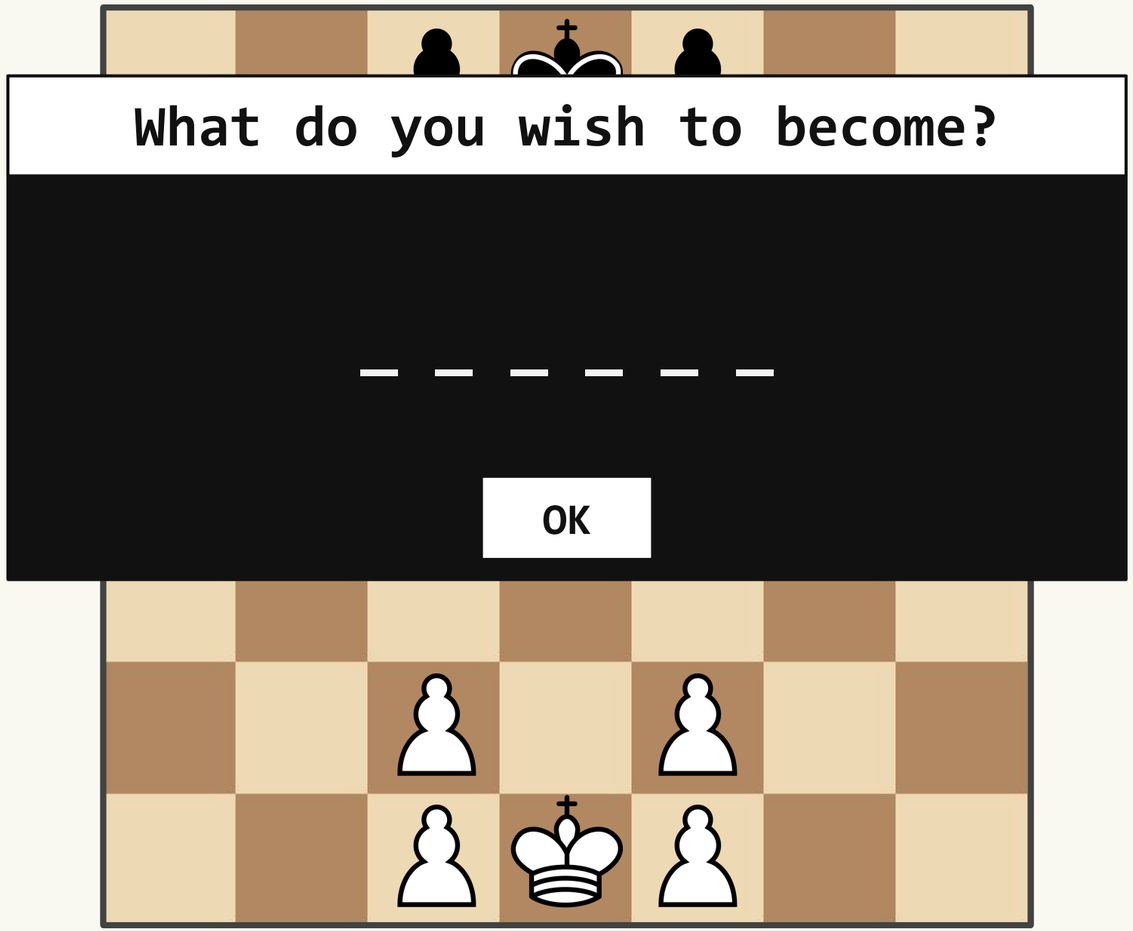

ChessCraft, Stuart Spence

Miracle Chess a first concept for Live Automated Game Design

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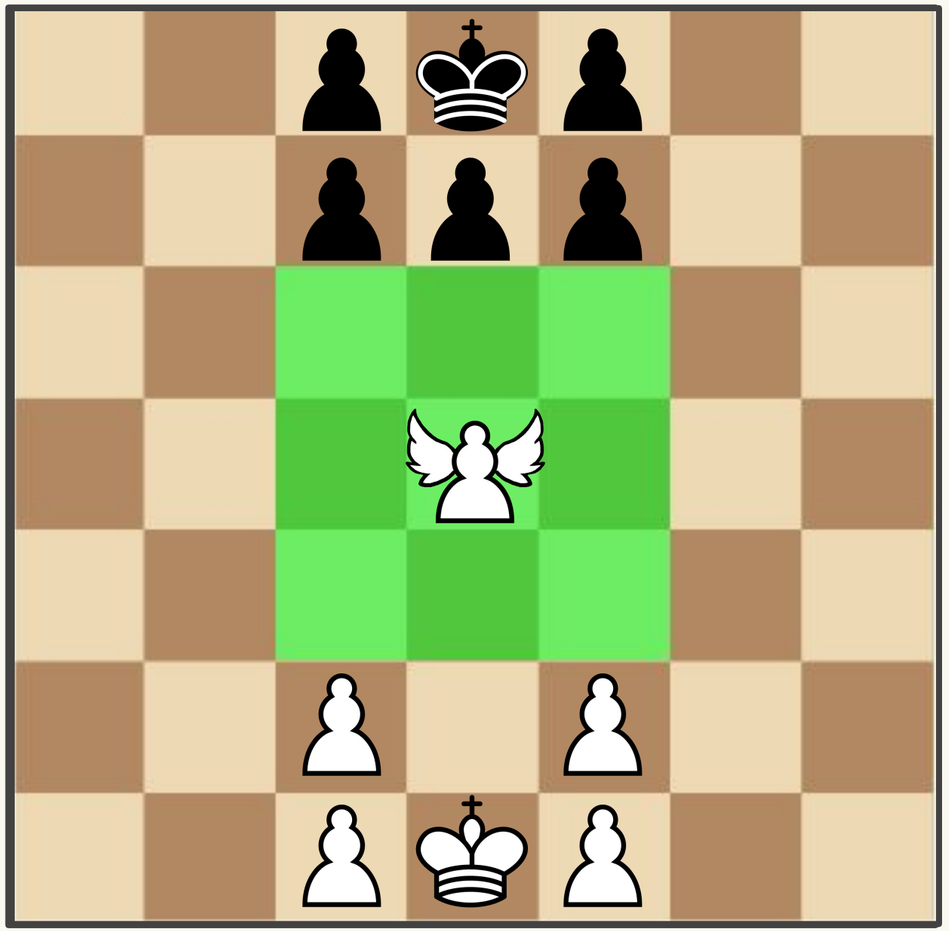


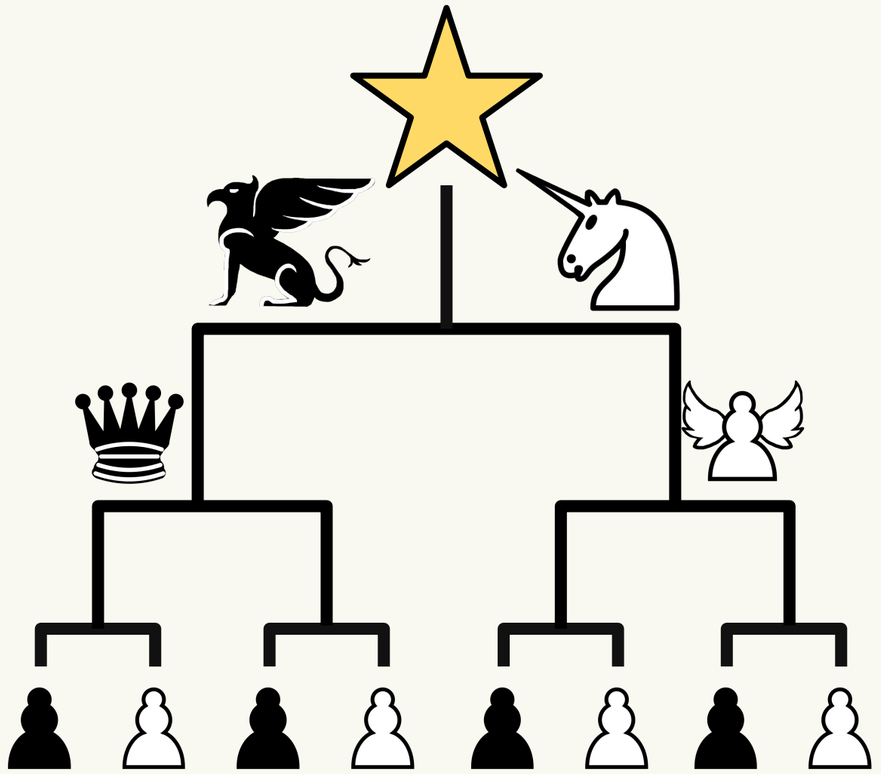
Angel

Can move 1 cell in all 8 directions.

Pieces next to it can't be captured

ChessCraft, Stuart Spence

Miracle Chess a first concept for Live Automated Game Design



ChessCraft, Stuart Spence

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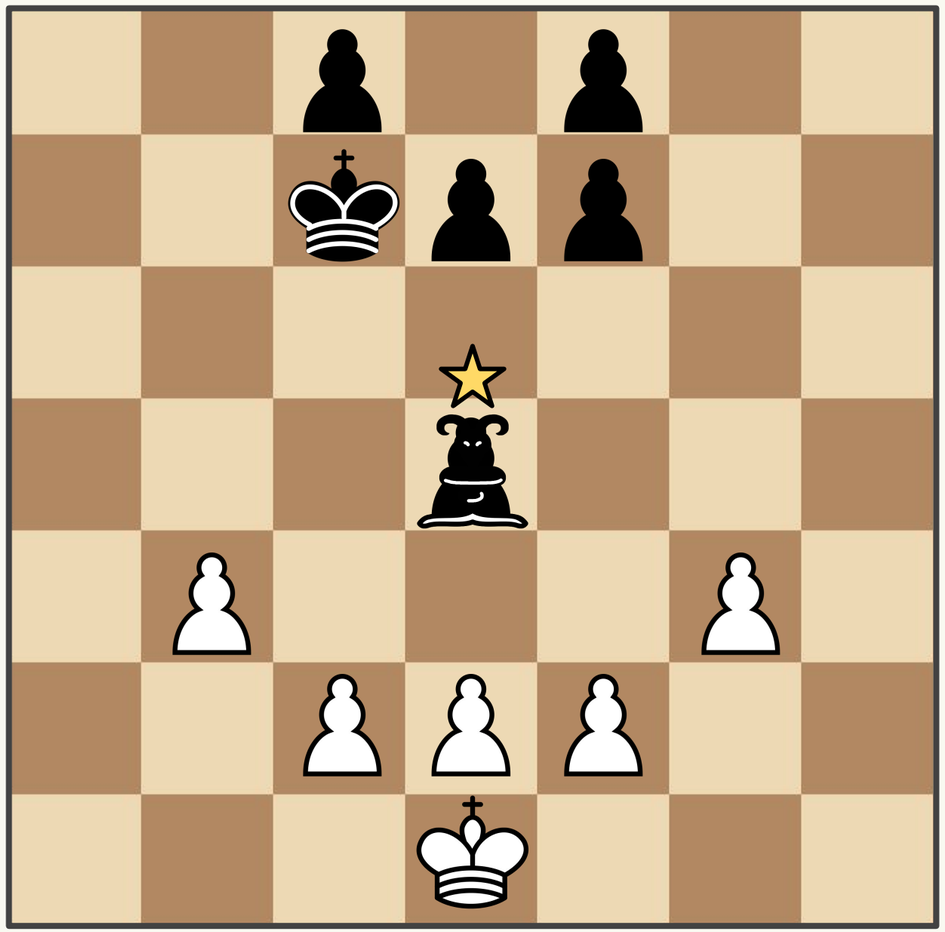

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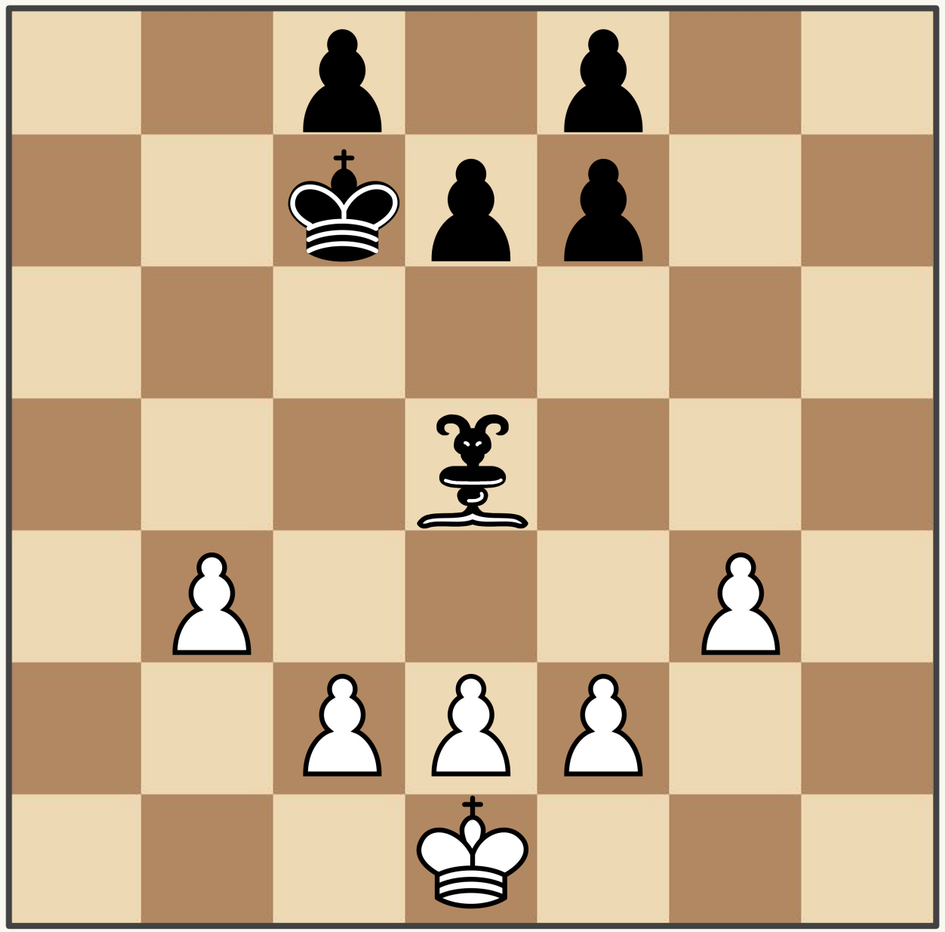

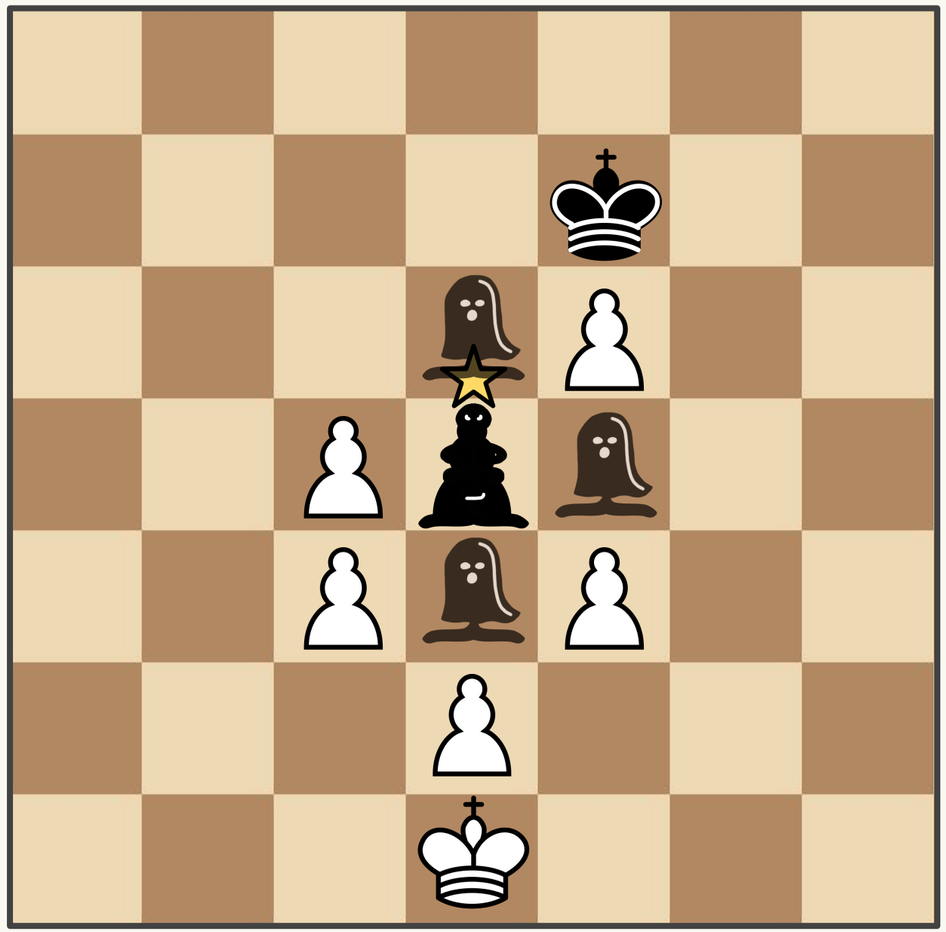

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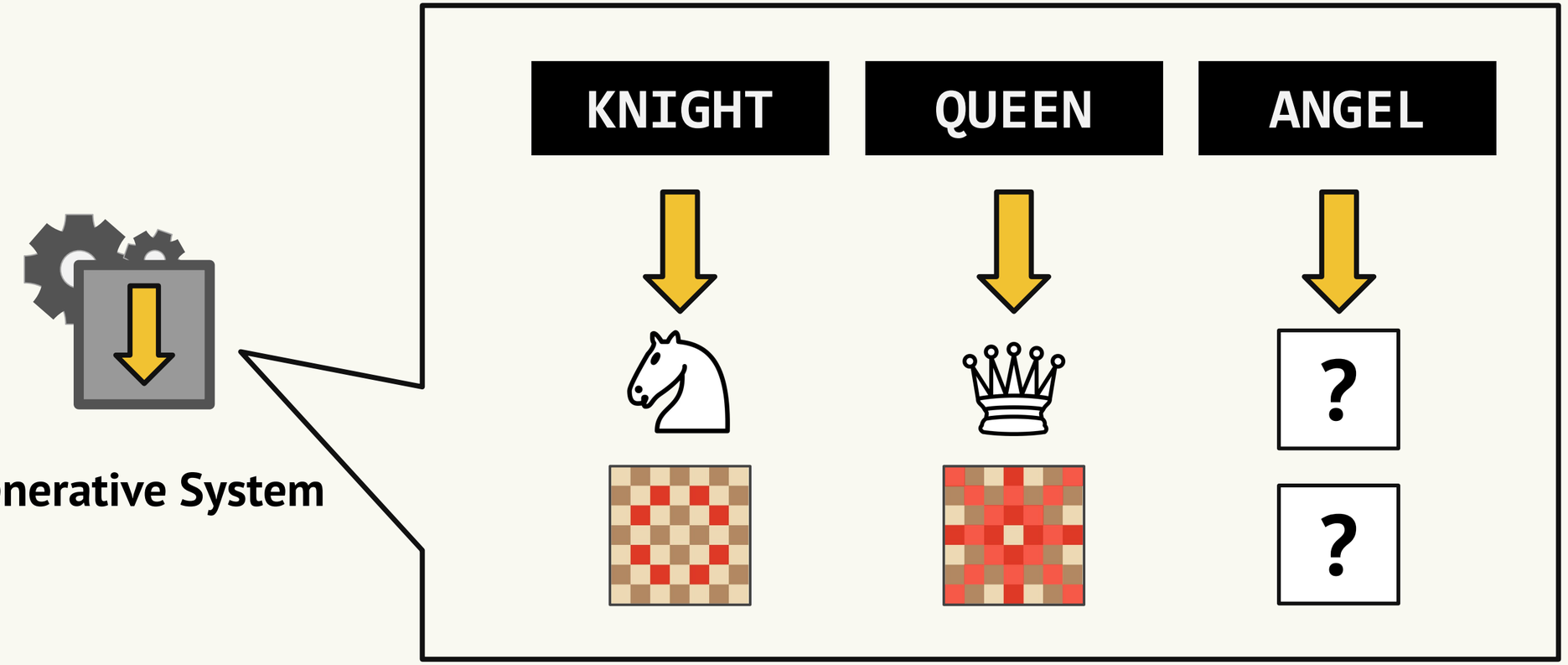
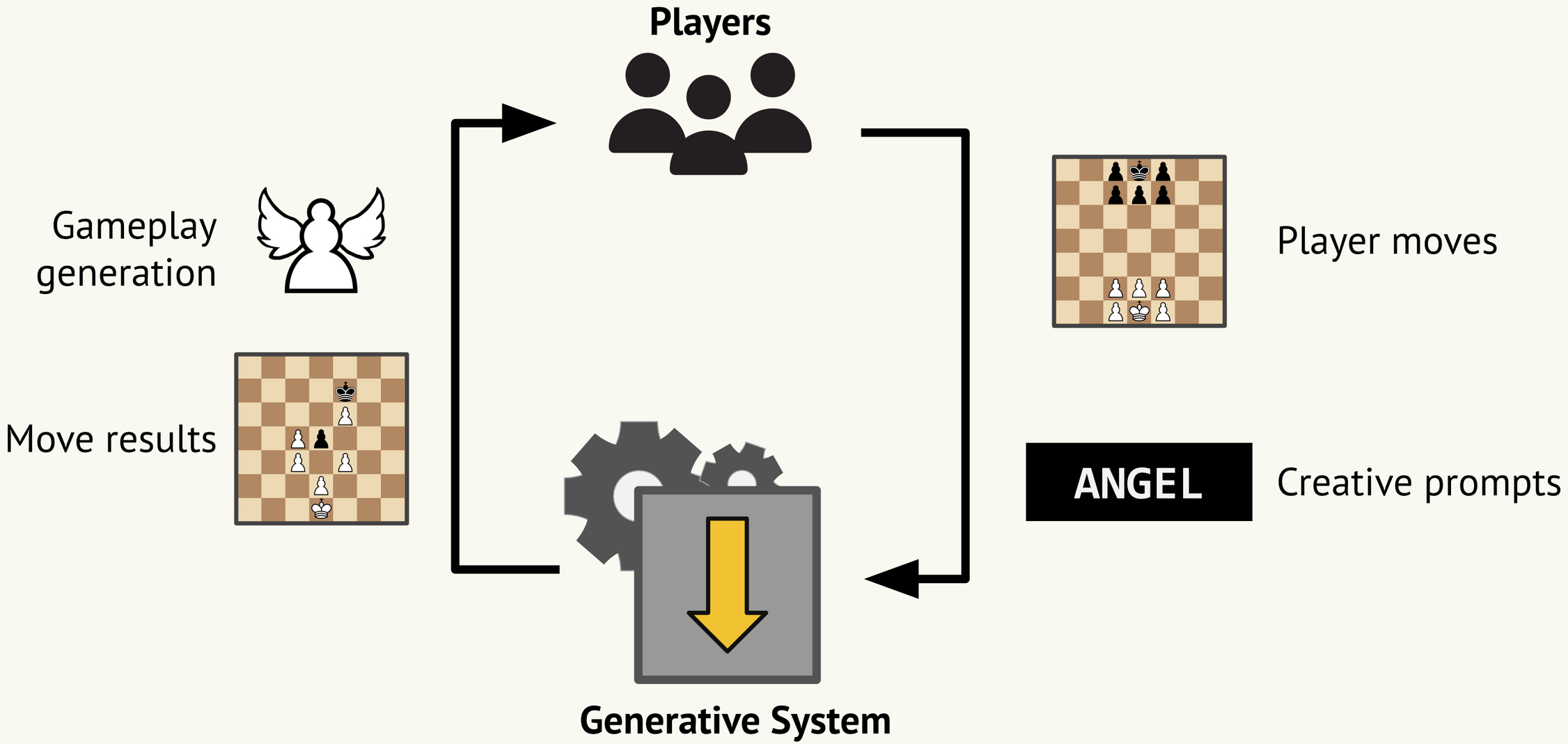
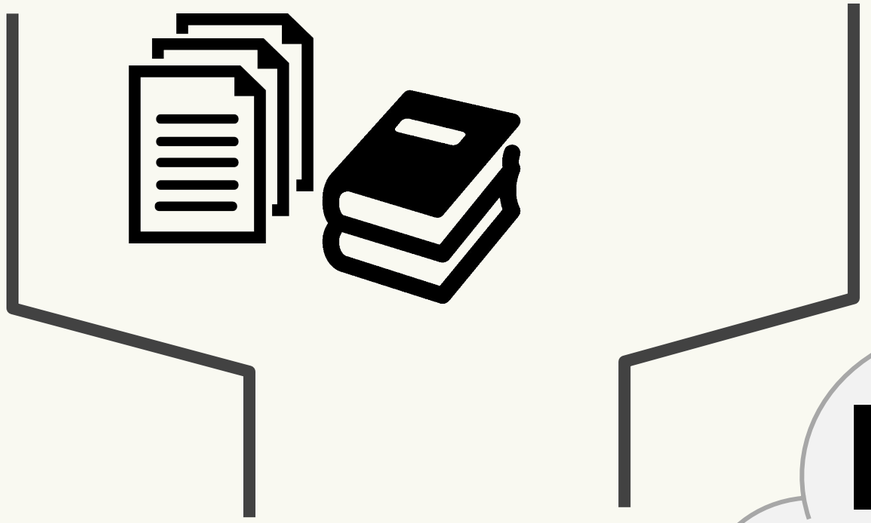


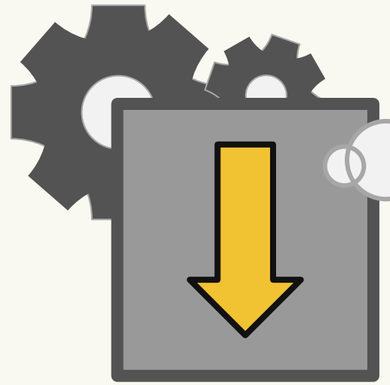
«Revealing game dynamics via word embeddings of gameplay data»
Rabii, Y., & Cook, M. (2021)

Miracle Chess a first concept for Live Automated Game Design

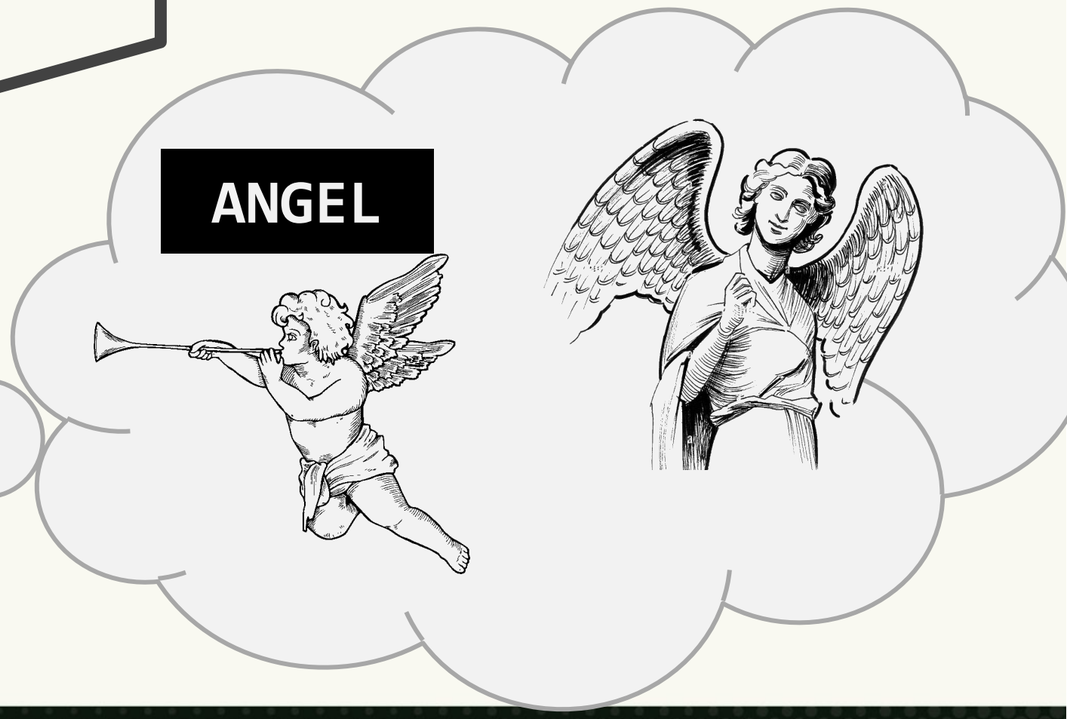


Web Scrape (who?)

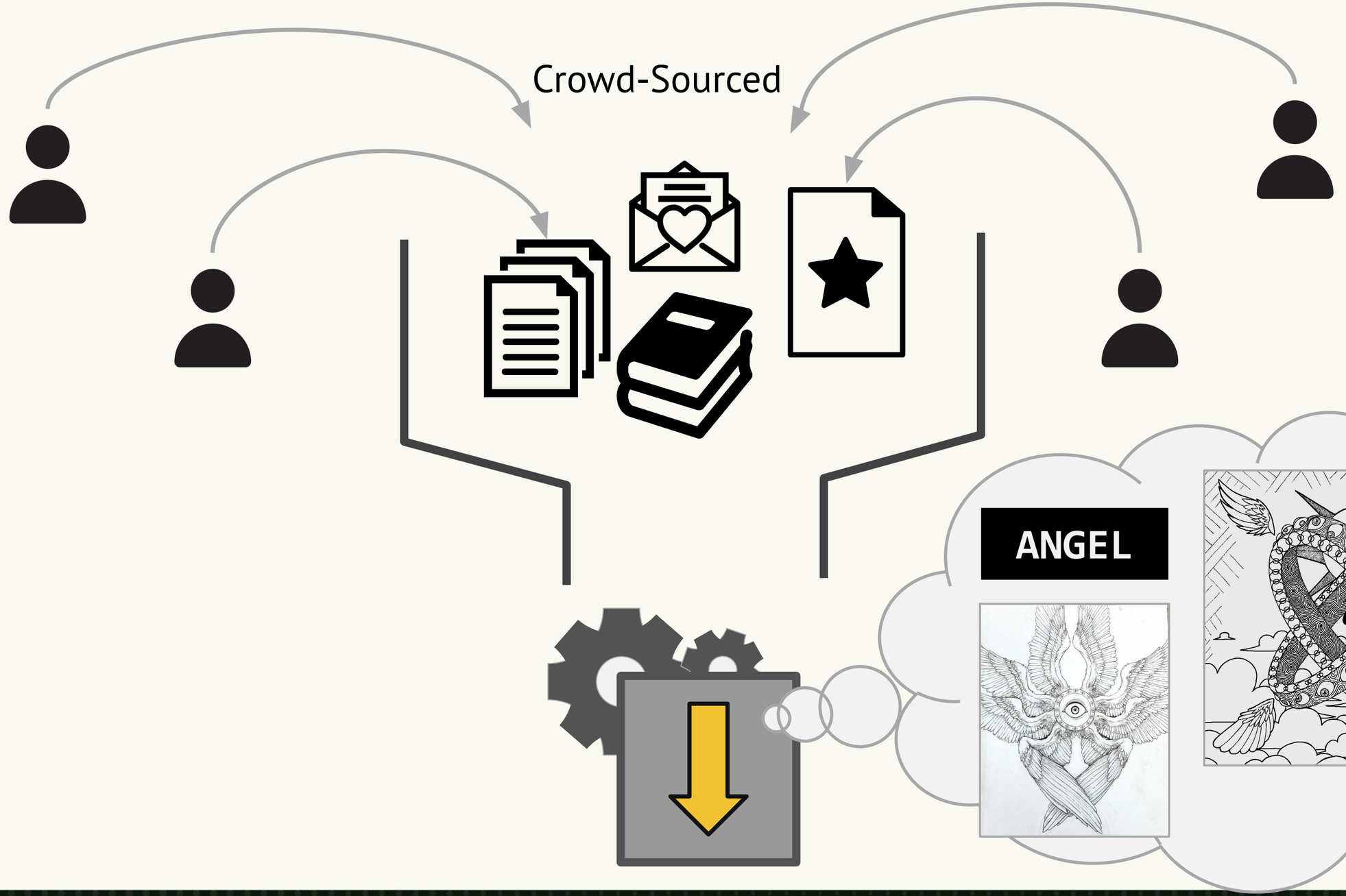




Knowledge Representation



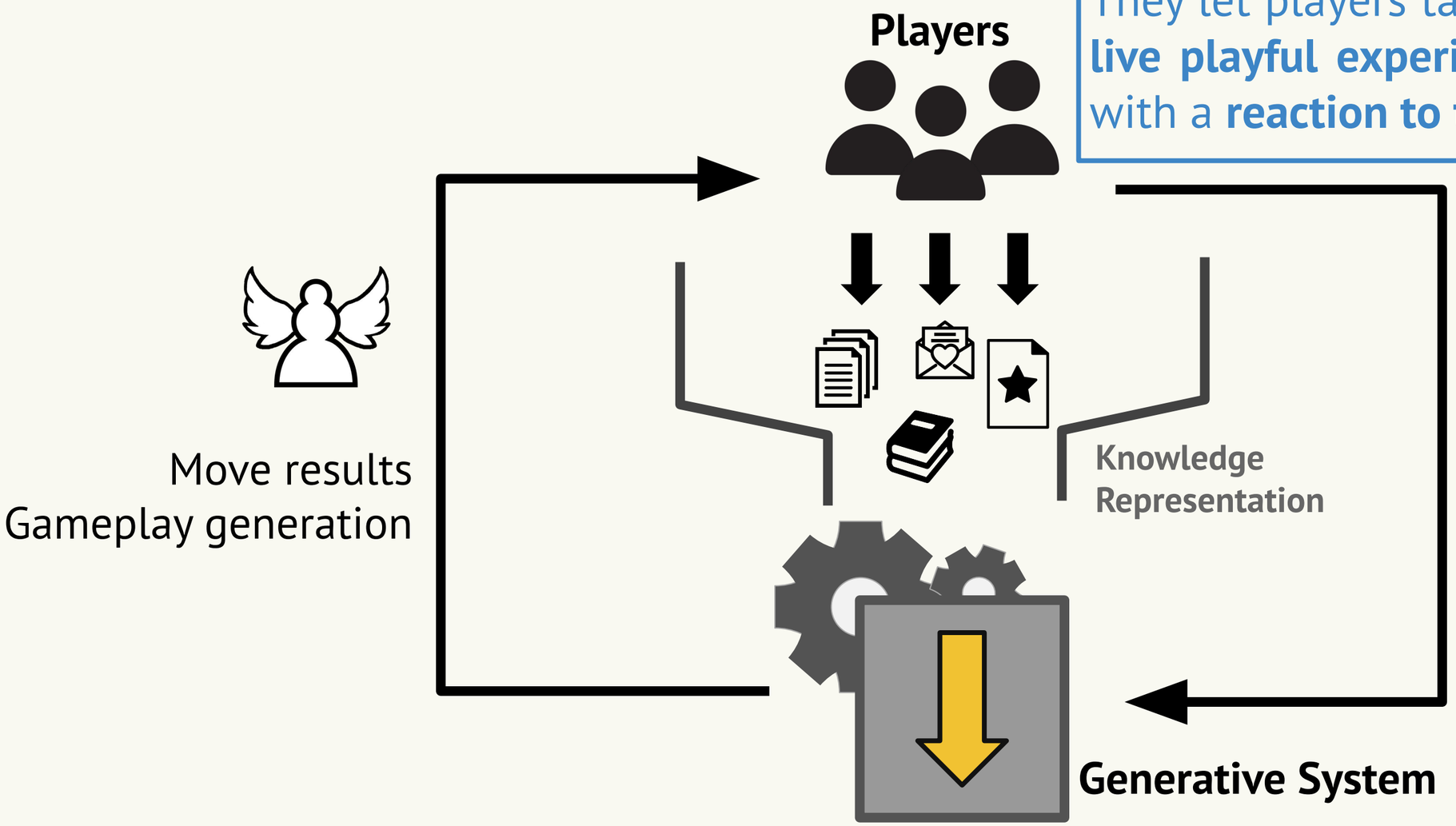
Crowd-Sourced



bAAAtery, DeviantArt

Miracle Chess a first concept for Live Automated Game Design

They let players take part in the design of a **live playful experience** and surprises them with a **reaction to their own creations**



GDC | March 21-25, 2022
San Francisco, CA

FINAL PART — Take-Aways

#GDC22

Disco Elysium (edited)

Keep in Mind

- **WE LIVE IN A SOCIETY**
  AI in games focused on tech complexity but neglected designing the social structure around their games – even though they are its backbone

- **NO FREE LUNCH**
  PCG brought up as a way to save cost – fails at that. Instead of looking at at way to make things cheaper, look at it as a way to make things different

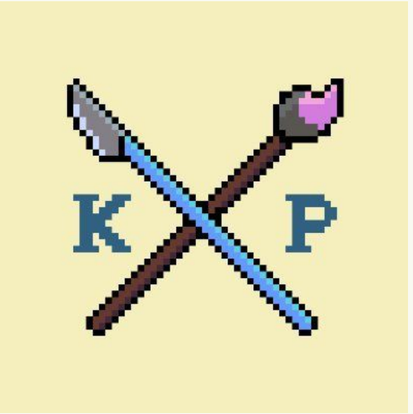
Disco Elysium (edited)

@florencesn

@pyrofoux

@pyjamads

@mtrc



@knifeandbrush

We’re excited to work and chat with people who want to make the games industry - and AI - a better and weirder place.

Email us: sayhello@knivesandpaintbrushes.org

More info: knivesandpaintbrushes.org

And don’t forget…

GDC AUDIENCE MEMBER - The audience looks at the slides in dismay:

"But.. you *are* AI researchers."

YOU - "Yeah -- fuck us."

GDC AUDIENCE MEMBER - "But why? You're building the future, you get to work on exciting new technology..."

YOU - "But whose future are we building? THE SAME PEOPLE WHO RUINED THE PRESENT."

Task complete: spoke at GDC 2022

@FlorenceSN @pyrofoux
sayhello@knivesandpaintbrushes.org
knivesandpaintbrushes.org

104.14 12:35 Day 4