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Group name: Video Game Mechanics

Cognitive Analysis Draft

I. Hypotheses

1. Participants will predominantly generate game mechanics by analogically mapping from previously encountered games or media narratives.

2. Participants will evaluate the quality or feasibility of their proposed mechanics based on subjective heuristics such as perceived fun or aesthetic appeal.

II. Methodology

This study utilized a semi-structured interview format to investigate the cognitive processes behind early-stage video game design. The primary goal was to understand how individuals conceptualize and evaluate novel game mechanics, particularly during the ideation phase of development.

Participants were recruited mostly from the Georgia Tech student population using convenience sampling. Each interview was conducted online. To reduce observer bias and encourage natural responses, interviewers did not record audio, but instead took detailed notes and encouraged participants to think aloud during the design task.

To analyze the data, we plan on using qualitative coding and thematic analysis, focusing on the presence of cognitive strategies such as analogical mapping, schema retrieval, heuristic evaluation, and satisficing. Codes will be developed iteratively through discussion and cross-checking of interview notes. The results of this analysis will be used to test our hypotheses and build a cognitive framework explaining how individuals generate and assess novel game mechanics.

III. Participants

Participants were recruited from the student population and completed a brief pre-test demographic survey that collected information on age, gender, race, academic year, major, gaming habits, and prior game development experience.

Table 1: Description of Study Participants

Participant	Age	Gender	Major/Degree	Hours/week gaming	Experience	Chosen prompt

1	18-22	Female	BS Illustration	20-25	Early production, Self-taught	2
2	18-22	Female	N/A	10-15	Scratch, Flash	2
3	18-22	Male	BS/MS CS	10-15	In classes now	3
4	18-22	Male	BS CS	15-20	High school class	1
5	18-22	Male	BS BME	15-20	Self-taught	2
6	18-22	Male	MS EE	5	Level creation only	3
7	23-27	Male	MS CS	6	In classes now	3
8	18-22	Female	BS CS	20+	Made game replicas	1
9	23-27	Female	BS Computational Media	10-20	Created several games	2
10	23-27	Male	MS Industrial Design	5-7	Prototype experience from coursework	3
11	23-27	Female	PhD Psychology	8-10	None	3
12	23-27	Male	BS CS	15-20	Personal projects	2

IV. Study Protocol

Each interview lasted approximately 20 to 30 minutes and was conducted using a standardized protocol. The interview was divided into four main segments:

1. Introduction and Consent: Participants were informed of the study's purpose, their rights, and how the data would be used. Verbal consent was obtained before proceeding.
2. Creative Design Task: Interviewees were asked to develop a core mechanic for a hypothetical game based on one of three narrative prompts. These prompts included scenarios such as playing a detective who is the prime suspect, a sentient weapon, or a robot undergoing self-discovery.
3. Process and Visualization Questions: After each prompt, participants were asked to explain their thought process and describe the visual and interactive aspects of their game idea. Interviewers took note of implicit assumptions about game perspective, layout, and control schemes.
4. Evaluation and Reflection: Participants discussed their idea generation triggers, the values they consider important in mechanic design, and how they decide whether a concept is worth exploring further.

Data from the interviews were analyzed qualitatively to identify patterns in cognitive strategies, decision-making criteria, and conceptual frameworks used during design ideation.

V. Results

We collected qualitative data through detailed written notes taken during each interview. Because sessions were not audio-recorded, the data takes the form of interviewer-annotated transcripts capturing participant responses, quotes, and key cognitive observations. Each transcript includes the participant's design prompt choice, their walk-through of the mechanic development process, and their responses to reflection and evaluation questions.

On average, each transcript is approximately 600–800 words, with the shortest around 450 words and the longest nearing 1,200 words, depending on the level of elaboration from the participant. No participants withdrew early, and all interviews proceeded without disruption.

Below are sample excerpts from two interviews that illustrate the structure and content of the data:

> Sample Transcript Excerpt – Participant 3 (Prompt: Robot Self-Discovery)
> Interviewer: "Can you walk me through your process for designing this mechanic?"
> Participant: He imagined a robot that gains new emotions as the story progresses. Like in Big Hero 6, when Baymax starts understanding more human emotions. Each emotion would unlock a new gameplay ability.
> Comment: Participant draws direct analogy from animated film. Schema of 'emotional state = ability' appears. May be relying on emotional progression arc seen in media.

> Sample Transcript Excerpt – Participant 8 (Prompt: Detective Suspect)
> Participant: She was watching Until Dawn yesterday and liked how her choices affect survival. She wanted that, but in a detective story where every decision makes you look more or less guilty.
> Interviewer: "What makes that mechanic interesting to you?"
> Participant: Because it forces the player to second-guess even their minor decisions. That tension is fun.
> Comment: Strong influence of recent exposure. Mechanic revolves around player perception and branching narrative structure.

The table below provides a structured summary of each participant's proposed mechanic, their reasoning and evaluation approach, and assumptions about gameplay. These entries serve as the empirical foundation for the thematic analysis in the next section.

Table 2: Interview Summary

Participant	Mechanic	Idea Source	Reasoning Style	Evaluation Focus	Assumptions
1	Shaping oneself over the course of the game as progression	Astrobot	Goal driven, meet industry expectations	Uniqueness, feasibility, Player freedom	3rd person, small team of developers, low budget
2	Negotiation system (trade powers for fate)	Kingdom Hearts	Analogical reasoning	Uniqueness, narrative depth	3rd person perspective, menu only in combat
3	Robot switches between emotional modes	Big Hero 6, The Wild Robot	Emotional mapping, story driven	Player relatability, modular expansion	RPG, 3rd person perspective, PC game
4	Dual-Perspective karma-based detective game	Baldur's Gate 3, 1800s noir detective aesthetic.	Story-first, emphasis on mechanic-story coherence	Ease of understanding, narrative depth, fun factor	3rdperson, PC game, open world, karma meter (innocent/guilty)
5	Sentient weapon whose form and powers evolve based on the wielder	Xenoblade Chronicles, Soul Eater anime.	Constraint-driven, world-first, genre-focused	Fun, progression, learning, audience response	3D open world, medieval setting, turn-based combat, RPG format, swap perspectives.
6	Grow flowers on ground as player walks	Undertale, Pokémon Black/White	Aesthetic driven, visual inspiration	Visual appeal, immediate input feedback	3rd person, cute robot, minimal UI, photorealistic nature
7	Robot upgrades by collecting items	QQ Pets, Minecraft	Memory-weighted game influence	Precedent in popular games	1st person, keyboard only
8	Quicktime decisions	Until Dawn, GTA	Memory, genre matching	User satisfaction, genre fit	3rd person, console game, city setting
9	Robot companion with toggling emotion states based on stimuli	Big Hero 6, Inside Out	Narrative coherence through character expression	Emotional clarity, flexibility	Sidekick NPC, 3rd person, social simulation elements

10	Sentient sword with fixed location- player must adapt	Soul Eater, DnD	Constraint-driven abstraction	Strategic depth, player mastery	Turn-based combat, character switching, high fantasy setting
11	Puzzle system based on anchoring bias	Cognitive bias literature	Cognitive principle scaffolding	Mental challenge, player learning	Top-down view, puzzle interface, no combat
12	Scripting-based mechanic to write gameplay logic	APIs, coding interfaces	Technical abstraction model	Player agency, emergent complexity	Command-line-like interface, sandbox mode, single-player

VI. Analysis

The interview process revealed several common patterns across participants. One of the most prominent strategies was analogical reasoning, where participants were inspired from previously played or observed games and media. This was evident in Participant 3 citing movies like *Big Hero 6* and *The Wild Robot* as inspiration for the gameplay mechanic of a robot gaining emotions and changing behavior based on emotional states. Most participants demonstrated the retrieval of specific schemas close to the original prompt and recombined them to produce novel game mechanics.

Another pattern revealed was the reliance on memory and familiarity. Participants often based their designs on personal preferences and past gaming experiences. Participant 8 mentioned that recently watching a playthrough of *Until Dawn* directly influenced them to use quicktime events in their game. This suggests that recent exposure can bring forward cognitive schemas that were stored and influence decisions when doing a creative design task. Participants frequently used existing media as a baseline reference, allowing them to build and connect new concepts to create a unique mechanic.

The participants' evaluation strategies were often varied. The participants typically assigned value to if the mechanic would be fun and interesting. Participant 6 expressed that their flower-growing mechanic was selected because it "looked nice" and did not consider other options. The participants' subjective evaluation indicated that they pursued the first viable idea that aligned with their internal standards. Participant 7 was even more explicit, saying that if a mechanic wasn't already found in other popular games, they would not pursue it further. This highlights a common reliance on popularity and precedent as a form of evaluation.

There was a consistent but implicit reference to the project's core criteria across participants: distinctiveness, fairness, fun, and intuitiveness. Most designs attempted to be original but often borrowed mechanics from similar games (distinct) that the participants themselves enjoyed (fun), incorporated some sort of adaptability or agency (intuitive), and were rarely concerned with the balance of the mechanic (fairness). Fairness was often the most downplayed. Participant 3 explained that if they personally found a mechanic idea to be fun and playable, they assumed it would be fair for others as well. Developers substitute self-assessment for usability testing and feedback in the ideation stage.

Participant	Analogical Mapping	Schema Retrieval	Heuristic Eval.	Satisficing	Quote Example	Evidence for Schema Retrieval & Satisficing
P1	Yes (Astrobot)	Yes	Yes (freedom, uniqueness)	No	"Giving the player more freedom is most important."	Mentioned giving player 'freedom' like in known 3D platformers; evaluated one idea deeply, didn't pursue others.
P2	Yes (Kingdom Hearts)	Yes	Yes (narrative depth)	Yes	"I wanted it to be like how the Keyblade works in Kingdom Hearts."	Directly invoked Kingdom Hearts keyblade mechanic; chose a familiar concept and committed early.
P3	Yes (Big Hero 6, Wild Robot)	Yes	Yes (fun)	Yes	"It reminded me of Big Hero 6 and The Wild Robot."	Cited Big Hero 6 and Wild Robot; leaned into emotional logic without exploring many variants.
P4	Yes (Baldur's Gate 3)	Yes	Yes (coherence)	No	"Wanted story and mechanic to align, like in Baldur's Gate 3."	Referenced Baldur's Gate 3's character switching; considered narrative fit but explored more than one idea.

P5	Yes (Soul Eater, Xenoblade)	Yes	Yes (fun, learning)	Yes	"I thought of Soul Eater, where weapons change with the user."	Drew from Soul Eater and Xenoblade schemas (emotion mechanics); settled quickly on first matching concept.
P6	Yes (Undertale, Pokemon)	Yes	Yes (visual appeal)	Yes	"It just looked nice, like in Undertale."	Named Undertale and Pokemon; emphasized visual aesthetic and appeal without iterating alternatives.
P7	Yes (QQ Pet, Minecraft)	Yes	Yes (precedent)	Yes	"QQ Pet takes the most space in my head."	Cited QQ Pet and Minecraft; described no iteration beyond the initial idea, saying it was 'just the first thought.'
P8	Yes (Until Dawn)	Yes	Yes (user satisfaction)	Yes	"I was watching Until Dawn earlier today."	Watched Until Dawn before interview; built mechanic around branching narrative concept from it with no alternatives discussed.
P9	Yes (Big Hero 6, Wild Robot)	Yes	Yes (relatability)	Yes	"Reminded me of Baymax's different modes for emotions."	Pulled from Baymax/Big Hero 6 again; used familiar character logic to define mechanic and UI, no evidence

						of additional ideation.
P10	Yes (Soul Eater, DnD)	Yes	Yes (progression)	Yes	"Started with constraint: weapon can't move. Anime like Soul Eater."	Began from idea of a 'non-mobile' weapon, as seen in DnD and anime; stuck with initial dual-mode weapon concept.
P11	Yes (Self-Determination Theory, cognitive bias studies)	Yes	Yes (intrinsic motivation)	No	"Started with Anchoring Bias-wanted to externalize thought process."	Activated schema from cognitive bias literature; designed mechanic from anchoring bias directly, but evaluated multiple examples before finalizing.
P12	Yes (coding interfaces, APIs)	Yes	Yes (emergent complexity)	No	"Player writes scripts like disable_sector_1A(). That's elegant."	Framed idea through programming/API mental model; iterated through interface and abstraction layers instead of jumping to final mechanic.

VII. Conclusion

The data suggest the emergence of analogical reasoning based approach. Subjects retrieve patterns or mechanics extracted from their experience with existing games. Analogous reasoning is used to generate mappings from between the existing game schema, the inspirational source, and the novel game schema.

Interviews also suggest a less rigorous evaluation. Key parameters included uniqueness, fun, and aesthetic appeal, each vague and not easily quantifiable. These parameters are instead evaluated against the remembered experience of similar mechanics that have been mapped onto the emerging game schema.

VIII. Implications for computational cognitive model

Analogical Reasoning as Core Mechanism: Designers retrieve and map familiar schemas from past games or media to new prompts, using analogy to bridge source material to novel ideas.

Memory-Driven Ideation: Recency and personal preference guiding schema selection.

Heuristic Evaluation over Systematic Testing: Ideas are judged based on subjective criteria, often using internal validation rather than formal analysis.

Satisficing Strategy: Designers tend to pursue the first idea that fits their goals rather than exhaustively exploring alternatives.

References

[1] References here in alphabetical order