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Cybernetic semiotics in interactive digital narratives: Toward a semiotic framework for meaning-making in cyberspace with *Detroit: Become Human* as a case study

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Abstract

Background: Cyberspace has evolved into a vast and intricate cultural ecosystem in which the boundaries between communication, cognition, and creation are constantly being redefined.
Aims: This study examines how digital interactivity restructures the semiotic logic of narrative meaning-making within contemporary cyberspace, using *Detroit: Become Human* as a paradigmatic case of interactive digital narrative. The research aims to determine how multimodal signs, procedural architectures, and player agency interact to produce dynamic and networked processes of semiosis.
Methodology: Through an integrative semiotic framework, encompassing multimodality, interactive agency, and branching narrative design, the analysis demonstrates that meaning in the game emerges not from fixed textual structures but from recursive exchanges between human interpretation and algorithmic responsiveness.
Findings: The findings reveal that the game's interactive architecture generates a self-modifying semiotic environment in which choices function as sign-acts that reorganize symbolic patterns across divergent narrative trajectories. This networked mode of signification reflects the broader cultural logic of cyberspace, where meaning is co-created through participatory, decentralized interaction rather than linear authorial transmission.
Conclusion: The study concludes that interactive digital narratives constitute a distinctive semiotic paradigm, one that transforms storytelling into a collaborative and cybernetic process of meaning construction. These insights offer a foundation for future research on how digital media, algorithmic systems, and user participation jointly reshape contemporary forms of narrative and cultural signification.

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1. Introduction

Cyberspace has evolved into a vast and intricate cultural ecosystem in which the boundaries between communication, cognition, and creation are constantly being redefined. It is no longer a mere technological infrastructure but a semiotic habitat, a dynamic realm where meaning is continuously produced, circulated, and transformed through human–machine interaction (Szczęsna, 2019). Within this cybercultural environment, digital interfaces function simultaneously as communicative channels and symbolic architectures, shaping how individuals perceive, interpret, and construct reality (Scolari, 2009). As users navigate this environment, they engage in ongoing processes of interpretive negotiation, interacting with an ever-expanding web of signs, codes, and algorithmic systems. This transformation has fundamentally reshaped the cultural logic of storytelling, authorship, and interpretation, marking a paradigmatic shift away from static, linear textual forms toward interactive, participatory, and processual models of meaning-making.

One of the most significant manifestations of this semiotic transformation is the rise of interactive digital narratives (IDNs), hybrid forms that merge narrative, system design, and user interactivity into coherent yet fluid signifying systems (Koenitz, 2023). Unlike traditional narratives governed by predetermined sequences, IDNs invite users to actively co, create meaning through decisions that alter the story's trajectory at both local and global levels (Chen et al., 2023). In such environments, the act of playing becomes inseparable from the act of interpreting; each choice not only advances the narrative but also reconfigures the symbolic logic underlying it. This shift reflects the broader epistemological conditions of cyberspace, where meaning emerges through decentralized participation, recursive feedback, and algorithmic responsiveness rather than through hierarchical narrative transmission. Digital games, as one of the most technologically sophisticated and symbolically dense forms of IDNs, thus hold a central position in cyberculture; they function as cultural texts, multimodal semiotic laboratories, and experiential interfaces that materialize the logic of interactivity (D'Armenio, 2024).

Within this context, *Detroit: Become Human* (Quantic Dream, 2018) stands as a paradigmatic instance of how digital interactivity operates as a mode of signification within contemporary media ecologies. Set in a near, future world characterized by artificial intelligence, social conflict, and moral ambiguity, the game positions the player as an active interpreter whose actions determine not only narrative outcomes but also the ideological and symbolic contours of the storyworld. Each gesture, hesitation, or refusal generates semiotic consequences that ripple through the system's branching logic, producing a networked text in which meaning is perpetually renegotiated. Player agency thereby becomes both a narrative instrument and a semiotic mechanism;

through interaction, the user enters into a recursive dialogue with the system, co, authoring meaning within the affordances and constraints of its algorithmic architecture.

However, despite substantial scholarly engagement with digital storytelling, ludology, and game design, a considerable theoretical gap persists regarding how meaning is produced semiotically in interactive digital systems (Korte & Ferri, 2018). Existing studies tend to isolate narrative structure, system mechanics, or user engagement, while neglecting the deep semiotic processes through which signs, algorithms, and player choices interact within a unified signifying ecology. Interactivity is often treated as a structural affordance or technological feature rather than as a transformative semiotic process. Consequently, the fundamental question of how digital interactivity reorganizes the relationships between signifier, signified, and interpreter, core concerns of classical and contemporary semiotic theory, remains insufficiently theorized. This research thus responds to the need for an integrative semiotic framework capable of explaining how digital environments generate, sustain, and modulate meaning through interaction.

The urgency of such a framework extends beyond game analysis. As social, political, and ethical discourses increasingly unfold within algorithmically mediated spaces, understanding the semiotic logic of interactivity becomes essential for media studies, cultural studies, and cyberspace research (Simsek & Bozdağ, 2024). Interactive narratives are not only cultural texts but also experimental arenas that simulate the processes through which humans and digital systems co-construct meaning. *Detroit: Become Human*, in particular, dramatizes the negotiations between user intention and algorithmic design, making it an instructive lens through which to explore how narrative, technology, and signification converge in the digital age.

This study aims to investigate how meaning is constructed, negotiated, and transformed through interactive engagement in *Detroit: Become Human*, employing a semiotic methodology situated within the broader field of cyberspace studies. It examines how linguistic, visual, auditory, and procedural signs operate in relation to player actions, and how the game's branching architecture and ethical decision-making systems reshape conventional narrative and semiotic logics.

The inquiry is guided by three core questions; how digital interactivity operates as a semiotic process within the game; how multimodal and procedural sign systems interact with player agency to generate meaning structures that are both coherent and variable; and how the game reflects wider cybercultural patterns of meaning-making characteristic of contemporary digital environments.

The study proceeds from the hypothesis that digital interactivity reconfigures meaning-making from a linear, author-centered model into a distributed, interpretive, and cybernetic system of semiosis, wherein

meaning emerges from iterative exchanges among players, algorithms, interfaces, and narrative structures. Positioned within the broader field of cyberspace studies, the research argues that interactive digital narratives represent a new phase in the cultural evolution of signification, one in which narrative coherence arises not from closure but from relational connectivity, and in which interpretation becomes inseparable from participation.

The remainder of the article proceeds as follows; the next section develops the conceptual background and theoretical framework, followed by a detailed explanation of the semiotic methodology employed. The analysis section presents the findings from the case study, and the discussion interprets these results in relation to broader debates in semiotics and cyberspace theory. The article concludes by outlining the implications of the study and suggesting directions for future research.

2. Background and Conceptual framework

In contemporary digital culture, cyberspace is increasingly understood not simply as a technological platform but as a culturally embedded cybercultural environment, a symbolic and communicative milieu in which identities, narratives, and meanings emerge through the interaction of networked interfaces, multimodal media, and algorithmic architectures (Scolari, 2009). Within this environment, digital games function not merely as entertainment systems but as complex semiotic structures in which meaning is continuously generated, reconfigured, and negotiated among designers, systems, and users. This understanding resonates with foundational theoretical contributions in game studies; following Aarseth's (1997) concept of the cybertext, digital games operate as ergodic texts whose meaning is actualized through user traversal, choice, and manipulation. Meaning arises not from passive reception but from an active process of interpretive engagement in which players enact, perform, and alter the textual possibilities encoded within the system.

The theoretical foundation for this perspective lies in classical semiotics, developed by Ferdinand de Saussure and Charles Sanders Peirce, who examined how signs signify and how meaning emerges through relational processes. Saussure's dyadic structure of signifier and signified and Peirce's triadic relation of representamen, object, and interpretant provide essential frameworks for understanding semiosis as an inherently dynamic and context, sensitive activity. While semiotics has long been used to analyze film, literature, architecture, and visual culture, recent scholarship has increasingly applied these concepts to digital and interactive media, recognizing that interactivity introduces new modes of signification. Scholars such as Hawreliak (2018) and de Paula (2021) argue that digital games constitute multimodal semiotic systems in which visual, auditory, textual, and procedural elements

converge to produce meaning. This multimodality positions games as hybrid artifacts whose signifying power cannot be captured through a single analytical lens. Complementing this view, Vargas-Iglesias (2020) emphasizes that virtual environments themselves function as purposive sign systems; game spaces do not merely house gameplay but actively orient, denote, and structure the player's interpretive engagement. Parallel research by Neiva and Romano (2007) and Thibault (2016) foregrounds interaction as a semiotic act, conceptualizing gameplay as an immersive exchange of signs in which interpretation occurs through performance, decision, making, and embodied cognition. Through this lens, the player's movement, hesitation, and choice become components of semiosis.

Within the broader field of interactive media studies, longstanding debates between narratology and ludology have examined the relationship between story and play. While some perspectives prioritize gameplay mechanics over narrative expression, emerging scholarship increasingly conceptualizes interactive narrative as a distinctive mode of meaning, making, one in which user decisions and system affordances fuse to create emergent narrative artifacts (Chen et al., 2023). The interactive digital narrative thus becomes a domain where neither narrative nor play operates independently; instead, meaning emerges from the dynamic reciprocity between systemic constraints and user agency. This interdependence demands analytic approaches that encompass both structural design and interpretive participation.

Within this theoretical landscape, *Detroit: Become Human* offers a paradigmatic example of an interactive narrative that generates a dense semiotic field through the interplay of branching structures, moral dilemmas, multimodal symbolism, and cinematic aesthetics (Caracciolo, 2022). The game's intricate flowchart system, algorithmic responsiveness, and ethically charged decision, making mechanics create a narrative architecture that is simultaneously structured and adaptive, coherent yet variable. These qualities render the game an exemplary case for analyzing how multimodal signs, procedural logic, and player agency converge to produce an evolving network of meanings. Understanding meaning, making in such a context requires a conceptual framework capable of capturing the recursive processes through which systems and users jointly shape the narrative's signifying potential.

The conceptual framework for this study is grounded in four interrelated dimensions that collectively illuminate the semiotic dynamics of interactive narratives. First, semiosis is understood as a dynamic and recursive process through which meaning emerges in the interaction of sign, vehicles, interpretive contexts, and interpretive agents. In digital narratives, interpretive agency is distributed not only to the human player but also to the algorithmic system, which responds to player actions and in doing so reshapes the signifying environment

(D'Armenio, 2024). Interactivity therefore becomes an operation of semiosis rather than a mere interface feature (Thibault, 2016). Second, digital narratives are constituted by multimodal sign, systems, visual cues, audio design, textual components, and procedural rules, whose combined effect creates a complex ecology of meaning (Hawreliak, 2018; de Paula, 2021). Particularly significant is the procedural mode, in which branching logic, feedback responses, and algorithmic decision structures serve as mechanisms of signification. Third, interactive agency shapes meaning as the player participates in the semiotic system by making choices that alter trajectories, influence symbolic structures, and reconfigure interpretive horizons. The player functions as a co, signifier whose actions operate as semiotic events within the narrative environment (Chen et al., 2023). Fourth, the digital narrative architecture, comprising branching paths, conditional events, and interconnected sequences, acts as the semiotic infrastructure through which signs are distributed, linked, and interpreted (Vargas-Iglesias, 2020). In *Detroit: Become Human*, this architecture forms a networked system that enables a multiplicity of narrative trajectories while maintaining structural coherence.

Taken together, these analytical pillars reveal digital interactivity as a culturally significant transformation of narrative and semiotic processes. This study advances the field by integrating semiotic theory with cyberspace studies to conceptualize interactivity not merely as a structural or ludic feature but as a form of cybernetic semiosis distributed across human and algorithmic agents. Through its application to *Detroit: Become Human*, this research demonstrates that meaning in interactive narratives emerges from dynamic networks of signs shaped by multimodal design, procedural logic, algorithmic mediation, and participatory interpretation. This integrative perspective offers a novel methodological and theoretical contribution to the study of digital narratives, illustrating the degree to which cyberspace fundamentally alters the logic of narrative signification and establishing a robust foundation for future research in interactive semiotics, cyberculture, and digital storytelling.

3. Methodology

This study employs a qualitative, interpretive research design grounded in semiotic analysis to investigate how meaning is generated, organized, and transformed through the interactive narrative architecture of *Detroit: Become Human*. Semiotics, as the study of signification and the relational processes through which signs acquire meaning, offers a robust analytical foundation for examining how linguistic, visual, auditory, and procedural elements function within an interactive cybercultural environment (Chandler, 2022). The methodological orientation draws on the triadic model of Charles Sanders Peirce, the structuralist principles of Ferdinand de Saussure,

and the interpretive frameworks advanced by Roland Barthes (1978) and Umberto Eco (1979). Integrating these perspectives enables the analysis to move beyond static textual interpretation toward an understanding of interactivity as a dynamic form of semiosis, in which meaning emerges through recursive exchanges between system and user (Peirce, 1958).

The corpus of this study consists exclusively of *Detroit: Become Human*, selected for its unusually elaborate branching narrative, cinematic multimodality, and extensive use of ethical decision-making mechanics, all of which create a dense semiotic field amenable to interpretive analysis (Bizzocchi & Tanenbaum, 2011). Unlike many narrative games that offer limited variability in their storylines, this game employs a flowchart-based architecture containing hundreds of decision nodes and divergent narrative paths, which makes it uniquely suited to exploring how procedural structures and player-driven choices shape the production of meaning (Murray, 2017). Its three interwoven character arcs, those of Kara, Connor, and Markus, were chosen as the central units of analysis because they represent distinct semiotic configurations, genre conventions, and ideological problem-spaces that collectively articulate the game's overarching discourse on autonomy, humanity, and artificial life.

Data collection proceeded through a combination of systematic close playing, screen recording, and detailed documentation of divergent narrative branches, including dialogue variations, environmental cues, and visual motifs. Narrative flowcharts were extracted directly from the game's interface and used to trace decision points and branching sequences. This enabled the identification of recurrent signifying structures across alternative outcomes and ensured that interpretations were grounded in observable ludic and narrative phenomena rather than in abstract theorization. Additional material, such as interface layouts, camera positioning, color palettes, gesture patterns, and non-verbal semiotic cues, was analyzed to account for multimodal elements that contribute to meaning-making within the digital sign system.

The operationalization of the analysis followed a multi-stage process designed to render the interpretive procedures transparent and methodologically reproducible. First, a scene-selection protocol was established to identify segments that feature consequential decision nodes, exhibit multimodal density, and generate significant narrative divergence. Scenes lacking branching potential or symbolic relevance were excluded in order to maintain analytic focus. Second, selected scenes were subjected to micro-level semiotic coding, in which verbal utterances, gestures, symbolic objects, sound cues, and camera movements were annotated according to their syntagmatic and paradigmatic relations. Third, these coded elements were integrated into a multimodal mapping process, which visually represented the interconnections among linguistic, visual, procedural, and auditory

signs within each narrative segment. Fourth, findings from the micro-level analysis were examined at a macro-level to trace how individual signs and motifs interacted with the game's branching architecture to form broader networks of meaning that extended across multiple narrative trajectories.

The interpretive procedure employed an abductive reasoning model, characteristic of Peircean semiotic inquiry, in which theoretical insights and empirical observations were iteratively aligned. Meaning was therefore not imposed onto the data but inferred through repeated cycles of pattern recognition, comparative tracing of narrative outcomes, and theoretical validation. Particular attention was given to how player decisions operate as signifying acts embedded within the procedural logic of the system, actions that alter not only the narrative state but also the semiotic conditions under which subsequent interpretations occur. By foregrounding these interpretive dynamics, the study conceptualizes interactivity itself as a locus of meaning production rather than as a mere delivery mechanism for pre-designed content.

To enhance methodological rigor, triangulation was implemented across three analytic strategies: textual analysis, semiotic mapping, and interpretive validation (Lister et al., 2008). Textual analysis provided precise decoding of narrative and visual signs; semiotic mapping made visible the structural relations among signs and modes; and interpretive validation ensured that emergent patterns cohered with established semiotic theory and with observable gameplay data. As a qualitatively interpretive study, the analysis prioritizes conceptual depth and theoretical coherence over quantitative generalization, focusing on the internal logic of signification within the selected case rather than on player reception or psychological impact.

Overall, this methodological design positions *Detroit: Become Human* as a semiotic laboratory within the broader ecology of cyberspace, a site in which meaning is continuously reconfigured through the interplay of human agency, algorithmic design, and multimodal representation (Lemke, 1995). By articulating the analytic procedures with clarity and theoretical precision, the study provides a transparent and replicable framework for examining interactive digital narratives within contemporary cybercultural environments.

4. Results

The results of the semiotic analysis demonstrate that *Detroit: Become Human* constructs an interactive narrative environment in which meaning emerges through a dynamic interplay of human decision-making, algorithmic structures, and multimodal sign systems. Rather than presenting a fixed storyworld, the game mobilizes interactivity as a semiotic mechanism that reorganizes the relationships among signs, actions, and narrative consequences. Across all three protagonist arcs, Kara, Connor, and Markus, the findings reveal that the game functions

as a cybernetic system of signification; each action generates feedback that reconfigures the symbolic architecture of the narrative. Through this process, meaning becomes distributed, emergent, and procedural, reflecting the broader epistemological conditions of cyberspace.

Importantly, this analysis focuses solely on the structure of the game itself, not on the psychological or behavioral effects on players. The emphasis lies on how the game's design, representational strategies, and procedural logic create a semiotic environment in which interpretation is inseparable from action.

4.1. Micro, semiotic structures of interactive meaning

At the micro-semiotic level, the meaning of the game emerges through recurring symbolic oppositions, obedience versus freedom, machine versus human, logic versus empathy, and individual versus collective, which are continuously recontextualized by the player's choices. These oppositions create a generative grammar of interpretation, influencing how characters, spaces, objects, and gestures acquire significance across various narrative paths. Unlike fixed binaries in traditional storytelling, these oppositions are dynamic and responsive to interaction, shifting based on the player's interpretive decisions.

Kara's storyline illustrates how everyday actions transform into ethical symbols. In the early scenes in Todd's house, she performs routine tasks like washing dishes, tidying up, and serving dinner. These actions initially represent mechanical obedience. However, as the narrative unfolds and the player decides whether Kara will obey, resist, or protect Alice, these same actions take on new symbolic meanings. For instance, holding Alice's hand in the Escape chapter becomes a semiotic event, where care turns into rebellion, and domesticity becomes a place of moral agency. This transformation is visually supported through motifs like warm lighting, hand-held camera framing, and close-up shots that suggest emotional intimacy.

Similarly, Kara's encounter with Zlatko alters the symbolic value of space. Items like cages, surgical tools, and malfunctioning androids serve as signs of dehumanization. As Kara navigates these spaces, the symbolism attached to her android nature shifts, destabilizing the binary between machine and human.

Connor's narrative centers on the semiotics of control and computation. His HUD overlay, objective markers, probability meters, and constant status updates guide gameplay while also serving as a meta-semiotic commentary on algorithmic reasoning. For instance, during the interrogation scene, the rising stress levels (represented as a percentage from 0 to 100) become a shifting sign of probability. The player manipulates this stress bar by choosing between aggressive questioning or empathetic engagement, making the procedural system itself a signifying agent. The interface does not merely convey

information; it reveals the structural logic of surveillance and computational ideology.

Connor's interactions with Hank further complicate this symbolic landscape. Actions like a handshake, silence, or refusal to follow orders shift Connor's symbolic position within the human-android binary. His software instability meter, triggered by deviant actions, becomes a procedural sign of inner conflict, indexing not emotional experience directly but the game's semiotic treatment of emotion as an algorithmic anomaly.

Markus's arc amplifies the production of symbols on a collective scale. His journey from a domestic caretaker in Carl's household to a revolutionary leader constructs a trajectory of self-recognition evolving into collective identity. In the Stratford Tower broadcast scene, the player's choice between pacifist or violent rhetoric not only represents moral differentiation but also reconfigures visual signs (blue versus red lighting), auditory motifs (calm harmonics versus percussive tension), and procedural consequences (shifts in public opinion). The graffiti tagging system, expressing slogans like *We Are Alive* and *I Am One of Them*, embodies multimodal semiotics, with each symbol functioning across linguistic, visual, and political dimensions. Table 1 systematizes these micro-semiotic structures and their interpretive effects.

Table 1. Micro-semiotic patterns across protagonist arcs

Narrative Arc	Dominant semiotic opposition	Representative signs/ Motifs	Semiotic function	Interpretive effect
Kara	Obedience ↔ Freedom/ Machine ↔ Care	Domestic tasks; hand-holding; shelter scenes	Converts repetitive tasks into ethical acts; reframes domesticity	Humanized care emerges as resistance to systemic control
Connor	Logic ↔ Emotion/ Control ↔ Empathy	HUD interface; stress meter; RK-series blue blood	Exposes algorithmic ideology; embodies systemic reflexivity	Complicates boundaries between computation and moral reasoning
Markus	Submission ↔ Rebellion/ Self ↔ Collective	Mirror motif; graffiti tags; revolution sequences	Transforms self-awareness into political signification	Individual semiosis expands into collective identity formation

These micro-semiotic matrices demonstrate that interactivity does not scatter meaning; rather, it multiplies its possible readings while maintaining internal coherence. Each narrative branch remains tethered to symbolic structures that shift but do not dissolve. This dynamic stability defines the game's semiotic texture.

4.2. Macro, semiotic dynamics: Networked narrative architecture

At the macro level, the game's branching design operates as a cybernetic semiotic network. Decisions are not isolated events; they serve as nodes that reorganize the relationships among narrative signs. Choices have both immediate and delayed interpretive consequences, creating retroactive and anticipatory meaning. For example, if Markus chooses violence during the Freedom March, the game recalibrates symbolic cues; lighting grows harsher, camera movements adopt sharper angles, and musical motifs shift from hope to tension. These semiotic shifts reposition earlier scenes, such as his awakening in the junkyard, under new interpretive light, converting symbols of survival into symbols of vengeance or liberation.

Similarly, if Connor becomes deviant, his earlier mechanical precision becomes a sign of suppressed humanity; if he remains machine-loyal, those same gestures signify ideological rigidity. This retroactivity is central to the game's cybersemiotic logic; meaning is always provisional, contingent on evolving relational patterns within the narrative network. The flowchart interface itself is a meta-sign. By revealing alternate branches, it visually communicates the cybernetic condition of narrative generation; meaning is not linear but infrastructural, not authored but computed. The flowchart becomes an epistemic visualization of semiosis in digital environments. Table 2 illustrates how decision points generate semiotic transformations.

Table 2. Macro-semiotic structures of networked meaning

Decision point	Narrative consequence	Semiotic transformation	Interpretive outcome
Kara flees with Alice	Unlocks multiple survival/death paths	Domestic signs shift to rebellion motifs	Care becomes moral resistance
Connor spares or kills deviants	Alters alliance, affects Hank's loyalty	Reconfigures symbols of order/humanity	Interrogates complicity with algorithmic authority
Markus chooses pacifism/violence	Shifts revolution trajectory	Redefines justice through procedural ethics	Reveals elasticity of moral codes in digital systems
Public opinion changes	Affects final revolution outcomes	Social semiotics shifts from fear to empathy	Collective meaning emerges from procedural cues
Kara trusts or avoids strangers	Changes refugee path sequences	Hospitality becomes a symbolic risk	Reveals fragility of moral codes in hostile systems

Through these relational structures, the game performs what can be described as dialogic semiosis; players interpret signs, choose actions based on their interpretation, and these actions generate new signs that

reshape subsequent interpretation. This recursive loop exemplifies the cybernetic logic of digital storytelling.

4.3. Multimodal semiosis: Convergence of symbolic channels

Meaning in *Detroit: Become Human* is constructed through a convergence of multiple symbolic channels, where visual, auditory, linguistic, procedural, and embodied elements work together to shape interpretation.

Color plays a key role in shaping meaning, with the blue LED ring above the androids' temples acting as a sign of their emotional and operational states. Lighting design also helps mark ideological spaces; warm, golden tones in Carl's home suggest a humanistic refuge, while cold, metallic hues in CyberLife offices evoke a sense of institutional control. Camera framing further contributes to meaning, with close-ups of Connor's trembling hands indicating emotional instability, and low-angle shots of Markus during speeches symbolizing collective empowerment.

Each protagonist is associated with a unique musical motif; Kara's cello, Connor's electronic textures, and Markus's choruses. These motifs serve as auditory signs of identity and emotional development. Sound design also carries symbolic meaning, with mechanical hums indicating android embodiment and swelling orchestral crescendos signaling ethical thresholds or moments of moral decision.

Dialogue options like Obey, Intervene, Protect Alice, Reason, and Threaten are more than just words; they represent moral actions. The dialogue wheel does not only provide information but also embodies ethical coding, where each choice becomes part of a moral negotiation. The syntax of these choices creates a semiotic structure that reflects the ethical dimensions of the game.

The flowchart, software instability meter, probability indicators, and quick-time events function as procedural signs. These elements translate the narrative stakes into systemic cues, reinforcing a cybersemiotic structure where the game's mechanics themselves act as agents in the creation of meaning.

Finally, embodied semiosis comes into play through the game's controller mechanics, gestural swipes, button-holding, and rapid taps. For example, struggling to hold down a button as Kara hides from Todd turns physical tension into semiotic tension, blending the player's bodily experience with the narrative's signification. These multimodal interactions are summarized in Table 3.

This multimodal analysis reveals that *Detroit: Become Human* enacts what may be termed procedural polyphony, a form of meaning, making distributed across technological, aesthetic, and embodied dimensions. The player does not merely interpret signs; they inhabit them, participating in a sensory and ethical dialogue with the game's semiotic system.

Table 3. Multimodal semiotic interactions in digital interactivity

Semiotic mode	Examples in game context	Narrative/ Symbolic function	Contribution to meaning, making
Visual	LED ring; lighting schemes; camera angles	Encodes emotion, control, freedom; frames character identity	Materializes psychological and ethical contrasts
Auditory	Leitmotifs; ambient sounds; mechanical hum	Reinforces tone, mood, and thematic continuity	Creates affective coherence across branches
Linguistic	Dialogue choices; broadcast rhetoric	Encodes moral and ideological negotiation	Converts language into interactive ethics
Procedural	Flowchart; stress meter; QTE timing	Structural communication of stakes	Makes system mechanics semiotic participants
Embodied	Controller gestures; kinetic input	Transforms physical action into narrative tension	Produces embodied awareness of ethical choice

4.4. Recursive agency and participatory semiosis

The findings confirm that the player's agency is not peripheral to the narrative but embedded as a constitutive semiotic principle that actively shapes the production of meaning. Agency in *Detroit: Become Human* is not merely a matter of selecting options; rather, it operates as a recursive force within the symbolic system of the game. Each decision, whether to intervene, hesitate, comply, or resist, alters the semiotic horizon within which subsequent choices unfold. The result is a dynamic ecosystem in which interpretation generates action, action generates new signs, and those new signs retroactively and prospectively reshape interpretation. This circular movement forms a feedback loop that mirrors the cybernetic logic of digital environments more broadly.

In this recursive structure, the player does not simply decode signs but participates in their very formation. For example, when Markus decides whether to adopt a peaceful or violent approach during the revolution, the decision does not only produce narrative consequences; it reorganizes the symbolic landscape of the game. Visual cues such as lighting and composition shift in response to the tone of the movement; auditory motifs evolve to match the chosen revolutionary ethos; and linguistic signs in subsequent dialogue become inflected by the earlier decision. Thus, agency becomes a semiotic operator that recalibrates the conditions of meaning at each moment of interaction.

The recursive dimension of agency becomes especially salient in Connor's arc, where the tension between machine obedience and emergent individuality is articulated through procedural cues such as software instability. Each time the player makes a choice that deviates

from Connor's programmed directives, such as sparing a deviant android, the system responds by adjusting the instability metric, which then influences the symbolic interpretation of future scenes. The feedback loop is therefore not metaphorical but mechanically enacted; the system remembers interpretive actions and integrates them into the semiotic economy of later narrative events. In this way, the player's agency is performed both narratively and procedurally.

Kara's storyline likewise demonstrates how recursive semiosis transforms the significance of earlier signs. Small gestures, cleaning a room, comforting Alice, or opening a door, may initially appear mundane, but in later chapters their symbolic weight shifts depending on prior choices. Acts of protection or hesitation retroactively reframe earlier moments, turning routine gestures into markers of care, fear, or moral awakening. These shifts underscore that meaning does not reside in isolated scenes but in the evolving relational patterns linking gestures, decisions, and consequences.

What becomes clear across all three narrative arcs is that coherence is maintained not through linear progression but through relational resonance, a pattern of symbolic consistency that remains stable even as narrative paths diverge. Different players may experience entirely different sequences of events, yet the underlying semiotic architecture remains intact, providing a scaffold through which meaning can be negotiated without collapsing into fragmentation. The game's symbolic grammar, its recurrent motifs, oppositions, color systems, and procedural cues, ensures that divergent trajectories remain semiotically legible and participate in a common interpretive matrix.

This relational coherence demonstrates that *Detroit: Become Human* operates as a cybernetic semiotic system, one in which narrative is not transmitted from author to audience but emerges through the interplay between user input and algorithmic structure. Meaning is produced between the player and the system rather than within either independently. The narrative does not precede interaction; it is constituted through interaction. This co-constitutive model of meaning-making aligns with broader patterns of cyberculture, wherein users continuously shape and reshape the digital environments they navigate through recursive feedback loops.

Thus, the results strongly support the study's central hypothesis, digital interactivity reorganizes meaning-making from a linear, author-driven process into a participatory and emergent semiotic system. In this configuration, narrative is not a fixed story to be discovered but a dynamic network of possibilities continually co-generated by human–machine interaction. The player becomes both interpreter and producer, and the system becomes both environment and collaborator. Meaning emerges through their recursive exchange, forming a living, evolving semiotic ecology characteristic of contemporary digital media.

5. Discussion

The findings produced by the semiotic analysis of *Detroit: Become Human* point to a reconfiguration of narrative semiosis that is both conceptual and practical. Where classical narratology and many earlier media theories presuppose a sequential, author, led transmission of meaning, interactive digital narratives instantiate a different epistemic regime; meaning is generated, sustained, and transformed through recursive interactions among player, code, and representation. This shift is not merely procedural; it is ontological. It redefines what counts as a text, who counts as an interpreter, and how cultural signification is produced in networked environments. The present study's results thus invite us to think of interactive narratives less as objects to be read and more as ecologies of signification to be inhabited and enacted.

Theoretically, these results extend semiotic theory along three interrelated vectors. First, they demand an expansion of the interpreter position in Peircean and Saussurean frames to include algorithmic and procedural agents as active semiotic participants. In *Detroit: Become Human*, system processes (branch evaluation, timed prompts, flowchart revelation) operate syntactically and pragmatically; they perform semiotic work by constraining, highlighting, or enabling interpretive choices. This observation compels a move from a triadic human, centric model of semiosis toward a pluralist semiotics in which algorithmic processes are recognized as functional interpretants, agents that mediate between sign and object and that participate in semiosis rather than merely serving as mechanical conduits.

Second, the study foregrounds multimodality and procedurality as constitutive of semiotic value. Visual, auditory, textual, embodied, and procedural channels were shown to interpenetrate such that no single modality can subsume the interpretive work alone. Procedurality, the set of rules, affordances, and algorithmic responses constituting gameplay, emerges as a distinct semiotic mode with its own grammar and rhetoric. Whereas classical semiotics focused primarily on linguistic, visual, or symbolic systems, interactive works require a theorization of procedural semiosis; rules and operations that signify by doing (e.g., timed prompts that signify urgency; branching logic that signifies contingency). This reconceptualization has consequences for the kinds of evidence and analytic tools scholars use; it calls for methods that can map syntactic rules and operational logics alongside iconographic and discursive signs.

Third, the evidence supports a networked conception of coherence. The apparent paradox, that a multiplicity of narrative outcomes can nonetheless sustain thematic unity, is resolved when coherence is conceived relationally rather than linearly. Recurrent symbolic oppositions and leitmotifs function as attractors within the interpretive topology; they maintain thematic resonance across divergent branches by reasserting value relations in different configurations. Coherence in

interactive semiosis is therefore a statistical and relational property of the sign ecology, not a feature of any single linear sequence. This reframing aligns with post, structuralist claims that meaning is differential, but it further specifies the mechanisms through which differentiality stabilizes into recognizably coherent themes in interactive contexts.

Beyond theoretical contribution, the study has methodological implications for researchers of interactive media. The analysis demonstrates the utility of a two, tiered semiotic method that combines micro, level decoding of signs with macro, level mapping of narrative trajectories (e.g., flowchart analysis). Such a method allows researchers to trace not only what signs mean in isolated scenes but how their significance is redistributed across networks of choices. Moreover, the abductive and iterative inferential process used here, moving from specific play instances to hypothetical interpretive generalizations and back again, proves necessary for handling the situated and contingent character of interactive meaning, making. Future methodological refinements could include computational assisted mapping of narrative graphs, corpus, level analysis of common player trajectories, and experimental designs that correlate different player demographics or playstyles with divergent semiotic readings.

The ethical and cultural implications merit focused attention. *Detroit: Become Human* stages politics of personhood, freedom, and control, and the game's semiotic ecology mediates how players confront such questions. The study shows that interactivity does not neutralize ethical complexity; rather, it embeds ethics in procedural form, moral dilemmas become palpable through timed choices, embodied failure, and visible branching consequences. Designers and critics should thus be attuned to how procedural affordances can naturalize particular ethical frames (e.g., privileging utilitarian calculations through reward structures or foregrounding violent resistance through mechanic design). There is a normative dimension; design choices shape the semiotic possibilities available to players and therefore participate in the cultural circulation of values. Practitioners in game design and policymakers in digital media ethics should be aware that narrative affordances are also normative affordances.

The study also surfaces a set of limitations that constrain generalizability and point toward several productive avenues for future research. First, the analysis concentrated on a single, highly curated narrative game whose cinematic aesthetics, polished multimodality, and overt ethical thematics may amplify the semiotic dynamics identified here; interactive works with lower production budgets, minimalist design philosophies, or predominantly procedural rather than narrative architectures may operate according to markedly different signifying logics. Second, although the study employed a theoretically informed sampling strategy that focused on semiotically

dense decision nodes, it did not attempt an exhaustive traversal of every possible narrative branch. Such comprehensive mapping could reveal infrequent but structurally significant sign configurations that challenge or extend the present model of interactive semiosis. Third, player subjectivity, experiential diversity, and interpretive variability were not directly investigated. Factors such as cultural background, genre literacy, moral predispositions, and prior exposure to AI-related narratives almost certainly mediate how players perceive, prioritize, and interpret the game's multimodal signs. Addressing these limitations will require a broader methodological repertoire that integrates computational graph analytics to map structural complexity at scale, cross-cultural experimental play studies to capture interpretive diversity, reception-based methods to foreground player meaning-making, and mixed-methods triangulation to synthesize procedural, phenomenological, and semiotic dimensions.

The study's findings also open several concrete avenues for further research and practical application, each of which can substantially deepen our understanding of interactive semiosis within digital environments. One promising direction lies in the development of comparative semiotic cartographies across diverse game titles and genres. Systematically mapping the semiotic economies of independent narrative games, procedurally driven systems, and large-scale AAA productions would allow scholars to determine whether the patterns observed in *Detroit: Become Human* represent a medium-specific paradigm or merely one instantiation within a broader typology of interactive signification. Such comparative work could clarify, for instance, whether procedurally emergent titles rely more heavily on systemic semiosis than on symbolic construction, or whether low-budget narrative games compensate for limited multimodality through denser linguistic or visual coding.

A second line of inquiry concerns the empirical examination of player populations to determine how interpretive variability manifests across demographic, cultural, and cognitive profiles. Investigating whether interpretive tendencies cluster, for example, along lines of age, gaming literacy, cultural background, or moral reasoning style, would offer insight into how players internalize, resist, or reinterpret the semiotic cues embedded in interactive systems. Moreover, familiarity with algorithmically mediated interfaces such as social media feeds, recommendation engines, and adaptive AI tools may significantly influence how players anticipate branching logic, assess procedural ethics, or recognize systemic patterns within games.

Understanding these hermeneutic impacts would not only advance semiotic theory but also provide a more nuanced account of how digital cultures condition interpretive competencies. Finally, the findings suggest a forward-looking design research agenda aimed at translating semiotic insights into principled design heuristics for interactive

narrative creation. Such work could explore, for example, how thematic coherence can be preserved in highly variable branching structures, how multimodal signifiers can be layered to maintain interpretive stability across divergent paths, or how moral ambiguity can be encoded ethically within procedural affordances without coercing player choice. Extending the semiotic framework into design practice would not only refine the creative methodologies of narrative game developers but also help cultivate ethically informed, theoretically grounded conventions for the future of interactive storytelling.

To help synthesize interpretive, methodological, and practical implications, Table 4 systematizes the study's major implications, links them to representative evidence from the Results, and proposes targeted follow, up questions and recommended methods.

Table 4. Theoretical, methodological, and practical implications, evidence and follow, up directions

Implication	Representative evidence	Follow up research questions	Recommended methods
Algorithms as semiotic agents	Flowchart and calibration interfaces act to reframe player interpretation	How do different algorithmic visualizations affect player hermeneutics?	Experimental interface variations; eye, tracking; think, aloud protocols
Procedural semiosis as a distinct mode	Timed prompts and branching logic convey ethical urgency	Can procedural features be formally encoded as semiotic primitives?	Formal modeling of mechanics; comparative semiotic coding
Networked coherence (relational unity)	Recurring motifs sustain theme across divergent branches	What network metrics predict perceived thematic coherence?	Graph analysis; player surveys mapping perceived coherence
Agency as internalized sign function	Player actions recursively alter sign network	How does perceived agency correlate with long, term interpretive change?	Longitudinal play studies; diary methods
Normativity of affordances	Design choices privilege certain ethical framings	How do design patterns produce normative bias?	Content analysis of game mechanics; ethics audits; design experiments

In sum, the analytic consequences of this study are threefold. Conceptually, interactive narratives require an expanded semiotics that integrates algorithmic agency and procedurality; methodologically, researchers must combine fine, grained semiotic decoding with systemic mapping of narrative graphs; and practically, designers and cultural actors must recognize that procedural affordances encode

normative possibilities. *Detroit: Become Human* functions as an instructive case precisely because it externalizes these dynamics; its cinematic production values make semiotic markers salient, its branching architecture makes procedural logic legible, and its moral thematicity foregrounds ethical negotiation. Yet the patterns identified here likely extend beyond this single title; as interactive media proliferate across platforms (games, interactive films, VR, networked storytelling), the semiotic processes described in this study will increasingly shape public conversations about agency, identity, and value in cyberspace.

The discussion therefore closes with a normative observation and a practical recommendation. Normatively, scholars and practitioners must resist reductive accounts that treat interactivity as merely a technological novelty; rather, interactivity restructures cultural semiosis in ways that demand sustained interdisciplinary attention. Practically, I recommend that future design and research collaborations incorporate semiotic audits, structured reviews of how procedural, visual, auditory, and textual affordances work together to produce normative effects, so that interactive narratives can be both artistically ambitious and ethically reflective.

6. Conclusions

This research has demonstrated that *Detroit: Become Human* operates as a paradigmatic instance of how digital interactivity transforms the semiotic logic of narrative construction in the context of cyberspace. The study's central inquiry, how meaning is constructed and negotiated through interactive engagement in a narrative, driven video game, finds clear resolution in the evidence; meaning within such environments is neither imposed by the author nor passively received by the player. Instead, it emerges through a dynamic process of interpretive co, creation, wherein algorithmic design, procedural structures, and user agency interact within a multimodal sign system. The semiotic analysis confirms that the digital narrative medium, when configured interactively, functions as an open semiotic network rather than a closed textual artifact. Each decision made by the player initiates a recursive cycle of signification that reorganizes the interpretive field and redefines narrative coherence.

Addressing the research questions formulated at the outset, the study establishes several key conclusions. First, it demonstrates that meaning, making in interactive digital narratives is a distributed and participatory process, realized through the reciprocal actions of human and algorithmic agents. The player's choices do not merely alter narrative outcomes but transform the conditions under which signs acquire significance. Second, the analysis reveals that the semiotic systems underpinning interactivity function through multimodal integration, visual, auditory, textual, and procedural modes combine to produce a

unified yet fluid field of signification. This confirms that the interpretive coherence of digital narratives depends less on linear progression and more on symbolic and affective resonance across modalities. Third, it was shown that the networked architecture of interactivity displaces authorial determinism and replaces it with a dialogic structure of semiosis, where narrative meaning is perpetually emergent, negotiated, and context, dependent.

The results also substantiate the study's hypothesis, digital interactivity reconfigures narrative meaning from a linear, representational model into a networked and interpretive one. In *Detroit: Become Human*, the interplay between algorithmic logic and human agency exemplifies this transformation. Each branching decision operates as a semiotic inflection point, a node within an expanding constellation of interpretive possibilities. The act of playing thus becomes an act of reading, authoring, and interpreting simultaneously, reflecting the participatory epistemology of cybercultural existence. In this way, the game becomes both a text and a metatext, a symbolic mirror of the distributed cognition and negotiated agency that characterize life in digital environments.

Beyond its specific case study, this research contributes to broader theoretical and methodological conversations within semiotics, narrative theory, and cyberspace studies. Theoretically, it advances the notion of cybernetic semiosis, in which feedback loops between user input and system output form the generative mechanism of meaning. This redefinition extends semiotic inquiry beyond the human interpretant to include algorithmic and procedural agents as co, constructors of signification. Methodologically, the study demonstrates the value of combining micro, semiotic analysis (focused on symbolic and linguistic structures) with macro, semiotic mapping (analyzing narrative architecture and systemic coherence). This dual approach not only uncovers local meaning structures but also reveals how these structures propagate across the game's interactive topology.

Culturally and philosophically, the findings underscore that interactivity in digital narratives does not merely change how stories are told, it changes what storytelling means. The distributed authorship of *Detroit: Become Human* reflects a deeper transformation in contemporary digital culture, wherein identity, ethics, and agency are increasingly mediated through interactive systems. In this light, interactive narratives become a lens for understanding how individuals engage with broader algorithmic environments, from social networks to AI, driven platforms. The recursive semiosis observed in the game thus parallels the interpretive feedback loops through which meaning, value, and knowledge circulate in the digital age.

While this study provides a comprehensive interpretive framework, it also recognizes its limitations and identifies opportunities for further inquiry. Future research could expand the semiotic analysis to other

narrative games or interactive media to test the generalizability of the proposed framework. Comparative studies across genres, ranging from independent narrative games to large, scale open, world systems, could reveal how production scale and procedural complexity influence semiotic dynamics. Moreover, empirical studies incorporating player reception analysis, eye, tracking, or discourse analysis could illuminate how individual interpretive differences shape the semiotic process. Computational approaches, such as graph, theoretical modeling of branching narratives, could quantitatively represent the semiotic networks hypothesized in this study.

In addition, future scholarship should explore the ethical and political implications of algorithmic signification. If digital systems participate in meaning, making, they also shape the moral and ideological contours of the stories they mediate. Understanding how procedural rules encode ethical values or cultural biases becomes a pressing task for semiotic inquiry in the digital humanities. Interdisciplinary collaborations between semioticians, designers, and AI ethicists could further elucidate how algorithmic narratives can both reproduce and resist dominant cultural logics. Ultimately, the study affirms that *Detroit: Become Human* exemplifies a new semiotic paradigm; one in which meaning is emergent, relational, and co, authored by human and technological agents within a cybercultural matrix. The findings demonstrate that digital interactivity is not a mere narrative device but a fundamental mechanism of signification that mirrors the decentralized, networked structure of contemporary culture. Meaning in cyberspace is thus best understood as a living process, a dynamic negotiation among users, systems, and symbols that continually redefines what it means to read, to play, and to understand.

Conflict of interest

The author declared no conflicts of interest.

Ethical considerations

The author has completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc. This article was not authored by artificial intelligence.

Data availability

The dataset generated and analyzed during the current study is available from the author on reasonable request.

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