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The Entanglement of Interactive Digital Narratives and the Body: The role of aesthetics and sensory perception

Ana Catarina Monteiro
I2ADS & Faculty of Engineering
University of Porto, Porto, Portugal
catarina02d@gmail.com

Miguel Carvalhais
i2ADS & Faculty of Fine Arts
University of Porto, Porto, Portugal
mcarvalhais@fba.up.pt

Rui Torres
ICNOVA & University of Fernando Pessoa
Porto, Portugal
rtorres@ufp.edu.pt

Computational systems have molded the interactions between code and language, increasing the complexity of the feedback loops that connect humans and machines, old and new technologies, and analog and digital processes. When computation is enacted, Interactive Digital Narratives (IDNs) emerge from these interactions, increasing the intermediation network where aspects like source code, executable, and runtime can reveal new dimensions of aesthetic reception. IDNs operate across several technologies and activate modes of performativity through the mediated body, giving rise to new aesthetics of behavior. This paper examines how IDNs change the role of aesthetics and sensory perception and how this impacts the construction of meaning while reading them.

Through analyzing the sensory-motor experiences shaped by readers in two case studies, Elsinore (2019) and Wide Ocean Big Jacket (2020), we will examine the interrelation between the idea of movement and the sense-making elements that allow the construction of meaning by readers. Based on four main ontological categories – being-in-the-world, temporality, embodiment, and language – we will look at IDNs as active cognitive agents that, together with readers, give rise to sophisticated acts of interpretation and representation. We will examine how the system affordances are structurally coupled with readers, either through how the narrative system adjusts its content, rhythm, or narrative elements to create a more personalized experience or in the form of text-based responses, character reactions, or changes to the structure and direction of the narrative.

Sense-making; Embodiment; Construction of Meaning; Interactive Digital Narratives; Readers;

1. INTRODUCTION

Computational media integrates interaction between the system and the reader, enabling textual and procedural approaches that are not limited to representation and subjectivity (Anable, 2018). They are complex systems that merge an experience between the computer, the body, and consciousness, exceeding the power of metaphor and becoming computational universes (Hayles, 1999) where we live, represented by the cybernetic fold[1] (Sedgwick & Frank, 1995).

The complexity of digital platforms has sparked the emergence of Interactive Digital Narratives (IDNs) that become dynamic entities resulting "from the inter-relationship, inter-action, and inter-connectivity of elements within a system and between a system and its environment" (Koenitz et al., 2021, p. 1).

They are a cybernetic medium where the relationship between subject and object is mutually dependent and beneficial, with each influencing and shaping the other. There is a constant feedback loop in which the reader sees an action on screen, processes a response to that action, and sends a signal back to the system, which responds, starting the cycle again. There is an observing system where "we have to take into account the medium-specific relationships between production, media texts, and reception" (Frissen et al., 2015), which is also characterized by polysemy (Hall, 2019) because meaning and context matter and become a temporally extended practice of engaging oneself with what is out there (Noë, 2023). Consequently, we understand by system how the information is presented to the readers but also the computation processes that constitute them. These processes are responsible for enabling the behavior of the different elements and can be explained by the definition of operational logic and playable models.
IDNs' algorithmic nature is deeply integrated with system dynamics, revealing an interdependence between the brain, body, and world. They become structurally coupled through the readers' choices

and the ability to access, modify, and recompile the source code that operates them. Transformed into objects of meaning, they must be understood as "ways of constructing ideas, beliefs, and experiences, emerging from particular social relations" (Pelletier, 2009, p. 89). This results in narratives that are a combination of rules, objectives, and procedures presented through the affordances that steer the reader into an understanding of the system (Schell, 2008). Whether promoting a shift of attention through managing an avatar with a controller or through creating an action-oriented narrative, the system of an IDN is realized and perceived in distributed cognitive environments. This means that when readers interact with IDNs, they do so in environments of "multitude" (Galloway, 2021), in which various components expand and migrate from older forms of media into experiential platforms. Furthermore, IDNs are not limited to their visual representation. Instead, they are realized as a group of components where we must account for their materiality, which is governed by software systems that couple a set of behaviors.

IDNs function as cognitive and perceptual reorganization practices (Noë, 2015) involving the system, its readers, and narrative units, that we can conceptualize as "storylets" – small, self-contained narrative pieces that interact to form a larger story (Kreminski & Wardrip-Fruin, 2018). It is essential to consider how the ludic mechanics ensure a satisfying traversa (Reed, 2017). The dynamic behavior of the system, assembled through mechanics, dynamics, and aesthetics (Hunicke et al., 2004), allows the narrative system to adjust its content and rhythm flexibly. This capability influences the structure and direction of the narrative (Kreminski & Wardrip-Fruin, 2018). For example, in Immortality (2022), produced by Sam Barlow, the mechanics allow players to playback, rewind, fast-forward, zoom, or jump in the available footage. This enables readers to show their interest in certain characters, items, or pieces of imagery, which are themselves elements of the mechanics' level. The dynamics make the progression of the narrative accountable, defining the set of variables that allow readers to engage in the main interactions during the process. Lastly, aesthetics are related to evoking vivid mental images that depend intrinsically on the environment and the interface elements shown (Carstensdottir et al., 2019).

Moreover, readers can address an ontological transfer between the syntax and semantics of the computational artifact (Hui, 2016), which is structured by their relation to one another and with the world around them and which does not stop when they finish experiencing the IDN. This transfer is related to an aura of significance that heightens sensory awareness and forges relations with the readers' bodily experience. The experience becomes an embodied and situated activity, resulting in an aesthetic shift related to the search for information, the attribution of meaning, and the action.

2. THE ROLE OF AESTHETICS AND SENSORY PERCEPTION

When readers interact with an IDN, they engage with a playable system formed of units of narrative (Reed, 2017). To understand the relationship between the system and the narrative that it creates, it is crucial to become aware of its operational logic, which will help readers understand what is behind the IDN models. The operational logic of the IDN consists of fundamental abstract operations that determine the system's state evolution (Wardrip-Fruin, 2020). These operations integrate the underlying algorithmic processes, which are usually not directly accessible, with the visible interface elements that constitute the object's external appearance and what we see on the screen (Nake, 2016). One depends on the other, and together, they determine what will happen during the playthrough. Enacting the mechanics establishes new aesthetic experiences based on the readers' interactions with the software agency, which is responsible for creating a world where it is possible to interact with other agents and the environment (Sicart, 2023).

IDNs are perceived and recognized through rules and constraints, challenging readers to cognitively understand the constituted structures of experience through which the world is lived (Legrand, 2007) and that respond to changes in their environment. In doing so, they become artifacts that imply behavior and embodied, action-guided perception (Penny, 2017), transforming sensory perception. This transformation references not only the actions performed by the body but also all the knowledge and abilities that arise and remain within the body. Moreover, the aesthetics we are pursuing are related and entangled with the body insofar as they account for perception not only as a matter of the brain passively receiving and interpreting sensory information but also as an active process involving the entire body (Noë, 2015). The bodily sensations are defined by the interplay between motion capture and the affects that it is capable of producing (Fazi, 2019). Besides that, we look for this relation not as connected structures but as spaces that afford specific movements between them, turning the exploration of the actual boundaries of the self into one entangled with software systems (Klevjer, 2012).

Additionally, we should focus on the behavior of the computational system and how the dynamic interactive system of these narratives allows readers to create and read. We call for an aesthetics of behavior that evokes a sense of recognition that

goes beyond the representational qualities or the digital and mechanical properties of IDNs. It is related to how readers decode what the system is giving them and, at the same time, how readers encode the signals they are giving back to the system. There is an ontological resonance characterized by the readers' shift of attention to the various elements of the narrative system (Bell, 2021), consequently allowing the construction of meaning as a richly bodily capacity based on the readers' orientation and background.

As we navigate our world and interact with the materials around us, we must examine IDNs as interactive systems that promote symbiotic relationships based on the relationships with the body and the idea of movement, where readers are not only engaging with the artifact but with the real-world situation where the artifact is experience.

3. THE INTERRELATION BETWEEN MOVEMENT AND COGNITION

"Connecting with an audience is the point of any story. The question is, how? And how do you know when you've done it"? This question, raised by the digital anthropologist Frank Rose (2021), makes us pay attention to what a computational system is capable of and what it makes possible for the reader to do. Regarding the computational system, there is a perception of space that, whether physical or digital, requires diverse types of interactive and cognitive processes through which readers become conscious of the virtual positions of the rules and constraints around them.

When readers see the title, the designer, or the opening screens of an IDN, they start developing hypotheses about the narrative's meaning (Martin, 2019). When they begin to interact with the characters, theme, or mechanics, they can take operative actions, such as the simple movement of their finger pressing a button. On the other hand, the resulting actions can also cause changes in the larger picture of the narrative. In that same case, the change in the narrative state initiated through the button press is considered a resultant action (Björk & Holopainen, 2005; Schell, 2008). The meaning that is inferred from these interactions doesn't end when the physical action stops. We enactively perceive the actions as forms of intentionality (Gallagher, 2017), where the body becomes the general medium for understanding the world (Merleau-Ponty, 1996), and the embodiment becomes "a property of our engagement with the world that allows us to make it meaningful" (Dourish, 2004, p. 126).

To understand the interrelation between the idea of movement and the interpretation of these media forms, we need to focus on the four sense-making elements, which are based on the concepts of being-in-the-world, temporality, embodiment, and language (Sandberg & Tsoukas, 2020). The notion of being-in-the-world is connected to the idea that the computational artifact exists as a network between the material agency and social phenomena, becoming a complex and multidimensional reality in which the relationship between object and subject is fluid (Barad, 2007) and offers a set of possibilities for action. To that extent, an IDN becomes a somatic object that is perceived and recognized as belonging to the readers, involving the body in the creation of signs and messages that are multimodal, unstable, and situated (Carvalhais, 2022). Temporality relates to our knowledge and ability to predict certain behaviors or events that will happen. It also has to do with the ability to foresee needs from a point of view that relates to the past and present, but also with an eye to the future (Sandberg & Tsoukas, 2020). Embodiment is the contact between agents and the world through actions involving motor skills and bodily intentionality (Gallagher, 2017). For example, in Bandersnatch (2018), when readers use their remote controls or keyboards to choose one of the text options that appear on the screen, they know that behind this option, there is an attached result that will lead them to a different direction. Lastly, language pertains to how readers use the semantic space to engage with the world, creating meaning from their interactions (Sandberg & Tsoukas, 2020). It allows a performative multiplicity that can be narrative, ludic, semiotic, or tactile and may arise from the actions of the reader or the system (Jayemanne, 2017).

This way, the data generated from the contact between readers and IDNs creates a digital third space that recombines and recontextualizes new entanglements with the body. It is constantly developing:

> "new geographies which are emotional, linguistic, semantic, relational, or relative to the many patterns that non-human algorithms can glimpse in the way layers emerge from data, information, and knowledge, correlating different spaces, times and human networks" (Iaconesi & Persico, 2015).

Insofar as we can see, we will now examine the sensory-motor experiences shaped by readers in Elsinore (2019) and Wide Ocean Big Jacket (2020), inquiring about how the system and the narrative are structurally coupled with readers.

4. *ELSINORE* AND *WIDE OCEAN BIG JACKET*: HOW READERS ENACT THEM

We chose to analyze Elsinore (2019) and Wide Ocean Big Jacket (2020) because both display practices that are performative, with improvisational elements that are context-specific and emerge from the collaboration between the body and embodiment (Hayles, 1999). In both, readers can engage with characters through dialogue trees and interacting with objects in the environment, influencing the direction of conversations and the relationships between characters. These two works challenge the readers' cognitive capacities by presenting them with decision-making scenarios where it is essential to anticipate the consequences of their actions. We bring the concept of ontological resonance to the research to analyze how the playable system enables the reader to create expressive input and how this expressive input is related to the shift of attention to the various experiences and attitudes towards the narrative about the choices readers make. When readers experience an IDN, they rely on a set of sensory-motor capacities grounded on primary intersubjectivity processes, including affective processes (Gallagher, 2006). These processes allow readers to perceive the other as someone they can interact with, transferring those experience elements into the actual world (Bell, 2021).

Figure 1: *Elsinore* (2019), retrieved by Wikipedia.org

Figure 2: *Wide Ocean Big Jacket* (2020), retrieved by Wikipedia.org

Elsinore is based on Shakespeare's tragedy Hamlet and its character, Ophelia. Revolving around a time loop where readers are trapped in a repeating four-day cycle, they can explore themes of fate, free will, and the consequences of one's actions that can alter the course of the narrative. Through Ophelia, readers can also gather information by observing events and talking with non-player characters (NPCs), enabling them to make informed decisions and change what the NPCs and Ophelia are pursuing. Listening to the conversations of the different NPCs allows Ophelia to retain knowledge referred to us as "Hearsay". This awareness enables readers to make informed decisions and alter the course of events based on their past experiences. It also becomes a valuable resource for influencing NPCs' behaviors by opening up "Leads" that represent narrative threads that can be completed (Mitchell & Kway, 2020). It empowers readers to strategically plan their actions, experimenting with different choices to uncover hidden details. As point-and-click adventure game, all interactions are made by clicking on characters and spaces that appear on the screen. All the information discovered about events and characters is collected in a journal, which the reader can visit at any time. Actions in Elsinore (2019) appear from the association between an abstract model and the specific context in which the model is instantiated (being-in-the-world) and are designed to evoke emotions and create a sense of connection between the reader and the narrative. By actively participating in the characters' lives and making choices, readers become emotionally invested, retaining knowledge about them and being able to predict facts and events (temporarily). There is a repeat play in the form of a rewind that is required to progress in the narrative, with 20 rewinds necessary to achieve some form of ending. Insofar as there is an intersubjective dimension that results from feeling emotional identification with the character, feeling part of the space and time of the world, or simply knowing that they are (embodied) in the narrative world but without the feeling of being perceptual (Ensslin et al., 2019). These symbolic actions contribute to compositional resonance by influencing how readers perceive the narrative (language), which can be achieved through narrative closure or system closure. In the first, there is a sense of finality in seeing all the questions related to the narrative answered (Carroll, 2007). System closure is associated with the idea of a work's structure other than how the narrative is perceived (Murray, 1997).

Figure 3: *Elsinore* frame,
retrieved from a game session

Wide Ocean Big Jacket (2020) is an interactive narrative that follows the story of a camping trip with two adults and two teenagers. The gameplay explores the characters' personalities and relationships through conversations and interactions during the camping trip. It is known for its unique storytelling approach and the emotional depth it achieves within a relatively short playtime. During the playthrough, readers can make dialogue choices that influence the direction of conversations and interactions between characters, revealing different aspects of their personalities. They can observe the surroundings, interact with objects and characters to trigger conversations and progress the story. Readers can take photographs at specific points using a camera, adding a layer of personalization to the storytelling as readers can document particular events that resonate with them. At the same time, there are moments when players can choose how much time to spend doing certain activities or conversations, adding a sense of pacing and reader agency. Because readers control the characters' movements, exploration is essential for discovering new areas and triggering events. Readers make decisions that shape the tone of the dialogue, reveal character traits, and influence the relationships within the group. Through these choices, readers gain insights into the thoughts and emotions of each character.

Figure 4: *Wide Ocean Big Jacket* frame,
retrieved from a game session

In Wide Ocean Big Jacket (2020), the visual and auditory elements of the game contribute to creating a sense of place, and readers may mentally construct a representation of the campsite and its surroundings. The attention to detail helps build a mental representation as readers immerse themselves in the atmosphere of the camping trip. This way, a spatial resonance is described in terms of the readers' shift of attention from the natural environment to certain parts of the IDN and the construction of a mental representation of the latter. There is also a model construction, which includes the narrative space parts relevant to the readers' actions. Thus, Wide Ocean Big Jacket (2020) emerges from the physicality and the lively interplay encountered between readers and the digital work (being-in-the-world), allowing them to shape the narrative in real time in concert with the different elements (temporality). It is directly perceived by the body (embodiment), contributing to "a psychological, social and ideological machinery that is centrally involved in the production of subjects" (Denson, 2020, p. 55). The meaning-making is generated immanently (Deleuze, 1997) within the world through becoming and transformation processes (language).

5. CONCLUSIONS

At a point where computational artifacts are dictating our everyday lives, IDNs help us understand the complexity of the construction of meaning behind the software procedures and the hardware's mechanical and material assets. However, when we think about software, we tend to forget that the body is also there, experiencing the agency of computers in the interface (Sicart, 2023). With the assembling of objects, characters, and the actions that readers can perform, the worlds represented by IDNs have placed them in different relations with the body that cannot be detached from the media's relation to materiality (Munster, 2011). Materializing IDNs involves thinking about them as affective systems that consider the behavior of the artifact with embodiment, being "encoded not only in the content of the texts themselves but in the practices that surround their production and reception" (Meiners, 2004).

Starting from the concept of affection in IDNs allows us to see the homologies among the actions of a reader's body, the actions of a system's mechanics, and the actions of ideological signification to understand how IDNs, as cultural formations, are affectively charged (Anable, 2018). Not only do time and space engage with the digital code to produce new and different sensations, but there is also a set of movements and transformations of the body that

help to modulate the relations readers form or deny between entities (Munster, 2011). There is a constant exchange of information and energy between the system and the body, turning IDNs into a form of representation that is structurally coupled with the readers by processing input data and providing output information (Penny, 2017).

Furthermore, the mediation of the body means that when we engage aesthetically with an IDN, we are not only interacting with the object but also with the creative processes that produced it. Their mediation makes it possible to infer the individual choices that are being made, leading to an appealing intersubjective relationship that "enables the reorganization of the life of which it is the representation and against which it is a reaction" (Noë, 2023, p. 12). Readers become entangled with the machine's logic and the operator's actions, and because of that, they become products of that entanglement.

When we analyze the sensory-motor affordances that are experienced by readers in Elsinore (2018) and Wide Ocean Big Jacket (2020), we are creating space for an operational ambience that functions through algorithmic background operations (Fizek, 2022), where it is possible to find a mechanism of recognition (Casetti, 2016). Insofar as readers become able to accept the existence and legitimacy of the computational artifact, they ask how it works and how they can get into it. Secondly, they change and interpret the work, creating meaning based on their orientation and background, and capable of producing a representational ambience involving the body in that experience and highlighting the materiality of the software (Sicart, 2023).

Subsequently, the construction of meaning is non-predicative (Martin, 2019) in that it is not formed in mental terms or states of language. This transforms the experience from not perceiving to perceiving or from perceiving to perceiving differently into a new aesthetic experience. Thus experience is primarily concerned with the ability to present a rule set that can create several unlimited possibilities for the reader to undertake, and in which the exploration of the entanglement between IDNs and the body opens several avenues for future research.

6. REFERENCES

Anable, A. (2018). Playing with feelings: Video games and affect. U of Minnesota Press.

Barad, K. (2007). Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning. Duke University Press.

Bell, A. (2021). It all feels too real": Digital Storyworlds and "Ontological Resonance. Style, 55(3), 430-452.

Björk, S., & Holopainen, J. (2005). Games and design patterns. The game design reader: A rules of play anthology, 410-437.

Carroll, N. (2007). Narrative closure. Philosophical studies, 135, 1-15.

Carstensdottir, E., Kleinman, E., & El-Nasr, M. S. (2019). Player interaction in narrative games: structure and narrative progression mechanics. Proceedings of the 14th International Conference on the Foundations of Digital Games,

Carvalhais, M. (2022). Art and Computation. V2_Publishing

Casetti, F. (2016). The Relocation of Cinema.

Deleuze, G. (1997). Immanence: A Life. Theory, culture & society, 14(2), 3-7.

Denson, S. (2020). Discorrelated Images. Duke University Press.

Dourish, P. (2004). Where the action is: the foundations of embodied interaction. MIT press.

Ensslin, A., Bell, A., Smith, J., Van Der Bom, I., & Skains, R. (2019). Immersion, digital fiction, and the switchboard metaphor. Participations: Journal of Audience Reception Studies, 16(1), 320-342.

Fazi, M. B. (2019). Digital aesthetics: The discrete and the continuous. Theory, culture & society, 36(1), 3-26.

Fizek, S. (2022). Playing at a Distance: Borderlands of Video Game Aesthetic. MIT Press.

Flusser, V. (2013). Towards a philosophy of photography. Reaktion Books.

Frissen, V., Lammes, S., De Lange, M., De Mul, J., & Raessens, J. (2015). Homo ludens 2.0: Play, media, and identity.

Gallagher, S. (2006). How the body shapes the mind. Clarendon Press.

Gallagher, S. (2017). Enactivist interventions: Rethinking the mind. Oxford University Press.

Galloway, A. (2021). Uncomputable: play and politics in the long digital age. Verso Books.

Hall, S. (2019). Encoding—Decoding (1980). In Crime and Media (pp. 44-55). Routledge.

Hayles, N. K. (1999). How we became posthuman: Virtual bodies in cybernetics, literature, and informatics. University of Chicago Press.

Hui, Y. (2016). On the existence of digital objects (Vol. 48). U of Minnesota Press.

Hunicke, R., LeBlanc, M., & Zubek, R. (2004). MDA: A formal approach to game design and game research. Proceedings of the AAAI Workshop on Challenges in Game AI,

Iaconesi, S., & Persico, O. (2015). The Third Infoscape: Data, Information and Knowledge in the city. New paradigms for urban interaction. arXiv preprint arXiv:1506.08268.

Jagoda, P. (2016). Network aesthetics. University of Chicago Press.

Jayemanne, D. (2017). Performativity in art, literature, and videogames. Springer.

Klevjer, R. (2012). Enter the avatar: The phenomenology of prosthetic telepresence in computer games. In The philosophy of computer games (pp. 17-38). Springer.

Koenitz, H., Barbara, J., & Eladhari, M. P. (2021). Interactive Digital Narratives (IDN) as Representations of Complexity: Lineage, Opportunities and Future Work. International Conference on Interactive Digital Storytelling,

Kreminski, M., & Wardrip-Fruin, N. (2018). Sketching a map of the storylets design space. Interactive Storytelling: 11th International Conference on Interactive Digital Storytelling, ICIDS 2018, Dublin, Ireland, December 5–8, 2018, Proceedings 11,

Legrand, D. (2007). Pre-reflective self-consciousness: on being bodily in the world. Janus head, 9(2), 493-519.

Martin, P. (2019). Carnal hermeneutics and the digital game. Journal of the Philosophy of Games, 2(1).

Meiners, E. R. (2004). An Archive of Feelings: Trauma, Sexuality and Lesbian Public Cultures. NWSA Journal, 16(3), 224-225.

Munster, A. (2011). Materializing new media: Embodiment in information aesthetics. UPNE.

Merleau-Ponty, M. (1996). Phenomenology of perception. Motilal Banarsidass Publishe.

Mitchell, A., & Kway, L. (2020). "How do I restart this thing?" Repeat experience and resistance to closure in rewind storygames. Interactive Storytelling: 13th International Conference on Interactive Digital Storytelling, ICIDS 2020, Bournemouth, UK, November 3–6, 2020, Proceedings 13,

Murray, J. (1997). Hamlet on the Holodeck: The Future of Narrative in Cyberspace. Cambridge: MITPress.

Nake, F. (2016). The Disappearing Masterpiece: Digital Image & Algorithmic Revolution. XCoAX 2016: Proceedings of the Fourth Conference on Computation, Communication, Aesthetics, and X,

Noë, A. (2015). Strange tools: Art and human nature. Hill and Wang.

Noë, A. (2023). The Entanglement: How Art and Philosophy Make Us What We Are. Princeton University Press.

Pelletier, C. (2009). Games and learning: What's the connection. International Journal of Learning and Media, 1(1), 83-101.

Penny, S. (2017). Making sense: Cognition, computing, art, and embodiment. MIT Press.

Reed, A. A. (2017). Changeful tales: design-driven approaches toward more expressive storygames. University of California, Santa Cruz.

Rose, F. (2021). The Sea we Swim in: How Stories Work in a Data-Driven World. WW Norton & Company.

Sandberg, J., & Tsoukas, H. (2020). Sensemaking reconsidered: Towards a broader understanding through phenomenology. Organization Theory, 1(1), 2631787719879937.

Schell, J. (2008). The Art of Game Design: A book of lenses. CRC press.

Sedgwick, E. K., & Frank, A. (1995). Shame in the cybernetic fold: Reading Silvan Tomkins. Critical inquiry, 21(2), 496-522.

Sicart, M. (2023). Playing Software: Homo Ludens in Computational Culture. MIT Press.

Wardrip-Fruin, N. (2020). How Pac-Man Eats. MIT Press.

7. FOOTNOTES

[1] The "cybernetic fold" corresponds to the period between 1940 and 1960 when cybernetics and systems theory were applied to everything from politics to art, from biology to economics.