

# How we Construct Meaning in Interactive Digital Narratives: a structurally coupled relation

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## Abstract

Computational systems, by being procedural and interactive, encompass new radical possibilities and augment and extend the way we tell stories. The Interactive Digital Narratives that are created with them are ontological machines that can be formally understood in terms of processes and representations that expose and mask selections of potential action and movement. These qualities change how they construct and establish meaning for readers. This paper will explore meaning-making in Interactive Digital Narratives through an interdisciplinary approach that combines the cognitive theory of enaction with the analysis of the narrative structure in *Florence* and *Her Story*. By identifying the different forms that the narrative can take based on the readers' choices, we seek to comprehend how readers and systems become structurally coupled. We research how the emergent and continuous interactions developed during the reading of an Interactive Digital Narrative are closely intertwined with the readers' sensory-motor experiences. We shape narratives through how we perceive them, which is essential for sense-making and how we attend to the medium's specificity.

**Keywords** *Interactive Digital Narratives; Construction of Meaning; Enaction; Structural Coupling; Sense-Making.*

## 1. Introduction

Telling stories is a crucial aspect of human existence. With the development of computational systems, narratives are shaped by the technologies we have within our reach and the ways we use them. The computational systems expand the type of narratives that can be generated, and that include text-based adventure games, interactive fictions, hypertext fictions, interactive documentaries, digital games, and virtual reality experiences, among other genres. By enacting processes that produce not only events but also a diversity of behaviors and outcomes, Interactive Digital Narratives (IDNs) possess an algorithmic nature characterized by the articulation of hardware, interface, and software. IDNs act in the world and augment, supplement, and mediate new reading processes turning into informational objects that cannot be separated from computation (Kitchin & Dodge, 2011).

IDNs are a kind of narrative expression (Roth & Koenitz, 2016) that can be defined for the variety of narrative structures that can be represented. The structure diversity invites readers to explore and enable different aspects of narrative compression, creating a more engaging and immersive experience (Ferri, 2015). IDNs result "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), allowing the ability to create immersive and engaging experiences under the bias of multimodality.

IDNs are defined by encouraging new perceptions of subjectivity and identity and adjusting how we see ourselves as individuals and human subjects (Gallagher, 2017). They allow new ways of seeing, knowing, and doing that arise from the relationships and interactions between the diverse agents that constitute them (Fuller, 2003). These agents, which include the machinery and the dialogues that arise from here, work in a space that acts as a dynamic participant and alters the conditions through which the narrative is formed (Kitchin & Dodge, 2011). This way, IDNs are characterized by their materiality as an emergent property that includes both analog resemblance and digital coding generated through fragmentation and recombination (Hayles, 2004). Being navigable in two dimensions — through the choices that the readers make to progress and through the access to the source code that operates them and allows the readers to change and recompile it — IDNs are a combination of *surfaces* and *subfaces* (Nake, 2016). They are constantly being transformed by code, created and controlled by programming. They capture the world within a system of thought and a set of instructions (Kitchin & Dodge, 2011) that enhances their capacity to become culturally assumed as significant parts of the human experience. They are created and read in a cognitive environment where enaction highlights the position that emergent and lively social coordination plays in conducting and assisting perception and action (Stewart et al., 2010).

In other words, emergence in IDNs results from the interplay between the mechanics of the system and the process of a continuous self-organization that determines what is real and meaningful for the system (Vernon, 2014). A line is constructed between perception and thought where it is needed to act to make sense of what is seen. Furthermore, IDNs embrace the idea of an interdependence between brain, body, and world characterized by the cognitive theory of enaction, whose principal idea is “that a cognitive system develops its own understanding of the world around it through its interactions with the environment” (p. 47). Based on autonomy, embodiment, emergence, experience, and sense-making, a process of structural coupling is developed between the system and its environment (ibid). Besides, this structural coupling relation is co-determined and captured through an emergent process that examines the logic and ideal forms of meanings (Rump, 2018) raised during the reading of the IDNs.

Starting with an understanding of how IDNs work, we want to discuss the rules, procedures, and objectives behind the narrative's development, which we can also describe as narrative mechanics. We want to understand what makes IDNs compelling to interact, observing also how they express ideas and make arguments.

## **2. The implications of narrative mechanics and system dynamics to the construction of meaning**

Encounters with diverse narratives are part of our world and how we live our everyday lives. When we enter into contact with the computational gaze (Carvalhais, 2022), narrative and interactivity become compatible. This compatibility can be a good reason for researching the narrative mechanics related to this type of works and how they can influence how we experiment and deal with them.

Interactive Digital Narratives (IDNs) are described by the development of semiotic sequences that operate in what Aarseth (1997) defines as an *ergodic traversal*. They are based on an enactment of processes that establish connections between a “system-oriented media” and a specific type of communication that is also related to the readers’ experiences that such connections support (Wardrip-Fruin, 2020). Besides, they are based on interactive systems that are constantly producing dynamic outputs. These outputs can be in the form of actions that the readers have to perform to go through the narrative or can be abstract outputs, sets of causal connections made cognitively by the readers (Dubbelman, 2021). In either of them, the readers understand the narrative as a “forgiving flexible cognitive frame for constructing, communicating, and reconstructing mentally projected worlds” (Herman, 2004, p. 49). This way, we approach narrative as a cognitive structure for the construction of meaning, where readers repeatedly make sense of the virtual world, being in contact with the characters that are presented, the events that take place, or their own motivations and goals (Dubbelman, 2021).

When in contact with IDNs, the way readers organize information is a robust instrument of shaping the world. The decisions that motivate readers to collect certain facts or neglect others displays a set of significances. We understand the construction of meaning as an interpretative process (Eco, 1979) through which we understand the Other as an active and dynamic process, that enhances the readers’ background, knowledge, and cultural context. The reader plays an active role in the construction of meaning because the diverse elements that constitute IDNs are structured by an inferential model and because of that they become infinitely interpretable (*ibid*). Besides that, we can also define the construction of meaning with the concept of closure, where the readers’ cognitive process of trying to comprehend and connect the fragmented elements (Eco, 1979) is a primary element to the achieving of a meaningful reading for IDNs.

Furthermore, in order to understand the construction of meaning behind IDNs, we need to assess not only 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 (Wardrip-Fruin, 2020).

Operational logic addresses the fundamental levels in which the abstract operations that state the evolution of a system (Bogost, 2008) communicate what is happening during the diverse interaction opportunities (Wardrip-Fruin, 2020). They are directly related to the procedures and rules presented by the system of IDNs, describing the goal of the narrative, the ways readers can interact with them, and what kind of outputs result from there (Schell, 2008). The operational logic can be represented by some elements that form the structure of IDNs, which are readers, rules, objectives, and procedures (Fullerton, 2014).

Readers are responsible for making the narrative system meaningful, accepting the rules and constraints defined by the system, and cooperating with the world created through their actions (Björk & Holopainen, 2005; Järvinen, 2008). These actions happen in the “magic circle” (Huizinga, 1971), an environment that separates the space and time of play from the space and time of ordinary life. This way, when we enter in the magic circle, usually defined by a space that is marked with specific

boundaries, we adopt a particular set of rules. These are determined by the objects presented and actions that are possible to the readers, which are communicated via the diversity of elements and the behavior that arises from here (Fullerton, 2014). The rules are also liable for limiting the number and order of actions that can be taken and can be defined into different types. Salen and Zimmerman (2004) define *operational*, *constitutive*, and *implicit* rules: operational rules are written and explicit; constitutive rules are more abstract and appear behind the operational ones, informing them about the formal structure; implicit rules are behavioral and are associated directly with the goals and motivations of the readers (Schell, 2008). Objectives are gained and produced, becoming the core of meaning (Järvinen, 2008) since they define the tone set up and give readers something to achieve (Fullerton, 2014). In order to adopt these objectives, we need procedures, which are about how we can establish contact with the IDNs. Procedures are the logical components that contain the narrative state, and that can be manipulated by the readers to achieve their goals (Björk & Holopainen, 2005). They are strictly connected with the actions that the readers can make to change the narrative state, being physical actions, such as pressing a button, or logical actions that are related to the narrative state changes (ibid).

Besides that, narrative mechanics has a unique ontological structure rooted in the fact that the operational logic behind it is created and embodied by their creators' intentions, experiences, and perspectives (Gadamer, 2006). This way, the mechanics can also be understood through the concept of "meaningful play" (Tekinbas & Zimmerman, 2003), which is about the creation of a sense of purpose and significance for the readers, by integrating their actions in a broader context that goes beyond the artifact itself (Bond, 2014).

Since operational logic is responsible for providing a meaningful and engaging experience, a playable model results specifically from a procedural representation that needs to be grounded with the environment around it so that it can obey its communicative role (Wardrip-Fruin, 2020). A playable model appeals to the system dynamics that enhance the readers' understanding of that very system being represented by the IDNs (Bond, 2014). When engaging with the system's dynamics, readers are contacting with procedural and environmental aesthetics that determine the nature of the IDNs as well as their experience. The essential elements that define the system's dynamics are objects, properties, behaviors, and relationships (Fullerton, 2014). All of these acts are in correlation to each other, being that a change in one of them causes alterations to the system state, emphasizing the different outcomes that result from here.

Objects are the main blocks of a system, and they can be physical, abstract, or both, depending on the nature of the system. They are defined by their properties, which consist in the qualities that describe the physical or conceptual aspects of objects. The behaviors are the potential actions that an object can have, and that change the system state (ibid). For example, in IDNs, an object can be a character represented in the narrative, which will be defined by a set of variables that allows forming the main interactions during the process. They also contain a set of behaviors that can include the ability to act in specific ways or contain several characteristics that help the readers to advance and construct meaning.

The relationships of the system dynamics can also be affected by the structures of information, control, and feedback (ibid), which are related to the phenomenology of interaction and how the meaning-making of the IDNs is influenced by interactivity, readers' agency, and narrative structure.

### 3. How the body is shaping the phenomenology of interaction

What does it mean to say that we understand Interactive Digital Narratives (IDNs)? Is IDNs an object *per se* full of meaning, or does it need to follow a set of instructions and a composition of elements that will help them to produce meaning?

When in contact with IDNs, a unique situation arises, which is much different from other types of narrative situations because it involves active participation and agency (Eskelinen, 2001). The readers' agency, defined by the choices that readers can make during the progression of IDNs, also involves exploring and discovering new aspects of the narrative (Ensslin, 2014). It relates to the definition of understanding as a form of play described by Gadamer (2013) and that underlines the readers as an interpreter that behaves as a participant in an event that is both in need of interpretation and constituted by interpretation. The readers' agency can be interconnected with how the information is structured, influencing how readers come to their decisions (Fullerton, 2014), how the things are connected, and how changing one variable leads to changes in other variables.

Since there is a continuous exchange of information and energy, the IDNs are structurally coupled with the readers by processing input data and providing output information that will influence the readers' actions and outcomes. Simon Penny (2017) affirms that the:

*“Structural coupling is a central concept in autopoietic theory. The term describes the process by which structurally determined transformations in each of two or more systemic unities induce—in each other—a trajectory of reciprocally triggered change. Structural coupling triggers change in the organism but does not specify the nature of the change”* (p. 24).

The change that is created is cognitive and establishes that the construction of meaning is embodied, being not only a reference to the actions that are performed by the body but also to all the knowledge and abilities that arise and remain in the body (ibid). This way, the experience of interpreting IDNs with the body cannot be only expressed through language and other forms of symbolic representation, meaning that the body's sensory and perceptual experience is non-predicative (Martin, 2019). This non-predicative aspect follows the phenomenology approach that encompasses studying the readers' experience regarding their bodily sensations and emotions. Perception is not only a matter of the brain passively receiving and interpreting sensory information but an active process that involves the entire body. Besides that, we do not perceive the world as isolated observers but as embodied agents constantly interacting with the environment (Noë, 2015).

In IDNs, the structural coupling frequently includes giving the readers choices that will impact the progression of the narrative and that will lead them to different outcomes. However, it is not just that: the structural coupling can be enabled by forms of collaborative storytelling, where the narrative system adjusts its content, pacing, or narrative elements to create a more personalized experience, but also in forms of text-based responses, character reactions, or changes in the narrative's structure

and direction. There is also the usage of problem-solving or decision-making technique such as challenges, puzzles, or quests that will contribute for the openness narrative (Nacke & Deterding, 2017).

In the case of IDNs, the interaction with the digital environment points the readers into a virtual situation (Vella & Gualeni, 2019), also creating new forms of virtual subjectivity that have the potential to dissolve the boundaries between the self and the other (Haraway, 1994). At the same time, virtual subjectivity allows readers to express themselves in modes that are not possible in the physical world, implying the creation of complex and multifaceted identities (Turkle, 2011).

Because of the existence of some of these concepts and relationships that come across, readers become actively engaged in the construction of IDNs. Consequently, they are more prospective to see themselves finding meaning and significance in all processes that are being communicated. Relatively, the construction of meaning is not fixed or objective and also depends on the idea of incorporation (Calleja, 2011), characterized by an immersive and transformative experience.

For analyzing the construction of meaning in IDNs we use a logical movement that involves forming the best possible explanation for a set of observations or events. Start by underlying the primary elements of the IDN we want to analyze, we can use the process of abduction (Peirce, 1992) to understand what is behind the systems literacy, as well as the narrative structure that shapes the readers' experience. By comprehending how the system works we are able to cross paths, find patterns and generate potential explanation for the observations we are making.

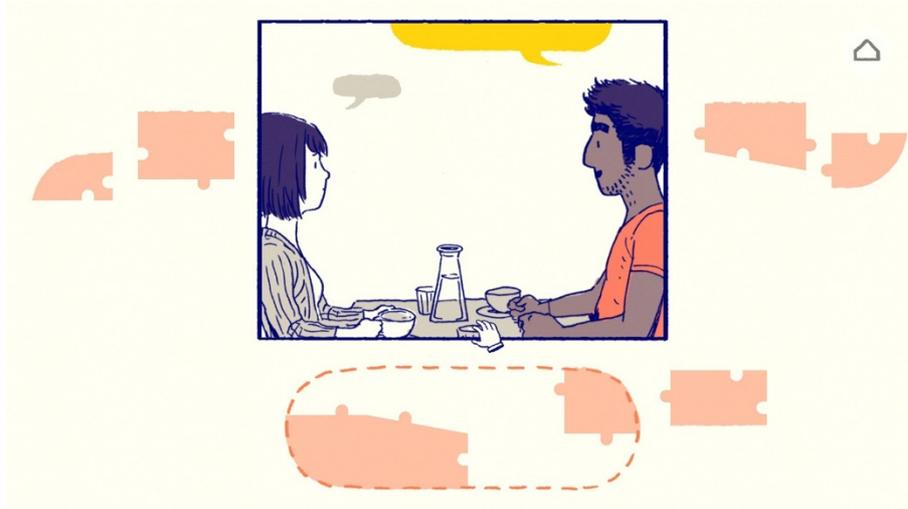
#### **4. Analyzing the construction of meaning in the Interactive Digital Narratives *Florence and Her Story***

When we enter in contact with an Interactive Digital Narrative, we activate and follow some commands that allow us to make sense of a range of sensory modalities. The first can be the memory we have from previous experiences or some things that can help us relate to the digital artifact. We can also construct the meaning based on the title, author, graphics, or instructions we need to cross to interact with it (Martin, 2019). Besides that, we draw meaning from the combination of elements that compose the narrative mechanics and the system dynamics that we already addressed in this paper.

Based on that, we will now address and analyze the Interactive Digital Narratives (IDNs) *Florence and Her Story*. Being narratives that don't have 3D exploration, no embodiment of a character, no cause and effect, and no meaningful state changes (Núñez & Remesal, 2021), we will approach how they are still meaningful to readers through rules and dynamics.

Florence is a 2018 interactive game published by Annapurna Interactive that follows the story of a young woman named Florence Yeoh and the ups and downs of her first love relationship with a musician named Krish. The narrative has a predetermined set of mechanics. It uses the style of comics to convey its story, allowing readers to use elementary touch gestures, such as tapping, swiping, and dragging, to complete a diversity of tasks that are related to the story. It is through the

use of puzzles and mini-games that, over the course of 20 chapters, the readers switch between narrative mechanics. The readers must solve puzzles that represent the early stages of the relationship between Florence and Krish (Figure 1). At the same time, some balloon mini-games are popped to expand the interactive dialogue sequences and the emotional highs and lows of Florence's journey.



**Figure 1. Florence screenshot**

Following a five-act structure, *Florence* also uses interactive dialogue sequences and symbolic imagery to convey the emotional journey of its characters. For example, the narrative uses a recurring motif of a bird cage to represent Florence's feelings of being trapped in her mundane life and her eventual liberation as she grows as an individual.

The puzzle mechanic behind *Florence* is one of the main factors that allow readers to construct meaning. It is through the rhythm with which the puzzles have to be solved or the way puzzle pieces change their shape that readers can understand they are in front of different situations (Kocher, 2021) and that they need to do different actions in order to traverse the narrative. Since readers are contacting with a linear structure, the construction of meaning through choice is not an option. Instead, the readers have to discover the content in order to progress in the narrative, so there are some visual indicators that are used to track exploration and investigation (Carstensdottir et al., 2019). This way, meaning is constructed through cognitive interactivity that identifies psychological, emotional, hermeneutic, and semiotic interactions (Zimmerman, 2004) and that is behind the processes of narrative transportation, identification, and engagement (Green & Jenkins, 2014). Being transported into the narrative world is broadly defined according to a cognitive and emotional dimension that leads to a change in attitude, belief, or behavior through various processes, including the evocation of vivid mental images (ibid). At the same time, since the issues addressed in *Florence* are connected to the idea of personal growth and self-discovery, as well as the challenges of a romantic relationship is easier to feel identification with the main characters. "Merging with the character and sharing the character's knowledge about the narrated events" (Tal-Or & Cohen, 2010, p. 404) makes readers potentially more engaged with the narrative.

*Her Story* is an Interactive Digital Narrative by Sam Barlow released in 2015 that follows the premise of a detective story. This piece is composed of 271 short videos of up to 80 seconds taken from a police database, created for this purpose, including seven interviews with the main character, Hannah Smith. The goal is to discover the facts about the mystery behind the disappearance of Simon, which is Hannah's husband. Although *Her Story* cannot be considered a branching narrative, as readers are never forced to choose between two options, the action of making some choices is presented to the readers. Some of these consist of typing keywords into the search bar that consequently displays up to five video clips that contain the typed keyword, allowing the readers to watch them and try to make sense of them (Figure 2).



Figure 2. *Her Story* screenshot

*Her Story* uses a fishbone narrative structure that allows readers to explore the sub-stories but always returns to the main thread (Gaudenzi, 2013). This way, the readers will explore the database of videos in any order they choose but being a mandatory characteristic to progress in the narrative. The actions that need to be taken are performative because it is not “displayed clearly and in such a way where there is no doubt about what options are available” (Carstensdottir et al., 2019). Instead, it depends more on the environment and the interface elements that are shown. Moreover, the progression in the narrative is also “presented through interactive cut-scenes or moments of narration that require the player to follow a strict pre-scripted interaction” (ibid).

*Her Story* also uses minimalistic visuals, consisting only of a computer screen displaying the database, permitting the readers to focus on the story and the main character. Barlow (2021) says that, at some point, it is just about natural curiosity. The readers forget about the narrative mechanics and accept that the IDN is only trying to give them driving knowledge about the main character and her story. This way, to create meaning, the readers should use their deductive skills to figure out what happened to Simon. *Her Story* does not reveal clear answers, and it is the readers that need to infer and make the connections between the different pieces of information. The construction of meaning is related to pattern recognition and the activation of possible selves, where the readers explore different ideas through diverse paths. There is also the interesting objective of this narrative, which is

understanding the main character and learning about her story, leading the readers to relate to analogous situations that can happen in their own lives (Green & Jenkins, 2014):

“But the thing that I was very interested in after Her Story came out was that the murder mystery, the idea that you need to solve this crime, was just the hook that got people in there. But you can solve that question, to a degree, quite easily or quite quickly. Which then leads to the more interesting objective, which, for me, is understanding this woman, learning her story.” (Núñez & Remesal, 2021)

## 5. Conclusions

Like other computational media, Interactive Digital Narratives (IDNs) create semiotic sequences that operate in an ergodic traversal and are based on dynamic systems that integrate and display a range of other digital forms. The establishment of some narrative mechanics determines how the narrative unfolds and how it is possible to lead the readers towards a specific interpretation or the convention of a particular message.

As a medium composed of aesthetic objects distributed across both technological and experiential dimensions (Denson, 2020), IDNs are composed and organized by code, breaking down the boundaries between the technological apparatus and our perception of it. According to Flusser (2013), a technological apparatus is defined by the production and distribution of elements that already exist in the system and that are controlled by a set of rules. This way, the code becomes a *metamedium* that turns elements such as a button, a character, or a virtual world into “syntactical units of meaning” (Youngblood, 1989), ensuring a conjugation about the inference of anticipations and revisions of past experiences, establishing a transudative relationship between the object and the subject (Denson, 2020). The exchange between these two aesthetic forms is responsible for the construction of meaning in IDNs since it allows the extension of new epistemological and ontological conditions for the relation between technology and the readers’ personal experiences.

Moreover, the construction of meaning becomes embodied since it requires physical and cognitive engagement with the narrative, being through making some choices, exploring environments, or interacting with characters (Ryan, 2001). This augments the readers’ “embodied experience into complex assemblages of capacities and processes” (Ash, 2013, p. 34). IDNs are directly perceived by the body and contribute with “a psychological, social and ideological machinery that is centrally involved in the production of subjects” (Denson, 2020, p. 55). Then, we understand meaning-making as *intermediative*, a notion that involves immersion as situated and sensorial and comprises the feedback loops between readers and computers (Hayles, 2004b). At the same time, the meaning emerges from what is depicted while reading the IDNs and through how the readers sensorially perceive the space. “The nature of the medium in which they are instantiated matters” (ibid), and meaning emerges from the physicality and the lively interplay encountered between readers and the digital work.

Since IDNs allow for multiple perspectives, allowing readers to shape the narrative in real-time and in concert with various elements, the construction of meaning is networked. It is based on systems that establish different relationships and communities between the elements of which they

are made (Gallagher, 2017). Through representation, interaction, and interpretation, its main role is “creating itself and being for itself” (Carvalhais, 2022, p. 52). They are immanent, emphasizing the interconnectedness and continuity of the construction of meaning that doesn’t stop when readers stop to engage with the digital work. Instead, meaning-making is generated immanently within the world through becoming and transformation processes (Deleuze, 1997).

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