

Interactive Immersive Narratives Techniques Applied for Edutainment in Interactive Health Projects: Analysis of Two USC's Labyrinth Projects.

Jorge I. Mora Fernández

Prometheus Research Program & Group I+D+C CICNETART, SENESCYT & DIUC,
School of Philosophy, Letters & Education Sciences, University of Cuenca, Ecuador.
multiculturalvideos@gmail.com

Abstract. The interactive narratives for developing interactive and educational documentaries have served for developing interactive installations and products in galleries, exhibitions, museums, universities, webs and videogames. During the last years, these previous experiences of applying interactive narrative techniques in digital historical or educational products have served to developed interactive narratives applied to health education, treatment or recovery. Two of projects developed by the USC's Labyrinth Project, directed by Marsha Kinder, are examples of the application of experiences in other narrative genres to health edutainment. This paper analyzes the interactive narrative elements integrated on the interfaces of the projects: *A Tale of Two MAO Genes* and *Interacting with Autism*. This analysis develops a model that describes the interactive immersive narrative elements integrated on their interfaces. It serves to identify the interactive narrative elements that create immersion in edutainment health projects so they can be applied on new narratives about recovering from addiction.

Keywords: Interactive narratives, edutainment, health, interface, hypermedia system, transmedia, interactive documentary, immersion, agency, narrative paradox, narrative closure, narrative intelligibility.

1 Introduction

Interactive narratives techniques have been applied to the production of interaction design for edutainment interactive media projects since the beginning of existence of digital medium, as Janet Murray describes it [1]. However, is only during the last years that those immersive and interactive storytelling techniques have been applied more to edutainment in health contents. The processes of developing edutainment through the creation of interactive database narratives, first for fictional, artistic and historical contents and lately for health contents, have been experienced by the USC's Labyrinth Project, a research initiative on interactive narrative and digital scholarship.

Thus, after a scientific visit at USC and an interview with the director of the Labyrinth Projects, Marsha Kinder Ph.D; about her interactive narrative design experiences and the current project that the Group I+D+C CICNETART is designing, an interactive narrative media project focus on recovering from addiction, it was clear the need to deeply analyze the interaction designs applied on the Labyrinth's health related projects. This research process serves to collect the HCI, Human Computer Interface, affordances ([1], p.409) that develop immersion and agency of the interactors in two health projects: *A Tale of Two MAO Genes: Exploring the Biology and Culture of Aggression and Anxiety* [2], and *Interacting with Autism, a video based resource* [3]. The first project is "an interactive science education project on a DVD that contains six hours of compelling multimedia material designed for diverse audiences – from K-12 to Graduate School, from science majors to the general public. It focuses on Dr. Jean Chen Shih's thirty years of pioneering molecular research on a crucial pair of brain enzymes, known as the MAO A and MAO B genes (monamine oxidase) that help control aggression and anxiety." [2]. *Interacting with Autism* combines scientific and personal documentaries with animation on a video-based website, "...that presents the most reliable evidence-based information currently available on Autism Spectrum Disorder (ASD). This website is designed primarily for those on the autism spectrum and their families, as well as educators and healthcare workers, to help them make informed choices about what approaches might be most effective for any specific individual diagnosed with autism. We are especially interested in reaching families from ethnic communities and economic groups who are usually underserved and whose children typically do not receive early diagnosis. For that reason, the website is bilingual—accessible both in English and Spanish." [3]. These interactive health projects are analyzed through an original and detailed model of analysis to study the integration of IDS [4] techniques, Interactive Digital Storytelling, within the interface and the interaction design. With all, the conclusions of the interaction design analysis serve to be applied on the interactive narrative design of a health project about recovery from addiction. The final discussions and conclusions are focused in collecting interactive narrative and aesthetic techniques to develop, at the Group I+D+C CICNETART, the prototype of an interactive documentary about recovery from addiction.

2 IDS Descriptions & Techniques to Include on the Analysis.

Firstly, the goals, hypothesis and the concepts of the IDS study are described in order to develop an accurate model of analysis of the narrative interaction design integrated on the interface, which are finally relevant for new interactive health projects. To include on the model and analyze the different interactive narratives and aesthetic elements, used by the mentioned projects of the Labyrinth group, is necessary to clarify some important practical and conceptual descriptions involved in the interactive narratives and interaction designs. Some of the most important to observe are: digital media affordances, immersion, agency and types of interaction, emergent narrative, hypermedia interface, hypermedia narrative cinema, narrative paradox, author-audience distance (AAD), narrative intelligibility, narrative closure.

2.1. Goals and Hypothesis

The goals of this research are to study how the interaction design and the narrative techniques were integrated successfully¹ to obtain the necessary interactor immersion and agency on the health edutainment contents. The model focuses on identifying the narrative and expressive techniques used on edutainment and on the interaction design that present, between others, good narrative intelligibility and closure [5]. The goal is looking for the pertinent interactive narrative concepts that serve to design effective interactive communications for health edutainment and behavioral change. In words of Ben Shaul ([6], p.84) "...the complimentary lures that reinforce rather than dismantle the interactor's engagement when transitioning back and forth from cognitively constructing the hyper-narrative in her mind to behaviorally intervening in order to change its course". In brief, the final objective is to determine how the agency and immersion are obtained on interactive health edutainment projects through the "behaviorally intervention", with the interface, "to change the course" of information organization, while keeping narrative intelligibility and closure.

The hypothesis of the research is that through the analysis of the interface design on successful health projects is possible to describe how the four affordances of digital media ([1], p. 51): encyclopedic, spatial, procedural and participatory, are developed and integrated to obtain immersion and agency on new health edutainment projects. An effective interface design allows the user identification with the interactive narrative presented, through a transparent participation with: the values, the characters' situations, the actions, the spaces and the times narrated. Interactive health documentaries can present close ADD, good narrative intelligibility and closure as well as satisfactory immersion and agency.

2.2. Immersion, Agency, Hypermedia Interface, Hypermedia Narrative Cinema and System Goal.

According with Mateas & Murray ([7], p.21): "Immersion is the feeling of being present in another place and engaged in the action therein. Immersion is related to Coleridge's "willing suspension of disbelief" when a participant is immersed in an experience, they are willing to accept the internal logic of the experience, even though this logic deviates from the logic of the real world." Integrating the previous concept with the types of interaction Mora ([8], pp.191, 509) describes immersion as: "...the identification and responsibility that the user feels about the development of the narrative actions and the processes that the character live when he can mediate through the interface with the narrative forms and structures, thanks to the different types of interaction (selective, transformative and constructive) that the hypermedia expressions offer." In relationship with the concept of agency, Murray, J. ([7], p.10) : "Agency is the term I use to distinguish the pleasure of interactivity, which arises from the two properties of the procedural and the participatory. When the world responds expressively and coherently to our engagement with it, then we experience agency." "...agency can be intensify through the dramatic effect."

¹ Here success is understood as the narrative communication between a user and a system ([5], pp.13, 22), for instance, through close ADD, narrative intelligibility and closure.

For the interface the synthetic definition of Moreno, I. ([9], p. 114) is: "the mix of hardware and software through the ones the reader-author communicates with the hypermedia program". It is complemented by the more extensive description of Mora, ([8], pp. 222, 511): "The interface is configured by a set of interactive expressions that serve to attract the spectator's attention, his receptive and participatory position in the communicative moment, and to invite him in becoming a reader-author through the different type of interactions with the narrative forms." "It is the physical and functional connection between the hypermedia system and the perceptual and communicative human systems." Another important concept is the hypermedia or interactive multimedia. Moreno I. ([9], p.27) describes it as: "Hypermedia describes all the spectrum of interactive media from telecommunications, high-definition TV, videogame and the multimedia." The hypermedia interface concept is integrated by Mora ([8] p.222) on the following description: "the organized set of interactive and multi-sensorial expressions organized under the representations that are allow by the information technologies."

Moreover, since the analyzed projects can be considered hypermedia narrative cinema, on this research the words of Ben Saul ([6], p. 7) are used to describe this concept: "a variety of hypotheses and actual works whose common denominator is their focus upon a computer-mediated interaction between users or "interactors" and moving audio-visual texts that strives, through the use cinematic strategies, to offer the interactor an option to change at predetermined points the course of action by shifting to other predetermined options". On that sense, on the model of analysis is considered also what are the types and how are the narrative structures presented through the hypermedia interfaces of the health projects. All to observe how the hyper-narrative is balanced with the system goal. The hypermedia narrative structure [8] is materialized in the multimedia expressions that are articulated on the interface design. The relationships between the hyper-narratives to the system goal of immersive-interactive media are considered from Bruni, L.E. ([5], p.13) perspective as: "...experiences... ...are also related to the success of narrative communication between a user system and a system, which determines the degree to which the goals of that system have been accomplished. We see thereby a close relation between 1) the various aspect of narrative communication, 2) interaction between user and system, and 3) the achievement of the goals of the system."

2.3. Interaction, Types of Interactivity and Productive Interactivity.

The concept of interaction necessary to be used here is the one describes by Mora ([8], p. 171, 510): "To act interdependently or reciprocally in response to action coming from an interface, person, agent, force, function or object interdependently or reciprocally. It is specially applied to the communicative multi-sensorial dialog between human-machine or human/s-machine/s-human/s through the use of the hypermedia interface." It is also complemented with Murray's description of ([1], p.426): "In digital media, human actions and computer responses are shaped into discrete interactions, which, if well formed, elicit the experience of agency in the interactor. Digital environments can also represent complex systems of interaction in simulations". In that sense, the complexity forms thanks to the different types of interactivity that digital media projects can offer. The concept of interactivity used here is the one

described by Murray ([1], p.426): “A design term that is... ..Composed of three separate entities: the procedural and participatory affordances of the digital medium, and the associated aesthetic pleasure of agency that results when the interactor is appropriately scripted to perform actions that the computer code can respond to appropriately.” The types of interactivity that the interactor can develop with the interface are referred by Mora and Moreno’s concepts ([8], pp.173- 174) and summarized here: “...Three types of participation selective, transformative and constructive... ..Selective: the user interacts only selecting the options that the program offers... ..Transformative: the user not only can select the options proposed by the author, he can also transform them... ..Constructive: The system allows the user to select, transform even to build new proposals or recombination of possibilities that were not previewed by the original author. In that sense it allows to interact to create emergent narratives.” Another important concept to be included in the model of analysis, due to its relationship with the constructive type of interaction with the system, is productive interactivity. Hurup Bevensen ([10], p. 62) describes it as: “To participate in the process of modifying narrative material through writing, navigating and interacting with objects embodied in an open world computer game, resulting in dramatic elements to the “next” player.” Ryan [11] complements the description of productive interactivity as: “[participating] in the writing of text by contributing permanent documents to a database or a collective literary project”

2.4. Concepts related with the “Narrative Paradox”: ADD, Narrative Intelligibility and Narrative Closure.

All these described concepts are included on the model of analysis so it can be observed and study how the “narrative paradox” is resolved on the interaction design of this project. The “narrative paradox” is considered through Bruni, L.E ([5], p. 14) perspective: “With the advent of new media and its possibilities for interactivity in the generation and reception of narrative structures, the issue of “narrative paradox” arises, in which the relationship between authorship and interactivity is seen as being inversely proportional i.e.: the problem of having free-roaming interactive world and an author-controlled narrative at the same time... ..The paradox arises in all its implications with the “empowering” possibilities of digital media and presupposes an ideal of “emancipating” the audience from the “tyranny” of the author.”

There are some other concepts that are necessary to describe and to observe to understand how the projects try to resolve the “narrative paradox”, one of them is the ADD. According to Bruni ([5], pp. 14-15): “The Author-Audience Distance (ADD) is a function of “narrative intelligibility”... ..Eco introduces the concept of “aberrant decoding” in order to explain how messages can be interpreted differently... ..We refer here to this interpretation gap as the ADD which thereby illustrates the continuum that goes from complete aberrant decoding to perfect reception of the preferred decoding, depending on how defective is the sharing of the coding and system between author and audience.”

Another important concept related with the “narrative paradox” and to the ADD is the narrative intelligibility. Bruni and Baceviciute ([5], p. 18) describe it on his study as “...the process in which the audience receives or generate meaning in a way that is close to what is intended, desired or expected by the author... .. i.e. the fidelity of the

transmission, or how close the AAD is... ..this distance then depends on the alignment between the author's intended meaning and the one comprehended by the user.” Another important concept is the narrative closure described by Bruni and Baceviciute ([6] p. 18) as: “...the process where the audience may construct its own meaning out of what is being mediated, independent on whether that meaning corresponds or gets close to what is intended by the author...”

In order to include a clear understanding and provide this research with a narrative intelligibility and closure the concept of emergent narratives is taken from Jenkins [12] definitions described on Bevensee and Schoenay-Fog words ([10], p.61) as: “...narrative material through a rich environment and intelligent characters, with which the user is able to associate, interpret, and ultimately construct his/her own understanding of the story.” This description is complemented with Truesdale et al ([13], p. 65) perspective on emergent narratives (EN): “...the conceptual approach is to place an interactor within an interactive environment from which the narrative dynamically alters based on individual actions of both the interactor and any involved agents.”

3 Model of Analysis

The following model of analysis, (see Table 1), is designed focused on analyzing the interactive narrative and aesthetics elements presented on the interface and how the combinations of those elements on the interface serve to the activation and the existence of the practical concepts such as: immersion, agency, types of interaction, productive interactivity, emergent narrative, hypermedia narrative cinema, narrative paradox, author-audience distance, AAD, narrative intelligibility, and narrative closure. This model of analysis of the interactive communicative and narrative dynamics is applied to the analysis of the selected Health Labyrinths Projects: *A Tale of Two MAO Genes* and *Interacting with Autism*. The model goal is to analyze how the interface design generates immersion and agency through the different combination of interactive narrative elements and techniques. The first versions of the model were effectively used in doctoral and postdoctoral researches at the Visual Arts Department, UCSD, University of California San Diego, and the Interactive Media division, at USC, University of Southern California, to analyze hypermedia interfaces in inter design and active digital storytelling projects.

The main focus of this model is to observe, describe and identify the elements and concepts that converge during the interaction with the interface, which implement the described narrative concepts and combined them on a way that creates a better agency and immersion. Thus, some technological-aesthetic-narrative interfacial algorithms, or combinations, are found so they can be integrated in designing future health projects.

Table 1. Model of Analysis of the Interactive Design, Aesthetic, Narrative Elements & Concepts, Applied on Hypermedia Interfaces of IDS Projects. (Source: self-design).

1. Project Name and description of the interfaces and the conjunction of hypermedia expressions:
1.1. Identifiable denomination of the hypermedia interface. Each different interface that appears on the hypermedia product should be numbered, named and observed under this descriptive model to obtain a deep analysis:
2. General characteristics of the interface and detailed description of the multimedia characteristics of the expressions that can allow interaction with any of the narrative elements. 2.1. Software: Group of expressions and

<p>technological tools that are used for the relationship and generation of natural and virtual interactions: A) Of iconic intermediation, B) Symbolic, C) Combination of A & B, D) Natural-mimetic, E) Opened or virtual reality, D) Semi-opened or simulators of virtual reality F) Convergent, G) Pull or push interfaces, H) Static or dynamic Interfaces, I) Mute or sound interfaces, J) Smart interfaces, and K) The iteration. 2.2.Types of image or perceptive representations: A) Still image, B) Photo-mimetic, C) Photo-infographic, D) Info-graphic, E) Still image with sounded image, F) Image in movement, G) Cine-mimetic, H) Cine-infographic, I) Cine-mimetic and info-graphic, J) Visual image in movement with or without sounded image, K) Audiovisual image, L) Sounded image, and M) Sounded image with or without visual image or extraterritorial images. 2.3. Hardware: Group of physical expressions: A) Of intermediation, and B) Natural-mimetic. 2.4. Typographic description: A) Size of letter, B) Style of font or type, C) Characteristics or effects of the letter, and D) Color of the letter. 2.5. Iconic description. 2.6. Symbolic description.</p>
<p>3. Features of the characters represented on the interface and general description of the potential interactions with the characters. 3.1. Character or avatar of 1st, 2d or 3rd Person. 3.2. Physical characteristics: A) Sex, B) Age, C) Height and weight, D) Hair, eyes and skin colors, E) Pose, F) Corporal appearance and customs, G) Morphological defects, and H) Hereditary aspects 3.3. Sociological characteristics: A) Economic status, B) Employment, C) Type of education, D) Life and family relationships, E) Religion, F) Race, nationality, G) Function in his community, and E) Political tendencies. 3.4. Psychological characteristics: A) Sexual and moral life, B) Personal ambitions and motivations, C) Frustrations, main conflicts, D) Temper: angry, tolerant, pessimistic, optimistic, etc, E) Vital attitude: complacent, combative, surrendered, F) Insecurities: obsessions, inhibitions, superstitions. G) Extroverted, introverted, well balanced, H) Capacities, aptitudes, languages, I) Qualities: imagination, criteria, taste, equilibrium, J) Intellectual coefficient: high, regular, low</p>
<p>4. Characteristics of the actions represented on the interface and general description of the potential interactions with the actions. 4.1. Type of structure. 4.2. Secondary theme or subplot. 4.3. Changing hierarchy. 4.4. Changing hierarchy: A) Relationships between main and secondary actions, B) Real relationships between main actions, C) Real relationships between secondary actions, D) Simulated relationships between main and secondary actions, E) Annulated between main and secondary actions.</p>
<p>5.Characteristics of the spaces represented on the interface and general description of the potential interactions with the spaces. 5.1. Natural, constructed, mimetic-natural or mimetic-info graphic, 5.2. Senses implied in the spatial perception: view, ear and/or touch, 5.3. Implicit space and/or explicit, 5.4. 2D/3D or 4D space, 5.5. Perspective: size, scale, position and point of views, 5.6. Focus or defocus, 5.7. Illumination and color temperature, 5.8. Props, 5.9. Protagonist space and/or hyperspace, 5.10. Absent space or suggested space, 5.11. Selection space with representation: coincident or different, and 5.12. Hyperspace.</p>
<p>6. Characteristics of the time represented in the interface and general description of the potential interactions with the time. 6.1. Order: flashback, flash-forward, meta-retrospective or meta- prospective, 6.2. Duration: pure diegesis, impure diegesis, open or close, 6.3. Frequency: repetitive sequence or singular multiple, 6.4. Temporal localization: past, present, future, changing or inexistent, and 6.5. Iteration</p>
<p>7. Aspects of the interactive narrative elements: characters, actions, spaces and times that have a type of interaction available: selective, transformative or constructive, which allow productive interactivity with emergent narratives.</p>
<p>8. Values or spiritual principles and unscrupulous values that are available to activate through the interaction with the narrative elements: characters, actions, spaces and times, presented by the edutainment content.</p>
<p>9. Description how the immersion is achieved.</p>
<p>10. Description how the agency is achieved.</p>
<p>11. Description how the hypermedia narrative cinema structure and the relationship with the system is achieved.</p>
<p>12. Description of how the “narrative paradox” is resolved integrating the ADD, with the narrative intelligibility and the narrative closure.</p>

4 Discussion: Application of the Model, and the Interaction Design and IDS Common Denominators.

After applying the detailed model in both projects, *A Tale of Two MAO Genes and Interacting with Autism*, the common denominators on the interaction design are founded. In relationship with the design of software both projects have a combination of iconic and symbolic intermediation with attractive typographic design, dynamic, push, sound and iteration combined on their interfaces. On the type of image or perceptive representations both projects have cine-mimetic and info-graphic audiovisual images. The hardware used on both allows mouse and touch pad intermediation. The typography used is bigger than 14 letters size, with cold colors for physical health descriptions, and warm colors for psychological health. Both projects use clear icons, and attractive symbols with letters for pushing interactions.

The narrative characters presented on both health projects are real people presented from a 2nd and 3rd person perspectives to keep objectivity. The protagonists are coral, people involved in genetic research or in the autism situation, so the themes become the main characters. Its multicultural approach includes people from all type of educational and economical levels. The narrative actions are structure on circular, basted and parallel encyclopedic narratives, with a main theme and several subplots that enrich, going deeper on the information provided, and reinforcing the main one. It presents a changing narrative with relationships between main and secondary actions. The narrative spaces presented on both health projects are natural, mimetic-natural, or mimetic-info-graphic when is necessary to describe spaces microscopically or psychologically. These are represented on 2D and 3D. The spaces are presented given priority to the people, within medium shots and frontal positions, talking heads. The interface sizes are computer based, 1440x852 and 1680x1050. The senses implied in the spatial perception are: view, ear and touch. The props used are clinical and scientific tools, on one project, and educational and therapeutic toys, on the other. The narrative times has the orders of flashback, flash-forward, meta-retrospective or meta-prospective related with the different secondary narratives, on the *MAO A&B project*, and meta-retrospective and meta-prospective during the secondary narratives. They are pure diegesis, open. The temporal localization on the first project is changing, letting us to observe the research beginnings until its present and potential future, and on *Interacting with Autism* is the present, both let time iteration. In terms of the values, they have in common the following ones: honesty, hope, faith, courage, integrity, good-will, humility, fraternal love, justice, perseverance, service, responsibility, self-acceptance, patience, spiritual awakening. In the case of *A Tale of Two MAO Genes* there also some present some unscrupulous values: animal brutality, greediness, lack of integrity with nature.

On both projects the immersion effect on the interactive narrative is achieved not as on a spatial sense but on an intellectual, emotional and moral levels. The interface design presents the contents with enough textual questions, images and videos representing several scientific and ethical subplots that invite the user to develop “the suspension of disbelief” and immerse in the well-documented multimedia and multi-perspective information. The multi-narrative access, the circular structure and the changing hierarchy provides the participant with enough interactions to satisfy his/her intellectual questions and to see the benefits, limits and difficulties of researching about genetics. The fact o being able to do transformative interaction to go deeper on the understanding of the concepts related with genetic research provides the sensation of navigating freely through the database. On *Interacting With Autism*, its theme, the real dramatic and hopeful personal stories provide the proper emotional immersion for the user to feel the responsibility to continue interacting with the encyclopedic, or database narrative, generating his/her own narrative structure experience, through selective and transformative interactions. The immersion is also helped through the constructive, or productive interaction, where an extra video or multimedia info about a theme related with autism can be requested or provided. The cine-mimetic documentaries serve to generate emotional agency through dramatic identification with real characters, in real situations, that invites the user to go deeper on a subject or change according with his/her mood or interest.

The agency is obtained on the *Two MAO Genes* project thanks to the great offer of cine-mimetic and info-graphic documentaries, text and info-graphic descriptions, a project with great procedural properties of meaningful documents, and the participatory properties of letting navigate, through a simple but functional interactive design, a huge database of genetic researches. The participant feels the freedom of navigating and building coherence according with his/her own psychological and emotional perspectives. The treatment of the narrative time, with openness, lets the participant to review different historical moments of the genetic research and, in parallel, the scientific evolution and health applications, generating a dramatic identification with the subject. The fact of the participant being able, through the info-graphic clips, of traveling inside the human body, to understand processes that determine the emotional and mental human states, generates also dramatic identifications. On *Interactive with Autism* the effect of agency is built up based on the plots and subplots' navigation and interaction with the open structures. Thanks to its interaction design, which provides easy access through menus, a basted narrative with parallel lines can be accessed and the structure built on a great database of videos. The autism world responds with coherence since the great offer of subplots and characters organized on the submenus of understanding, treating and living with autism provided a detailed description of each video of the subplots that allow the user to search and review the experiences he identify the most.

The narrative structure of *A Tale of Two Mao Genes* is circular, since the subplots or subthemes can be navigated circularly through arrows, and accessed to deeper or more general levels, in any moment, through square buttons. This is a simply way of presenting a database narrative full of scientific details and concepts, specially since the system goal is to educate to huge variety of audiences [2] "from K-12, to Graduate school, from science major's to general public". The edutainment goal of a complex theme as genetics, the tale of how the MAO genes were discover, and their consequences on the biology and culture of aggression and anxiety, is achieved through an hypermedia interface that allow multilevel access. These various aspects of narrative communication, the transformative structure interaction, and the selective interaction, of managing the level of content detail that the user want to navigate on the system, are aspect that guaranties the achievement of the system of the edutainment goal for several audiences. Following the hypermedia structure presented on the interface of *Interacting With Autism* it can be concluded that the simple use of well design icons and symbols, and the text clear descriptions in the submenus and the video menus, allow a transparent participation thanks to provide a clear narrative communication between the user and the system. The types of interaction: selective, transformative and constructive, which the user can develop, are clear for the user since he can select between video themes related with understanding, treating and living with autism. The shortness of the videos, as average around 4 minutes, and as maximum around 15 minutes, provides a dynamic experience about a complex subject. The system goal is achieved through providing a multilevel structure to an encyclopedic video source of the daily situation and the state-of-the-art research in autism.

The "narrative paradox" of *A Tale of Two MAO Genes* is resolved integrating a close ADD, with the narrative intelligibility and the narrative closure. The complex dynamics of procedural and participatory affordances allow the "all ages", attractive and functional interaction design, to access the encyclopedic multimedia contents.

This makes the author-audience distance very close and receptive. Although the scientific coding between author and audience can be far, the system is presented on an immersive hypermedia interface that allow the gap to be navigated on a simple and educative way, breaking the user's fear of the unknown. The narrative intelligibility is also diverse and with an attractive design, with info-graphic and audiovisual colorful designs, since the authors are very conscience that are presenting complex contents. This allows the user to comprehended better through small clear pieces of information. The narrative closure is let to the user interaction with the system, and to how deep on the database narrative he wants to go to complete his education. The circular and multi-access structures give the user the agency to generate his/her own narrative closure, his/her right structure and organization of the multimedia contents. However, there is not allowed any emergent narrative, which can make an interactive edutainment project boring after exploring it several times. In *Interacting with Autism* the narrative paradox is resolved very efficiently. For a complex theme as autism, the brief presentation and the video summaries, presenting the subthemes understanding, treating and living with autism, helps to break a long initial ADD in a short period of time. Through the professional and family video descriptions of the solutions, situations and difficulties of autism, complemented with the interaction of autistic children and adults, the user can have a clear overview and direct contact with autism, which otherwise would require a lot of time to understand, because a lot of the technicalities of the autism spectrum. This creates a "preferred decoding" and narrative intelligibility, since the language used by the real characters is common language explaining complex processes, rather than technical language. These facts, and the cine-mimetic-info-graphic videos presenting how an autistic person can perceive overwhelming multi-sensorial inputs on his daily living, help a lot to approach the coding distance between the authors and the audiences. That way the author intention of approaching the world of autism to the general audiences is obtained. Thus, the narrative closure is achieved thanks to the open narrative structure, where the user may construct its own.

5 Summary of the discussion & conclusions to apply on future IDS projects about health edutainment in recovery from addiction.

In summary, health edutainment interactive narratives need to count with an interaction design that presents flow and transparent navigation through all the encyclopedic and database contents. Interactive webs full of short documentaries with interactive secondary narrative experiences around a main theme, like recovery from addiction, are good options of content organization. Transparent push interfaces with attractive combinations of icons, text and attractive symbols are needed to generate an initial immersion and agency of the users. There are some important problems to avoid on hypermedia narrative cinema, as described by Ben Saul ([6], p.30): "...the major hyper-narrative split-attention stumbling blocks: non restriction of narrative threads, incoherent transitions between different narrative threads and non resolution of multi-threaded narratives." In this sense, the analyzed Labyrinth projects present effective circular, basted and parallel lines narratives that generate a immersion on the main

plots, genetics and autism, making complex themes attractive. The use of a variety of cases of recovery from addiction, perspectives, and techniques seems desirable for the future health project. It is also crucial on the interaction design to include all the types of interactions: selective, transformative and constructive, or productive interaction, to choose the content navigation, to transform the narrative structure and to nurture with meaningful new contents and comments the IDS. With all these techniques will be possible to create meaningful relationships, between the immersive sensorial, psychological or emotional moments and the interactive aesthetic, narrative, and values elements expressed through the hypermedia interface, on a health edutainment project about recovery from addiction.

The interaction design needs to implement as much as possible the properties of encyclopedic, special, procedural and participatory. As Murray ([1], pp.53, 410) underlines: “In approaching interaction design as a cultural practice our aim is always to make an object that is satisfying in itself and that advances the digital medium by refining or creating the conventions that best exploit these four affordances.” That is why for the health edutainment interactive narrative project about recovery from addiction we are looking into:

(i) Creating encyclopedic information with optimized procedural processes, where the user can easily and fast access different multicultural experiences and techniques of recovering from addiction, archival of the history of recovering from addiction, documents and news about them, as well as to the possibility of uploading extra information.

(ii) Presenting several spatial and participatory options where the users can interact with the processes of recovering from addiction, on different intellectual and emotional levels, through real and virtual physical, mental and spiritual spaces. That way it will be procured the identification with the multidimensional and multicultural narratives, through the variety of characters and the types of interaction with them. This will activate the memories and the human imagination of the past, present and future of the people represented on the IDS health project, and of the user himself if he/she has experience similar personal, familiar or friendship situations.

Finally, the health edutainment interactive narrative projects will try to serve as a digital media creation for informing about the history, current free possibilities to recover from addiction, and its medical researches. Some interactive narratives and documentaries will also serve to conduct new research, using neurocinema techniques, to determine what recovery techniques are more efficient and interactive for the human brain. This last research is being negotiated to be conducted at the Arthur C. Clarke Center for Human Imagination, directed by Sheldon Brown, at University of California San Diego, in collaboration with Pia Tikka, neurocinema artist and researcher at the Aalto University, in Finland.

Acknowledgements. This work was supported by the Prometheus Project, Secretary of Higher Education, Science, Technology and Innovation of the Republic of Ecuador, by the DIUC, Direction of Research of the University of Cuenca, through the Research Group CICNETART I+D+C, and the School of Philosophy, Letters and Education Sciences, Careers of Social and Digital Communication & Cinema.

References

1. Murray, J.: *Inventing The Medium. Principles of Interaction, Design as a Cultural Practice.* The MIT Press, Cambridge. (2012)
2. Kinder, M., Shih, J.C., Kang, K.H.A., Comella, R.: *A Tale of Two MAO Genes: Exploring the Biology and Culture of Aggression and Anxiety.* The Labyrinth Project, University of Southern California, USC, Los Angeles. (2010)
3. Harris, M., Kinder, M., Mahoy, S.: *Interacting with Autism, a video based resource.* USC School of Cinematic Arts, USC, Los Angeles. (2013), <http://interactingwithautism.com/> (accessed June 1, 2014)
4. Knoller, N.: *The Expressive Space of IDS-as-Art.* In Oyarzum, D. et al (eds.) ICIDS 2012. LNCS, vol. 7648, pp. 30-41, Springer, Heidelberg (2012)
5. Bruni, E., Baceviciute, S.: *Narrative Intelligentibility and Closure in Interactive Systems.* In Koenitz, H. et al. (eds.) ICIDS 2013. LNCS, vol. 8230, pp.13-15, 18, 22. Springer, Heidelberg (2013)
6. Ben Shaul, N.: *Hyper-Narrative Interactive Cinema: Problems and Solutions.* Editions Rodopi B.V. Amsterdam, New York (2008)
7. Mateas, M., Murray, J.: *A Preliminary Poetics for Interactive Drama and Games, and From Game-Story to Cyberdrama.* In Wardrip-Fruin N., Harrigan P. (eds.) *First Person: New Media as Story, Performance and Game.* p. 2-33. The MIT Press, Cambridge (2004)
8. Mora, J.: *La interfaz hipermedia: el paradigma de la comunicación interactiva. Modelos para implementar la inmersión juvenil en multimedia interactivos culturales. (Videojuegos, cine, realidad aumentada, museos y web).* Fundación Autor, Madrid (2009)
9. Moreno Sánchez, I.: *Musas y Nuevas Tecnologías: El relato hipermedia.* Paidós Comunicación, Barcelona (2002)
10. Hurup Bevensen, S., Schoenau-Fog, H.: *Conceptualizing Productive Interactivity in Emergent Narratives.* In Koenitz, H. et al. (eds.) ICIDS 2013. LNCS, vol. 8230, pp. 61, 62. Springer, Heidelberg (2013)
11. Ryan, M.L.: *Narrative as Virtual Reality.* The John Hopkins University Press, Maryland (2001)
12. Jenkins, H.: *Convergence Culture.* New York University Press, New York (2007)
13. Truesdale, J., Louchart, S., Hastie, H., Aylett, R.: *Suitability of Modelling Context for Use within Emergent Narrative.* In Koenitz, H. et al. (eds.) ICIDS 2013. LNCS, vol. 8230, p. 65. Springer, Heidelberg (2013)