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Abstract

This article deals with part of the Transhabitat poetic research project developed within the Art and Technology research stream from the Graduate Program in Visual Arts at the Federal University of Santa Maria in Southern Brazil. The research focuses on the production of generative images addressed to the creation and presentation of interactive and immersive installations of cybrid spatiality. It envolves the association of individuals (humans), media (information and communication technologies) and milieus (material and digital). In Transhabitat, the construction and reinterpretation of information takes place in the hybridizations that make up a transorganic habitat and provoke a mode of atopic habitation.

Keywords: Transhabitat, Generative image, Atopic habitation

1 Transhabitat

The Transhabitat Master's research (Camargo, 2016) arises from the communicative relations among individuals, media and milieus. It involves the poetic creation and experiencing of generative images focused on the production and presentation of interactive and immersive installations (assisted by LabInter¹) in which the habitat hybridizes itself to the multimedia information flows.

In Transhabitat, the prefix "trans" refers to the transformation of information through media support, to the transcoding that generates and reinterprets images. The term "*habitat*" points to the association of the individuals, media and milieus that compose habitable spaces. As Peter Anders (1997) points out, these environments of hybrid spatiality, which he calls cybrid,² are result of physical space (material) and cyberspace (digital) hybridization that, in turn, constitute an interactive *habitat* where information is

constantly constructed and reinterpreted by dynamic connections and thereby form networks of mutant topologies.

Anders (1997) notes that cybrid refers to the association of "actuality" and "virtuality" through the constant construction and actualization of reality by digital information. The author reflects on the connection, association, contamination and self-regulation between these two spatial realms by means of interactive flows of informational construction and reinterpretation within generative image production processes. For Roy Ascott (2002), this transmedial cybridization between physical space and cyberspace generates a cyberception³, a space-time notion that changes through its interaction with information, without defining the boundaries of each medium. According to Ascott, cyberception makes it possible to observe more acutely the emerging processes of nature, the mediatic flows, the invisible forces and fields of multiple realities.

We investigate how interactions take place between individuals and media. The interactivity, available in the communication and information technologies of computers and multimedia, evokes innovations within processes of knowledge construction and artist and technological imagistic manipulation. The activity of the interactor, requires a "real time" feedback from the media. The contemporary artwork emerges from this interaction and it is this same experience that endows its existence.

The ceaseless process of construction and transformation related to the city space is inspirational; it makes up layers of overlapping interactions and event arrangements of distinct natures and periods, both perceived in the accumulation of different information and visible on the surfaces of these collective living environments. These compositions can be understood as cybrid spatiality topologies, in which multiple languages represent the materialization of superposed events within habitable locations. This transmutable habitat is enchanting; it gives shape to environments composed of dynamic networks that build information and generate a multiplicity of images, actualized each moment in their connections and interactions.

In this context, the term transorganic becomes one of the pivotal concepts examined in Transhabitat's poetic research. Developed by Massimo Di Felice (2009) in the book "Paisagens Pós-urbanas: o Fim da Experiência Urbana e as Formas Comunicativas do Habitar" (Post-Urban Landscapes: The End of the Urban Experience and the Communicative Forms of Inhabiting⁴), the transorganic serves as inspiration to rethink and recontextualize the ways of inhabiting contemporary environments. Di Felice points out that "[...] the transorganic way of inhabiting presents as an habitation made of communicative fluxes and networked interactions among subjects, informational technologies and environments [...]" (Di Felice 2009, p. 262). This produces a cybrid habitat where images are transformed, pluralized, and expanded through transorganic flows of information, enabling an increasingly communicative habitation.

Transhabitat aims to produce deterritorializations which calls forth new spatial configurations, and puts itself as a constantly mutating stage for interactive experiences. It has as starting point the production of threedimensional (3D) scans of different environments, which can be primarily visualized through a series of video animations that capture the passage of time, camera movements and the transmutation of three-dimensional model patterns in digital environment. Thus, these animations generate images (Fig. 1), structured in interactive and immersive installations, admit a generative association between individuals, media and milieus.



Fig. 1: Transhabitat. Frames from the point cloud scans of José Camargo's apartment, Sebo Café, and Arte Pública group Workshop at the old Railway Station of VFRGS - Viação Férrea do Rio Grande do Sul (Santa Maria, RS, in Southern Brazil). Source: Author, 2015.

Our research attains to the construction and reconfiguration of information and spatiotemporal structures of environments through the generation of images with multimedia. It deals with connections of reciprocal flows that give rise to an informational spatiality, that has no interior or exterior, but is, nevertheless, inhabitable as an interactive installation and experienced through transorganic images. Its object is the place reconfiguration, where physical environments become interfaces, emerging from their reciprocal interactions with cyberspace.

In this way, *Transhabitat* seeks to cross physical architecture transversally by the cyberspace, dynamically associating milieus and transmuting their structures, their formats and topological parameters. It aims to transcend traditional structures and generate images of variation, irregularity and unpredictability in these spatiotemporal arrangements. Perceived in other ways of inhabitation, which generate new relationships and organizations, these arrangements reveal the need of creating environments that allow ever-faster communication between individuals, media and milieus.

2 Transcave

In Transcave project (an interactive installation which was part of the Transhabitat poetic research), one can discern and contemplate a communicative habitat, where an individual body, by its presential participation, generatively communicates and interacts with images. Interconnected to informational flows, Transcave understands architecture as event. As Bernard Tschumi (1996) explains, the event is based on an architectural experimentation as reciprocally interconnecting space, time and the subject. For him, the event sensitizes and expands architecture through the spatio-temporal events that shape the places.

Transcave constitutes as an immersive and interactive installation that has as its central element an ephemeral architecture. Idealized as a contemporary cave in transparent plastic material, it admits flexibility and lightness while offering some shelter. This structure, conditioned to the technologies used (computers, Kinect sensors and multimedia projectors), produces a constantly changing cybrid habitat in response to the evental⁵ immersions and interactions of individuals, media and milieus, with digital, immaterial images of the event. In this context, Transcave (Fig. 2) proposes an interactive communication between bodies (human individuals), environments (physical and cyberspace) and technologies (media), thus activating unprecedented symbiotic relations and extending ways of inhabiting cybrid spatialities.



Fig. 2: Photographs of the Transcave interactive and immersive installation during the qualification for the author's master's at the Cláudio Carriconde Hall, Arts and Letters Center, Federal University of Santa Maria in Southern Brazil. Source: Author, 2014.

Transcave alludes to the movement through the space we inhabit. From the idea of cave as a primitive shelter, it transcends the grotto's explicit function, dilutes its physicality into dynamic images and become the medium in which the individual reflects on his own experience in the world. Inspired by the complex geometries present in nature and caves' structures, it creates image animations of mutant topologies through generative cybrid processes. These images, conceived within the digital environment of softwares, create the effect of immersion and establish the interaction of the human individual's body with the architectonic element.

In this context, the human body expands and enhances its senses with multimedia, transcending the physical constraints of the space. Similarly, the ephemeral architecture itself has its materiality proven as its configuration undergoes mutations due to the presence of interactors. The association between the movements of the interactors' bodies and the animated images that traverse this ephemeral architecture occurs generatively and nonlinearly. Consequently, in this interactive and immersive installation, it is possible to experience cybrid environments and transorganic habitats, composed of events that associate individuals, media and milieus, that establish mutually communicative relations.

3 Generative Images

Transhabitat emerges from a research of generative imaging processes, making use of cybrid media. Within these practices, information can be constructed and recycled. Exploring the idea of recombination and recontextualization, it aims to deconstruct traditional methodologies while aspiring to transpose the stability and balance of codes with interactive actions.

For Claudia Giannetti (2006), the generative process arises from the conception of multiple alternatives focused on the expansion and multiplicity of a system. While exploring new formats for examples, generative methods work as a path to the construction of heterogeneous informations. Finally, the generated model can also be the result of the accumulation of various patterns and samples. Bolter (2000) opts for the concept of remediation to argue that the generative processes nurture recombinations, not by domination, but by its crossing with communication and information technologies. In this context, the computer emerges as a medium that allows the construction and transcoding of information that, along with the artist/programmer, defines the possibilities and generative principles of image development processes.

The generative computational art is not only the visually aesthetic result but a full process of formation. The artist who works with generative art produces within the midst of art, technology and science, as well as amongst human spectator and technological media. Digital software brings the image (message) to life, but it depends on the relationship between sender and receiver (interactors). It is also subjected to contaminations established between those two interactor. Alexander Galloway (2004) understands generative art as the art of the protocol, which he defines as the the way of organizing the networked digital information universe, a transmissible format of cultural extension. This protocol is an executable code that makes possible the connection and interaction of the process. The generative process associates to the attitudes of reading and openness of information; it is understood as a producer of the transition from one state to another, in the search of expanding its boundaries in order to achieve an different condition.

Vera Bighetti (2008) understands that cyberspace presents itself as an interface that creates informational networks through interactivity. The interactivity focused on digital generative art is the activity that aims to break with pure representation - it seeks looks for formats through the generation of multiple variables. As

such, the generative art creation engages the random and the unexpected, estimulating a kind of counteraction against the programmed instruction, as the original issues emerge from the (in)constant (re)interpretation and (de)construction of information. These generative methods in art investigates the cybridizations of physical and digital media, focusing not on their incompatibilities, but on the connections they produce with each other via cybrid information cumulations.

Thus, the nature and forms of the models are scaled in relation to their states (material or digital) that continually regenerate in a tangle of updates and virtualizations. Transhabitat (Fig. 3) was exhibited in an event together with the performance Intermitências Zerodimensionais (Zerodimensional Intermittences), by the projection of images associated with the sound and movement of interactors' bodies in a system that takes place in "real time". These images are animated by data crossing the interactor's movement captured by a Kinect sensor and "exploded" by expanding their pixels, which, when synchronized to the vibration of sound programmed in Processing software, can then proceed to be visualized in three dimensions.



Fig. 3: On the left, Transhabitat frames in real-time interaction with sound and body movement. On the right, photograph of Intermitências Zerodimensionais (Zerodimensional Intermittences), a telematic performance of the LATI Network at ANPAP 2015. Black Box Theater, in Arts and Letters Center, Federal University of Santa Maria in Southern Brazil. Source: Author, 2015.

This permits the exploration of new communicative possibilities and complex relationships between elements considered immaterial such as the audio and light of projected images. In other moments, the integration of the body movement with sound reflects the relationships between various human and nonhuman entities that occupy disparate territories, altering their spatio-temporal configurations and delineating their traces as a topological graph. As result, images are transmuted in a generation of variations, irregularities and unforeseeable arrangements and a transgression of traditional structures and compositions of a space-time range.

In this landscape, Transhabitat manages the construction of information associated to the reconfiguration of the "form" as a cybrid topological hypersurface, generated by virtue of dynamic morphogenetic⁶ processes. The creation of this cybrid "form" can be experienced and presented through the generative processes of structural transformation of images. Sperling (2003) remarks that Argan understands morphogenesis as the connection between science and art, expressed in geometric forms which he associates to topology. He emphasizes: "topology, i.e., the science that reflects on geometric shapes as phenomena that, having a temporal development, it no longer defines the being of space but its becoming" (Argan, 1992, p. 454 *apud* Sperling, 2003, p. 33).

The generation and visualization of digital 3D fractal patterns was made possible by the Mandelbulb3D^Z software, which also enabled the creation of images and animations through the alteration of parameters. This process results in the composition of images such as those used in the interactive Transcave installation (Fig. 4). At this point, their organic character are revealed in the mutation of its topology, activated through the interaction with the viewer's corporeal presence, as an interactor that alters the environment. The images of fractal topologies become animated by the body movement that is perceived using the Kinect sensor through the multimedia projector.



Fig. 4: Photographs of Transcave, exhibited at FACTORS 2015 - Festival de Arte Ciência e Tecnologia do Rio Grande do Sul (Rio Grande do Sul Science and Technology Art Festival), in Santa Maria Museum of Art. Source: Author, 2015.

This system generates images that actualize, transmute and traverse each other, generating new topological compositions. In this context, Victor Consiglieri (1995), in Morfologia de la arquitectura (The Morphology of Architecture), explains the origins of topological studies within the field of architecture:

Topological space is no longer understood as a conventional three-dimensional space, but as a space of communication due to its structural system of connections, regions and boundaries, although it all remains three-dimensional. [...] The objective of this topological space is to find a configuration in which there is a relationship of regions, a connection between several domains on one or more levels. This relationship is ensured by other domains where the correspondence becomes dubious, but in which it is always possible to identify the communication function. This communication or translation consists of crossing boundaries of various kinds by means of connections (Consiglieri, 1995, p. 168, our translation).

In this sense, generativity expands the processes of construction of information and images with spatial dynamics that make up reorganizable systems for the layers of cybrid events, transforming the architecture and urbanism of contemporary cities. This happens because the material spatiality of these constructions is traversed by informational flows that produce a transorganic habitat and provoke an $atopic^{8}$ mode of inhabiting.

4 Atopic Habitation

Di Felice (2009) relates inhabiting to mediatic transformations, understanding that the passage from a natural, static and balanced to a communicative, floating and technological one is the result of the development and proliferation of photography, electric light, cinema, mass media and digital networks. Multimedia has changed the relationship between perceiving, creating and inhabiting to a heightened broadening of these experiences.

Consequently, we can envision a systemic, collaborative inhabiting where individual and environment communicate and autoregulate each other. Di Felice posits different ways of inhabiting and relates them to the transformations of communicative forms. He considers that the "atopic inhabiting" configures itself in the dynamic hybridization of individuals, technologies and milieus, and in the emergence of a "new typology of ecosystems, neither organic nor inorganic, neither aesthetic nor circumscribable, yet informational and immaterial" (Di Felice, 2009, p. 291, our translation).

In addressing the concept of the transorganic proposed by Di Felice (2009), we recognize the atopic way of inhabiting as an idea that goes beyond architectural and geographical relations. It is no longer limited to the traditional dimensions of the urban milieu, but associated to mutating spatialities and informational fluxes. Nowadays, through multimedia, interactive communications and diffusion of mobile technologies, the *genius* $loci^{9}$ is intensified and multiplied while extending the meaning of places from merely geographical and physical, to <u>simultaneously</u> informational and immaterial space:

What happens when information and architecture, body and media, combine into an endless continuum, i.e. when the *genius loci* becomes manipulable via digital interfaces and can assume multiple identities and dimensions? The tendency towards hybridization between space, body and information is the result of recent technological innovations that determine the transition to digital forms of interaction between systems, machines and people. (Di Felice, 2009, p. 224, our translation).

The poetic research of *Transhabitat* adopts a methodology that associates artistic practice and theoretical problematization. These theories underpinned the association of interactor and habitable environments, in a symbiosis between individual, media and milieu, in order to integrate these references to the conception of transorganic environments. Through the experimentation of emerging technologies focused on generative processes with images, Transhabitat proposes communicative ways of inhabiting with access to information in "real time", enabling interaction and change in the topological structures of environments.

Consequently, the topology deals with the connections established between the dynamic couplings of space and time, thereby allowing the expansion of places and territories. Transhabitat (Fig. 5) is thus experienced in interactive and immersive installations that associate the body and the environments, generating transorganic images. These images transcend the cybrid space-time, (de)constructing and transmuting parameters and composing dynamic informational networks that define an atopic inhabiting.



Fig. 5: Photographs of Transhabitat at the LabInter Exposition, Arte.Topologia.Tecnologia 2016, at the Cláudio Carriconde Hall, in Arts and Letters Center, Federal University of Santa Maria in Southern Brazil. Source: Muriel Paraboni, 2016.

The integration of individuals, media and milieus composes a dynamic organism that instigates the connection with information and conceive events that encourage the constitution and the reconfiguration of habitats and their inhabitants. By the constitution of a Transhabitat, generated in networked transorganic interactions and informational exchange, the flows of cybrid information, mutual between individuals and media, transform the spatiality of these environments. They give rise to a hyperspace that has not differences between inside and outside, material and immaterial, yet still atopically habitable.

As such, Di Felice believes that information

[...] becomes a body and architecture, and creates the possibility of thinking spatiality and the body as distributed, communicative and interactive. [...] This gives rise to a new generation of inhabitants of manifold spaces and post-geographies, accustomed to building their own city and to establishing with the environment and technique, a new type of relationship based on a dynamic complexity that [...] furthers other types of transorganic habitats. (Di Felice, 2010, p. 92).

Di Felice also points out that

"post-geographies and digital networks are not spatialities before us, but immersive experiences that invite us to go beyond what we see. [...] "If in the context of post-urban experience, where the relationship between dwelling and interacting with computers becomes ceaseless, the living experience becomes something beyond the reach of sight" (Di Felice, 2009, p. 226).

Thus, atopy is not just another territoriality, yet it can be understood as an informational and transorganic structure that goes beyond the traditional notion of space. Beyond architecture and the physical environment, atopic inhabiting is not tied to topographic coordinates. It is linked to informational flows and mutating spatialities, such as mobile media and wireless connections, which construe the individual as a constructor and mediatic support for information, as digital communication networks transcend our bodies, almost freeing us from our physical material underpinnings. As Di Felice states, "Subsequently, an inhabiting emerges in which there are no territories to traverse, nor geographies to reside in" (Di Felice, 2009, p. 226).

In this sense, the poetic proposition of Transhabitat points to the sensory communicative relations between art and technology, individuals, media and milieus (physical space and cyberspace). In this process of images and interactive installations, we experience "real-time" interactions that build and reconfigure information, and in turn provoke cybridizations that modify spatio-temporal structures. Such a conjunction conceives a transorganic habitat and allows atopic habitation.

5 Final Considerations

The Transhabitat poetic integrates specific and transdisciplinary knowledge in a contemporary art research project, by crossing a spectrum of theories from various knowledge areas into a syncretic transdisciplinary methodology between art, science and technology. It is in this field of concepts transgressed by displacements and definitions, not yet fully elaborated, that the poetic research takes. This causes cybrid technological operations, once technology alters poetic processes and constitutes a new path.

Therefore, we understand this poetic research in Visual Arts as the result of the association of a practical production and a theoretical grounding that makes use of diverse technological means in offline and online digital environments as means of investigation towards grouping and cross-referencing data. This web of knowledge works as an extension of the mind where rhizomatic junctures of analog and digital media are capable of manage the information and the interactivity between elements of different origins.

Transhabitat's interactive and immersive installations make use of diverse generative processes for the creation of images of complex topologies. Initially modeled and rendered in a 3D digital environment, these images were subsequently presented for public interaction in an activity that intensifies the communicative properties and interactively transform the environment. Thus, we seek to facilitate transorganic experiences in the interactive involvement with these images, while composing associations between cybrid multimedia and systems of dynamic topologies with complex behaviors.

We can detect "spontaneous" accumulations, irregularities and fragmentations in this attitude, which not only aim at disorder, but also towards a reaction to the rationalization of the space built by information. Thus, it provides the transformation of perception through symbiotic interactions that modify the forms of inhabit. These connections between media and milieu, between heterogeneous individuals and informational territories generate a transorganic habitat in constant updates.

In this *habitat*, we can attempt to transcend the limits of the human body and of physical space, understanding that we actually live between the virtual and the physical, between space and cyberspace, which causes the endless reciprocal actualization of these milieus. This suggests the emergence of an atopic and interactive inhabiting, marked by the location disfigurement and the triggering of cybridizations in the relationships between individuals, media (physical and digital space) and communicational and informational multimedia.

As such, Transhabitat proposes other ways of inhabiting and transforming environments based on associations between individuals, media and milieus. By activating generative processes of construction and reconfiguration of information, it gives rise to complex topological systems that can be appreciated as audiovisual images and immersive, interactive installations of art and technology. In this way, a cybrid and dynamic habitat, traversed by networks of informational flows integrate and overlap transorganic events, conceiving an atopic habitation, surrounded by emergent communicative relations.

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<u>1</u> LabInter - *Laboratório Interdisciplinar Interativo* (Interactive Interdisciplinary Laboratory) is an laboratory associated to the Postgraduate Program in Visual Arts at the Federal University of Santa Maria, in Southern Brazil and coordinated by Dr. Andreia Machado Oliveira. It directs the research and production in the areas of Art, Science and Technology and constitutes into research-creation space of interactive, interdisciplinary and collaborative projects in: game art, immersive environments and interactive installations, augmented reality and digital narratives. Projects are developed in association with other institutions and national and international groups, encouraging partnerships between artists, scientists and technology innovators.

 $\underline{2}$ For Peter Anders (1997), the Cybrid proposes on the experiential parity of physical space and cyberspace to develop cognitive constructs which straddle the two modes of existence.

<u>3</u> Roy Ascott defines Cyberception in his seminal "Technoetic Aesthetics: 100 Terms and Definitions for the Post-biological Era" (1996) as "the emergent human faculty of technologically-augmented cognition and perception" (Ascott, 2003).

<u>4</u> Trans. note: We have translated the Portuguese term *habitar* as inhabit rather than dwell despite the influential heft of Heidegger's concept of Dwelling (1971). We sought to remain more faithful to the Latin etymology of *habitar*, but also to allow the text to resonate with the motif of the Transhabitat project. Further, we wanted to move away from the constructive aspect of dwell and inflect the understanding of the cybrid milieu as an immanent, heterogeneous coming to being.

5 Evental refers to the aesthetic event as open-ended fluid experience that cannot be encapsulated by bounded identitary categories of being. As such it is affective and modal and describes the inherent instability and mutability of the knower-known relation, its shifting polarization and the attenuation of the divide between the natural and the artificial.

<u>6</u> Morphogenesis: formation of landscapes or land forms (O.E.D.). From the Greek "*morphe*" - form, and "*genesis*" - creation./p>

<u>7</u> Mandelbulb3D is a free software developed by a group of contributors. It formulates a series of complex equations that generate a wide variety of 3D fractal objects in the digital environment. The rendering environment includes lighting, color, shadow, specularity, and other effects, allowing the user fine control over imaging and animation. Available at: < <u>http://mandelbulb.com</u> >.

<u>8</u> Atopy: Franco Rella (1988) considers it "the fundamental word of contemporary modernity". He situates it through a quip from Simone Weil as "Being rooted in the absence of place", as a neither here nor a desituated there. The nature of being is marked by a "*complexio oppositorum*", where both being and not-being need to co-exist to impart sense to each other's significance as the union of the un-unifiable, as the real place of difference. From the Greek "*atopia*" - unusualness, strangeness, a being out of the way, and from "*atopos*" - out of place, eccentric, from "a" - not, without, and "*topos*" - place, region, space, subject of a speech. (https://www.etymonline.com/word/topos)

<u>9</u> Trans. note: "In contemporary usage, "genius loci" usually refers to a location's distinctive atmosphere, or a "spirit of place" (VOGLER, 2006, p. 2).