DESCOBERTAS: creativity as libretto of a multimodal opera
Topic: Multimodal Opera, Music
(paper)
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Abstract

This article describes parts of the processes that have guided the composition of the multimodal opera Descobertas. It addresses, more specifically, the ways in which models of creativity previously applied by the author in a variety of multimodal contexts [1][2] are interwoven into a new, coherent totality by drawing parallels with human invention and the psychological and emotional traits of the process of discoveries in the Arts and Sciences. The libretto is in large part inspired by the literature on human creativity [3]. Great discoveries, contrary to widespread beliefs, seem to be the result of intuitive and implicit interactions. The creative process that underlies them are, in short, described as comprising four stages [4]: preparation: arises from intense confrontations with the elements of the problem; incubation: where the problem is "put aside" and is not consciously attended to; illumination: where the solution suddenly enters consciousness; verification: where the insight is matched to the rules and conventions of the domain. Descobertas' discourse on human creativity draws directly from this and is organized in four sections entitled Fundação, Germinação, Iluminação and Reflexão respectively. Choreographies and visuals are created through the combination of dance, the stage presence of a choir and percussions, and through computer graphics. Its opening presents a palette of gestures, images, textures and other kinds of projections, that immerses the public into an implicit dialogue between sounds and movement. Audio is captured from the live orchestra to generate a digital landscape that is itself re-integrated into a projection of video- dance (see figure 1). The article first discusses how the underlying plot is devised to enable scenic and musical developments while maintaining balance amongst the various elements. It then comments on the organization of the generative processes so as to bind it to the desired symbolism. It discusses how the methodology drew from workshops with dancers and musicians specifically designed to gain control on the final structure of the work. Overall, Descobertas is a study on interactive media, on intertwining language in the course of the work and on how multimodalities can contribute to the creation of new interactive narratives [5]. The notion of interaction is explored beyond its textual and analytical dimensions, in a way that interlaces several perceptual modalities into a totality that invites the mind in the contemplation of its emergent qualities.

Figure 1: Shapes, colours and movement of the digital landscape that is re- integrated into a projection of video-dance.

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Key words: multimodal, opera, creativity, music, dance, computer graphics

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DESCOBERTAS: Creativity as Libretto of a Multimodal Opera

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Abstract
This article introduces the main concepts and processes guiding the composition of the multimodal opera *Descobertas* that was create to celebrate University of Campinas 50th anniversary. It describes the integration of dance, chamber and vocal music accomplished with real time immersive visuals and an interactive sound diffusion system developed to perform the opera. The text, supported by comments on concepts, a gallery of images and diagrams of the performance, addresses the ways in which models of creativity previously applied by the author, in a variety of multimodal contexts, are interwoven into a new artwork.

1. Introduction

Many decisive steps in the processes of creativity and discovery rely on implicit factors rather than explicit ones. Great discoveries seem to be the result of intuitive and implicit interactions. The creative process that underlies them is, in short, described as comprising four stages: Preparation, Incubation, Illumination and Verification [1]. *Descobertas* parallels that model of human creativity in four sections entitled *Fundação, Germinação, Iluminação* and *Reflexão,* respectively.

Choreographies, visuals and music were created through the combination of dance, the stage presence of a choir and soloists, and four instrumental ensembles combined with interactive computer graphics. The libretto is in large part inspired by the literature on human creativity [2][10][11]. Further, in order to describe the realm of different moments of *Descobertas*, a gallery of photos introduces poetic quotes from the libretto, created by Stefano Manzolli.

In the next sections, an introduction on motivations and the aesthetical views of the work is presented. It is followed by a brief discussion on theoretical views that dialogued with organization of musical ideas and structural elements of the opera. Then a section discusses how music, dance, interactive audio-visual and soundscape were integrated in a final opera score. Finally, to elucidate how the performance interweaved expressive modalities, some aspects of the world premiere on September 2016 are introduced.

2. Perspectives

Descobertas explores the motion of multimodal generative installations in the realm of interactive music systems. In previous work, we have explored multimodal generative installations as immersive and interactive infrastructures in which is possible to generate, interact, analyse and storage multimodal information (audio, video, images, human movement and bio-signals) [3][4][6]. Motivations for developing them is resumed: *for studying music cognition in its fullness and understand the process of discovery and creativity, it is necessary to examine how the brain and body work together in the solution of such complex problems* [5]. Therefore, our main goal was to explore new paradigms on music cognition mediated by interactive technologies that attempt to express how creativity operates [7]. Shortly, *Descobertas* projects all these previous aspects in a contemporary concert composition. In one stage, it connects two performing arts, dance and music, with interactive technologies to then present to the public a multimodal opera. Shortly, *Descobertas* explores the theme of creativity as a meta-experiment of emergentism situated in a specific frame of time: an opera score.

Figure 1: *Dancers' Constellation. A nebulous and almost indecipherable constellation appeared at the first moment. Suddenly, behold, it appears as a twelve-pointed star in the ineffable breast: an idea. Struggling itself against the harshness of the day, it rumbles in the human mind its desire to burst.*

2.1 Motivations

I created architecture of nuances, actions and gestures to represent the constant and ubiquitous process of searching when a piece of music is composed. I refer to various processes that trace and demarcate courses in my mind. In the instrumental score and in the poetic script of *Descobertas,* I proposed encounters of languages to syncretize how the unfolding of creative processes is done. Therefore, the scenes connecting dance, choir, soloists and four instrumental groups, distributed on the stage, do not rely on a narrative but

on a set of melodic profiles, harmonies, interactive soundscapes and video-dance. All these aspects parallel multiple sensations when the limits of the creative process are experienced. In four acts, *Descobertas* portrays scenes such as: *an ellipse of ideas re-creating encounters and dialogues; fruits bloom from the combinatory underground game of dreams; a journey in the train of associations, is preceded by shrapnel, empty drawers, and blank papers*, various moments representing how the human imagination works.

The theoretical point of view of Michel Debrun [8] in an instigating text on the dynamics self-organized systems, anchored the concepts expressed in the Opera. In Act 3, *Iluminação*, the choir and five soloists incorporate Debrun's voice to personify the complex interactions between the author and the work.

Figure 2: <u>*Intangible Constellation*</u> *then appropriates dreams and delusions. Taking strength, dimensions and days, pursues the author, who dodges from uncertainties, but sometimes confused, cannot establish guidelines.*

2.2 Four Stages of Creativity

Descobertas follows also a definition of creativity where it is seen as the generation of original ideas by forming associative elements into new combinations that meet specific requirements and/or are useful. How these ideas are formed is a matter of some debate and a number of schools of thought propose alternative answers ranging from the systematic methodical approach of the *Structuralisms*, to the alternative methods of the *Inspirationalists* and the emphasis of social factors proposed by the *Situationalists* [10][11]. Nevertheless, for the proposal of *Descobertas,* creativity is seen to comprise a specific number of stages [1]: 1) <u>Preparation</u> through intense confrontations with the elements of the problem; 2) <u>Incubation</u>, where the problem is "put aside" and is not consciously attended to. 3) <u>Illumination</u>, where the solution suddenly enters consciousness. 4) <u>Verification</u>, where the insight is matched to the rules and conventions of the domain.

Figure 3: <u>*Moving Castellers*</u>. *On the tightrope rope stretched between conscious and unconscious seeks paths, directions and certainties. But the author only finds dreams and delusions.*

2.4 Discovery and Abduction

The process of discovery started to receive more attention in the 19th century when W. Whewell (1794-1866) proposed that induction is a creative mental act. This was later captured with Peirce's notion of abduction [12]. Abduction indicates a conjecture, or according to Peirce a hypothesis, that can account for previously observed data. Deductive inference is applied to define whether the observable implications if this hypothesis are true and subsequently a phase of hypothesis testing follows, or in Peirce's terminology, induction. While induction and deduction are traditionally investigated thoroughly in philosophy, abduction seems to be less scrutinized, despite being one of the most important contributions of Peirce's Pragmatism. Basically, abduction is the kind of inference that generates explanatory hypotheses when anomalous facts are perceived. It is related to the presence of surprising or unexpected events. Habits and beliefs give rise to expectations that allow the anticipation of future events. Given that expectations are not always successful, sometimes there is a conflict between the expectations of well-established habits and the dynamics of environmental events, producing a surprising effect.

When it integrates several modalities, *Descobertas'* libretto captures those concepts to give to the audience stimuli to abduct on how creative processes are instantiated in everyday life. Moreover, in previous article, we postulated that musical experience is not diverse from other kinds of cognitive experiences, thus employing similar reasoning those applied on daily life [13], Solving a very complex mathematical puzzle or doing the supermarket, or listening to music employs the same mental-logical operations available to acquire knowledge from experience.

Figure 4: *Train of Associations. Epiphanic or mechanical, religious or metrical, surprising or expected, a new view arises. As a beam of light in closed eyes, the insight of Poincare comes to consciousness.*

3. Montage and Integration

This section discusses how scenic, dance and musical developments are integrated while balance is maintained amongst other elements. The organization of the generative processes was developed to bind *Descobertas* to the desired symbolism. The montage process was based on workshops with dancers and musicians, specifically designed to gain control on the final structure of the work.

3.1 Interactive Music Controls

Several processes were developed to enable the opera performance. Shortly, as previous presented in [4][5][6], *Descobertas* integration is very much anchored in the possibility of creating computer systems for aiding generative composition and interactive performance with multimodal content. The work was performed in a theatre and all the interactions on-stage and off-stage were controlled via wireless technology. Therefore video projected on the back-stage and sounds projected around the audience were controlled with mobile devices. (see figure 5).
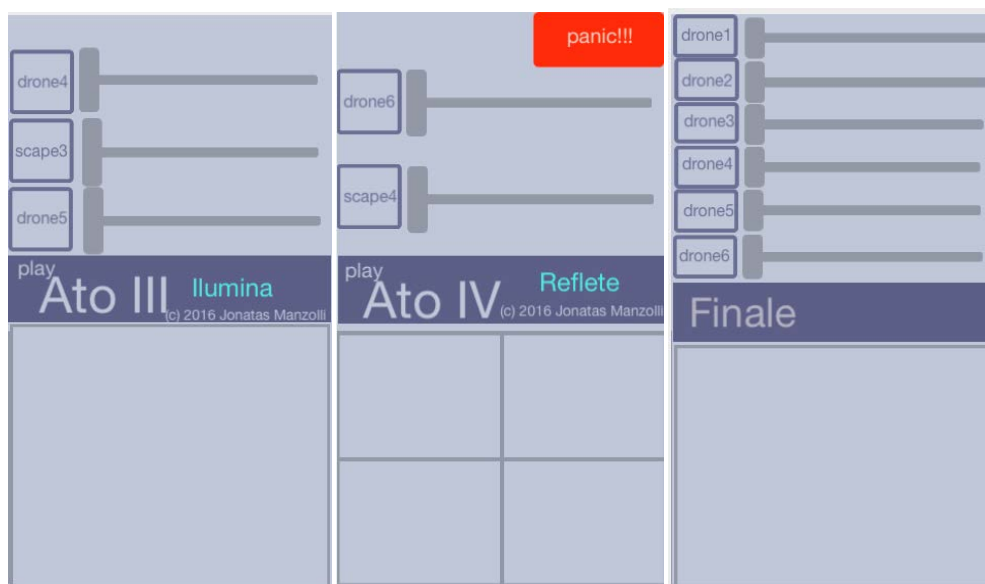

Figure 5: Portable mobile real time control using mobile phones and tablets.

A 6-channel surround ambisonics sound diffusion system was adopted to spatialize soundscapes that linked the opera four acts. Loudspeakers were positioned in the front, middle and back of the audience, for controlling sound diffusion, a Pure Data (PD) patch was created (see Figure 6), and another patch was develop to process video frames with genetic algorithms. Further, a second program was developed in HTML 5, which processed video layers at the Internet in real time. In both case, the same genetic algorithm re-created decompositions of recorded movements and manipulated video layers, simultaneous. Figure 6 presents two graphical interfaces developed to control sound diffusion and image processing with genetic algorithms, respectively.
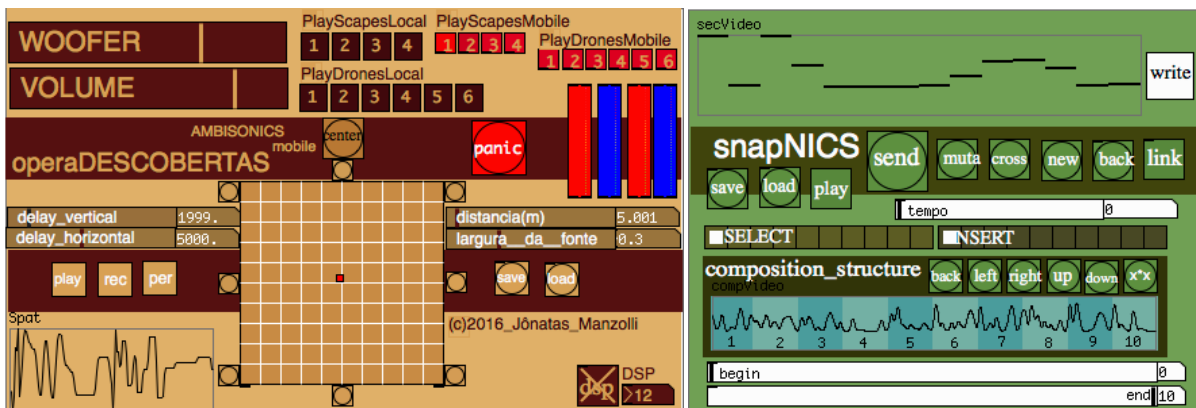
Figure 6: Music interactive control graphic interfaces implemented in Pure Data. The real time spatialization system in ambisonics is in the left and the genetic algorithm processor of images, in the right.

3.2 Scenes, Dances and Video-Dance

All four Acts were divided into Scenes and Dances. The first ones emphasised expressive movements to assemble gestures, visuals and sonic structures such as the moving Castellers (see figure 3, figure 4 and figure 6) where dancers built a human castell expressing the dynamics and power of association of ideas. In the second ones, there was more emphasis on choreographies (see figure2 and figure 5). Table 1 presents the structuring processes for Act 1.

I – FUNDAÇÃO
Scene 1 - Prologue: establishes the bases of how space is a metaphor for a mindspace;
Dance 1 - Fission-Fusion: establishes the energy of attraction and repulsion connecting Author and Work;
Dance 2 – Encounter: moment in which Author and Work are seen each other for the first time.
Scene 2 - Montage: direct inspired by the Castellers of Barcelona, human towers that were formed to representing the synergy of a creative process.
Dance 3 - Chain of Gestures: first moment in which all elements of the process come into the stage, a prophecy of synergy is established.

Table 1: *Development of Scenes and Dances in Act 1.*

Figure 7: _Dancers integrated with Percussion Players_. *Undaunted, the author is not silent in front of the solution. In fact, the process is more important, which in itself is an endless spiral.*

There is not a linear narrative in *Descobertas*, but a development based on the interaction between the Author and the Work that relies on lyrical bases. Therefore, characters of the plot are not personified by singers, as in the traditional opera, but by dancers divided into two groups: 1) four protagonists: *Author, Work, Poem and Aesthetic*, and 2) five mobilizers: representing the catalytic forces of the creative process.

During five months, through workshops and intensive rehearsals the personification of the plot was transferred to the dancers' movements. The built of gestures in a collective creation methodology has emerged in a choreographic composition.

Another important aspect was that the choreographic workshops were transferred to video-dance. Deconstructed elements of the movement and the dancers' expressions were recreated in video art. It introduced a new layer of meaning that transferred the dance physical space to the virtual space of the video. In several moments, the virtualization of dance was used to integrate sections of the work. Mainly in Act 2, all expressive movements were performed through video-dance. Figure 8 shows the decomposition and recreation of movements of four video frames that were manipulated by genetic algorithms, as mentioned in the previous section.
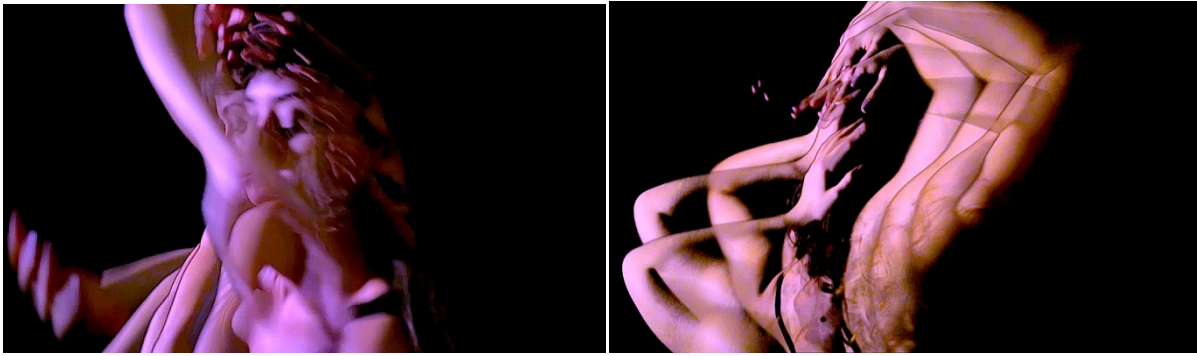
Figure 8: <u>Video-dance frames.</u> And through exposure and nudity, suddenly everything makes sense. Blank drawers and chopped papers are recorded in memories. And in reverence to the process, a breakthrough comes to life.

3.3 Scenic Choir, Soloists and Music Score

As mentioned earlier, the soloists and the choir do not perform a dramatic function as in the traditional opera. But they are commentators of the actions performed by the main dancers and the mobilizers. The five soloists, *Soprano, Mezzo-soprano, Contralto, Tenor and Baritone*, add vocal colouring to other music instruments and dialogue with the choir when both comment on the creative act. Act 3, Iluminação, is totally performed by the choir and soloists. As already mentioned, Debrun's point of view inspired the lyrics sung by them.

Act 4, Reflexão, with longer duration, is then dedicated to the integration of vocal material with dance. This act is a suite of symbolic pictures that portrays different moments of reflection during daily processes of evaluation and learning.

Finally, all these elements are represented in a unified musical score that brings together all the essential aspects of the work. Explicitly, the musical writing relies in an inductive principle of development. Therefore, during the opera, several musical aspects such as harmony, rhythm, melodic structure, vocal texture of soloists and choir are iterated in different processes. It follows two examples of this type of musical writing. In figure 9, from Act 2, the reiterated element is the harmonic structure, and in figure 10, from Act 4, the rhythmic structure is developed as inductive process.

Figure 9: Harmonic Inductive Passage. From Act 2, reiterated element is the harmonic structure,

Figure 10: Rhythmic inductive passage. From Act 4, the rhythmic structure is developed as inductive process.

4. Performance

Descobertas was composed and performed as part of the celebrations the University of Campinas 50th anniversary. With about 60 minutes, *Descobertas* was performed by different interpretive groups supported by technological mediation. It brought together 70 interpreters on stage, among musicians from the Unicamp Symphony Orchestra, the Percussion Group "GRUPU", the Contemporary Choir and Soloists and the Contemporary Dance Group "Redes" all from the University of Campinas (UNICAMP). The Centre Documentation and Cultural Diffusion (CIDDIC), the Interdisciplinary Nucleus for Sound Studies (NICS) and Departments of Music and Dance of the Institute of Arts of the University of UNICAMP produced the opera. The world premiere was performed at the Iguatemi Theatre, Campinas and received a public of almost thousand people, on 27 and 28 September 2016. Figure 11 illustrates the montage: the interactive video-dance is projected on back-stage, four instrument ensembles are distributed between back-stage and front-stage and the dance is performed at centre of the stage.
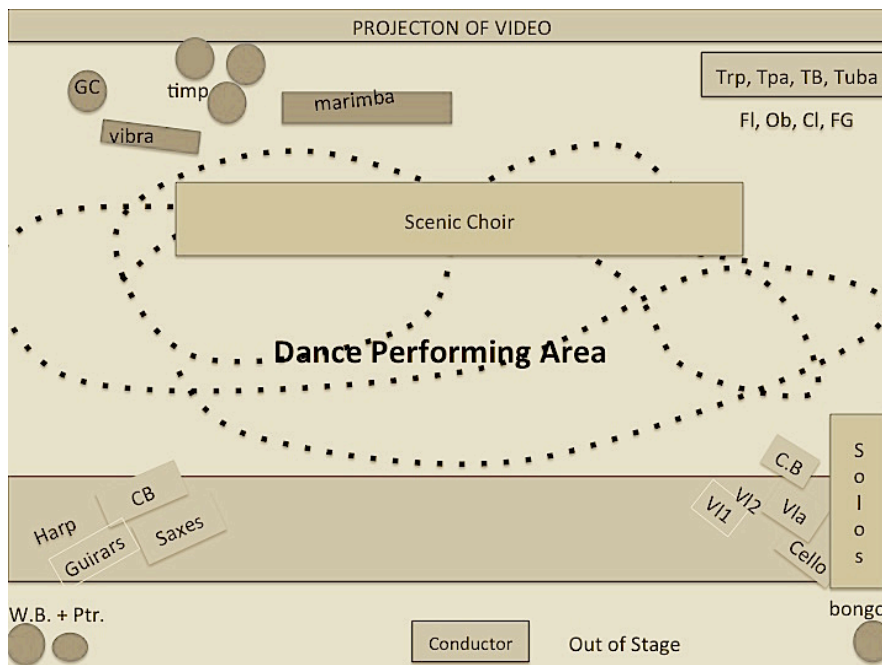

Figure 11: Stage Montage: percussion, wood and brass ensembles were located on the back-stage; strings ensemble and harp, guitar(s), double bass and sax(es) on front-stage.

All these performance elements produced a palette of gestures, images and textures that immersed the public into an implicit dialogue supported by sounds and movements. Audio was captured from the live music instruments to generate a digital soundscape that was itself re-integrated into a projection of video-dance. In this way, audience was exposed to different sensory modalities.

Figure 12: <u>Conductor and moving Castellers</u>. *Discovering does not end the discovery, on the contrary: it opens the bars of the deciphering of a continuous contemplation.*

Figure 13: <u>Full Stage</u>. Rendered, form and mode in the starry sky draw a perpetual movement, which runs up new foundations, other germinations, great illuminations, important reflections and, of course, naked constellations.

5. Conclusion

Descobertas was composed with the aim of using the creative process itself as a meta-

experiment of emergentism. Overall, it is a study on interactive media and on how multimodalities can contribute to the creation of new interactive narratives. The notion of interaction is explored beyond its textual and analytical dimensions, in a way that interlaces several perceptual modalities into a totality that invites the mind to contemplate its emergent qualities.

Descobertas poetizes the process so intimate and so overwhelming that is the gestation of an idea, an axiom or a technology inside of the human mind. Thus, to give birth to a creative process, ideas and concepts are found, germinated, illuminated and, finally, reflected. It postulates that any creative process performers a dance between conscious and unconscious. Thus the argument of this multimodal opera portrays the psychological underground games of creative processes. *Descobertas* is not an evocation of any truth; on the contrary, it is a reverence to the process itself. It says that there is a constant process of attraction and repulse between the author and the work that, finally, lead to the emergence of new forms.

In forging all these elements together, *Descobertas* might reiterates Stravinsky's assertion that *music is given for the purpose of coordinating man and time.* Certainly, it enlarges this view by saying: music is born in a joint action of human mind and body with memory.

Acknowledgements

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