On a Multiplicity: Deconstructing Cartesian Dualism Using Mathematical Tools in Performance

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Introduction

The well-known and seductive idea of being a dual entity composed of a body with emotions and a mind with reason, with only tentative and uncertain connections between them, has been considered an instrinsic human feature in many academic fields. Decartes' (i.e., Cartesian) dualism, which associates reason with mental and rational processing and emotion with body and feelings has influenced thought for nearly four centuries.[1]

This dualism played a central role in many research fields, from philosophy, psychology, anthropology, biology, and sociology to mathematics and performance art. The development of technologies, combined with a turn to the study of emotions as an important feature of research itself, has contributed to the ongoing deconstructing of Cartesian dualism. Recent research trends in the neurosciences and visual anthropology—and in particular visual autoethnography—are important examples of the rising of non dualistic ways of researching and connecting techniques and technologies associated with reason to the study of the senses and art associated with emotion.

Editor's note: several videos of the performance, and the preliminary performance process, presented in this essay can be found at http://telmajoaosantos.net

[1] The best introduction to this dualism is in René Descartes' *Le Discours de la méthode pour bien conduire sa raison et chercher la vérité dans les sciences*, 1637. As it will become clear in what follows, I am particularly interested in starting with Descartes (1596-1650) not just because he is a central figure in early Modern philosophy, but because he was also a physician and a mathematician.

<http://liminalities.net/10-3/multiplicity.pdf>

In *Descartes' Error: Emotion, Reason, and the Human Brain*, António Damásio describes some medical cases where a patient lost brain area corresponding to emotions and still wasn't able to use rational skills, and also cases where the patient lost brain area associated with reason and still wasn't able to use emotional skills[2]. Also in anthropology, for instance, emotions started to play an important role as an object and subject in fieldwork, in the sense that anthropologists start to recognize their transforming nature (see, for instance, Howes, 2006; Leavitt, 1996; and MacDougall, 2006).

Being myself both a PhD in Mathematics, with a research focus on the Calculus of Variations[3], as well as a practicing performance artist and experimental dancer, I am frequently asked if there is any connection in these two fields of study. The assumption for many perplexed colleagues repeats classic mind-body dualism: that mathematics is for the realm of mind and reason and performance is for the body and emotion. I started to think about the possibility of finding environments and methodologies in between them to understand how both fields could be seen and connected in individual experience. And so it emerges with the idea of performing autoethnography, a sort of cultural studies of the self as a multilayered contextual subject imbedded in social life.[4] Tamy Spry, for instance, explains her performance experience like this:

> in seeking to dis-(re)-cover my body and voice in all parts of my life, I began writing and performing auto ethnography, concentrating on the body as the site from which the story is generated, thus beginning the methodological praxis of reintegrating my body and mind into my scholarship (708).

Furthermore, "in auto ethnographic performance self *is* other. Dialogical engagement in performance encourages the performer to interrogate the political and ideological contexts and power relations between self and other, and self *as* other" (716).

In this paper I present a methodology used to video record body movement improvisation after several hours – at least five hours - of mathematical study as an autoethnographic tool for the construction of a presentation of an individual (i.e., me) as a set of multiple selves in a performance art piece, and more con-

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[2] This book continues Damásio's work in the relationship of brain and consciousness in developing his studies on the brain in *Self Comes to Mind: Constructing the Conscious Brain* (2010) and *The Feeling of What Happens: Body, Emotion and the Making of Consciousness* (1999).

[3] Calculus of Variations is a field of mathematical analysis that deals mainly with existence and regularity (such as several degrees of smoothness, for instance) of solutions to minimization and maximization problems involving functions depending on one or some of these variables: time, position, velocity, acceleration. See, for example, Santos (2011) and Goncharov & Santos (2001, 2012).

[4] See, for instance, Reed-Danahay (1997), Russel (1999), and Spry (2001).

cretely a multimedia performance with some sound and body movement layers constructed in real time.

This paper is divided into four sections. In the first one I introduce some basic notions of Mathematical Analysis as well as some other concepts that I will use throughout the paper. In the second section I present a theoretical approach of the method to be used, that is, a methodology to video record autoethnographic material and also to construct the specific performance art piece. This model starts with the idea of *Axiomatic Image*, an "image" which emerges as a global concept one wants to develop, being its effective origin axiomatic. We just identify it; we cannot find an exact moment or exact causes for its emerging nature. We need to take into account that this "image" is dynamic in the sense that we don't accept it as a final and completely defined concept, but as an abstract concept still to be questioned and understood, as well as contextualized. After accepting the *Axiomatic Image* we start the process of generating other "images" – concrete 3-dimensional ones – as physical environments. This process is characterized by researching in different directions: body research associated with some theoretical research as well as theoretical analysis associated with some body movement. The resulting "images" are called *Sub-Images*. Finally we introduce in each *Sub-Image* what we call the *Dynamics*. The effective "narrative" of the material produced characterizes the *Dynamics*.

In the third section I present how I used the method to construct a series of body movement improvisation videos (which I will denote from now on as *Improvisation Series*). In *Improvisation Series*, the main goal is to identify the theoretical model described in Section 2, in the sense of developing perception skills to achieve some environment of the "body without organs" (Deleuze & Guattari) or the "immanence plan" (Gil) in the space between mathematical thought and body movement improvisation. In *Improvisation Series* the *Axiomatic Image* is autobiographic, connected with my life in 2011. I have worked in Mathematics since 2005 and changed my home only once before 2010. Meanwhile I practiced contemporary dance and performance and, starting in 2008 I began performing solos around the idea that my political and subversive body is a research site for the moral, cultural and social role of the body associated with my profession as a university professor and mathematics researcher. Between 2008 and 2010 I engaged in some video recording around body movement improvisations but always outside my own home. From the end of 2010 and through 2011, I changed homes 3 times, which was also during my final year of graduate study in Maths. During this time, I decided to rehearse at home, each time improvising in defined and restricted spaces after at least 5 hours studying Mathematics. The *Sub-Images* are *almost-determined* in the sense that there is at least some neighborhood around the *Axiomatic Image* that is considered around the physical specific spaces where I decided to do the *Improvisation Series*. In what concerns the *Dynamics*, the "narrative" is developed around the possibilities of constructing and decon-

structing the body as a unified body-mind, or mathematical reasoning-body movement object.

In the fourth and final part of this paper, I describe the process used to create a performance art piece as a real time construction of body movement improvisation and sound as voice (discourse) using the autoethnographic video recordings, *Improvisation Series*. The result is a performative construction of a multiplicity of (my)selves which, following the idea of not distancing mathematical work from body movement improvisation, seeks to articulate the possible spaces in between. The concrete performance art piece is the result of a continuous reconfiguration of myself regarding the method described above.

1. Preliminaries

Some of the notions that will be used in the model presented in the next section come from a mathematical landscape. So I start by presenting some background on the subject. First, the notion of *set* (by Georg Cantor), *subset* and examples of some usual basic sets used in Mathematics.[5]

Let us first formalize the notion of axiom, which was already introduced in an informal way.

Definition 1.1 *An **axiom** is a proposition that is not proved, but considered being either self-evident or subject to necessary decision. Therefore, its truth is taken for granted and serves as a starting point for deducing and inferring other (theory-dependent) truths.*

An axiom can be of two different types: logical or non-logical. Logical axioms are statements that are taken to be universally true. For instance, the fact that 1=1, or more generally, that for any number x, we have x=x. Non-logical axioms are defining properties of the domain of a specific mathematical theory. For instance, the fact that 1+2=2+1 (and both are equal to 3), or more generally, the fact that for any two numbers x and y we have x+y=y+x. In either way it is a mathematical statement that is a starting point to deduce other derived ones.

In Performance Art, the notion of axiom refers to what may not be proved or questioned regarding its origin inside a creative process. For example, the initial idea or concept of a concrete performance is considered to have an axiomatic origin. We then derive other ideas, concepts from that one (as the *Sub-Images* and the *Dynamics* that I address below), but we consider that first one without contestation, that is, axiomatic in its origin; and that is why we call it, as we will see in the next section, the *Axiomatic Image*.

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[5] All of these concepts can be seen and studied with more detail in Lebl (2013) and Zakon (2001).

Now we introduce the important notions of set and subset, giving also several examples of sets and subsets considered in mathematics setting and also in performance art context.

Definition 1.2
(a) *A **set** A is a gathering together into a whole of definite, distinct objects of our perception and of our thought – which are called elements of the set. We denote a $\in$ A when we want to say that a is a element of the set A;*
(b) *We say that B is a **subset** of A, or that B is contained in A, and we denote by B⊆A, if every element of B is also an element of A.*

Let us now recall some sets used in Mathematics. We have the set of natural numbers, represented by $\mathbb{N}$= {1, 2, 3, 4, …, 100000, …}, that is, it is the set where its elements are the natural numbers 1,2,3,4,…. If we add 0 to it we obtain $\mathbb{N}_0$= {0, 1, 2,…}, which is the above set $\mathbb{N}$ just adding zero. Joining the negative numbers we obtain the set of integer numbers represented by $\mathbb{Z}$= {…, -3, -2, -1, 0, 1, 2, 3, …} (in here we add the symmetric numbers, the negative ones). If we add to $\mathbb{Z}$ numbers of the type *a/b*, or *a÷b*, where *a, b* $\in$ $\mathbb{Z}$ (*a* and *b* are members of the set $\mathbb{Z}$) and *a/b* $\notin\mathbb{Z}$ (the number *a÷b* is not a member of $\mathbb{Z}$), we have the set of rational numbers $\mathbb{Q}$= {*a/b : a, b* $\in$ $\mathbb{Z}$}, i.e., numbers which can also be seen as finite or periodically infinite tithes, as for instance ½, ⅔, ⅝, 0,5; 0,666(6), or even non periodic infinite tithes that can be expressed by a fraction a/b. Finally, adding to the set $\mathbb{Q}$ the non-periodically infinite tithes as √2, π, *e*, etc, we obtain the set of real numbers $\mathbb{R}$. This set is usually called the real line, and we say we cover $\mathbb{R}$ or the real line when we go with the pencil or pen from minus infinity to plus infinity without taking it off the paper, and so it is a continuous set. We also can consider some subsets of a set. For example the set A={1/2, 1/4, 3} is a subset of the set $\mathbb{Q}$, and the set B={1/2, 3} is a subset of the set A. Also considering the real numbers, some of its subsets are usually called **intervals**, which are sets that go from one number to another (one or the other or both non-infinite; if both are infinite, it is the set $\mathbb{R}$ itself) without taking off the pencil or pen from the paper, or a combination of these. For instance the set C=[0,4] is the interval that goes from 0 to 4, including 0 and 4, and it is a subset of $\mathbb{R}$. Also D=]0,4] is the interval that goes from 0 to 4 but does not include 0, including just 4, and it is also a subset of $\mathbb{R}$. We can consider E=]5/4, π [, which is the interval that goes from 5/4 to π without including both 5/4 and π, and it is a subset of $\mathbb{R}$..

In Performance Art we can consider a set of defined spaces, concrete ideas, objects, words, movements, and so on. For instance we can consider the set A= {points on the floor where the performer can place his feet inside Room 1}.

Now we present here the notion of what we denote by *limb*, which refers directly to the mathematical notion of neighborhood.

Definition 1.3 *Consider the set of real numbers ℝ, any fixed element of this set, that is x ∈ ℝ, and consider also any fixed sufficiently small positive real number, that is, ε>0. A **limb** is an interval that goes from the number x minus the small ε to the number x plus thesmall ε, and we denote it by]x-ε, x+ε[.*

As an example we can consider the interval]1,9; 2,1[, which is a *limb* of the number 2 ∈ ℝ , being ε = 0,1 in this case. Let us observe that in a Mathematics context a *limb* or neighborhood is only considered within real numbers (and so by means of a continuous idea of a set).

In Performance Art we deal with elements of notions like presence/absence, movement, action, words, and so on, as points where we consider *limbs*. These *limbs* have to be of the same nature as the points themselves. This means that, for example, if we consider a concrete action of lifting the right arm, its possible limbs have to be continuous sets of actions nearby lifting the right arm: lifting the right arm using several nearby directions, using different ways, and so on. Similarly, if we use a concrete word as a point, we have to consider nearby words as limbs.

We now introduce some important definitions related with the notions of sets, intervals and limbs, which are interior, exterior, isolated and boundary points. This definition just formalizes the first idea that comes to our minds: an interior point is a point that is in the interior of a set, or that nearby we only find points from the set; an exterior point is a point that belongs to the outside of a set in the sense that nearby there are only points from the outside of the set; an isolated point is a point that is isolated from the others, or that we cannot find any similar one nearby. A boundary point is a point that is located not totally inside and not totally outside the set: it is exactly located on the boundary of that set, which means that nearby we can find points from the inside of the set and from the outside of the same set. Formally,

Definition 1.4
a) *An **interior point** of a set A ⊆ ℝ is a point a ∈ A such that considering some small limb of this point a, all this small limb is contained in A, that is, this limb is a subset of the set A;*
b) *An **exterior point** of a set A ⊆ ℝ is a point a ∈ A such that considering some small limb of this point a, all this small limb is outside the set A, that is, this limb does not have any point in common with the set A;*

c) An ***isolated point*** *of a set* $A \subseteq \mathbb{R}$ *is a point* $a \in A$ *such that on some limb of this point a, it is the only point of A inside this limb. That is, it is a point such that it's the only point in common with some limb is the point itself.*

d) *A **boundary point** of a set* $A \subseteq \mathbb{R}$ *is a point* $a \in A$ *that is nearby points that are members of the set A and at the same time nearby points that are not members of the set A is on the boundary of the set A. That is, considering any limb of this point a we can find points from the set A and from outside the set A.*

As an example we can consider the set A = [1,2]∪{3}, that is the set that joins the interval that goes from 1 to 2 continuously and the number 3 alone. We have that the set]1,2[is the set of the interior points of the set A (if we consider very very small limbs of any of the points which belong to]1,2[they are all contained in A – and that is why we exclude the numbers 1 and 2); also the set that goes from minus infinity until 1, from 2 until 3 and from 3 until plus infinity, not including 1,2 and 3 is the set of the exterior points of A, in the sense that considering very small limbs of these outside points, these limbs are all contained in the exterior of the set A, or they have nothing in common with the set A. We have that 3 is an isolated point (if we consider for instance the limb with $\varepsilon=0,5$ we have that in the limb]3-0,5; 3+0,5[=]2,5; 3,5[the point 3 is the only point from the set in that limb), and 1,2 and 3 are boundary points (if we consider the same $\varepsilon=0,5$ we have that inside each of the limbs]1-0,5; 1+0,5[=]0,5; 1,5[,]2-0,5; 2+0,5[=]1,5; 2,5[and also]3-0,5; 3+0,5[=]2,5; 3,5[we can find points that belong to the set A and also points that don't belong to the set A).

In performance, if we consider the set of moments in silence, the moments when the performer is silent are interior points of the set, the moments when he or she starts to do some noise are boundary points, and the moments when he or she is making noise are exterior points. If we consider the set of screams and the performer is silent, then screams and becomes silent again, we have that this scream is an isolated point regarding the set of screams.

We now introduce the definition of sequence, an operation that picks some natural numbers and turns them into real numbers. Sequences are particular cases of real-valued functions, which are operations that turn subsets of $\mathbb{R}$ into other subsets of $\mathbb{R}$.

Definition 1.5 *A **sequence** $(u_n)_n$ is an operation which maps some subset A of $\mathbb{N}$ into some subset B of $\mathbb{R}$, and we denote by*

$$(u_n)_n : A \subseteq \mathbb{N} \to B \subseteq \mathbb{R}$$
$$n \mapsto u_n$$

For each element a of A ($a \in A$) we correspond one and only one element b of B ($b \in B$) through u_n.

For instance, if we define $u_n = 1/n$, we have that for n $\in \mathbb{N}$, that is, for n=1,2,3,4,…, we obtain through u_n the values 1, 1/2, 1/3, 1/4,…, and so $B=\{1,1/2,1/3,1/4,1/5,…, 1/150664,…\}$.

In performance, a sequence can be defined by means of various instruments: sequences of movements, sequences of actions, sequences of presence/absence states, sequences of words, sounds, etc. Therefore, each movement, action, presence/absence state, word, sound, is an element of the respective sequence.

Definition 1.6 *A **function** f is an operation that maps elements of C $\subseteq \mathbb{R}$ into elements of D $\subseteq \mathbb{R}$, that is*

$$f: C \subseteq \mathbb{R} \to D \subseteq \mathbb{R}$$
$$x \mapsto f(x)$$

For each element x $\in$ C we correspond one and only one element which is the value of x through f, that is, f(x) $\in$ D. We usually denote by C the domain of the function f, i.e., C= dom f, that is, the set of members of C for which the function f is defined and achieve real valued numbers.

For instance, if we define f(x)=x-2, we have that for x $\in \mathbb{R}$ we obtain through f values that also belong to $\mathbb{R}$. If we consider the function f(x)=1/x, we cannot consider the value x=0, because the number 1/0 is not defined in $\mathbb{R}$ (it is one of the non-logical axioms regarding numbers: we cannot divide any number by zero) and so the domain is the set $\mathbb{R}$ excluding the zero, and it takes values on all $\mathbb{R}$ excluding zero.

In performance, a function can, as a sequence, be defined by means of various instruments: functions of movements, actions, presence/absence states, words, sounds, and so on. The difference is that now we can consider continuous sets of all these instruments and apply to them any function that will transform them into another continuous set of other instruments.

We need also to define now the notions of limit and continuity of a function, which are very important concepts in mathematics and also will help to define what we need in the model to apply with Performance Art.

Definition 1.7 *Consider the function*
$$f: C \subseteq \mathbb{R} \to D \subseteq \mathbb{R}$$
$$x \mapsto f(x).$$

(a) *We say that b $\in \mathbb{R}$ is the **limit** of the function f when x $\in$ C tends to a, and we denote by b = $\lim_{x \to a} f(x)$, if each time x $\in$ C approaches the point a $\in \mathbb{R}$, the function f through x approaches b $\in \mathbb{R}$.*

(b) *We say that f is* **continuous** *on a point a if each time $x \in C$ approaches $a \in \mathbb{R}$, f approaches f(a) through x, That is, considering the notion of limit defined in (a), b=f(a). We say that f is continuous on any subset $B \subseteq C$ if for any $x \in B$ approaching $a \in B$ then f approaches f(a). If B=C we say that f is continuous everywhere on C.*

In Mathematics, if we consider for instance the function $f(x)=\frac{1}{x}$ we have that $\lim_{x \to 1} f(x) = 1$. This means that if x approaches 1 then $f(x)=\frac{1}{x}$ approaches $\frac{1}{1} = 1$. In fact, this function is continuous on its domain. An example of a function that is not continuous is

$$f: C \subseteq \mathbb{R} \to D \subseteq \mathbb{R}$$
$$x \mapsto f(x) = \begin{cases} 1 & if & x \leq 1 \\ 2 & if & x > 1 \end{cases}.$$

This means that if we consider x approaching 1 from values greater that 1 we approach 2, but $2 \neq f(1)=1$. So, f is not continuous on x=1. But it is actually continuous on all other points except this one, which lead us to the next definition.

Before the next definition let us just observe that in performance, if we consider a function that represents an action, defining its limit is to analyze and calculate the limit of its validity within the narrative and the sense it makes also within the specific performance art piece.

Definition 1.8 *We say that a function*
$$f: C \subseteq \mathbb{R} \to D \subseteq \mathbb{R}$$
$$x \mapsto f(x)$$
is **almost continuous** *when it is continuous for almost all points $x \in C$. That is, f is continuous on the set C except a set E, which is made of only isolated points regarding continuity.*

The concept of an almost continuous function is introduced in here with a specific goal in mind: to include in our approach more general performance art pieces that don't have to be exactly continuous; or in which we can exclude some discrete points – moments, actions, and so on – and to treat them within a continuity approach, considering limits of defined functions between those discrete points.

Now we define the points where we will consider limbs

Definition 1.9 *A* **cut** *is a point $a \in \mathbb{R}$ where a function $f: C \subseteq \mathbb{R} \to D \subseteq \mathbb{R}$ takes some concrete value f(a), where a is an isolated or a boundary point regarding some predefined subset A of C, but it is an interior point regarding the all domain C. That is, it is a point*

where the almost continuous functions is not actually continuous; so, a point of discontinuity, but a point that is in the interior of the domain.

Considering the function defined above

$$f: C \subseteq \mathbb{R} \to D \subseteq \mathbb{R}$$
$$x \mapsto f(x) = \begin{cases} 1 & if \quad x \leq 1 \\ 2 & if \quad x > 1 \end{cases}'$$

the point x=1 is a cut of the function in the sense that 1 is an interior point of the domain $\mathbb{R}$ but f is not continuous on 1. We have that f(1)=1 but if we approach 1 from superior values x>1, we reach $2 \neq$ f(1)=1.

In performance, if we consider an action as running around the stage, each time we hesitate can be considered a cut of that function. So, it is a point where we are still running but where we can stop, analyze our perception skills at that moment and to change – or not – the effective action of running around the stage.

2.　The Model

In this section I present a proposal of a theoretical model, as a first sketch of a possible structure within creative processes, and especially within performance art pieces. This model approaches the construction of concrete performance art pieces taking into account experimental and improvisation-based movement techniques, using the mathematical notions presented in Section 1. I believe that this model can be used within the construction of any performance art piece, and the main goal of this paper, and especially this section, is to establish its generality.

I divide this section in three parts, each one devoted to a concept associated with an important part of the global structure of any specific performance art piece. All concepts use the mathematical notions defined in Section 1 in order for the structure to have a solid ground. In the first part I introduce the notion of *Axiomatic Image*, which is connected with the informal idea of what is the main concept of a specific performance art piece. It is not exactly the concrete departure point from which we work on experimenting different directions. It has an axiomatic, abstract, conscious and "mature" (process-wise consciousness) nature. It needs to be part of a conscious and creative process of research.

In the second part I introduce the notion of *Sub-Images*, which will be concrete three-dimensional but at the same time dynamic and abstract images that are consequence of the *Axiomatic Images* through the construction of a paradigm where mathematical notions, together with movement improvisation techniques give origin to these concrete ideas, or concrete images. This part of the construc-

tion process is the longest one since we need to experiment and try out several directions from the initial *Axiomatic Image*, taking into account that we cannot run away from the logical and mathematical definitions of section 1, and especially we cannot run away from the *Axiomatic Image*. It is not, as it may seem at first, the scenography or the performance art piece itself. It is a more dynamic and abstract concept, composed of both theoretical concepts and movement techniques, which are not only made of a pre-defined or final 'form.' In the end of this part of the process we define the *Sub-Images* to be used in the specific performance art piece.

In the third and final part of this section I introduce and develop the *Dynamics* inside each *Sub-Image*. The *Dynamics* is associated with the effective narrative and final form of a performance art piece. As with the *Axiomatic Image* and the *Sub-Images*, it is much more that this association; it is also the way each *Sub-Image* is fulfilled using the same paradigm used for the creation of *Sub-Images* from the *Axiomatic Image*. That is, it is possible to construct a model with three different parts, where the idea of an axiomatic origin is present, as several mathematical definitions, and where it is possible to construct a performance along the three parts.

2.1. Axiomatic Image

The aim now is to introduce the notion of *Axiomatic Image* and contextualize it within any performance art piece, relating it with the notion of axiom in Definition 1.1. In order to do this we need first to settle how do we understand what does *image* mean in the context of this paper, since it is a term that is present throughout it.

In *The Feeling of What Happens: Body, Emotion and the Making of Consciousness*, Antonio Damásio states that "By the term *images* I mean mental patterns with a structure built with the tokens of each of the sensorial modalities—visual, auditory, olfactory, gustatory, somatosensory" (318). Roughly speaking, the way we perceive and deal with the world around us translates in the brain as a set of images belonging to different levels of consciousness. This concept of "image" is what will follow throughout this paper, even if I understand the sensorial modalities in a non-dualistic way, that is, also related with abstract images.

Mental patterns have an organized and structured nature, even if we don't have total knowledge of what happens inside the brain. Neuroscientists are still searching for a definite answer on the way we manage these "images" and turn them into concepts. In this process of consciousness and images managment in the brain, Alva Noë (2002) explains the importance of the experience of the body, the way the world shows itself to us and how we show ourselves to the world. He claims that consciousness isn't something that happens, it is some-

thing we do or make (i.e., perform), going beyond the idea that consciousness is something inside of us, separated from the world.

A tool that also plays an important role is the value given to "images," or mental patterns in the sense referred above. A broader approach to images and their value is given in Damásio's *Self Comes to Mind: Constructing the Conscious Brain*. In this book, Damásio argues that Cartesian dualism makes no sense because emotion is reason and reason is emotion – body is mind and mind is body – in different proportions depending on the circumstances and respective value we attribute to them.

Definition 2.1 *An **Axiomatic Image (AI)** is an initial image which appears axiomatically, having as a sufficient condition the creation of consciousness and mental patterns conditions on what surround an individual, and which allow for it to happen.*

Recall from Definition 1.1 that an *Axiomatic Image* is a proposition that is not proved, which in any specific performance art piece can be seen as a concept, idea or bounded conceptual universe, which cannot be proved, having its truth taken for granted. Since in Performance Art contexts we deal mainly with subjective ideas, concepts and actions, we can accept that, except in some rare and concrete cases, the axiomatic origin of the *Axiomatic Image* is non logical. So, it doesn't have to be considered universally true, but it is considered true within a perspective of life and art, with some specific mathematical theory associated.

Any specific creative process starts when the *AI* shows up in the sense that it starts to be shaped inside consciousness and within the construction of mental patterns. Of course, we determine the moment of its origin as the moment when we are able to perceive its appearance and pertinence. We may also affirm that *AI* defines the universe of research in which the performer is engaged.

2.2. Sub-Images

After accepting the *Axiomatic Image*, it starts to be shaped inside consciousness, and then spreads out in almost every aspect of life, flowing and infiltrating oneself as one of the essential main goals. The intuitive idea is that after defining *AI* in a specific creative process, it disseminates into almost all mental patterns created by an individual, in this case a performer, until it becomes a consistent and big enough universe of action in his or her lived milieu. We can also follow Noë and affirm that, after defining and accepting *AI*, we experience the doing that allows us to connect to our own consciousness.

In a specific creation process we can then consider mental patterns, which form a set – the domain of a function that represents the performance art piece. So, the universe where *AI* is shaped, defined and conscious is therefore a set. In this set we define the function that is the most global one: the specific perfor-

mance art piece. Inside this set we can consider several subsets and also several functions associated with several possible environments and actions. Along this process, the goal is to develop improvisation and perception skills as a technique. By "improvisation" we mean to develop skills that allow the performer to create some conscious but not previously defined object, and also to continuously search for new vocabulary associated to the *AI*. By "perception skills" we mean to develop techniques of presence/absence through mental patterns. This process, if we maintain some smoothness and stability properties of the individual/performer, will define *almost continuous* functions that will also give origin to a process of generating new sets of mental patterns. In parallel we develop a theoretical study associated to these techniques and concepts in order for them to be included in the creation process to produce a structured final object.

Since the *AI* is a concept that spreads itself around almost all aspects of the performer's life, the mental patterns become more concrete, generating environments, since these images can also be addressed as *cuts* in the *almost continuous* functions. So, we can add the following definition

Definition 2.2 *A **Sub-Image (SI)** is an image that is a cut in the process of almost continuously spreading the AI.*

We can also say that we have an *AI* that appears as a set of sets of mental patterns. After a process of improvising, understanding perception skills and considering them theoretically, we obtain several *almost continuous* functions, each one associated to a set of mental patterns in which all of these techniques—improvisation, perception, theory—come together. The essential step is then to consider and analyze the *limbs* of *cuts* of these *almost continuous* functions, since these points are the ones where we can change direction or create new multidimensional universes.

Of course there are many—and I believe they can be infinite—possibilities when considering and defining *Sub-Images*, depending on the *almost continuous* functions and also on the *cuts* considered along the specific creation process. There is a point—a limit point—in this process of generating *Sub-Images* in the sense that the more *Sub-Images* we generate, the more we tend to distance ourselves from the *Axiomatic Image*. So there is a moment that we stop, since it is a limit point that belongs to the boundary of the more general set defined by the *Axiomatic Image*. If we don't stop, we go beyond the boundary of that set and attain its exterior, which doesn't interest us anymore

2.3. Dynamics

After setting the *Axiomatic Image* and the several *Sub-Images* inside a concrete creation process of a specific performance art piece, we can finally introduce the

Dynamics inside each *SI*. The *Dynamics* is associated with the effective narrative of the concrete final performance art piece; it can be seen as a methodology where movement improvisation, perception skills, together with theoretical approaches around those techniques and related concepts, are the essential tools to fulfill each *Sub-Image*. This methodology uses the same essential tools as used to generate the *Sub-Images* from the *Axiomatic Image*, but from a different perspective.

Each *SI* can be seen as a set where it is possible to consider a function that represents all actions inside it. Also subsets can be considered where different functions are defined. In the context of creating dynamics inside each *SI*, these functions are associated with concrete actions. How do we create this *Dynamics*? We consider as axiomatic a first body movement, action, or even a presence/absence body state. We then follow the methodology already introduced — from *AI* to generate *SI's* — of using improvisation and perception techniques as well as related theoretical approaches in this specific context. These techniques and theoretical approaches lead us to create *almost continuous* functions with points of discontinuity that will be the *cuts* that we analyze and in which we can stop or decide to continue the path associated to the function defined on some continuous subset, or to change direction and this *cut* becomes a changing point to other possible directions.

Definition 2.3 *The **dynamics** inside a Sub-Image is a set of almost continuous functions from the set of improvisation and perception techniques as well as theoretical approaches of the performer into a rebound between cuts and continuity.*

So, having in each *SI* a set and an *almost continuous* function with discontinuous points where we can stop, analyze and change directions, we can also create subsets of multidirectional movements, actions that will be part of the narrative. This means that we create in each *SI*, from a set and an *almost continuous* function, taking into account the possible changes of directions in each discontinuous point, a *cut*, several *almost continuous* functions.

3.   Improvisation Series as an autoethnographic visual example of the model

In this section I present a first application of the model introduced and described above. This first application is part of a specific performance art piece – "On a Multiplicity" – that works out, in the context of this paper, as a concrete example. "On a Multiplicity" is, in its final form, a multimedia performance art piece, where video and sound projection, together with sound and movement in real time, form the idea of a multiple self. It was born from the general *Axiomatic Image*: our multiplicity as human beings, with our ability to be conscious of our own actions and our own existence, from a personal perspective; that is, from

my own experience as a multiplicity of selves. From this general idea I restricted the *AI's* universe into my own experience, in my own multiplicity, engaging in an autoethnographic approach.

I divided the construction process of "On a Multiplicity" in two phases. In a first phase, which I decided to denote by *Improvisation Series,* which is the main focus of this section 3, I visually documented myself improvising movement using some known dance techniques with restricted rules regarding space and mental focus. On the second phase I edited and manipulated these videos, together with voice research around possible discourses on several subjects around mathematics and performance, and created from that two videos with sound to be projected, and then I engaged in creating the concrete performance art piece also with real time improvised movement and sound composition. As I understand the 2 phases of this project as independent ones in the sense that they can be considered individually as artistic objects and/or research materials, I will consider in each one an *Axiomatic Image*, as well as *Sub-Images* and with an associated *Dynamics*. This section is then dedicated to connect the model presented in the previous section to the first phase of a specific performance art piece, which is the documentary one.

As I mentioned in the Introduction of this paper, I strongly believe that this project, "On a Multiplicity", can also be perceived as an autoethnographic visual and performance experiment, especially for three main reasons. In the first place, this work has a documentary visual series experiment where I am mainly interested in myself as a multilayered self contextualized in a specific time, space and place. In the second, this performance produces objects that question the boundaries between visual imagery as a tool to construct artistic objects and also as a tool to research visual ethnography from several different perspectives. Finally, the end form of this performance is a concrete example of performing autoethnography since I am performing myself from a contextualized multilayered perspective.

In *Improvisation Series* I decided to video record myself doing some body movement improvisation after at least 5 hours of study regarding the last year of my PhD in Calculus of Variations. Each improvozation session happened in specific spaces in the houses I lived in. I did the video recordings between the end of 2010 and September 2011. Along this time I changed homes 3 times—home being for me the place where I live, work, and consequently where I am most of the time. In each house I chose one or two specific spaces related to the idea that the chosen space was one where I was most of the time or somehow the space with which I felt some empathy.

A part of the essence of this work is the choice of being alone and so I video record myself being alone, searching for an environment where it is possible to reconfigure myself at an infinitesimal level in restricted spaces or circumstances. Also, a relationship between the camera and me is naturally developed along the

way: "I want a corner, I want a wall, I want to feel the machine and to know that I cannot move too much in order to fit inside the screen" (excerpt from my *Improvisation series* writings along the process of video recording).

I have accepted one *Axiomatic Image*: *Me and my selves*. Also I defined five *Sub-Images*: the Hall, the Living Room, the In Between, the WC, and the Kitchen. Observe that the *Sub-Images* aren't mutually exclusive, or independent from each other. They belong to a general *intersubjective matrix* of me's (to use Daniel N. Stern's term.

The *Dynamics* in each *Sub-Image* of *Improvisation Series* is characterized by body movement research using some Laban improvisation techniques, and references from Nicole Peisl & Alva Noë (dancer at Forsythe Company and philosopher from Berkeley University)[6] respecting some perception techniques in presence/absence states. I also refer to the work by the Portuguese performers Tânia Carvalho[7] and Sofia Dias & Vítor Roriz[8]. In Tânia Carvalho's work I feel inspired by the new universes of movement that are constructed as well as the importance of the music and singing. Inside Sofia Dias & Vítor Roriz work I feel inspired by the meticulous work regarding perception.

3.1. Axiomatic Image: Me and my selves

The *Axiomatic Image* of "On a Multiplicity" is our multiplicity as human beings, with our ability to be conscious of our actions and feelings from a personal perspective. This general idea is then the universe to be worked on within this specific performance art piece. Regarding the creative process, each of the two phases has it own *AI*, *SI's* and respective *Dynamics*. This section is devoted to the first phase of autoethnographic video recordings where also the *AI*, *SI's* and *Dynamics* arise, but always inside the main *AI* settled above.

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[6] See, for instance, http://www.youtube.com/watch?v=zMT-pFHy3D0, a talk with William Forsythe and Alva Noë on Consciousness. Also one can watch http://blip.tv/dancetechtvbliptv/dance-as-a-way-of-knowing-interview-with-alva-no%C3%AB-1003324 for Noë's ideas regarding dance as a way of knowing and exploring his experiences and thoughts on dance.

[7] Tânia Carvalho is a portuguese performer and she has done some amazing exploriations regarding "different" movement:
http://www.youtube.com/watch?v=CNR7imd44N4,
http://www.youtube.com/watch?v=0jylzf-tPis,
http://www.youtube.com/watch?v=1VnPZ9Wy_9s. Regarding her explorations on voice, singing I refer, for instance to http://www.youtube.com/watch?v=lE6lfsU5bNc, http://www.youtube.com/watch?v=RoA9IYqwqW4.

[8] The work by the portuguese performers Sofia Dias and Vítor Roriz is one of the most interesting ones for me in this generation in what regards the creation of perception environments metamorphosing themselves along the pieces:
http://www.youtube.com/watch?v=VNjhEbcEfOQ.

In this first phase of the construction process of "On a Multiplicity" we define the *Axiomatic Image* as being *Me and My Selves*. This *AI* follows directly from the general *AI*, but in here I focus more on the personal perspective, considering *Me and My Selves* as a set, where the elements are inferred from a departure point: the will to understand the mental patterns and so the images in the brain/body and the way they are connected, in connection with the specific research on Calculus of Variations I was evolved with at that time, as well as with the connections I was developing in parallel with other aspects of my domestic and daily life.

In *Improvisation Series* I decided to create a series of improvised movement video recordings immediately after at least 5 hours focused on the research I was doing in Calculus of Variations and within restricted spaces of the houses where I lived along that time. The restricted spaces were chosen from my personal experience and as *cuts* in the *almost continuous* functions, which arise as consequence of a combination of improvisation, perception and theoretical approaches to concepts.

3.2 Sub-Images: Hall, Living Room, In Between, WC and Kitchen

After accepting *Me and My Selves* as the *AI* and allowing the connections I started to establish with the spaces inside each of the 3 houses where I lived, and taking into account that I was always alone, even if I shared the house with another person, the *Sub-Images* started to arise. They appeared along the year I spent working on this phase and not at the same time, since as said before, I lived in 3 different houses and in each house I established connections with different spaces. So, this *SI's* emerged along the time I dedicated myself to *Improvisation Series*.

Almost every day, and after many hours sitting on a desk dedicating myself to mathematics, and within also some hours of theoretical study on performance studies and anthropology, I engaged in some body movement improvisation using some known techniques that I develop below in the subsection dedicated to the *Dynamics*. This construction process gave origin to *almost continuous* functions of improvised movement, with each function associated with one of the restricted spaces of each of the three houses, and having Mathematics, Performance Studies, Autoethnography, and Dance Techniques as tools and also subjects/objects of research. Each *SI* is then composed by video recordings around a determined and concrete space of one of the three houses, being each recording a *cut* of one of the *almost continuous* function.

Concretely, in each house I defined and developed an *almost continuous* function and then I worked on *limbs* of *cuts*. The *cuts* were the choses spaces and the *limbs* were the neighborhoods of the improvised movement chosen in each space. The first *almost continuous* function was defined in the first house, where I found a *cut*, the Hall, that I worked on. In the second house I defined another

almost continuous function where I found 3 *cuts* to work on: The Living Room, The In Between, and the WC. Finally, in the third house I defined the last *almost continuous* function in the Kitchen as the *cut* where I would work on the respective *limb*.

Hall

The Hall was motivated by a series of circumstances in my personal life. They led me to a really small house composed by a hall where there was the kitchen, with two holes (our bedrooms, mine and a friend with whom I was sharing the house) and a half of a hole, the WC. They also led me to a state of anxiety related to the ending of my PhD thesis, the lack of money and space to rehearse, and this state of anxiety implied a profound need to move and to research around the minimal space where I was spending my days, studying, alone.

Living Room

The Living Room was born after the Hall, with a change of home. My friend and I were able to move to a much bigger and not much more expensive apartment, where I could finally have a Living Room separated from the kitchen and from the Hall, and so a better place to work on my mathematics research and also with some space to do my body movement research. So, the Living Room turned out to be the strongest possibility of Sub-Image, the place where I was almost always working.

"In Between"

I was working in the Living Room of my new home and there was no door between the Living Room and the Hall, so this space "in between" was always present as some kind of absence, since it wasn't a real defined space inside the house, but was always present in a visual and geometrical way. Since I moved to this house, I felt compelled to search for movement inside of this space. Deleuze & Guattari describe the situation well:

> Staying stratified—organized, signified, subjected— is not the worst that can happen; the worst that can happen is if you throw the strata into demented or suicidal collapse, which brings them back down on us heavier than ever. This is how it should be done: Lodge yourself on a stratum, experiment with the opportunities it offers, find an advantageous place on it, find potential movements of deterritorialization, possible lines of flight, experience them, produce flow conjunctions here and there, try out continuums of intensities segment by segment, have a small plot of new land at all times (161).

WC

The WC I used is a very small one and belongs to the second house, where I also used the Living Room and the In Between. It is really cute and sufficient, but hasn't much space to use outside the furniture. I chose it because it was very cozy and warm. I was ill during a part of my staying in this house—fever and stomach problems from a tropical virus—and I spent hours in there. It became naturally a space to use in this research.

Kitchen

The Kitchen belongs to the third and last house where I lived in 2011. This house had 3 bedrooms, a kitchen, a closed balcony and a WC. In this new home I never felt the need to work on the closed balcony despite working on Mathematics there during the mornings and planning to rehearse there. But I never felt the reality of the space in my work or the intensity to be part of this study. The only place where I felt the need to move was the Kitchen, where I spent a lot of time cooking and relating to it. I was ill during July and August (still from the tropical virus) and I moved there in the end of July, right after getting out of the hospital where I had been for 15 days; so I spent the first weeks in the house taking care of my health, cooking and resting most of the time, even if I was keeping my 5 hours daily study to fulfill my expectations regarding the PhD thesis as well as this project. The Kitchen became the place where I felt awake and useful. I was feeling better but the cooking and the relationship continued and I decided to do the research in there having as a starting point a concrete relationship of discovering the space and how the body could fit into it.

3.3 Dynamics

After accepting the *AI* and the *SI's* I dedicated myself to construct the dynamics inside each *SI*. I wanted to video record myself using techniques like Laban Improvisation Technologies[9], the Real Time Composition technique introduced and developed by João Fiadeiro[10], some perception techniques by Sofia Dias and Vítor Roriz, and by the connection between the work of dancer Nicole Peisl and of philosopher of mind Alva Noë (who was also a philosopher-in-residence at Forsythe Dance Company where Peisl had danced).[11] The construction pro-

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[9] See, for a simple example, this video: http://www.frequency.com/video/improvisation-technologies-laban-model/115545181

[10] See João Fiadeiro's work at:
http://atelierealtextoctrgb.blogspot.pt/2010/05/indroducao.html

[11] See the proposal of the joint work by Nicole Peisl and Alva Noë in (Noe, 2012)

cess, composed by the combination of studying several fields and improvising movement using these techniques, led me to the rising of an *almost continuous* function, which is the set of movement improvisations inside each *SI*, and that also leads to several *almost continuous* functions – each one associated with one movement improvisation video with cuts that are the moments inside the improvisation movement when I change the direction of the type of movement I was doing, or the type of perception focus I was researching.

Hall

Since the first movement in The Hall, I realized I would have to be careful with the structure of the rebound between the movement of my body and the emotional dimension of the physical space. The Hall was narrow and the perfect scenery for physical as well as emotional castration, but I wanted my body to intervene sufficiently in order to fulfill the space, and not just to reaffirm something. Leaning, sliding, climbing, and lodging myself between walls, I engaged in a process of puzzling the body, trying different gravity centers and different approaches.

   The energy is almost always low, due to the dramaturgic potential of the space. Sometimes, my body is filled with fear, especially in contact with both walls, which was interesting to work on. So I crafted here a physical work around the center, using directions, frames, equilibriums and new connections using the floor and both walls.

Living Room

The Living Room was a difficult space to work. It had some free space and my main imprisonment was the photographic/filming machine. So, it interested me to understand how I could relate the movement with the space and this kind of imprisonment (it is spatial but does not come from a feature of the space around, it is a self-imprisonment). I worked mainly the hip, knee and ankle articulations in the lower part of my body, rebounding between the stabilization of the center and the disequilibrium of the whole body. I also worked on the velocity of movement, in the sense that I first tried to change the velocity and then I used some perception techniques that would allow me to open possibilities concerning the connection with the space.

"In Between"

I look at this space as being itself a *limb,* in this context an object that lies between two other concrete and defined ones, where the conflicts and the negotiation of the body takes place between two different defined and concrete spaces:

the Hall and the Living Room, even if this Hall wasn't the one I worked on (the new Living Room and the new Hall belong to a new home).

In this space I felt like dancing and I felt like using both spaces: The Hall and The Living Room, but with a defined maximum radius of action, to be always around the "In Between". I decide to use the walls dividing both spaces and I also decide to use the floor to change space priorities. I allowed the movement to metamorphose itself into different dynamics, rhythms and intentions, as natural features of this *limb*.

WC

In this space I used the bidet, the washbasin and the bathtub to work essentially on different deconstructions of stereotypes of the body inside this room, the WC. In the bidet I worked mainly on disequilibrium positions and also on altered perception states of the body, as for instance trembling parts of the body or the whole body. In the washbasin, I used the fact of having a good basis to sit, and a mirror.

I tried some movement analysis related to double images (mine and the respective projection in the mirror), and as I was filming the front just sometimes it turned out to be possible to see the projection of my movement in the mirror. Then I worked on some back isolations and different movement improvisation in sitting positions.

In the bathtub I used mainly the levels: to lie down, to be up, and to be sitting. As the bathtub is overdetermined as a sensual image I decided to focus on discovering level perceptions instead of sensuality.

Kitchen

In the Kitchen the idea was to close this study with the simple idea of restarting, that is, to discover the space and how the body could fit into it. I used the floor, the oven, the sink, and the benches. On the floor I engaged in movement improvisation focusing on the relationship with the temperature. The floor was cold, despite the high air temperature in the room. These differences in the body while I was moving led me to research new movement possibilities.

In the oven and on the benches I decided to use the primary idea of discovering the space using the body, and it became a research endeavor on measuring the space with the body and searching for ways to fit into it. On the sink I used mainly possibilities for equilibrium since it was not so easy to control so much of its basis, trying different body centers.

4. The performance art piece "On a Multiplicity"

The impetus for this performance was to engage the idea of human beings in their multiplicity as a counter-example to Cartesian dualism. I also wanted to share my own multiplicity since I dedicate myself to both Mathematics and Performance Art, with a twist of Visual Autoethnography within the research.

I engaged first in an autoethnographic approach where I video recorded myself and in parallel I read, wrote and tried to connect that with the improvisation movement I was exploring on those videos. After that I engaged in the construction of the effective performance art piece, the one I would be sharing with the public. So I can affirm that the motivation to construct this performance art piece was mainly the idea of sharing the autoethnographic research, creating the idea of multiplicity and *limbs* of *cuts* on an *almost continuous* process of metamorphosing the body, also with mathematical reasoning associated. I wanted to work on the videos from *Improvisation Series* but I also wanted to perform myself, to "be" in real time.

This section is devoted to the application of the model presented in Section 2 to the construction of the performance piece itself. I start by defining what is the *Axiomatic Image* in this context, obviously taking into account that I am dealing with the more general idea of multiplicity as a feature of human beings from a personal perspective. Then I address the origin and rising of the *Sub-Images* in this setting. Finally, then, I engage in the *Dynamics* associated to each *Sub-Image*.

I constructed the performance to be shared with a small yet intimate audience, since the physical proximity is important and also because it is important in this approach to have a chat with the public after the presentation in order to understand the perceptual places the public found in order to follow the performance art piece.

4.1. Axiomatic Image: Multiplicity of my selves

The first idea to perform myself beyond *Improvisation Series* was for sharing the multiplicity of the individual and the complex relationships and environments, which can be found and developed in between the selves. So, the main ideas are multiplicity and sharing the environment. The sharing is not a total sharing, it has an axiomatic origin and only exists as a concept in relation to other concepts. In other words, it suffers a metamorphosis along the process.

Since the beginning I was concerned with the negotiation of my selves in the *limbs* inside the universe of mathematical reasoning/body movement and what could be the radius of each *limb* around various *cuts*. I decided to do an autoethnographical approach also in the concrete performance art piece.

So, the *Axiomatic Image* is the Multiplicity of My Selves. It is related to the first *AI* of the project: the multiplicity of each human being with their ability to

be conscious of their own actions and of themselves. It is also related with the *AI* in *Improvisation Series*: Me and My Selves. In here I am not so focused on discovering my selves but I realized I would be focused on their own multiplicity, or in the multiple connections that can be made in between the settled selves coming from *Improvisation Series*.

I can affirm that the *Axiomatic Image* is associated with the self construction of Stern's concept of "intersubjective matrix," that is, the performer's construction of intersubjective relationships among the selves.

4.2 Sub-Images

After accepting the Multiply of My Selves as the *AI,* I engaged in a process of gathering together the material from *Improvisation Series* and starting to edit it. I also engaged in video recording of myself talking about the process, video recording myself improvising after spending at least 5 hours thinking about possibilities of constructing and presenting the performance. I arrived then at 3 *Sub-Images*: Wall I: Improvisation Series as a tool; Wall II: Performing my selves as a tool; and Wall III: My selves as a tool. The two first *SI's*, (Wall I and Wall II) ended up by being two videos to be projected, both a consequence of analyzing *Improvisation Series*, while Wall III is associated with real time composition.

In the creation process I defined two *almost continuous* functions, one referring to the analysis and reformulation of *Improvisation Series* and the other referring to movement and sound creation in real time. These two *almost continuous* functions are related because movement and sound happen in real time in the concrete (live body) performance art piece, simultaneously with the video projections of Wall I and Wall II, even if these can also be considered and studied as two different functions. In the first one, I founded two *cuts* to work on their *limbs*, which are Wall I and Wall II, that is, one is a video with work around the videos from *Improvisation Series*, and the other one a video with feedbacks and video recorded analysis, presentations, improvisations around *Improvisation Series*. The second *almost continuous* function led me to a *cut*, which is exactly the Wall III associated to the creation in real time connected with all the work done around multiplicity of selves, movement and sound.

4.2.1 Wall I: Improvisation Series as a tool

One of the goals arising from the *almost continuous* function characterized by watching, rewatching and analyzing the videos, together with the theoretical study around autoethnography, performance art and video editing, was to set as a *cut* the idea of editing *Improvisation Series,* and put them into the same screen and projected it on one wall.

4.2.2 Wall II: Performing my selves as a tool

Along the process of analyzing *Improvisation Series* videos, I realized that I had to choose as a *cut* what I would denote as a chronology of the analysis itself, and the work around the idea of creating a video to be projected on another wall.

4.2.3 Wall III: My selves as a tool

On the *almost continuous* function related to creating real time sound and movement, I found the *cut* setting my improvisation and perception work on the body, together with an experimental work around looping voice and mathematics or performance talks, all in real time. It is in the *limb* of this *cut* that I develop the *Dynamics* of this *Sub-Image*.

4.3 Dynamics

After accepting the *AI* Multiplicity of My Selves, and defining the *SI's* Wall I: Improvisation Series as a Tool, Wall II: Performing My Selves as a Tool and Wall III: My Selves as a Tool, I entered the *Dynamics* of the concrete performance art piece, which is the result of finding the *Dynamics* inside each *Sub-Image*.

To generate presence/absence possibilities, not only with movement improvisation in real time, but also with multimedia *remediations*[12] of my selves,

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[12] See Telma João Santos, "Performance as remediation, where the concepts of immediacy and hypermediacy converge." In *Art & Remediation*, de José Quaresma, 20-30. Lisbon: CIEBA-FBAUL, 2013.

especially in performing my selves, was one of the mottos for the *Dynamics*, along with the possible connections to ways of (re)presenting my selves. So, in each *SI* I developed *almost continuous* functions with *cuts* that represent changes of multimedia, focus, size and shape within both projections of Wall I and Wall II, as well as in Wall III, in real time.

4.3.1 Wall I: Improvisation Series as a tool

In this *Sub-Image* I decided to edit all the videos from *Improvisation Series* in black and white and with some old television and deformations look. Then I decided to put all the videos in the same screen and create a multiplicity as the *almost continuous* function. There are many *cuts* as the changing of videos, and sizes, and shapes, together with the focus of the viewer. [13]

4.3.2 Wall II: Performing my selves as a tool

In this *Sub-Image* I wanted to set some chronology on the construction, together with the idea of the multiple possibilities of self (re)presentation. So, I constructed an *almost continuous* function, which represents my selves and the *cuts* of changing self (re) presentations or of (re) presenting these (re) presentations.

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[13] The photograph on this page is courtesy of Tiago Frazão.

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4.3.3 Wall III: My selves as a tool

This *Sub-Image* representing the work around real time movement improvisa-
tion, connected with the specific space and the way the video projections of Wall
I and Wall II are settled, and also with improvised sound and talks about the
construction of this performance art piece and the specific research I am doing
in Mathematics, is probably the most subjective *Dynamics* of all the *Dynamics*
treated above.

The live aspects of this *Dynamics* are always changing and adapting along
public presentations and along time.[14] It depends on the way my body health is,
my relationship with the work itself I and the specific space and public: I can be
close to the audience or maintain a distance, I can chose to touch some percep-
tion "places" as anger or seduction, all within the idea of my own multiplicity,
and also experimenting new perception and body/mind states.

I create then in this *SI almost continuous* functions, fulfilling the all perfor-
mance through different approaches, and so creating different *almost continuous*
functions. In each of these approaches I found *cuts* that are represented by
changes on perception or physical states, using some contemporary dance

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[14] The photograph on this page is courtesy of Filipe Oliveira.

movements coming from Laban Improvisation Technologies, as well as Real Time Composition as in the *Dynamics* of *Improvisation Series*, as well as my own movement based ways of (re)presenting my selves. The *cuts* can also be represented by changes in sound: looping, deleting, changing, adding, multiplying, and so on.

Conclusion

This paper started with the idea of settling a model that could explain a way of thinking and perceiving a creation process in any performance art piece, along with some mathematical concepts. I started in Section 1 by introducing the main mathematical concepts, and in Section 2 I introduced, defined and contextualized a possible model that can be used in a creation process within any performance art piece, since it is very open from the conceptual, choreographically and stenographical perspectives. Sections 3 and 4 are examples of applications of the model within a project that I decided to call "On a Multiplicity." This project had two phases in its construction: a video documental phase called *Improvisation Series*, and the construction of the effective performance art piece.

Beyond the interest of connecting different research fields as Mathematics, Performance Studies and Visual Anthropology, is the fact that this model, and "On a Multiplicity" as a concrete example of application of the model, can be seen as a counter-example of the body-mind, emotion-reason dualisms.

There is another important feature implicit in this paper: the research on (re)presentations of selves, which can be multimedia as well as virtual remediations in performance. Consequently, this this aspect includes how new technologies can be themselves used as research tools for bringing new ways of perceiving identity, communication, sharing and performance.

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