

MPhil Thesis

Towards the Oracle Machine

**An exploration of decision making processes through the use of
software, media divination and other shamanic techniques in
realtime audiovisual performance**

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We shall not go any further into the nature of this oracle
apart from saying that it cannot be a machine. Turing (1939)

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Abstract

This thesis uses computational art practice to explore the question of indeterminacy and uncertainty in contemporary societies. It explores the issues navigating through different disciplines, starting from a preamble where the discoveries of quantum mechanics are confronted with the vision of modern and contemporary empiricists and re-articulated in post-structuralism and postmodernism. The approach from physics and determinism moves towards one of the classic questions of philosophy, that of free will. The state of indecision is described as the act of making a decision, an act extended in time - eventually to infinity.

The reflection leads to the field of generative semiotics. Since the use of oracles to make decisions is also a peculiarity of humans, the distance that articulated language creates between reality and signs is proposed as a disruption that fosters the dichotomy of instinct and rationality. In this fracture nature assumes the form of the divine, whereas rationality is a procedural form. Technology, as an ultimate expression of this rational form, surpasses humans in procedural decision making capabilities, becoming a novel instrument to reach a divine union. Yet, early computing showed that, to halt a process resolving an undecidable problem, a machine has to receive an input of a different kind, an analog tape or an oracle as it were. The interaction with a different substance - the analogue sensor or a supernatural daemon - becomes the trigger to surpass a situation of impasse.

The question of uncertainty is then transduced into an art work that responds as an intervention in that interdisciplinary space, materialising an aesthetic form that draws on elements of the absurd and the aliatory in art, all re-interpreted in a do-it-yourself hacker fashion, creating a peculiar noise drama that has the effect of a symbolic ritual, or, ultimately, its seductive illusions.

1. Preamble

Although apparently everything was known about the universe, there was always something (about it) that remained inherently mysterious. The unknown resulted, then, intrinsic and adjacent to knowledge and comprehension.

The question about uncertainty, the description of the real and its enigmas, starts from a vision of the world without ruptures, a uniform structure understandable by logic and dominated by meaningful relations. As if thought, that seems to be related to the language of our consciousness¹, was a permanent presence able to make sense of the real, the imaginary, the symbolic, and the virtual². This illusion of comprehension, and the idea of a necessity and the determination of being, are confronted with a continuous flux of sensations and perceptions that are very often contradictory, inadequate and partial.

The necessity to share a common understanding of the world contributes to the construction of an, eventually illusory, impression: if similar abstractions correspond to similar phenomena, these phenomena must produce homologous perceptions. Nonetheless, the relation among stimulus and perception is not always linear, and the presence of the one does not necessarily imply that of the other, or their causal relation in a given time-space. The analysis of biological processes such as

¹In the range from awareness to unconsciousness (range specified by the author).

²Potential included (clarification by the author).

vision reveals diachronic and polytropic formations occurring at the intersection of living entities and the environment. In fact, as Descartes reminded us, “*the image is a process - and a predicate – of the brain, not a property of the world represented*” (Descartes, 1664).

The human brain, through adaptation, turns around the pictures envisioned in order to allow orientation in a three dimensional space. The dimensions perceived are influenced by the senses and by a certain kind of use value which determines the possibility of mechanical movement and the development of life and survival. Before they can ever make sense of the world, men rotate it 180 degrees, and through the organs of sense the world becomes image, and this image is transformed into (or reconnected to) the idea of the thing itself. Although quasi instantaneous, this process - that is a metaphysical but subjective cosmic movement³ – extends the mental perception and reproduction of the world into the trajectory of time.

Practically speaking, in fact, there is a variable Δt^4 (Clemence, 1948) which includes the difference in time between the instant when the retinal formation happens, the infinitesimal time necessary for the transformation of this image into electrical signals, and the time used to stream these impulses to the brain for correction and interpretation. Although apparently insignificant from a quantitative point of view, this fragment of time brings up ontological questions of consistency, existence, synchronicity, and, more in general, doubt.

³Before becoming percept, the image of every object of the real world turns around 180° in the travel or transduction from the physical object to the eye, and other 180° in the transmission from the eyes to the brain. Beside a difference in time, it is questioned and suggested here that this movement implies further implications and transformations that invest the ontological dimension of an object (argument by the author).

⁴ ΔT or Delta T is the time difference obtained by subtracting one time scale from another, for example the Universal Time (a time scale based on the Earth’s rotation which is irregular over short periods) and Terrestrial Time (a theoretical uniform time scale); see Clemence (1948) and Essen (1968). Here it refers to the hypothetical difference between Terrestrial Time and Biological Time, or, in other words, the difference in time between external and internal to the person. ΔT can also refer to the interval of time used in determining velocity.

In fact, we tend to assume that what we see is present, material, it is form associated to substance (matter); still, we cannot be sure that our representation of the real is absolute. We can use different senses and their cross references to justify an idea of normality and give consistency to our perceptions. We can observe a cup of coffee on the table, assume the table exists and is there, we can see vapour over the coffee and we presume the drink is hot, we can smell it and then we touch it. When we finally drink this cup of coffee, we are reassured about its existence, and we know - because we can confront our perceptions - that the smell and the taste belong to the same substance.

Now the coffee isn't there anymore whereas smell and taste are persisting in space and time. We are awake, the night has come and we see the stars. We cannot touch them; we know - because science told us - that what we see is just a delay, the stars we see are historical information that has been travelling long years in the form of light, so the image we see is just a projection, the impression of the past over the present, and in the same instant the far away present which we cannot see may be deducible in a very different constellation. So, what is, in this case, the difference between a star and a cup of coffee?

It is a matter of time.

For example, if, paradoxically, we suppose or imagine that one day a difference in speed would dilate the process of conversion of the image of the cup of coffee into the idea of the cup of coffee, let's say, of ten hours, then, by the time we know there is some hot coffee on the table, and we see it steaming, we can be sure that, while our slow synapses were interpreting the visual event coffee-cup, someone else has drunk it, so the cup of coffee we see is not present anymore. Obviously, if this change of speed would regard one sense and not the others, we could smell the coffee without seeing it, and we could even grab an invisible cup, or, imagining a total a-

synchronicity of perceptions, we may perceive the flavour of coffee a week after we drank it.

In this sense, and according to this simple and explanatory logic, the materiality of the world we perceive is influenced by time, and this implies that materiality is incidental (in the sense that it belongs to the state of events), and not essential (as an absolute property of matter), at least for us. There is always a fragment of time between us and the reality we observe, so that we can perceive what we call the real only in time, yet what we perceive is already past and doesn't exist anymore, it's therefore unreal. Time creates a contradiction in the construction of the ontology of the real: not only there is no future, even the present is a constant invention, a continuous prediction of something approximately past. Reality appears, thus, as fragmentary and incidental as any other immaterial, imaginary or hyper-real world.

If a scientific experiment can determine the position of a particle of matter only in time, as trajectory, the individual empiric experience shows the opposite phenomenon: comparing the self to the instrument of scientific inspection, and the external world to a particle, we can say that in the latter case it is the time lapse, or trajectory, that is uncertain, whereas the specific instant allows identification⁵, of course in the form of representation.

Hume, in his 'An Enquiry Concerning Human Understanding' written in 1748, explains this subjective dependency on the senses:

... when men follow this blind and powerful instinct of nature, they always suppose the very images, presented by the senses, to be the external objects, and never entertain any suspicion, that the one are nothing

⁵According to Simondon the individual subject is an effect, rather than a cause, of individuation (Simondon, 1989). In antithesis and analogy with identification, which appears to be instantaneous, individuation manifests itself as a continuous generative process which has a different relation to time (clarification by the author).

but representations of the other. This very table, which we see white, and which we feel hard, is believed to exist, independent of our perception, and to be something external to our mind, which perceives it. Our presence bestows not being on it: our absence does not annihilate it. It preserves its existence uniform and entire, independent of the situation of intelligent beings, who perceive or contemplate it.

Hume (1748)

The author argues that what is present to the mind is not the table but its image, as there is no immediate intercourse between mind and object. So the existences that are present in the form of image to the mind are *copies or representations of other existences, which remain uniform and independent* (Hume, 1748). Although acknowledging the dependency of the object on the subject, the author seems to believe in the idea of the existence of a uniform, consistent, consequent and independent world; yet

... we have to remember that what we observe is not nature in itself but nature exposed to our method of questioning.

Heisenberg (1958)

Heisenberg affirms that the world described by classical physics, that rational system responding to Newtonian mechanics and determined by causality⁶, was an incomplete and erroneous description: language leads in fact to contradiction, also because of the tendency to ignore the influence of the instrument of inspection on the reality observed. If in reality the transition - that is a temporal transition - from the

⁶F. S. C. Northrop, in his introduction to Heisenberg's 'Physics and philosophy' makes a distinction between two types of causality, which are often used without any declared distinction by some physicists and philosophers: one has a stronger, teleological meaning and is synonymous to deterministic, the other has a weaker meaning and is intended as mechanical causality. In the latter acception of the word, every deterministic system is a causal system, but not every causal system is deterministic (pag.11). Heisenberg uses the term in its strong meaning. In quantum mechanics causality holds if it means mechanical causality but it is not valid in the sense of determinism.

“possible” to the “actual” takes place during the act of observation, it is impossible to describe what happens in an atomic event, because

... the word “happens” can apply only to the observation, not to the state of affairs between two observations... and we may say that the transition from the “possible” to the “actual” takes place as soon as the interaction of the object with the measuring device, and thereby with the rest of the world, has come into play.

Heisenberg (1958:54)

After Maxwell unified phenomena such as electricity and magnetism around 1860, Einstein’s theories of relativity modified the philosophy of modern physics by altering the philosophical conception of space and time and their relation to matter. Quantum mechanics brought change in the physicists’ epistemological theory of the relation of the experimenter to the object of scientific knowledge, questioning the understanding of reality and its theoretical definition. The concept of probability or chance enters into the definition of the state of a physical system and its subject matter because the interpretation of the observation of a system can be stated only in terms of a probability distribution concerning the position or momentum of particles of the system. The particles of classical physics lose their fundamental status dissolving into clouds of possibilities. In Newton’s or Einstein’s mechanics the concept of probability and chance was operational, it subsisted only as verification of what the scientist knows and it didn’t enter in the definition of the state of a mechanical system at any statical moment in principle. Quantum mechanics, especially its Heisenberg principle of indeterminacy, has brought the concept of potentiality back into physical science; he defines it as

... a quantitative version of the old concept of “potentia” in Aristotelian philosophy. It introduced something standing in the middle be-

tween the idea of an event and the actual event, a strange kind of physical reality just in the middle between possibility and reality.

Heisenberg (1958:41)

His philosophy of physics is, in this respect, closer to the metaphysics of Whitehead (1929), who, recognising the world as organic rather than materialistic, substitutes substance with ‘actual occasion’ and holds that nature is a structure of evolving processes and reality is the process. Whereas in materialism nothing exists except matter and its movements and modifications, in organic metaphysics reality is an instantaneous process, a constant becoming distributed in a timeless duration. This organic realism, where subjective forms complement eternal objects (or archetypal forms), was proposed as a substitute for classical materialism. In organic materialism and its logic there is no such a thing as the opposition between material and immaterial, because these two categories are not structuring a contrary relation; they are, instead, complementary, and almost indistinguishable.

But why did scientists until the advent of theoretical quantum mechanics believe in teleological causality and determinism? Why did Einstein, whose theories were also revolutionary, severely object to quantum mechanics by saying: “God does not play dice”?

In 1899 Max Planck discovered that physical action could not take any indiscriminate value; instead, it had to be some multiple of a very small quantity (Heisenberg, 1958:31). Planck’s constant is a number h referring to the quantum of action of any object or system of objects. This quantum, which extends from matter and electricity to light and to energy itself, represents the proportionality between the momentum and the quantum wavelength of any particle. On a micro scale, when the quantum numbers of the system being observed are small, the probability associated with the position-momentum in the state function becomes significant as

consequently does the uncertainty specified by the principle. On a macro scale, when the quantum numbers of a system are large, the probability numbers in the state function – as well as the quantitative amount of uncertainty – can be neglected. Thus, on the macro scale quantum mechanics converges with classical physics, or, in other words, quantum physics with its mechanical causality gives rise, as a special case of itself, to Newtonian and Einsteinian deterministic mechanics.

This inherent granularity of reality is counterintuitive and was never perceived because, in comparison to human experience, the quanta of action are very small. In any system of observation the difference in information between macrostates and microstates is called entropy⁷. Entropy in this acceptance means that every definition is an approximation, the erasure of a certain amount of information that is defined excessive in order to reach an ordinate simplification.

But what exactly is the physical effective dimension? It is an intuitive notion, which goes back to an archaic stage of Greek geometry, which deserves to be remembered, elaborated and actualised. It refers to the relation between 'figures' and 'objects': the first term denotes mathematical idealisations, the second real data.

Mandelbrot (1975:14)

If objects can only become models when using a certain margin of approximation, and their effective physical measure, and their real shape, can only be described through observation, then reality appears to be subordinated to experience, and it may be possible to draw Hume's argument one step forward, and start doubting about the existence of his very table, at least in terms of ontological singularity and univocity.

⁷In signal processing this is called noise and can be explained as that which is considered irrelevant or redundant. Noise, similarly to entropy, changes according to the degree of resolution applied (Nørretranders, 1998:32,33)

In classical physics science started from the belief – or one should say from the illusion? - that we could describe the world or at least parts of the world without any reference to ourselves.

Heisenberg (1958:55)

If all we know is subordinated to ourselves, the only possible description of the world participates in our imperfection⁸. So how can humans have any certainty if all their knowledge is subjective?

Nothing exists if it isn't perceived⁹, and everything that is perceived includes a dimension of uncertainty that is both ontological and procedural. Science is not exact because knowledge is subjected to human experience which is dynamic, momentary, individual. Certainty may be defined as an illusion produced by the senses in order to allow orientation in a multidimensional world. Reality can only be understood through approximation, and its description is influenced by the degree of resolution of the observer or system of observation.

Quantum theory and microphysics require a far more radical revision of the idea of a continuous and predictable path. The quest for precision is not limited by its cost, but by the very nature of matter. It is not true that uncertainty (lack of control) decreases as accuracy goes up: it goes up as well.

Liotard (1979:55)

If a system is influenced by its point of access and investigation and by its internal structure, and making any measurement of the initial state of a system requires a

⁸Imperfection here refers to the subjective limits of perceptions, it is not intended in moral sense, rather it refers to human capability to make mistakes (clarification by the author).

⁹In the second chapter of "Immanence: A life" Deleuze reflects on Hume: if science is an enquiry, theory is concerted to practice; ideas contain nothing but sensory impressions because relations are external to their terms, an autonomous logic or relations. Causality is a special form of relation and there is no error but delirium or illusion: when fantasy forges fictive causal chains, beliefs, that are at the base of knowledge, are not false but illegitimate (Deleuze, 1995).

certain energy, knowing that the description and the inherent uncertainty within a system increases as accuracy grows, it may be assumed that the more a certain system or situation is analysed, the more energy it is spent and the more confused its comprehension becomes; while its meaning is vanishing, it won't be possible to operate any form of certain prediction over its future states, and its coherent functioning will become increasingly mysterious and intrinsically undefinable.

2. Free will

The discoveries of quantum physics had a great influence on the imaginary of the 'citizens' of late XX century and beyond. The introduction of the concept of uncertainty propagated from the physical property of matter at a microscopic level, to the existential condition of men, finally manifesting itself among the counter effects and the properties of global capitalism. This immersion in the bath of insecurity and parallel concomitant possibilities had eventually had an effect on the faculty of choice. Making decision in a state of uncertainty or in a state of clarity implies, on the grand scale of things, some assumptions on free will and autonomy of agency. In fact, if humans have no free will, then there would be no real choice in the course of their existence, and the act of making a decision would be just an impression, a mere illusion. Else, the exercise of free will, the exercise of the faculty to desire something rather than another thing, would be crucial in making a choice. Furthermore, this immersion in the uncertainty frenzy would contagiously affect such important predicate of mankind.

What is it, in fact, that one wills? How can one distinguish authentic *voluntas* from the noisy influence of the social matrix and the superimposed desires that society forges for us?

This story is about a search for "The Oracle Machine", a supernatural machine that flew to earth from the ultra cosmos of technology to resolve simple and com-

plex problems that people were encountering at the beginning of the XXI century. Apparently, at that time, due to incredible developments in science, physics, informatics and engineering, the definition of reality and the position of the subject in its respect were becoming increasingly uncertain. Machines were becoming more and more perfect, confident, attractive, intelligent: they could learn from their mistakes and, apparently, not only could they feel, they were also starting to become affective. Moreover, people were increasingly delegating to technology important responsibilities, and by adapting to this new mechanical and electronic world their senses were becoming atrophic and their affective power was progressively reduced by collective psychological anesthesia, prescription drugs and general panic. A form of dependency between humans and machines was making people feel fragile, vulnerable, imperfect; the primogenial questions that were at the origin of knowledge, philosophy and science, instead of being answered, were constantly disputed over the centuries; one could have said that there was no progress in philosophy: the main questions were still unanswered and the discussion was turning over and over again, finally going back to the same points. But one could have also thought that at least science was progressing, because its analytical or deductive methods implied proofs, experiments and demonstrations... Yet that was another illusion, and science itself was leading to territories of extreme contradictions and paradoxes: if on the one hand technique, technology, although internally mysterious, were apparently functioning, on the other hand the theoretical definitions of physics were hard to prove and even harder to understand, and their ever more sophisticated findings were pointing to abstruse multiplicity, ineffable infinity and shocking absurdity.

Hence the suffering.

Once upon a time the scholastic standard, derived by a Christian interpretation of Aristotle (McGrade 2003), was imposed as a wall in front of the production of

any type of new knowledge. Later on, Kant idealised the grid into which you could find the structure. In the meantime Galileo had suggested that the Earth was not the center of the Universe, and, soon after¹, the self occupied that vacant place². Nowadays both the intellectual oligarchy and amateur theorists think about (post) structures, but comprehension requires imagination, and, if the utopian dream that wished philosophers to become bureaucrats was realised in the dystopian world dominated by ignorant businessmen, arrogant showmen and plastic dolls, what else is hidden in this heavy luggage filled with culture? Can we find any answers that can illuminate the path leading towards this marvellous machine we are searching? And why is it so necessary to find it nowadays?

Let's have a look...

If there is no objectivity and the knowledge of the world is influenced by observation, reality is in direct relation with individuation and identity. Consequently a crisis in identity can generate a crisis in reality, because reality is not given but depends on experience. Reality is not 'a priori', it is, rather, a percept. But if reality is a percept, a mental impression of something perceived by the senses, and the subject is an effect of the process of individuation, what allows the distinction between observing self and observed world? If the perception of reality depends on the individual, and the formation of the individual is an effect of the interrelation with the milieu, how can reality be defined in terms of relations? If both self and reality are created through the percept, they are in a relation of interdependency. It may be hypothesized that – similarly to individuality – reality is also a transductional effect, an incomplete coagulation (Simondon, 1964).

Although percepts preserve a tactile relation with the object perceived, there is no synchronicity between subject and world because the process of transduction

¹Soon in terms of history and cosmological transformations (clarification by the author).

²Paraphrasing existentialism and the dualism conscious vs non conscious (Sartre, 1964).

develops in time and implies a certain difference, a time lapse – even if infinitesimal. When reality is perceived, it is already past. Between subjects and objects of the world there is a fragment of time precluding simultaneity. This fragment of time is essential because it is in these fragments that reality and identity emerge. Yet subject and reality remain a reservoir of potentials, some actualised, others metastable. Then the formation of reality is influenced by the observer, yet the observer is an effect of the process of individuation which is influenced by the milieu, so to say the real world, which is part of reality. Are identity and reality, observed and observer, constantly contained in one another like a matryoshka³, in a way that, according to the distance between the two, or the grade of resolution, it is possible to find or lose them in one another, in a repetition which reminds of the cyclic occurrence of form in a fractal system or the continuum hypothesis?

If these formations dynamically influence each other and are in constant transformation, how can a subject make sense of the environment without necessarily making sense of the self? And what preserves identity if subject and self are also unstable systems?

According to Deleuze's schematization of the plans of sensation, percepts are the object of science because the process of perception begins with an object (stimulus) that is transduced by the sensory organs into neural activity, whereas affects, which are related to the unconscious or preconscious and lead to conscious emotions through the process of becoming, are the object of art (Deleuze, 1981). Therefore, while percepts preserve a stronger connection to the world, affects are closer to the subject because they are an abstraction of the percept operated by the subject. It is only through abstraction that a percept can become affect, in fact, although

³Does the environment, which is informed and completed by the emergency of the subject, influence the production of this reality perceived by the subject, if reality is the result of the subject plus the environment?

affects are independent and can be received by any subject, there cannot be affects that are not generated by a subject. An instrument of observation can collect data comparable to a percept, but can an instrument transform this data into an affect? If nowadays research in bioinformatics is implementing methods to detect human affects, can machines be programmed to create completely new abstractions of percepts, so to say, synthetic affects? And can a normal person receive an affect generated by a machine? Abstraction is one of the crucial problems that scientists working in the field of Artificial Intelligence have to resolve.

Shaviri, in his online review of Simondon's "*L'individuation psychique et collective*"⁴ writes that, according to the author, affects are mediating the actions of the subject in the real world (Shaviri, 2006).

Paolo Fabbri⁵, reading Deleuze's philosophy and his use of linguistics and semiotics in the development of his aesthetic theories, affirms that every sign, being the effect of the action of a body over another body, provoking a variation of power, or affective sensitivity, is therefore affect (Fabbri 1998). Thus affects can be signs, and signs are never arbitrary. In the same essay titled "Come Deleuze ci fa segno" (How Deleuze makes signs to us) the semiotician, delineating Deleuze's method of deformation and translation of different philosophical systems in his particular semiotics, in opposition to semiology, writes:

... linguistic signs have always something to do with other signs, which are natural signs; so that the opposition between conventionality and naturality of signs is revoked by Deleuze, reader of Spinoza, with the idea

⁴L'individuation à la lumière des notions de Forme et d'Information (Individuation in the light of the notions of Form and Information), published in two parts: L'individu et sa g n se physico-biologique (Individuation and its physical-biological genesis) first published in 1964, and L'individuation psychique et collective (Psychic and collective individuation) first published in 1989.

⁵Paolo Fabbri, scholar and friend of Deleuze, in his lectures in Semiotics of Art at University of Bologna, 1997/2002, often lingered over Deleuzian positions in art, aesthetics and signification.

that there is no arbitrary sign [...] in other words, there is no reality of any type outside signs, since signs are constitutive of objects and nominative of events, then they are, themselves, the reality. ⁶

Fabbri (1998)

If the actions of the subject on the real world are mediated by affects and affects are signs, agency is mediated by signs and, therefore, there is no distinction between symbolic and real agency. Human agency is described as the capability of human beings to make choices and impose those choices on the world. The difference between agency and free will is that agency is not concerned with how humans make decisions, while free will questions free act or its metaphysical determinism. Spinoza's position regarding free will is clear, and resonates in Peirce's theory of signs⁷:

In the mind there is no absolute or free will; but the mind is determined to wish this or that by a cause, which has also been determined by another cause, and this last by another cause, and so on to infinity.

Spinoza (1677: prop XLVIII)

Humans have no free will, and neither does God⁸ for the power of God is identical to its essence and will is only moved by necessity: there is no volition or condition to act.

... will no more appertains to God than does anything else in nature, but stands in the same relation to him as motion, rest, and the like, which we have shown to follow from the necessity of the divine nature,

⁶Translated by the author.

⁷In the distinction between object and interpretant and in their inferential relations, but also in his synechism, Peirce outlined a philosophy of the continuum, where a sign reminds to another sign, and so on to infinity. Similarly, Spinoza describes free will as a chain of causes which determine one another up to infinity

⁸God is intended here in philosophical terms, for there is absolutely no religious belief or position in this study (note by the author).

and to be conditioned by it to exist and act in a particular manner.

Spinoza (1677: prop XXXII corollary II)

Apparently, the necessity of nature is the supreme power which regulates every consequence, thus there is no will behind any action but a sequence of natural consequences that deploy from one another; will becomes a form of natural motion rather than a mental cognition, thus things happen by means of natural necessity and there is no divine master plan or human mission.

Jean-Paul Sartre, just after the end of the Second World War, publishes a text in which he analyses Descartes' doctrine of free will.

Descartes, following the Stoics, provides a capital distinction between liberty and potentiality [puissance]. To be free is not at all the possibility to do whatever one wants, but to will what one can.

Sartre (1946:95)

But what if one cannot do anything? Is this a form of freedom? The freedom to will nothing, the freedom not to move of an animal in a cage, the freedom of invalidity, the freedom of those who don't have a choice... Are they expressing their will by accepting their unfreedom or by reacting to it⁹? Whereas Hume¹⁰ (Hume, 1748) concluded that desire rather than reason governs human behaviour, in Descartes' vision (Descartes, 1674) the intellect allows men, with its clarity, to act in conformity with necessity¹¹. Error is a bad use of free will, or the use of will before the intellect. This position of Descartes is expanded by Spinoza (Spinoza, 1670), who negates the existence of free will and holds that everything must be and happen, by means of necessity, the way it does, and by Leibniz, who states that we live in the best possible

⁹In Descartes human freedom is limited by the possibility to will what God allows humans to will (Descartes, 1674), and when this God doesn't allow anything, freedom is nothing.

¹⁰Hume, 1748. An enquire concerning human understanding. Of liberty and necessity.

¹¹Interpreted as God's will (Sartre, 1946).

world and God is unlimited whereas his human creations are limited both in wisdom and power, and that limit predisposes them to wrong decisions, ineffective actions and false belief. Although Leibniz admits that material objects, causation, space and time are illusion, and substitutes the concept of causality, which is apparent, with that of a pre-established harmony among everything ordained by an Alter Entity, who doesn't create but allows things to be actual, still the philosopher of sufficient reason doesn't want to deny the existence of free will and, to reconcile it with the determinism of his theoretical system, proposes the view of compatibilism between determinism and necessity, and, to reassign God this same freeness, defines perfection, that informs the actual by supernatural choice, as determined by the greatest quantity of essence. Descartes, Spinoza and Leibniz identify, as Sartre suggests, the liberty of a being with the development of her essence.

Only centuries later, with the crisis of science and that of faith, the creative freeness that Descartes attributed to the divine could be given back to humans, gifting them with autonomy of action. Herbert Marcuse, in his '*A study on authority*' dated 1936, analyses the authority relationship. Authority contains a certain measure of freedom (voluntariness: affirmation of the bearer of authority) and submission to the authoritative will of the Other. In the authority relationship freedom and unfreedom, autonomy and heteronomy are united in a single person, the self who is the subject. The recognition of authority implies the surrender of autonomy. In this study Marcuse¹² observes the value of autonomy in the formation of bourgeois philosophical theory, from Luther to Kant. To preserve the autonomy of the person, the individual ceases to be considered a substance and becomes divisible. In this dualistic mode of division, the internal of the person, the person as a 'thing in

¹²According the author the Christian-bourgeoise doctrine of freedom contains an anti-authoritarian tendency because, when Luther and Calvin gave the Christian doctrine of freedom its decisive form, bourgeois society was generating the emergency to conquer its right to exist in a dialectic struggle with the existing authorities (Marcuse, 1936).

itself', as intelligible being in relation to Reason or God, becomes the realm of freedom, meanwhile the external world, the person as a member of the 'external world', becomes the realm of unfreedom. These two realms are not contiguous or superimposed, for freedom is - explains Marcuse - a condition for unfreedom. In fact, only because man is free, he can be unfree,

... for the full freedom of man in the 'external' world as well would indeed simultaneously denote his complete liberation from God, his enslavement to Devil.

Marcuse (1936:8)

The unfree will is based on a power that cannot be eradicated because human nature is attracted by disobedience, and this disobedience was chosen by committing the original sin. This duality in the representation of the self in the Protestant-bourgeois concept of freedom contains also another duality: the opposition between Reason and Faith, rational and irrational factors.

... the bourgeois concept of freedom left the way open for the recognition of certain metaphysical authorities and this recognition permits external unfreedom to be perpetuated within the human soul.

Marcuse (1936:8)

How can humans still be responsible for themselves if their will is determined? Calvinism reintroduces a concept of necessity that is not coercion but a 'spontaneous necessity', one which humans voluntarily accept.

... society's material process of production has in many instances been rationalized down to the last detail - but as a whole it remains 'irrational'.

Marcuse (1936:11)

According to Marcuse the bourgeois mentality, stigmatised by Calvinism, perpetuated the dichotomy Reason and Faith, and its cascading paradigm of antagonisms, structuring, on the one hand, a scientifically provable and mechanically engineered world (of production), yet attributing, on the other hand, the origin of success to the decision of a metaphysical authority, therefore situating it outside of human action. Kant places freedom in the realm of the transcendental, far from the empirical and intelligible world. Transcendental freedom follows a type of causality that stands in opposition to causality in nature: it results from free actions and not from external origins such as necessity and its causal factors. Freedom precedes any act for it is eternal and a priori; it is never the result of liberation. Bergson attacked Kant's idea of a realm of freedom relegated outside of time and space and suggests that time is homogeneous only when it is expressed in space, while most philosophers confused time with its spatial representation:

The problem of freedom . . . has its origin in the illusion through which we confuse succession and simultaneity, duration and extensity, quality and quantity.

Bergson (1913:240)

Psychic states unfold in time and constitute Duration, and it is in their relation to one another, in their multiplicity, that a certain unity is preserved, so that they seem to determine one another. But this is just the immediate data of consciousness, and if psychic phenomena are in themselves pure quality, or quantitative multiplicity, because, if isolated from one another, they differ in intensity, and intensity is quality, then, if their causes situated in space are quantity, quantity would, then, be the sign of quality, which is a nonsense. Psychic phenomena are in fact quantity and quality at the same time, and their extension in space is duration. Bergson's idea of simultaneity rejected the predominant mechanistic view of causality and predicated

a novel space for free will to happen in autonomous and unpredictable ways. In his interpretation, causality can only be reconstructed from the present looking backwards towards the past: if causality is at the base of things, then future is already contained in the present.

Deleuze in “Immanence: A life” defines a transcendental field as a sort of pre identity, a *pure stream of a-subjective consciousness, a qualitative duration of consciousness without a self*¹³. The plane of the transcendental is an absolute immanence complete in itself, neither in something nor belonging to something.

Consciousness becomes a fact only when a subject is produced at the same time as its object, both being outside the field and appearing as “transcendents”.

Deleuze (1995:26)

Therefore he distinguishes between virtuals and possible forms: ‘A life’ contains only virtuals, and virtual is something that possesses reality and is engaged in a process of actualisation *following the plane that gives it its particular reality*¹⁴. Possible forms actualise and transform the virtuals into something transcendent while virtuals define the immanence of the transcendental field. Rather than observing a form of temporal causality, Deleuze observes the behaviour of different strata including the real but constituting also something else, that real that never became actual. If there is anything unreal in temporal simultaneity it is outside the transcendental field, because, according to this description, all that which is transcendental is fundamentally real. The power of will, then, may be traceable in the forces that drive these ‘geological’ formations and transformations of transcendental substance. This process is the formation of reality and identity, subject and world; it implies the generation of affects and signs. When the transcendental becomes immanent, when

¹³Deleuze (1995:25).

¹⁴Deleuze (1995:31).

a particular reality is actualised, signs emerge out of this intersection. Signs always contain something that is transcendental and something that is virtual; they always imply essence and duration and the production of affect in relation to subjectivity. Deleuze showed us that, not only signs act as mediators of any form of interaction between self and reality: signs are the reality itself. Will can only access possible forms; the question whether humans are free or reality is predetermined - and auto determination is just an impression – remains open. Is it possible that the free will we experience is just a special case of necessity, like causality is a special case of quantum physics? Would therefore free will be potentiality?¹⁵

Luther's division between external and internal freedom can be reproduced in the dualism virtuality and potentiality, where potentiality is free will and virtuality is necessity. Potentiality regards the interaction between subjects and reality, meanwhile virtuality concerns the relation between humans and God or Reason. When free will differs from necessity, virtuality remains latent but still real. The mystic and occultist Aleister Crowley, at the beginning of the XX century, in his esoteric doctrines¹⁶ proposed the idea of a True Will that would reconcile free will and destiny. According to this doctrine any individual, in the course of her life, has to reconnect to an ideal self that is intended as the real identity that the person can assume; to take this form, the person has to discover and exercise the True Will, that will that is not imposed by culture or by any social contract, but comes from this inner, possibly transcendental, identity of the person (Crowley, 1926). The tension towards this will is a process of liberation from all that which is imposed and confuses the person and the formation of the real identity; when this liberation occurs, the True Will emerges as the only reasonable law, and the self assumes its

¹⁵Or are free will and necessity just two names for the same identical thing, like Hegel suggested? (Hegel, 1816).

¹⁶Commentaries of the 'Book of Law'. (Crowley, 1926).

necessary form, allowing destiny to present itself. Yet, if True Will is predestined, what liberty does it leave? Is freeness this adherence to an absolute form, or is it a rebellious destruction and deviance from it? In this theory, that may be seen as a form of idealism, the traditional hylomorphism¹⁷ is surpassed, there is no distinction between matter and form and free will and necessity become equivalent: in this sense, each substance is substance of expression constituted of the planes of signifier and signified; only in the path that subsumes will and necessity the self assumes its predestined form. And in the course of their incomplete life, in the constant flow of its duration, humans read and interpret the signs they encounter. In the union of virtuality and potentiality they can synchronize to destiny and let the self emerge in its necessary form. The continuous production and interpretation of signs determined by the encounter of self and reality and their mutual and reciprocal process of generation and transformation – which can also be called actualization of both reality and the subject – forms an immanent structure which guides humans in making decisions and imaging the future.

¹⁷Hylomorphism is the traditional cosmological doctrine, elaborated by Plato and Aristotle, affirming that every body is constituted of matter and form (Shields, 2010). Like matter and form are the dimensions of substance, free will and necessity, in this comparison, can be the dimensions of destiny.

3. Indecision

This chapter will focus on indecision and its relation to uncertainty and undecidability in the digital world of humans and the analogue world of machines. After reasoning about signs (and their behavior in relation to perception, agency, choice and free will), referring to various philosophical traditions, we will now look at the world of logic and informatics that use signs to interpret, process and recreate the real and the virtual.

During the last three centuries of the second millennium the field of logic went through a period of intense development which brought about, in the middle of the XX century, the invention of modern computers. The philosophical idea behind this development was the intuition that logic could be used to produce new knowledge; the technical challenge was the application of the rules and methods of arithmetic, algebra and mathematics to natural language in order to find operational answers to unanswered questions and, possibly, generate the exact and the beautiful through procedures whose abstraction would secure their perfection. In the seventeenth century there was an increasing trust in the idea that the universe could be reduced to a single symbolic system and that nothing was accidental but everything followed a plan and was determined and part of the same coherent discourse: Leibniz, for example, was convinced that all aspects of the world, natural and supernatu-

ral, were connected by relations of analogy¹ which could be discovered by rational means (Leibniz, 1714). The development of *calculus* laid the basis for the invention of an operational language, or logic algebra, that would specify rules for the manipulation of logical concepts in the manner that ordinary algebra specifies the rules for manipulating numbers; a sort of ideal framework which Leibniz called *calculus ratiocinator*. The invention of calculus favoured the development of experiments in the field of physics which brought about the theories of electrodynamics and quantum mechanics in the following centuries. Although every mathematician of note in the seventeenth century contributed to the development of 'infinitesimal methods' (Sondheimer & Rogerson, 1981), the discovery of calculus² is usually attributed to Newton and Leibniz in the period 1665-75. The paternity is shared because Newton's work antedated that of Leibniz, but Leibniz was the first to publish and his books had a greater and immediate influence on the mathematicians of the time. The development of calculus was favoured by the spirit associated with the Renaissance which engendered a great attention towards classical knowledge in art and science: editions of the work of Archimedes and other Greek mathematicians were published and spread in Europe during the sixteenth century. Such books had stimulated the development of theoretical mechanics which increased the use of machines in early forms of industry; these machines required the elaboration of computational methods that could give useful results even if the Archimedean standards of rigour were abandoned³. The calculus was an operational method which was opening the

¹In Wittgenstein's *Tractatus Logico-Philosophicus* (1922) a similar position is expressed in the words "Logic is not a body of doctrine, but a mirror-image of the world. Logic is transcendental." (Pag 78).

²Few important precursors are: Cavalieri, disciple of Galilei and professor at Bologna, who published in 1635 the *Geometria Indivisibilibus Continuatorum*; Fermat, who, beside solving simple differential functions around 1630, developed analytic geometry independently of Descartes and was, with Blaise Pascal, a founder of the mathematical theory of probability; Blaise Pascal (123-62), who contributed to many branches of mathematics and built the earliest calculating machine; the Dutchman Christiaan Huygens (1629-95), who created the wave theory of light.

³It was only after 1800 that Greek canons of rigour were reintroduced turning it from 'calculus' into 'analysis' (Sondheimer & Rogerson, 1981).

possibility to find certain coherence of results even when the theoretical law underlying the operation was not clear and the results would at times be wrong; it was an attempt to interpret the universe through experiments and quantitative inspection, and the knowledge proposed was used for the creation of new – sometimes mechanic – systems, and novel – sometimes esoteric - hypothesis.

In the XIX century the mathematician George Boole invented a system of symbolic logic which subsumed Aristotle's laws of logic and tried to practically implement Leibniz's belief⁴ in the use of mathematical symbolism for the generation of truthful sentences and correct answers (Davies, 2001). Boole proposed that logical relationships could be expressed as a kind of algebra and realised that what is significant in logical reasoning is the class or collection of objects or individuals described by the word in question. He also introduced the idea of secondary propositions, propositions that assert relations between other propositions. In the second part of the century Gottlob Frege sought a system of logic that included all of the deductive inferences of mathematical practice. Frege expanded Boole's idea of secondary proposition in the analysis of the structure of individual propositions and invented a formal syntax. Georg Cantor, contemporary of Frege, developed a theory of number in order to explore the field of infinite sets, accepting the paradox that, if for every number there exists a corresponding even number which is its double, then the number of all numbers is not greater than the number of even numbers, thus the whole is not greater than the part. Cantor's research expanded mathematical knowledge towards a field which humans hardly comprehend, that of infinity, and arrived to declare that infinite sets come in at least two sizes, that is, the reality of a set is not singular and its inherent immanence is not unique. Cantor introduced the term *transfinite numbers* to indicate numbers that are larger than all finite numbers, and

⁴Although there is no evidence that Boole was aware of Leibniz's work, it was nonetheless close to it (M. Davies, 2001).

his Continuum Hypothesis stated that there are no intermediate cardinal numbers between Aleph-null, the first transfinite cardinal number, and the cardinality of the continuum Aleph-one or, in other words, that there is no set of numbers between the integers and real numbers. Kurt Gödel, Austrian logician, mathematician and philosopher, in his paper named “On formally Undecidable propositions of Principia Mathematica and related Systems” first published in 1931 (In: Davis, 2004) affirmed that the Continuum Hypothesis could not be disproved from the standard Zermelo-Fraenkel set theory (ZF)⁵ (Jech, 2011) even if the axiom of choice is adopted: its proof of inconsistency was only showing that the axioms used cannot adequately describe the universe of sets. In this famous paper Gödel [who was influenced, in the development of his theories, by the meetings of the Vienna Circle, which he attended since 1926,], using Georg Cantor’s diagonal method, demonstrated that the property of a natural number being the code of a proposition provable in PM (Principia Mathematica) is itself expressible in PM, because the proposition asserted to be unprovable and the proposition making that assertion were one and the same. With this demonstration Gödel proposed the existence of undecidable propositions because of the paradox that provability in PM cannot be expressed in PM itself, or, as the Polish philosopher Alfred Tarski⁶ put it, always in the early 1930s, *one can never deduce the truth of a system from within the system itself* (Nørretranders, 1998:58). Gödel’s incompleteness theorem was revolutionary because it legitimated uncertainty and undecidability within what used to be considered exact science.

Whereas undecidability affirms with certainty the impossibility to define the truth of a statement within a certain condition, uncertainty does not depend on a system or on a single statement and refers to the relation between what is known and any

⁵ZFC became the standard form of axiomatic set theory and is today the most common foundation in mathematics (Russel & Norvig, 2003).

⁶Alfred Tarski (1901–1983) was a mathematician, logician and philosopher widely considered as second only to Gödel among the logicians of the twentieth century (Gómez-Torrente, 2012)

other information that is not present or available. The future, for example, is always intrinsically uncertain, because, no matter how well things are planned beforehand, there will always be something occurring that was outside of any imagination. When a set of knowledge has a relation of dependency with a set of non-knowledge, or unknown information, then the knowledge possessed is uncertain. Since there is always some information missing, due to the limits of humanity or the partiality of observation or due to entropy, then all knowledge is potentially uncertain. Indecision, on the other hand, does not regard the world of objects but that of humans. Indecision is the process of making a decision: every decision implies a moment of indecision, that moment when the different cases are analysed. Indecision and decision making can be extremely fast and dynamic but always imply a – sometimes infinitesimal – fragment of time. Perhaps within this instant of stretched time reality, or many realities, are ghostly appearances at the doors of perception, because in a fragment of time many different potential realities are coexisting in uncertain spaces. In any case, when this fragment of time increases in duration and a state becomes constant, indecision is a condition. In such a condition the individual cannot act because, although the answer or what to do is unknown, there is an emergent belief that there is one thing that is the right, intrinsically right thing to do, and there is the idea that, as long as there is a correct answer, there is also a wrong action or wrong outcome which may happen in the case of a mistake⁷. The fear of this possible mistake generates and increases the decision time, also called, in artificial intelligence, *mixing time*⁸ (Russel & Norvig, 2003), or indecision. In case it is believed that any outcome is good, then there is no indecision unless there is an underlying trust in an eventual best possible thing, that which is necessary or that which had to happen.

⁷See video interview in practical documentation (Dilemma01. xname, 2009).

⁸The mixing time is the time taken to reach a fixed point where the predicted distribution converges, after which it remains constant for all time (Russel & Norvig, 2003).

Since reality is determined and constructed within a point of view, intersection between the self and the world, the self is part of the system observed. There are apparently two problems: that of a language of description, or, as Wittgenstein used to define it, the difficulty of speaking about language from within language itself (Wittgenstein, 1921), and that of a point of view or measuring device. In any case, individuation, producing the self, does not liberate it from any implication with the world it is immersed in, because alterity, identity and reality belong to the same system. Therefore, assuming there is necessity, what happens in case of undecidability? Is it only from within the system that discerning is impossible? If necessity exists, there cannot be an undecidable proposition, because there is always something that was meant to be, the right thing to do. But what is the connection between the truth of a statement and the right choice, and why should a decision coincide with the right and the right with the truth? When a decision is a rational process, the correctness of its assumptions, its syntactical coherence and the truth of its statements should, apparently, assure that the decision is not erroneous.

But what is the right thing?

Is the right thing that which is necessary or that which is true? Is there an unconditional truth? Is destiny that which is necessary because it has to be or happen, or anything that happens becomes destiny through its formation and the passage from potentiality to actuality⁹? What margin of autonomy is left to humans? Is free will generating their actions and their outcomes, or there is no choice? This question lays at the origin of drama, the fight between self and necessity, will and destiny, which is at the basis of the plot of Greek tragedy¹⁰.

⁹And from future or present or past? (Question by the author).

¹⁰From the Attic tragedy of V century a.c., considered the highest expression of Greek poetry and art in the conjunction of the Apollinian and Dionysiac, emerges the awareness that every possible action is a play with the unknown, which, in its separation from humanity, can take the form of the divine (Nietzsche, 1872).

Assuming there is no necessity nor predetermination but only autonomy, how are humans with their free will dealing with undecidable questions, and aren't all human decisions an example of undecidability, since humans are always part of the reality they observe? Are humans damned to uncertainty and indecision by the paradoxes of logic and the intrinsic structure of the physical system they live in?

The fluctuatio animi that precedes resolute action is not a hesitation between several objects, or even between several paths, but the mobile superimposition of incompatible groups, groups that are alike but nonetheless disparate. Prior to action, the subject is firmly lodged between many worlds, between many orders. Action is the discovery of the meaning of this 'disparation', of that by which the particularities of each set are integrated in a richer, larger, set, one possessing a new dimension.

Simondon¹¹ (1995: 207-09)

When a decision is made all the other possibilities (events, objects, etc) that were present and potential before the decision was made are lost. This resolution can be seen as a positive affirmation of the act of will or as the death and negation of all the other possibilities that were not actualised. A recurring topological (from the Greek τόπος, "place", and λόγος, "study", Rocci, 1981 Rocci (h ed)) situation generating undecidability is one in which a subject has to decide where to be or whether to go to a certain location or not. Different studies on animal's behaviour show that also among groups of animals collective decisions are often connected to what direction the group should take, for example in case of migration (Conradt & Roper, 2005). Traveling and changing location can be perceived either as death or as a rebirth, but it is also a scenario in which these parallel possibilities become more evident and close to perception. If the subject projects the self to the new destination, there is a

¹¹Simondon here is quoted by Deleuze in a note of his review of Gilbert Simondon's *L'individu et sa genèse physico-biologique* published in France in 1966.

feeling of newness, novelty, restart, whereas if the subject remains anchored to the present location, yet has to move, the sensation emerging is that of loss, separation between individual and setting, person and self. Potentially, an individual in a fragile and unstable state finds balance in a form of repetition and predictability that does not allow for change, identifying thus the self with the setting, as a form of paradoxical metonymy - if we can consider the person as a part that is contained in the setting.

Yet what is the role of *intuition*, for both humans and animals, in relation to decision making? And is *spontaneity* connected to choice or is it automatic behaviour? What is the impulse that generates action?

Perhaps intuition can be compared to a very fast processing of disparate information, so fast that the act of deciding and analysing is not perceived. If a spontaneous decision is based on intuition, according to this acceptance it is fast, and, therefore, it isn't perceived as a decision but as a self evident choice enacted by impulsive and almost automatic behaviour. Henri Bergson, instead, defines intuition as a way to comprehend the absolute, it is therefore the method of reaching knowledge in metaphysics¹² (Bergson, 1923). In this case, determined choice, and action, would be guided by a comprehension of the absolute, whereas hesitation would be a sign of distancing from metaphysics, or, alternatively, as a dispersion in the incommensurable, interpreting Hamlet's behaviour (Shakespeare, 1623) as a paradigm of the position of man in the century of the scientific revolution, where the kaleidoscopic infinity of the Universe, perceived as that which is not the Self, throws the subject into an inner abyss of paralysis and isolation.

Ultimately, in fact, why does it take so long for Hamlet to act?

¹²Is intuition coming from outside the system or does it participate in the system? Or both? (Question by the author).

The hero is in a trap: humans have become excessive (they are not anymore the centre of the Universe), the order from cosmos to senseless infinite has lost its subject, it is time for comprehension, and the Self disappears in the symbolic: universal laws govern and describe relations and cosmic constitutions, language and social structures. The point of subjectivity is lost: relations between elements exist beyond the elements themselves.

Artificial Intelligence since its birth has been dealing with decision making. Classic artificial intelligence defines a rational decision as the right thing to do, but its interpretation of right and bad is not ethical but procedural: in informatics the right thing is that which allows an agent to achieve a goal or an expected outcome investing the smaller amount of resources.

Although computer science has developed a deep concern about relations, for example in the use of classes of objects or databases, Spinoza's conception of ethics as a relative and relational value was never directly translated into computation. In fact, there is no value or data type that is evaluated differently according to the other values that are in relation to them, unless we interpret semantic web ontologies, or Google ranking mechanics, as purely relational values, but this implies a different interpretation of what a relation is.

The recurring dualism of Western Philosophy, instead, made its way, through logic, into informatics, because all that which is digital can approximately be considered as includible in the infinite array of combinations of zero and one, or electronic impulses. The truth function of classical logic was translated in the Boolean logical operator that defines the property of being true or false, and its application in traditional AI, when dealing with uncertainty, is the implementation of the degree of belief: the agent's knowledge (of the world) can provide only an approximation that can be dealt with through the tools of probability theory. In this vision knowledge

is inherently subjective and imperfect, and uncertainty is accepted as a constant property.

Successive developments in Artificial Intelligence proposed, attempting to reproduce in machinic worlds patterns that were similar to those of organic life, another system that could deal with approximate knowledge, a discipline called fuzzy logic. In 1965 Lotfi A. Zadeh's proposed a theory of fuzzy sets (Zadeh, 1965): surpassing the binary ontology of traditional logic theory and extending its truth value to handle the concept of partial truth, or degree of truth, fuzzy logic was born. If probability provides a way of summarizing the uncertainty that comes from laziness (technical term to define the impossibility, in terms of resources, to list the complete set of antecedents or consequents needed to ensure and use an absolute rule) and ignorance (theoretical and/or practical: either there are no rules and no complete theory to describe a certain domain, or these rules haven't been tested enough), fuzzy logic, also called possibility theory (Zadeh, 1978), has proposed an ontology that allows *vagueness, ignorance and laziness*: an event can be sort of truth, and vagueness and uncertainty become orthogonal issues.

In fact, whereas in ordinary logic there are only truth-values, the fuzzy perspective introduces an infinite number of values between perfect truth and perfect falsity, which is called vagueness (Machina, 1976). Laziness, instead, indicates that too much work, or procedural power, is necessary to know all the sets of antecedents and consequent states necessary to ensure an exceptionless rule (Russel & Norvig, 1995). In the art project at the background of this study these attributes are interpreted as aesthetic and stylistic properties, rather than computational methods. In our performances, for example, the term fuzzy embodies a form of composition. Fuzzy logic is a method for reasoning with logical expressions describing membership in fuzzy sets. Fuzzy set theory is a means of specifying how well an object satisfies

a vague description. Fuzzy logic is therefore a truth-functional system; there is no absolute truth in fuzzy logic. Since there isn't an absolute reality either, and perception categorises objects in vague descriptions, this type of logic seems to be more natural and akin to human inner processes than geometrical truth. Fuzzy predicates can also be given a probabilistic interpretation in terms of random sets – that is, random variables whose possible values are sets of objects.

A Bayesian Network is a data structure used to represent dependencies among variables to give a concise specification of any full joint probability distribution. It is a directed graph in which each node is annotated with quantitative probability information (Russel & Norvig, 1995), which means that a number specifies the probability that a certain direction of the graph would be taken if the schematisation applied in the real world. These probabilistic graphical models represent a set of stochastic variables and their conditional dependencies and relations via directed acyclic graphs. Both the hybrid Bayesian network approach and the random sets approach appear to capture aspects of fuzziness without introducing degrees of truth, and this proves that the artificial world, compared to the organic, has abandoned the utopia of a truth that could not be disregarded - maybe because machines don't care about the truth as a moral or ethical value? More recently, researchers have come to understand the importance of complete knowledge bases – that is, knowledge bases that, like Bayesian networks, define a unique joint distribution over all possible worlds, worlds comparable to Deleuzian potential forms (Deleuze, 1995). Methods for doing this have been based on probabilistic versions of logic programming or semantic networks. Possibility theory was introduced to handle uncertainty in fuzzy systems and has much in common with probability (Zadeh, 1978).

Agents in uncertain environments must be able to keep track of the current state of the environment, just as logical agents must. A changing world is modelled using

a random variable for each aspect of the world at each point in time. This random variable is like analogue data from a sensor or an oracle as described by Alan Turing (see Chapter 5). A Markov assumption (Markov, 1954) affirms that the current state depends only on a finite history of previous states (Russel & Norvig, 1995). Prediction is the task of computing the posterior distribution over the future state, given all evidence to date. The time and space requirements for updating must be constant if an agent with limited memory is to keep track of the state distribution over a sequence of observations. The task of prediction can be seen simply as filtering without the addition of new evidence. This is the stationary distribution of the Markov process defined by the transitional model. In practical terms, this fails in predicting the actual state for a number of steps that is more than a small fraction of the mixing time. The more uncertainty there is in the transitional model, the shorter will be the mixing time and the more the future will be obscured. Smoothing is the process of computing the distribution over past states given evidence up to the present. This is similar to learning from experience. The key to the linear-time algorithm is to record the results of forward filtering over the whole sequence. The forward backward algorithm forms the backbone of the computational methods employed in many applications that deal with sequences of noisy observations. There is a recursive, almost fractal, relationship between most likely paths to each state X_{t+1} and most likely paths to each state X_t . Filtering with continuous or hybrid (discrete and continuous) networks generates state distributions whose representation grows without bound over time (like the universe). A dynamic Bayesian network is a Bayesian network that represents a temporal probability model. If an agent is something that acts, a rational agent is one that acts so as to achieve the best outcome or, when there is uncertainty, the best expected outcome. In fact the presence of uncertainty radically changes the way an agent makes decisions.

A logical agent typically has a goal and executes any plan that is guaranteed to achieve it. To make such choices, an agent must first have preferences between the different possible outcomes of the various plans. Utility theory is used to represent and reason with preferences. Preferences, as expressed by utilities, are combined with probabilities in the general theory of rational decisions called decision theory¹³ (Lehmann, 1950), that combines probabilistic methods with a utility function, that is representation of preferences in a given set or situation.

Uncertain relationships can often be characterised by so-called noisy logical relationships (Russel & Norvig, 1995). The standard example is the noisy-OR relation, which is an abstraction of the logical OR (Shall I do this or that?). According to the variable elimination algorithm, every variable that is not an ancestor of a query variable or evidence variable is irrelevant to the query. A variable elimination algorithm can therefore remove all these variables before evaluating the query, and this avoids paranoia and repeated computation. Alpha-beta pruning is a search algorithm that seeks to decrease nodes in a tree evaluating, when enough is known about a node, whether that node will never be reached by any of the agents in a game, because there are always better choices to be made. All the branches that cannot influence the final decision are then pruned away (Russel & Norvig, 2010). Machines seem to be better than humans in the practice of useless variables elimination, because, in fact, an element that can paralyse action and lead to paranoia is the confusion between relevant and irrelevant facts, and the interpretation of eventually disparate events as pertinent to the decision. ID3, which stands for Iterative Dichotomiser, is an algorithm used to classify data. ID3, given a set of examples described by several attributes or features, and a set of classes, tries to label each example with a class. The classes themselves are not observable because they are high-level informa-

¹³Decision Theory = Probability Theory + Utility Theory. (Russel & Norvig, 2003)

tion, whereas attributes are low level and can be observed. The correlation between attributes and classes is not known before and has to be learned, but since each attribute has little correlation with the classes, many of them have to be observed (Quinlan, 1986).

There is a certain entropy in Artificial Intelligence's methods to handle uncertainty: to optimize a system, all the information that is not necessary needs to be discharged, defining what knowledge is relevant in approaching what is not yet known. Another element in common with philosophy and physics is the attention to time: time always implies something that is not known, and the relation between past, present and future is a structure where events are displaced. Artificial Intelligence, in trying to develop techniques and machines that could become artificial life, has developed the need to control, reinvent and simulate life. The world that AI's machines and entities experience is the same world that humans inhabit. These machines are developing their own subjectivity and individuation processes and are able to be formed and to form a world of objects named reality just like humans do. Now that these machines – which have been inspired by biological models - rapidly improve and move towards a perfection and precision that participates of otherness because of its intrinsically non human state, time has come for humans to follow machine's example, and start learning from their experience in interacting with our world because, in fact, machines are now part of society. Since humans and machines share a form of uncertainty that is inherent to the physical properties of the real, whereas they react to them using different methods and capabilities – for example, as briefly exposed above, machines use their own graphical and logic forms of representation and concatenation – the fact that machines and humans can support each other in their mutual ongoing becoming is resulting everyday more evident.

Software, like any other instrument, came into existence with the aim of support-

ing humans and their capabilities. There is a long tradition of software projects developed in order to support humans in their orientation and decision making processes. Logic Theorist, for example is a computer program written in 1955 and 1956 by Allen Newell, Herbert Simon and J.C. Shaw (Russel & Norvig, 2003) and it is the first piece of software that was engineered to mimic the problem solving skills of a human being; it is therefore considered the first artificial intelligence program. Logic Theorist proved 38 of the first 52 theorems in Whitehead and Russel's 'Principia Mathematica', and found new and more elegant proofs for some. Its success was followed up by the General Problem Solver, or GPS. This program was designed to imitate human problem-solving protocols. GPS was the first program to embody the *thinking humanly approach*¹⁴. Thanks to the success of GPS and subsequent programs as models of cognition Newell and Simon embraced, renewing it, the traditional belief that logic could create new thought, and formulated the *physical symbol system hypothesis*, according to which a physical symbol system has the necessary and sufficient means for intelligent action (Newell & Simon, 1976) . Perhaps what they meant is that any system (human or machine) exhibiting intelligence must operate by manipulating data structures composed of symbols and that human thought is a sort of symbol manipulation system.

John McCarthy, the American computer scientist who coined the term "Artificial Intelligence" in 1955 and invented the Lisp programming language, published in 1958 a paper - probably the first ever written on logical AI - entitled "Programs with Common Sense", in which he described the Advice Taker, a hypothetical program that is considered as the first complete AI system (Russel & Norvig, 2003). Logic here is the method of representing information in computer memory and not just

¹⁴In Artificial Intelligence the 'thinking humanly approach' is a cognitive modelling approach that tries to determine how humans think in order to emulate the actual workings of human mind in the design of software (Russel & Norvig, 1995).

the subject matter of the program, and common sense reasoning ability is proposed as the key to AI. There is a difference between common sense and best action: common sense in fact does not necessarily indicate the best action at all but is a prudent judgement based upon the experience that someone already has. The best action is an abstract concept that is always theoretical because, if only one action is performed, it's impossible to define with certainty what would have been the outcome of any other action. The imaginary program The Advice Taker was designed so that it could accept new axioms in the normal course of operation, thereby allowing it to learn and achieve competence in new areas without being reprogrammed.

Today the path opened by The Advice Taker is continued by the discipline called Machine Learning, an old branch of Artificial Intelligence currently rather hype, concerned with the development and design of informatics systems and algorithms that allow computers to evolve behaviours based on empirical data received from databases or sensors (the machinic immediate data of consciousness). The advice taker embodied the general principles of knowledge representation and reasoning: that it is useful to have a formal, explicit representation of the world and the way the actions of an agent affect the world so as to be able to manipulate these representations with deductive processes, because a program has common sense if it automatically deduces for itself a sufficiently wide class of immediate consequences of anything it is told and what it already knows (McCarthy 1959:2). A formal representation of the world and a symbol system that can allow the manipulation of the world seem to be at the basis of both human and machine reasoning.

By reflecting on the programming of artificial agents and their activity in a real or artificial world (robotics or informatics), and comparing some of the solutions and theoretical frameworks of Artificial Intelligence to some of the references revised in

this study, we propose that simulation can be used to produce theoretical concepts and philosophy as it is already used to prove and formulate inductive and deductive theories and laws by simulating scientific experiments (refer to the Indecisive Robot described in the appendix [A.2. Robot, p. 95] as a potential example of simulation for theoretical formulation).

In an unstable (and Boolean) mind indecision, in terms of truth or false fluctuation, can become a constant state, so that every decision appears undecidable. In fact, when humans don't decide by instinct, moving to the plane of the transcendental, but try to perform a rational decision, since they are part of the system they are trying to analyse, the more accurate is the analysis of the situation and condition, the longer the time implied in analysing it and the bigger the uncertainty resulting.

But, before I proceed further, I would here remark that, by the will to affirm and decide, I mean the faculty, not the desire. I mean, I repeat, the faculty, whereby the mind affirms or denies what is true or false, not the desire, wherewith the mind wishes for or turns away from any given thing.

Spinoza (1677:PROP. 48)

Spinoza differentiates between desire and faculty to distinguish between true or false, a sort of capability of the human mind. Desire appears as a lower passion, probably more corporeal, whereas the faculty to decide, the human will, resides in the mind, and is operated by the intellect. Decision is driven by ethical principles of ontological truth, with the assumption that there is something that is right and something that is wrong.

Maybe indecision could be perceived as a state of grace, the pleasurable space of non-existence where the singularity of the real and the self are not yet happening. The grace of potentiality that belongs to the young and to the not in-formed, the

potentiality of infinite events and multiplicity of identity... But in fact it becomes fear, because it engenders the erasure of the self and the disappearance of subjectivity (pre-subjectivity of Deleuze's *A Life*) in a state of detachment from reality and time: time is not passing and the self becomes transcendental. If humans could avoid pain, enjoy the pure potentiality, the orgasmic multiplication of identity, the inherent libido of the fragmentation of the self, the chasm of the dispersion of reality... But *"In such a situation, pain remains the only measure promising a certainty of insight"* (Jünger¹⁵, 1934: 47).

Jünger's rejection of the liberal values of liberty and comfort is here translated in the measure of pain as pure identification and a - possibly masochistic - psychological and physical connection to the real. Not sacrifice as a virtue of man, or sign of a religious *pietas*, but as an extreme quantity that awakens subjectivity and reconnects individuality to the depth of substantial embodiment and, at the same time, to the higher spheres of transhumanisation.

Beyond rationality and language, beyond position and momentum, beyond signs and reality or the multiplication of possibilities and commodities, and the precariousness and insecurity of working conditions, pain provides a certainty in the communication between inside and outside, inner and outer, self and other, subject and world.

¹⁵Ernst Jünger, a writer whose celebration of certain elements of war made him popular among right-wing nationalists, but who never openly adhere to the German National Socialist movement, was also among the forerunners of magical realism. Throughout his life he had experimented with drugs, and some of his work is clearly influenced by his early experiments with mescaline. He met several times with LSD inventor Albert Hofmann and they took LSD together (Hofmann, 2013).

4. Language

One of the dreams of the Oracle Machine was a special semiotic software, one which could subsume two of the disciplines originated by logic, informatics and semiotics, creating an antidote to some of the conditions that rationality had, over time, fostered.

But what is semiotics, and what is its relation to language?

Every system of symbols, and every semi-symbolic system, presents a number of layers which structure its functioning. If symbolic systems are characterised by a form of conformity that creates correspondences between units of expression and units of meaning (content), and semi-symbolic systems present this structure of conformity on the level of categories rather than on that of units, semiotic systems are characterised by a non-conformity which appears enigmatic¹ if a system of analysis is not defined. The first two micro and macro worlds of signification offer appropriate material for a system of comparison and its testing. Natural languages are, in a sense, audiovisual systems, and the concept of symbolic and semi-symbolic systems is not restricted to spoken or written language, but goes, rather, in the direction of systems of notation and other logic apparatuses. Any existing set of symbols structured into a logic system presents a number of constant characteristics, so to say

¹The terminology here used refers to that outlined by Greimas and Courtes in “Semiotics and Language. An analytical dictionary.” (Greimas & Courtes, 1979) .

discrete signs, syntax, grammar, and the procedural production of meaning. The generative semiotics of the 'Paris School', which is based on that linguistic tradition originated by De Saussure and Hjelmslev - and whose most representative member is Algirdas Greimas (Greimas, 1970) - offers appropriate instruments to dissect a symbolic system. According to the structuralist and generative hypothesis (to be distinguished from Eco's interpretative method), semiotics is the study of systems and processes of signification. The fundamental postulate is that the signification of a text² can be articulated in different levels, from the most abstract to the concrete, along the 'generative trajectory'. The generative trajectory can be compared to a simple electronic system, or a mother board: passing through the circuit electricity engenders events and is transformed by those, so that the output, in whatever form, is different if detected at different sections of the circuit and the different cycles of this circulation may not produce identical effects. In a simple wave-oscillator, the sound will change when its output is moved, and electricity will be modulated and influenced by the presence of this output. The circuit, in itself, doesn't mean much: it is only through moving electrons within its trajectory, thus giving an access point (power) and an output (for example a speaker) that a composition of minimal elements (sememes: resistors, condensers, a piece of wire) can speak. A circuit can be thought of as a physical word: it is composed by minimal elements which don't mean anything per se', but can generate expression if combined following certain rules. Similarly to an inert circuit, a word that is written but not read by anyone perhaps doesn't generate any meaning.

Differently from the semiotics originated by Pierce³ and followed by Eco, which

²A text is here intended as a composition producing signification: in this sense, a film is a text, an image is text, and a piece of music is also text.

³We are referring here to Pierce's idea of a triadic structure of signs and the consequence of infinite semiosis: if interpretants are to count as further signs, and signs are interpretant of further signs, infinite chains of signs become conceptually necessary. But what happens to the first and last sign of the chain? (Reflections by the author, following Paolo Fabbri's "Visual

resemble a sort of endless chain that arbitrarily connects interpretant to sign (and so on), generative semiotics assumes that signifier and signified constantly influence and deform each other, structuring an interdependent relation which is similar, and maybe parallel, to that between observer and reality: both identity and signification emerge out of the encounter of meaning and sign, or world and point of access to it. Reality is not given in itself as a static and immutable array of objects, but it is a coagulation effect given by the encounter of a subjectivity that perceives the world as something other than the self, and in structuring this relation internal/external, the reality that is constructed as internal representation, and the identity that functions as an interface, or reflective liminality, are both marked by the pressure of these intertwined spheres of influence, which affect and tend to resemble one another. As well, the signified is not a “thing in itself” to which a signifier is pointing, because the perception of an object is the transduction from external to internal, from object to sign. And if perception is our point of access to the real, which is influenced and constructed by the action of this sort of biological measuring device, then we can see why, in a sense, signs are the reality itself.

Generative semiotics differs from linguistics, because its objects aren't the elements forming language but the actions that languages imply. For example, continuing the previous similitude, linguistics would focus on graphical systems of notations for the development of electronic circuits, while semiotics would look at their practical functioning and *mise en scène* (this similitude is obviously valid as an explanatory comparison which treats electronic components like a sort of alphabet, discovering a double articulation in its structure). This may imply the potential for the development of a *semio-electronic* discipline, which would focus on the process of signification generated and instantiated by an electronic device, not only in terms of

Semiotics” lectures at the University of Bologna, 1998).

human machine interaction, or conversation analysis, but as a discipline that would also focus on the modalities that are engendered when an electronic device is active and starts acting upon and communicating with the rest of the world (*altro da sé*)⁴. The instruments of semiotics are useful to study not only the field of action in its specific sense, rather that of the transformation and deviation of this action, following a conception, at least for what semiotics of Greimasian influence is concerned with, which interprets the act starting from its intrinsic strategic nature. According to the semiotic perspective, every subject taking part in an interaction is composed of different functions, which are progressively filled with different modal propositions and values, that are 'will', 'have to', 'can', 'know', 'believe', 'be', and 'make'; such modalities, inherited from linguistics, can constitute different combinations forming a subject which can be described as a multiplicity of agents accomplishing different plans of action. In this sense, subjectivity is not a compact and monolithic structure, because the stratification of the subject is constituted of different layers and levels interweaving a dynamic balance, thus the interrelation among subjectivities is interpreted by semiotics as a 'polemic' exchange of fluctuating modalities that are components of action. This polyphonic distribution of the subject may indicate two things: first of all, singularity does not apply to human identity; second, hesitation and indecision refer to complex states where the fluctuation of the different modalities produces an overflow: there is no more memory, input and output are stuck, too many procedures are running at the same time and action can't take place. Another characteristic of generative semiotics is the attention towards oppositions: the binary conception conceives the constitution of languages, up to the construction of sense and signification, through differences: sense would not be given in any positive and atomistic manner, but through disparity and relations among differences. Any

⁴In Italian in the text because in philosophical terms the Italian sentence, which mean "anything that is not yourself", is more clear and specific.

value, or component, that constructs anything significant, would be given by the difference in relation to another value.

Leibniz, in the extension of his doctoral thesis named '*Dissertatio de Arte Combinatoria*' published in 1666, suggests that all concepts are nothing but the combination of a relatively small number of other concepts, and, developing Descartes's idea of an alphabet of human thought, underlines a very important distinction that needs to be made when analysing combinatory systems, that is the distinction between differences that are significant and those which are irrelevant ("*capita variationum utilium aut inutilium reperire*"). In a system of signification differences can be more or less conducive of sense. The Dutch physicist and horologist Christiaan Huygens, also leading proponent of the light wave theory, in his '*Libellus de Ratiocinis in Ludo Aleae*' (On Reasoning in Games of Chances), dated 1657, proposed a systematic study of occurrences in cards and dice games which laid the basis for the development of probability theory. The comparison of symbols and the use of systems of symbols and their combinations for playing with and reasoning about reality is an interesting practice that different sciences, games and pseudo sciences have in common: from gambling to future prediction to statistics, official and esoteric knowledge meet in the use of systems of symbols to speak about the real. According to Jacques Lacan, language is that which distinguishes human and natural societies (Lacan, 1957). It is with the appearance of language that the dimension of the truth emerges, and the subject is fractured: in fact signifier and signified are not on the same plane, and the unconscious, which is structured, like a language, of discrete elements, is like the cryptogram of a lost language: it doesn't have to be decoded but deciphered because, like a rebus, it is language without code. The unconscious is, then, signification without signifier, pure signification. Language creates a trauma in the subject because the cogito is fractured in two (*cogitans* and

cogitatum): in the relation subject/signifier the root of being is transformed because identification includes the presence of an Alterity: the subject does not comprehend itself because this pure signification happens outside consciousness while regards, at the same time, the subject's own identification. What Lacan calls 'deputation of the transcendental subject' (Lacan, 1957:511) is the transformation of the subject into object (*cogitatum*), pure phenomenon.

If articulated language has so deeply transformed the existence of humans, animals probably represent an antecedent state in which this traumatic fracture hasn't happened as yet. Spinoza's position in regards to animals is multifaceted: on the one hand, in fact, animals participate, like humans, in the divine; on the other hand they can be used for the benefit of the human race. Since his "*naturalization of humanity is such that neither language nor volition nor reason distinguishes him finally from beasts*" (Sharp, 2011), probably it is the lack of a specific metaphysical frontier what makes Spinoza regularly insist on a presumed difference between humans and animals.

Still I do not deny that beasts feel: what I deny is, that we may not consult our own advantage and use them as we please, treating them in a way which best suits us; for their nature is not like ours....

Spinoza. Ethics, Pt. IV, Prop. XXXVII

Descartes, instead, bases his argument specifically on reason and volition, and, distinguishing in his ontology *divine substance*, *res cogitans* and *res extensa*, he separates humans from animals, situating them closer to in-animated objects. After defining as free only what is voluntary, he asserts:

Regarding animals without reason, it is obvious that they are not free, because they do not dispose of any faculty of auto-determination.

Descartes (1644:138)

But reason, as opposed to instinct, is a child of language; thus, if reason descends from language and freeness is an effect of reason, then freeness, or the faculty of autodetermination, depends on language.

And what else can be identified as an evident property of reason?

Forgetting the question about the existence of the soul (in humans, animals and, eventually, machines) - and the connected capability of will - and shifting paradigm⁵ to animal's forms of communication, a completely different perspective unfolds. Is it true, in fact, that animals don't use language? Animal language is animals' capability to communicate and express meaning; the process includes the encoding and decoding of messages and the transferring of information among different parts. Natural languages are characterised by a double register or articulation, which means that sentences and complex structures of signification can be broken down in meaningful elements (morphemes and words) composed in turn of smaller phonemic elements which signify only in combination with other phonemes. Animal language doesn't present this dual structure, and sound and behaviour are more directly connected to meaning; in comparison to natural languages, they avoid additional layers of compression and fragmentation, sometimes creating onomatopoeias, always structuring a strong direct relation between signifier and signified (Sebeok, 1968).

In general animals don't talk about abstract concepts, their utterances are responding to external stimuli and, although a strong form of memory is obviously present, they do refer to matters removed in space and time, but to a different degree if compared with humans. Yet the question of a precise definition of this degree, as

⁵The question here is whether there is a correlation between double articulation and uncertainty and doubt. To understand the connection between free will, thought and indecision and their relation to articulated language, we look at animals to investigate whereas these domains differ in a context where communication is not based on double articulation or, in case of exceptions, where double articulation is not the norm (analysis by the author).

to how remote their references can be, is undecidable, because it cannot be verified within human language. Current research in animal culture and biosemiotics are inspecting on the one hand forms of cultural learning through socially transmitted behaviours, on the other the production and interpretation of signs in biological realms (Sebeok, 2011). In the first case culture is interpreted as a process, in the second the hypothesis is that, if the process of semiosis, which is the formation of meaning through the interpretation of signs, is present within minimal biological elements, it is then an immanent and intrinsic property of matter. The consequences of this affirmation are opening new fields of exploration.

Human language is largely learned culturally, while animal communication systems are mostly known by instinct⁶. In this sense, they intertwine an intrinsic relation with nature. Humans may find animal language ambiguous when they try to interpret it as a natural language having a double register; in fact the attempt to decrypt a non codified message results in the failure of communication. Some cultures consider humans substantially different from animals because of the capability of thinking, and often the presence of thought is said to imply the presence of a so called immortal and eventually immaterial *soul*, also called *anima*. It is difficult to prove any of these assumptions because humans cannot demonstrate how their thought or sentimental power differs from that of other animals. The forms of logic that humans have created are not the only logic possible; communication always implies a level of symbolism, and technique and the use of tools to extend natural capabilities aren't exclusive to humans.

Confronting the functioning of animal communication to a programming language, and considering nature as equivalent to the machinic, animal communication may

⁶At the beginning of the XXI century progresses in zoosemiotics have demonstrated that animal communication is more subtle and complex than previously believed (Sebeok, 2011)Sebeok (2011).

be compared to a low level language like assembler, closer to the machine nature, whereas human language is high level and interpreted. In the context of programming languages, low level means that a language is more machine understandable than human readable. High-level programming languages are, on the other hand, easier for people to comprehend, but they require an interpreter to be translated to machine language. This renders the first type slower to execute than the second (in fact there is a double substance of signification), but they are easier to learn. Animal language is probably low level, which means that it is closer to nature and not subsequently codified, thus less symbolic and more ambiguous for humans. Yet both high and low level programming languages are compiled to a common base level, whereas animal and human languages execution is substantially different.

Because of the tendency to structure various layers of interpretation between them and the reality they observe, humans have implemented, over the centuries, the tendency to interpret nature as if its elements were part of a coherent, symbolic and linguistic discourse. The term apophenia, incorrectly attributed to Gestalt psychologist Klaus Conrad (Conrad, 1958), indicates the human tendency to seek patterns in nature, often interpreting as meaningful what is meaningless noise (if noise is ever meaningless). This attitude to engender a process of de-codification of data assigning to elements of reality a value which can acquire a specific meaning within a relation among parts, building a model of the world based on relations, can be reconnected to the structure of human language, which makes sense only as a combinatorial system. In any sense language influences our perception and interpretation of the world. Reasoning about the use of language in the description of reality and science, Heisenberg, quoting Weizsäcker, affirms that there may be different levels of language:

One level refers to the object – for instance, to the atoms or the elec-

trans. A second level refers to statements about objects. A third level may refer to statements about statements about objects, etc.

Heisenberg (1958:182)

This would allow the structuring of different logical patterns at different levels, and, as Weizsäcker suggests, classical logic may be a priori to quantum logic in the same way as classical physics is to quantum theory. Quantum logic would then constitute the general pattern, while classical logic would be contained into it as a special case. Extending Heisenberg's idea of layers and levels, what would be the position of animal logic within this structure? And where can natural logic, which the theories of biosemiotics are suggesting, be situated in this description?

If animal logic still implies the presence of an observer, natural logic is more complex to be defined in these terms. Can Descartes' vision of the world as a machine dreamt by a God function as a metaphor of this reality in constant formation producing meaning at any entropic level including its minimal terms? Or is human consciousness validating this intrinsic a priori enunciative process that nature engenders?

Is reality in any case searching for a reassuring confirmation in the form of the immaterial thought, or is matter real only when there is a relation of dependency on the immaterial? How problematic is a definition of thought?

Thought, according to the British quantum physicist David Bohm, is a shared system that has overdeveloped and is constantly producing problems while at the same time tries to solve them, because, in fact, thought is part of the system and is not aware of being the cause of its own sentence (Bohm, 1992). Wittgenstein⁷, in his *Tractatus Logico-Philosophicus*, makes an attempt to draw the limits to the expression of thought, because of the impossibility to compose any statement about the world as

⁷The author later repudiated this position, for example in the posthumous "On certainty" (Wittgenstein, 1969).

a whole. The boundaries of language indicate the boundaries of thought: language leaves always out something that is inexpressible, and this is precisely the connection between symbol and fact, which is the essence of logic and philosophy. The Oracle Machine explores this differential function, oscillating between what can be thought and the inexpressible.

5. Oracles

The desire to create a mechanism able to solve everyday dilemmas was conceived in 2004, under the name *La macchina delle risposte*, Italian for *The machine that gives answers*, but its literal translation is *The answering machine*. The answering machine is a special tape recorder commonly used in the recent past for answering telephone calls and recording callers' messages. Unlike voicemail, which can be a centralised or networked system that performs a similar function, an answering machine must be installed in the customer's premises alongside – or incorporated within – the customer's telephone. It was originally invented in 1898 by Valdemar Poulsen and was the first practical device used for recording telephone conversations. Poulsen's device, known as telegraphone, laid the foundation for the invention of the answering machines used today, which was created in 1935 by Willy Müller (Mercer, 2006). Landline telephones are nowadays collected as a curiosity and an obsolete technology. They represent the first devices that allowed technologically aided remote presence; their peculiar function creates a specific relation between two places and two persons.

Old analogue landlines were very different from the diffused mobile communication we use nowadays. First of all, there was a tactile analogue relation between the two parts involved in communication because the conjunction of the parts was taking place through a physical medium. Second, a number refers to a place rather than

to a person, and it's impossible to predict with certainty who will answer. Third, in the past, when a phone was ringing, who was calling or what number the call was coming from was unknown. Compared to current technology, the call was more mysterious and less personal at the same time. The entire telephone conversation used to take place in one room, and there was often a specific chair or a special position that a person would assume during the conversation. The telephone stimulated a strong identification with a particular place, which could be recalled to memory. Entering in conversation with a determinate place was a way to step in a remote room, listening to the sound of its environment – the traffic, the bell of a church, a child crying, etcetera – and this process was able to articulate a technological extension of the person's presence. One of the results of mobile technology is the creation of portable tools to mediate the access to reality at any given point, giving their users the impression to be always at the same point. This effect is enforced by the capillary attempt of multinationals to reconstruct all over the world identical facilities, camouflaging very diverse places into the same looking distributed supermarket. Analogue landlines were establishing, in contrast, solemn locations for sympathetic rites: there was a form of repetition that was creating a mediated but tactile connection between two remote parts, and this ritual was taking place in between spontaneity and formal act¹. Each phone call used to start with a sequence of actions that can be described as an algorithmic loop:

¹There is always something spontaneous in a ritual (assertion by the author).

```
if (no one is on the phone) && (there is enough privacy):  
  enter the room where the telephone is situated  
  sit in front of the phone  
  grab the phone handle  
  listen to the rhythmic sound of the free signal  
  focus on the person you are trying to contact  
  while you read, either from a book or from your own memory, the number of the  
  person you are looking for, focus on the image of the person  
  ask yourself: will she be there? Will he be happy to talk to me?  
  Look at yourself in a mirror, glass, or any other reflecting surface while tele-  
  transporting yourself to destination  
  for (i=0, I < n.length; i++)  
    insert your finger in the hole corresponding to the first number  
    turn to dial, listen to the sound that the machine produces  
    listen to the tone: if it sounds free:  
      if person_answering ≠ person_searched:  
        ask for person_searched - start conversation;  
      else:  
        goto for;
```

There was a moment of silence, a reflection before attempting the call, and a number of preconditions were required (the number is available, no one else needs the phone, etc). Contemporary telephony is faster and can happen in any place, so the fetishism revolves around the object and not the space. A call can leave a trace even if it is not answered (caller ID), and often phones discretely vibrate and do not ring. Once upon a time the sound of the call was the start of a ritual: when the sound would stop, there was a physical (not only communicative) contact between two remote parts. This physicality, this tactile relation between two people

talking to each other through a landline is not present in contemporary mobile telephony. The connection recalls to mind the two laws of sympathetic magic which were propounded most clearly by Sir James Frazer in *“The Golden Bough”* (1890) and Marcel Mauss in *“A General Theory of Magic”* (1903). They were proposed to describe widespread magical practices and rituals in traditional cultures. According to the first, the law of contagion, things that once were in contact with each other may influence each other through transfer of some of their properties via an essence. The second law, similarity, holds that things that resemble one another share fundamental properties. The remote contact that landlines offered used to create a real time space for contagion and information interchange, and this extended auricular touch used to stimulate another type of intimacy and interaction. Avital Ronell, referring to Lacan’s four fundamental concepts², writes:

Like transference, the telephone is given to us as effigy and as relation to absence. At bottom, it asserts an originary nonpresence and alterity. The self, when called into existence, comes to recognize an original self-effacement. Responding to the opening of the first exteriority, the self is prevented from being itself since the relation to the other is older than selfhood.

Avital Ronell (1989: 84)

This relation to Alterity, which is older because an individual exists before the process of identification takes place, embodies the opening of a dialogue with something that can be either machinic or supernatural, and, while this Other interweaves an a priori hierarchical relation to the Self and its absence, the absence gives space to the unconscious to emerge, respond or ask. The telephone, medium for transfer

²The unconscious and repetition, Of the gaze as Object Petit a, The Transference and the drive, The field of the Other and back to the transference (Ronell, 1989).

and expression, through the transformation³ of individual speech into electric signal, becomes symbol of our schizophrenic relation to technology in the global world and the dislocation and loss of contact with instinct and personal identity that this synthetic ubiquity engenders.

The Oracle is an archetypal figure of human culture, and, like Husserl's noemata (Husserl, 1913), is a potentially existing or non-existing entity present to our mind. An oracle (from latin *oraculum*) represents the response pronounced from a divinity in reply to a human consultation. From the response, the word came to indicate the place where the response was originally given. It constitutes a psychologically and socially elevated form of divination. The purpose to create an Oracle as an art project may seem bizarre on a first place, because the idea at the base is that humans cannot make such machine, and the action may be outrageous and participate in that very dangerous ὑβρις (arrogance) that was considered, among the ancient Greeks, the sin of haughtiness, the disrespectful attempt of a human to stand in front of the divine.

If we try to decompose in minimal components what an Oracle is, in very general terms, we will, first of all, analyse the root of the word, which means in fact 'word': the relation to text is central; humans use oracles and humans have developed a special method for communicating, they use in fact a symbolic language composed of sounds, represented by letters, and the combination of groups of sounds to create words, and the combination of words to create sentences, paragraphs, poems, books and so on. This register, which may be remembered in one of those patterns that Mandelbrot described (Mandelbrot, 1975), is rooted in the essence of humanity. We have a number of subsequent encryption and decryption, and the natural approach to communication of any new member of society goes through a series of complications

³From traditional shamanism to contemporary magic practices, metamorphosis has a special position in the construction of the ritual act (Pinchbeck, 2003).

before being called language, up to the capability of writing thoughts. Those logic and symbolic systems are so connected to our education to be commonly considered natural capabilities, although they are not dictated by instinct but by culture. If the use of oracles is not absolutely dependent on the use of language, yet, as the etymology of the word reminds us, it is a concept strictly connected to and originated by language.

Humans are the only beings⁴ in the world who use languages with a double articulation⁵ as well as oracles to call supernatural entities asking them support in their decision-making. Since animals can show uncertain behaviour and doubt, and they make collective decisions (Conradt & Roper, 2005), it cannot be affirmed that they have no will. Thus, since the use of oracles is not a direct consequence of the presence or absence of will, because animals don't seem to be consulting oracles, then, either there is a connection between the use of oracles and that of articulated language, or the other entities that are apparently not using oracles are already in a more direct connection with the divine (nature).

What emerges from the attitude to ask for answers outside the self, and also outside the ontological status of humanity - because an oracle is an appeal or a question asked to an element or entity of another kind - is a diffused sense of insecurity, confusion of perceptions and the attitude to construct a meta-level of comprehension where elements become signifying because their intrinsic and extrinsic relations are

⁴Although animals can display uncertain behaviour, apparently they don't use oracles, unless they do it through such a natural, intrinsic and spontaneous process, that the distinction between them and this process is invisible, and their actions are automatically flowing in parallel with nature, like hands are moving inside a clock. In ancient times the flight of birds was observed as a sign to the divine, maybe because before a big storm, it is often possible to see birds flying around nervously, and animals are said to perceive in advance earthquakes and natural disasters: they appear somehow closer to nature, and more aware, although their system of communication is simpler (reflections by the author).

⁵Beside recent studies (The Times, 2006) affirming that the spot-nosed monkeys (*Cercopithecus nictitans*), as well as higher primates (Ouattara et al, 2009), can use syntax to build, through discrete units of communication, sentences having specific meaning.

considered relevant - as if composing a message inside a system which appears to have a certain structure. A diffuse level of uncertainty is present whereas articulated language is at use: the logic of language and science, which struggled towards building structures of certainty, rationality and demonstrable paradigms and laws, leads to an abyss of concomitant possibilities which renders logicians and their instruments tremendously fragile and metamorphic, because everything depends on the perspective of the observer. The more precision is applied in observation, the more reality shows its complexity and becomes slightly out of measurement; at the same time, everything is to be interpreted and the process of interpretation itself is constantly mastering the creation of an alternative reality which states its cohesion and isolation.

Doubt, confusion and uncertainty appear to be a characteristic of humans, although sometimes they can apply to animals and machines. In the case of humans its presence contributes to the development of an identity which has the tendency to appeal, search for and trust entities imagined to be above the level of humanity, constructing this way an imaginary structure of beings, which is hierarchic: humans are central, animals are at the bottom and Gods are on top. This is a planar schema of a generic structure of belief and it exemplifies the possibility to discover complex narratives inside a two dimensional image. Another spatial and symbolic element inscribed in such general grid is the structure, described by Zoroastrianism, where good is situated on top in opposition to bad, that is situated at the bottom, like heaven and hell (although this includes exceptions and differentiations at a iconographic level). Another opposition is right and left. Maybe the use of language creates this, eventually illusory, idea of an order, or grid, which is oriented and not reticular, hierarchic but still relational: there are more animals than humans, more humans than demons, more demons than Gods. This order is somehow governed and regulated,

and, in the direction of the top, wisdom and justice are located. This structure is dynamic: a man can become demon (see mythological heroes in Classic culture), or a person can become a Saint (see Catholic tradition), or a famous person can become a star (see contemporary pop culture). Moreover, men can behave as beasts (see moral culture), and certain demons are half human and half animal (Centaurus, mermaids, monsters). The most interesting agents of this pyramidal structure are those transforming metamorphic creatures sharing properties and predicates of different substances and domains, entities that are half human and half god (angels, demons, natural spirits), and all those acting as messengers, or mediators of communication between different domains, i.e. priests, mediums, oracles and shamans. Churches, temples, sacred and damned place, particular natural locations but also theaters and any context adhibited to a performative or ritual act can be defined as a non-informed meta-spaces which allow the circulation of such properties and identities, favoring the occurrence of metamorphic events that can allow the unpredictable to happen, generating forms of mimicry and communication that would be elsewhere impossible. A performance transverses this dynamic structure producing signification in the form of abstract representation.

Did the structure of language itself inspire our definitions and the subdivision of objects of the world in classes and categories, or is it the chaotic and at the same time coherent form of the real that left its mark on language and our perception of it? These are objects belonging to different classes, where nature transcends into the supernatural and the supernatural invests and emanates into nature.

The idea of a software device able to make and provide decisions for others suggests a very complex machine that should be so supremely forged as to be able to perform and think and evaluate better than humans. The question if a human made rational machine can reach the required perfection is nonetheless controversial, and

the possibility of its development is at stake. In fact, if uncertainty is one of the typical characteristics of humans, it is highly possible that, because of the transitive property or because of contagion, this uncertainty would be transmitted to the hand made machine. Moreover, the question whether a machine made of inert, non organic matter can produce divination is problematic because divination requires intuition, belief and interpretation. If divination is defined as being inspired by a spirit, then the formulation may be the following: *Can a spirit inspire a machine?*

Or, as a variant of Deus ex Machina, can a Deus in Machina take place?

Can a machine be possessed⁶? How do we imagine the trance state of a machine?

The word machine derives from Latin 'machina', whose original meaning is a device having moving parts that perform or assist in performing any type of work. The advent of electronics has enlarged the traditional acceptance to include devices without moving parts. Descartes compared the human body to a machine in virtue of its material properties, whereas the mind was supposed to have immaterial properties (Descartes, 1664). This comparison left traces for a legitimate suspect: is there a ghost in the machine? Is this materiality of the body-machine implying the presence of its negation, the spiritual immaterial?⁷ Or, else, is there an independent mind in the machine? And is this mind something that has spiritual properties? If belief and interpretation can be simulated, and intuition can be described as fast processing of data, the social interaction that these events require for the oracle to happen cannot be injected into a single inert engine.

In *Machinic Heterogenesis* Félix Guattari (1992) proposes that machines are preliminary to technique and cannot be interpreted as its mere expression. Guattari, after

⁶Possession here is intended as 'being inspired by a spirit or an entity other than human' (specification by the author).

⁷A machine is a system that uses, creates and transforms energy, thus it implies movement and flow (reflection by the author).

distinguishing five main conceptions of machine⁸, proposes to go beyond the idea of technical machine trying to put the accent on its singular power of enunciation rather than on its vitalistic autonomy. Machines are composed of heterogeneous levels that are material, cognitive, affective and social. They present different components: the material and energetic; the semiotic, diagrammatic and algorithmic; the components related to human body's organs, influxes and wetware; the collective and individual representations; the desiring machines which produce subjectivity; the abstract machines with their transversal mechanism. Abstract machines are transversal and dynamic and can put all the other levels in relation, assigning them an ontological affirmation: this is the machinic concatenation that invests potential and virtual fields.

In complexity and computability theory, an oracle machine is an abstract machine used to study decision problems⁹. A Turing machine is a theoretical device that manipulates symbols on a strip of tape according to a table of rules. Despite its simplicity, a Turing machine can be adapted to simulate the logic of any computer algorithm, and is particularly useful in establishing the logical condition for the functions of a CPU inside a computer.

In mathematics most problems are problems of search, search of a scientific solution,

⁸Paraphrasing Guattari's words, the mechanistic conception sees a machine as a construction *partes extra partes*; the vitalistic interprets machines as living entities; cybernetics and Wiener's followers think that living beings are a special type of machine that can perform retroaction and learn from experience; the systemic conception of Maturana and Varela is centred on the concept of autopoiesis: only living machines can reproduce themselves; Heidegger and his followers give a dangerous ontological base to the conception of *techne*: truth can be reached through the exact. A similar assumption is somehow threatening new media art: if the substance of this type of art is technology, and technology can be evaluated on the basis of its technical properties (it works!), then new media art may be considered good when the technology composing it is exact... Yet art is not supposed to be either exact or good.

⁹An abstract machine can be visualised as a Turing machine with a black box, called an oracle, which is able to solve certain decision problems in a single operation. An oracle machine or o-machine is a Turing a-machine that pauses its computation at state "o" while, to complete its calculation, awaits the decision of the oracle — an unspecified external entity. This concept is now actively used by mathematicians (Davies, 2001) .

and the definition of the domain of this search in truth verification. A statement is true until a case that contradicts it is found. Gödel had found that in every theory T between the statement P and its negation $\text{non-}P$, there is always a gap of uncertainty. In the statement “Every number $< N$ is the sum of two primes” N defines the domain where the statement applies. If $N_1 > N_2$ and in the domain of N_2 the statement is true, then it is also true for the domain of N_1 . But what happens if $N=\infty$, so to say, if we are reasoning about infinity?

The supertask paradox (Stanford, 2012) questions whether machines can calculate infinity in a given time (not in the continuous); if there is a system where each machine can copy itself in two, so as to generate two machines that are smaller, and thus faster, at each cycle the network of machines would become so much faster as to be able to calculate infinity. But Quantum Mechanics disproves the supertask soft experiment; in fact, if these machines become smaller and smaller, then they may get to something that may be indivisible, such as a particle. But a machine is a composed element, and if an electronic machine is not bound to having moving parts, still a machine cannot be a particle, and if it was a particle then it would be hard to know where it is, because of Heisenberg’s Uncertainty principle, and if you know where it is maybe you don’t know when it was there. In any case, a too small machine is no longer a machine.

Turing, trying to respond to Gödel, proposed a system of logic based on ordinals in which the gap between P and $\text{not-}P$, where P is a proposition, is reduced by a sequence of truth values that are P_1, P_2, P_3 etc. In this infinite number of stages there is no oscillation, but there is a limit to it, that is P_ω (the infinite): this is what Turing defines, for the first time, an oracle (Turing, 1939). In his later work, the oracle machine becomes a Turing machine connected to an oracle. A Turing machine is a hypothetical device that manipulates symbols on a strip of tape following a table

of rules. Since they are mere mathematical abstractions, they benefit from the fact they have no limitations on the amount of tape they can use (Davies, 2000). This automatic machine helps computer scientists understand the limits of computation. The infinite tape is marked into squares, and on each square there can be a symbol. Passing through the machine, only one symbol is scanned at a time. The scanned symbol can be altered, and it can influence the behaviour of the machine, but the symbols printed elsewhere in the tape, but not being scanned, are not affecting it (Turing, 1948). Turing was conceptually differentiating the concept of memory in a electronic device in action and history: the scanned symbol would be processed in a sort of Random Access Memory, where behaviour emerges, whereas the rest of the tape is storage, information that can be accessed, but is not present at the moment of computation. The oracle is an entity capable of solving decision problems, even if they are not computable. It is not supposed to be a computer program, and its alphabet can be different from that of the work tape. It has two special states: the ASK state and the RESPONSE state. When the oracle is consulted, the content of the query tape is replaced with by that of the response tape (Papadimitriou, 2003). A machine with an oracle is a sort of hypercomputer, a machine that goes beyond what a machine can do, because it can resolve the halting problem.

An oracle is a machine that can calculate infinity, or infinite divisibility. That's why in Turing's later work the oracle becomes a different substance, the analogue tape (Davies, 2001) . In the physical world the oracle could be a sensor, something that is not algorithmic but gives input to an algorithm: an oracle is that which you cannot formalize within a given system, therefore tending to infinity.

In the real world the Oracle Machine¹⁰ we have been searching for is not a technical

¹⁰The oracle, being another sort of entity, which has to be substantially different, is represented as an analog external black box, and the opposition digital versus analog can be seen in parallel to that of human versus machinic or supernatural, and the oracle becomes an operation between different substances (reflection by the author).

evolution, or simple software. The Oracle Machine is a ritual and social experiment, and the machine itself is built of a combination of parts of different form, type and substance. The Oracle Machine becomes a sort of Frankenstein: a monster composed of different elements and actors that are not simply mechanical or electronic, an organic and inorganic compound of elements which work together in order to create a certain effect, and the question whether such effect is illusory, real or incidental is of no importance. Containing software combined with human agents, the Oracle machine is a collective experience which creates a synergy between symbolic objects, a time-space situation, a software and a collection of digital devices working together in order to obtain and construct a certain effect, created by the flow of collective energy in a ritual, theatrical and performative event. The machine's components trigger a circuit of energy which stimulates mixed substances and forces, mere objects, symbols, software, and people. There is no oracle without human presence, and there is no oracle without interpretation and language. The Oracle Machine becomes a collective happening, in the form of an audiovisual stream.

The Oracle Machine, 2009. Performance, series 2/2

Inspired by this speculative model I held two performances in Brazil in July 2009, one in Sao Paulo in the context of the Pure Data Convention and the other in Salvador at *Interatividade em Sistemas Computacionais Livres*¹¹. The performances were simulating a moment of uncertainty, a subjective instant of undecidability, when a person, the performer, immersed in a deep psychological isolation, yet in front of the public, shows a moment of intense fragility, a fracture in the exercise of free will and autonomy of action, finally instantiating a ritual of cathartic purification. The performance staged a reaction: what to do to overcome the paralysis? *Maybe talk to*

¹¹Visit festival url: <http://iscl2009.wordpress.com/2009/05/04/gt1/>

*someone, elaborate the problem, describe it, or even search for a solution. Better use a telephone though, remote communication is less invasive, especially in a moment of intense disarray. And who is it convenient to ask what to do? There's nothing better than an oracle to tell you what to do, so yeah, let's ring a supernatural entity and hear what they say*¹².

The main characters of these performances were software, hardware or human agents. The symbolic objects, like fragments of an unconscious discourse, disseminated a peculiar, fuzzy form of improvised narrative. The interaction was more allusive than technical: an old telephone was the obsolete device used to contact the oracle, while a sand-glass represented time and an old silver key the possibility to open a passage to outer dimensions.

The reality of the event didn't generate the exact but, rather, a form of subjective perception. The software, implementing a simple combinatory algorithm upon a small database of deconstructed sentences and words, human speech divided in minimal elements, recomposed an eventually linguistic discourse by rendering the second articulation a software operation (a detailed description of the performances in appendix). This software intervention, introducing a form of Alterity - that is the context which triggered the algorithm, transformed the result in the language of otherness.

Alterity is the action of a different form or substance over the discourse, that act, like Turing's analogue tape, as a material link to infinity. It is this sense of infinity, this quantum unknown or aleatoric action, that allows a form of transcension, transcending the real or technology as it were.

If we cannot separate our brain from language, and we cannot separate language from symbolic systems, then symbols appear to be intrinsically connected to our

¹²In italics are transcribed the author's thoughts

capability of thinking. Whereas the question whether computers can think is still under discussion - although surpassed by the reality of simulation, neural networks and gigantic databases - the idea of automated systems able to produce and generate thought is an ancestral dream of humanity. Gottfried Wilhelm von Leibniz in his monograph 'Dissertatio de Arte Combintoria' (Leibniz, 1666) described and analysed in detail the idea of a special alphabet whose elements represented not sounds, but concepts. His aim was to create a system in which symbols could magically produce correct answers to problems almost unaided. The conception of such a machine compares the functioning of a denotation structure - such as that of traditional Western music - with the production of concepts and spoken language through the use of logic, and of logic through the use of language. Music exists before any system to write and remember it, but the denotation method inspires the creation of other music. When we think of natural languages, we can say that logic is both a set of rules which allow language to make sense (grammar, syntax, logic), and that the elaboration of language through these rules produces other and more knowledge.

Leibniz's machine (Liebniz, 1666) indirectly compares music to thought, and, by seeking to define what level of fragmentation is necessary in identifying minimal grammatical elements, and what process is behind the elaboration of concepts, he asserted two main hypothesis: the first is that beauty (harmony) is composed, in a formal and ethical sense, of a certain structure drawn by a certain process (the right answer is ethically beautiful). The second is that a machine has more abilities than humans; in fact, not only should the machine compose thought, it is supposed to give the correct answer even to unsolvable problems. The language of a machine which can tell the truth participates of that other-languagedness which Bakhtin considers at the base of polyglossia, explained as the use and reuse of someone else's words to make and speak any new sentence.

For the creating literary consciousness, existing in a field illuminated by another's language, it is not the phonetic system of its own language that stands out, nor it is the distinctive features of its own morphology nor its own abstract lexicon - what stands out is precisely that which makes language concrete and which makes its world view ultimately untranslatable, that is, precisely, the style of the language as a totality ...

Bakhtin (1975)

Identity and language do not belong merely to the individual, rather they are shared by all and contain a certain level of otherness, affirms Bakhtin introducing his architectonic model of the human psyche and the concept of heteroglossia. The oracle machine performance follows this dream of an absolute truth - that which can be reached by appealing to the Other (as in non-Self), and this zone of Alterity becomes the source of those words and concepts re-composed (or de-fragmented) into a supernatural speech (whose answer is inscrutable), and the answer to the schizophrenia generated by capitalism is screamed into noise.

6. Shamanism

Leibniz's monadic structure has something in common with quantum physics: if every subject is constructing a reality by accessing it, and her point of view instantiates a world that is parallel to all the other potentials and to the world of anyone else, the system composed of a subject with relative world can be compared to a monad. In both theorems, in fact, there is an accent on the singularity of the point of access to reality that is mirrored from a slightly different angle in each entity. Every monad represents a potential world that is as real as parallel in its isolation or accident. An important intuition and remark is that monads are not all the same: some have awareness and others not. Leibniz doesn't distinguish humans on the basis of their gender, race, social status or religion, nor by their culture: Leibniz understands that humans¹ differ on the basis of their awareness, or apperception, that is the perception of perception. In section 4 of the Principles of Nature and of Grace he affirms that apperception is "*consciousness, or the reflective knowledge of this internal state*" (Leibniz, 1714). He adds that this is "*something not given to all souls, not at all times to a given soul*". With this intuition Leibniz indirectly suggests that consciousness and identity are oscillating, change over time, and the system and context in which they manifest themselves is not static. This consideration implies another, non implicit, intuition: there is something potentially existent

¹Monads can be described as a sort of spiritual atom: the spiritual essence of each person is a monad.

at the other side of consciousness, that is the unconscious.

Spinoza, in his *Tractatus Theologico-politicus*, affirms that prophecy is a form of revelation from God to man (Spinoza, 1670), and that all natural knowledge is a form of prophecy. The author drew a few symbols on a piece of paper and analysed them in his rational and analytic way, making complex concepts simple to understand: prophecy can be in the form of words or visions, sometimes it happens during dream states, but does not correspond to simple imagination, because imagination signifies internal, sensual conception occurring independently of external agency, whereas the peculiarity of prophecy is the presence of an external agency that transfers the message. The philosopher observes the word spirit, 'ruagh' in Hebrew, that signifies both the mind or soul itself and the modes of affection of the mind or soul, "*and by extension of the same principle the imagination of the prophets may be styled the mind of God, and the prophets themselves be said to be possessed of the mind of God*" (Spinoza, 1670:48). Prophecy becomes a form of dispossession, the union between the soul or mind of the prophet with that of another kind of entity.

Thus knowledge, similarly to the paradigm of the myth of the soul², is something that cannot be constructed, coagulated, stratified, but, in its initial existence, it can only be given. In this sense it isn't an inherently human creation and it has to be received from an external entity, because apparently humans don't know the truth, humans don't possess any knowledge. Such an idea, clearly expressed in the seventeenth century by Spinoza, one of the main representant of Western thought, is based on assumptions similar to those of most polytheistic and unorthodox practices: that to access a superior form of enlightenment a mediation between this and another world is necessary, so as to generate the transfer of the requested information. These unions can be compared to what we call today mediatic experiences, which can be

²In classical Latin culture *anima*, connected to the Greek *ánemos*, is like a divine "breath" that animates and gives life to bodies and entities (Rocci, 1981).

induced or accidental, and, in their primitive form, are described by anthropologists and practiced in ancient times and today, in Brazil³ and elsewhere. In polytheistic and syncretic cults and systems of belief, humans have to consult the 'spirit world' to resolve important (but eventually also marginal) personal and social issues (Drury, 1982). In some of these doctrines the spirits are aliens or extraterrestrials, but at the base of knowledge or *techne* there is, in most cases, a revelation from outer space.

At the end of the chapter on prophecy Spinoza distinguishes the imaginative faculty composed of enigma and allegory from the vulgar notions of spirits and insists on the fact "*that the power of prophecy is not common, that it does not remain long at a time with those who possess it, and that neither does it come upon them frequently.*" (Spinoza, 1670). Like Leibniz, Spinoza proposes a differentiation in the typology of humans in the sense that prophecy, like apperception, is a faculty that distinguishes special individuals: in fact it is not given to all *souls*, and not at all times. This distinction and subdivision of humans in *types or classes*⁴ that are not based on physical or material properties but on the spiritual power possessed, hasn't been absorbed in contemporary society as yet.

If prophecy can assume various forms, such as image, sound, dream, hallucination, inner vision, in many religions language has had a central role in the communication and interaction with the divine; the emergence of language has fostered new forms of interaction because humans could discuss the prophecy received and develop and remember new knowledge. When the introduction of language, with its power of reflection, fractured identity in conscious and unconscious self (Lacan, 1973),

³The community Vale do Amanhecer (Valley of Dawn), founded in 1969 and located 50 Kilometers from Brasilia is an example of both syncretism (the doctrine includes elements of Christianity, Spiritism, Egyptian beliefs, Afro-Brazilian religions, contemporary magic and the belief in flying saucers) and the distinction of individuals in two categories of individuals; here humans are defined as either Medium or Client. Mediums wear bright colours and are the reincarnation of extraterrestrial people; they are subdivided in Aparas and Doctrinators, the intellectuals (Holston, 1999).

⁴This word is used here in its acceptance in object oriented informatics.

humans started a conversation with the supernatural using the same code of their consciousness. The unconscious, that was before only used as an adjective, started to indicate something specific in the XIX century.

The scission between conscious and unconscious is mirrored and purported in the relation with Alterity: prophecy resonates as vision or word, and this communication with the Other confuses its boundaries with the internal communication of the unconscious self, which acquires divine characteristics. This inner discourse, underlying texture intertwining the human and the divine, the Ego and the Self, became, since the introduction of language, tempo, the rhythmic articulation of conscious and unconscious thought. In this *flux of consciousness*, it became eventually chaotic, at times, to recognise and distinguish all the parts participating in the reflection. As the discussion progressed, identity fragmented, and, in this polyphonic chorus, the recognition of the supernatural voice, the recognition of its authority and the admission of its existence, became extremely complex and, like human perception, logarithmically necessary.

Perhaps monotheistic and polytheistic religions dialogue using words and symbols as if humans were constantly seeking for a re-conjunction with the divine self that was informed in the pre-linguistic era. The Self is the daemon who knows, the non-articulated identity that was getting lost. This collective psychosis, this capillary dissociative identity disorder is evident in those individuals who are naturally prone to manifest the supernatural within themselves. These individuals, prophets, mediums, shamans, are a peculiar type of people that, like mythological deamons or messengers, participate of characteristics of, or visit worlds, or act as points of junction between this and other, eventually parallel, worlds. They act as repositories of contradictory things.

Thus prophecy, language and knowledge seem to be intrinsically connected among

themselves, at least in their mythological morphogenesis. In traditional shamanic practices music was a central element even before it possessed the power to disentangle rationality and bring the individual to a state of pure intuition. When rationality was developed, the distance from the intuitive self generated confusion; the translation from pure thought to articulated rationalism increased uncertainty because of the impossibility to talk about language from within language itself (Wittgenstein, 1921)⁵. This infection of the parts and their compromised, non innocent relation to the whole prevented any objective analysis of the system. Like the unconscious, the transcendental doesn't have a code, and perhaps communication, at a primordial state, was more similar to a transmission of images from brain to brain than to an encryption-decryption or vocalisation-audition process. Perhaps the mythical original sin is the use of language, and humans are tormented by rationality. The lost paradise becomes the primogenial state of the pre-verbal psychic human, while rationality, as much as it develops and favours new capabilities, eradicates some of the older. Yet nothing is forever lost, there is a constant question and a constant suffering and pain about the loss and search for the primary self, the self who knows. The dialogue between an authentic, inner identity and external, outer agency, may open a point of contact, the access to an immaterial level of discovery where the conjunction and disjunction of the presence and absence of the physicality of perception and the materiality of being reveal unconditional secrets.

Within this tension, is possession an emergent property of the real self, or is it the embodiment of an external entity?

And what does it mean to be possessed? What happens to these individuals who have mediatic capabilities?

⁵Wittgenstein will later assume a different position in relation to philosophical skepticism, affirming that doubt is embedded in a structure of underlined beliefs, therefore its most radical form must be rejected because in contradiction with the system of belief that expressed it (Wittgenstein, 1949).

As Leibniz envisioned, humans are not all the same in terms of awareness: certain individuals can receive an exterior intelligence, some still use intuition, telepathy, psychic powers, ubiquity and omnipresence. Contemporary technology substitutes as a surrogate certain psychic capabilities that most humans seem to have lost, such as the transmission of sound and images at a distance and other telepathic-alike faculties, as Athanasius Kircher had foreseen few centuries ago (Kircher, 1646).

Yet what are shamans?

Shamans are special individuals who can access outer dimensions in order to gather knowledge and healing capabilities. Particularly important is the spiritual journey that is necessary to become a shaman (Drury, 1982). Mediums can be of different kinds but in general, whereas the shaman would dialogue with Alterity, mediums become possessed and, as instruments, are embodied by an external agent who speaks and manifests itself. The distinction is important but probably not exclusive: a medium can be a shaman, and a shaman can be a medium.

In primitive societies⁶ there were special individuals who used to mediate the relations with this Otherness, the supernatural or spirit world, to find solutions and healing methodologies. The shape of the global world, comparable to a fat, oversized, enlarged metropolis, and the movement of tribes, collectives and subjectivities across disparate locations in this physical and informational map, dispersed shamans away and faded the role of rituals, once upon a time antidotes to insanity and theatrical medicines for groups and individuals.

The oracle, in its connection to Alterity, be that the transcendental self or the

⁶“In the lexicon of early anthropologists, a primitive culture is any of numerous societies characterized by features that may include lack of a written language, relative isolation, small population, relatively simple social institutions and technology, and a generally slow rate of sociocultural change. In some of these cultures history and beliefs are passed on through an oral tradition and may be the province of a person or group especially trained for the purpose.” (Encyclopaedia Britannica, 2014).

unconscious or a spirit or God, reconnects these two parts like a symbol is to be reconnected to its meaning, and through the same language that generated the fracture, this pre-linguistic field is given the possibility to emerge and its transcendental sense is expressed in words.

In the capitalist world dominated by profit and commodities, social and economic mechanisms transform subjects in desiring machines that possess and consume; still a very different and secret desire is guiding humans since the advent of articulated language, a desire that may partly clarify the enigma of oracles, shamanism and spiritism: in the search for a primordial self, in the loss of identity and singularity that indecision engenders and in its sense of transcendental union or fragmentation, humans are expressing an unconfessed and almost sexual desire towards the undistinguished, divine other or ineffable primogenial self, an intimate conjunction of pleasure and fear surpassing and completing identity: the will to be possessed.

7. Conclusion

This research is a reflection on decision making and the faculty of exercising free will and self determination in postmodern societies. The introduction of the *technological* as a novel form of supernatural on the one hand, the multiplication of possibilities offered by ubiquity and the global world on the other, are connected both to the classical physics of early quantum mechanics and to the precariousness of present working conditions. The indefinite access to a uniformised diversity of actions, spaces and places, in a landscape where individuals are uprooted, detoured from nature, the community and the territory, can generate a condition of paralysis and disorientation, where individuals don't know what to do in the present and cannot project themselves in the future either, because their socio-economical destiny is totally uncertain and unpredictable. In this *dramo-sophical*¹ panorama, the characteristic use of language with a double articulation - typical of mankind - is interpreted as a sign of distance between nature, instinct, true identity, and a form of perception able to guide the individual subject through an harmonic and spontaneous instantiation of the real. Within this distance, that is remarked in the fragmentation of individuals in industrial big cities, where the sense of community and belonging can be lost, the mediation with the supernatural and any other

¹Neologism coined by the author, conjunction of the word *philosophical*, whose etymology means 'love for wisdom', and *drama*. Dramo-sophical indicates the tragicomic struggle for knowledge (and information) in contemporary, eventually melodramatic, sociopolitical landscape.

system of belief - where alter-entities guide and support humans, is re-proposed as a new form of techno-magical electronic performance where the construction of a collective expanded reality represents that sacred space that allows new discoveries, supporting orientation and the formulation of substantial choices.

Live art substitutes the social space left vacant in the dispersion of social tribes and groups which, by abandoning their original territory, erase the physical connection to the ancestors and the spontaneous sense of territorial belonging. It is this fracture between the ground, so to say nature, and what is above nature, in other words the supernatural, that problematised the role of the shaman as a mediator between the community (and its issues) and the outer world.

Within this social dispersion, the will to surpass the rupture operated by language, migration, and the loss of the individual self - a self connected to nature and true will, or necessity, the *will to be possessed* by an otherness that surpasses individuation, impersonating the subject beyond rationality, is then identified as a secret, almost sexual, desire that eventually flows and occurs between humans and the supernatural.

The reflection is structured as a search, echoing the fundamental question of a mathematical or scientific problem, that is then transduced in artificial intelligence's techniques, where the search represents the method used (by an agent) to find a solution.

The mythical search for the Oracle Machine, the epic abstract structure that goes beyond the real, transverses different fields of knowledge, and, representing the form of the continuous, is always a spiralling tension, whose center point comes closer and closer but can never be reached [see Figure 1.1 in the appendix]. For this reason, humans can go towards the Oracle Machine, they can enact it, but they will never fully grasp it. Throughout this journey the Oracle Machine becomes a performance,

a technologically mediated audio-visual act that re-establishes the connection to shamanism and the supernatural that was getting lost in rational world.

Science first, since the Renaissance, imposed techniques and methods based on certainty over spiritism and superstition; later on, at the beginning of the twentieth century, by perfecting its instruments and strategies, it confuted some of its own original findings, and space melted with time, materiality with immateriality, mathematics with music and religion². Software stimulated and re-proposed the empiricism of alchemists and magicians, favouring function over system, the particular over the general. The development of electronic technology and ever more sophisticated measuring apparatuses increased the amount of data produced, and the capacity of contemporary memory storage devices allowed for this data to be saved and archived, and the concept of openness³ and network '*socialism*' made it possible for a great quantity of the data to become public, so that the computational power of present processors could be used, eventually, to interrogate it.

Nowadays machines became the repositories, and the sources, of knowledge. Humans stopped memorising information and started to learn procedures, lists of operations and search methods to interrogate databases, so that slowly intuition, creativity, that often come from unpredictable synaptic connections between apparently disparate notions, had to be simulated, digitally reproduced, and this idea that eventually machines were, as well as humans, made of both *res cogitans* and *res extensa*, silently made its way into culture, and the perception of machines as spiritual devices became a shared and common feeling. This setting generated the instinctual habit of

²Mathematics is, among the scientific disciplines, the most fundamental and the most abstract. Many mathematician become religious, generally monotheists. They seem to believe there is some form of unique intelligence behind the construction of the real, perhaps because of its intrinsic coherence, harmony and measure. Possibly what Plank defined the *inherent granularity* of the real? (Heisenberg, 1958)

³See for example the Open Data Institute: <http://www.theodi.org/>, Data Gov Uk: <http://data.gov.uk/>, and the NHS Making Public Data Public programme: <http://www.nhs.uk/aboutNHSCoices/professionals/developments/Pages/NHSCoicesdatasets.aspx>.

questioning, asking for and seeking answers from machines, which became the sole universally accepted shamans.

Yet, for magic to happen, for reality to exist, for the undecidable to halt, there has to be an intersection, as Alan Turing remarked (Turing, 1939), of substances of a different type, because infinity represents that dichotomic distance between the analogue and the digital, a rule and its process, software and its execution, the tangible and its abstraction, the immateriality of the material and the materiality of nothingness, and technology, as an expression of nature, saturates the incommensurable space between humanity and the divine. And this dwelling has no resolution, leaving reality and life anchored to the juxtaposition of a fracture made of potential differences, incomprehensible unpredictable swerves and the intersection of allotropic elements with metamorphic substances, until everything dissolves - or we imagine so? - through a chink of light, or a conscious crack.

At the end, perhaps, there is possibly no difference between the natural and the supernatural, they are the expression of the same singularity, and this singularity can be a multiplicity, as nature is, in itself, a divine process.

In contemporary critical theory and cultural history, apparently the esoteric and the occult, while emarginated by radical philosophy, have been appropriated by thinkers and doctrines⁴ often connected to reactionary, masculine and heroic traditionalist values, that were used to justify with irrationality politics of predominance and domination, in some cases pushed towards cruelty and beyond the limits of any ethics.

In contrast, the materialist perspective structured an, ultimately rational, critique of society and social organisations, proposing an ethical, non religious development

⁴Such as, for example, Mircea Eliade, or the Ariosophers, with their Ario-Christian Theozoology, whose most representative writers we don't dare to mention here (reference omitted by the author) .

of the human thought that, without spiritual implications, based its foundations on ethics and the basic principles inherited from the French revolution, mainly that of egalitarianism.

With this study we propose a critique and an artistic methodology that surpasses and transcends this opposition and reclaims a form of metaphysical imagination within a substantially materialist, postmodernist and post-structuralist, yet ultimately contemporary and intrinsically feminine, visionary and aerial thought.

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A. Appendices

This section documents the art work accompanying the thesis 'Towards the Oracle Machine'. It consists of two performances that are documented by screen grabs from video registrations, their textual description, the software used during the performances (pure data patches), and an experiment that implements Natural Language Toolkit¹ to extract textual oracles from Google. Additionally, an idea for the construction of an indecisive robot and the initial plan of its development are described in one of the subsections. A website² documents the project and its relative events.

A.1. Performances

The Oracle Machine has never happened in Europe as yet.

The first performance took place on July 24th 2009, in a theater in Sao Paulo, on the occasion of the Pure Data³ convention. Hence only Pure Data patches were used. I invited two artists to accompany me, Ricardo Palmieri, co-organizer of the Pure Data convention, and Cristiano Rosa, better known as Pan&Tone, unanimously considered the father of circuit bending in Brazil.

¹Platform for building Python programs to work with human language data. <http://nltk.org/>

²<http://theoraclemachine.net> (xname, 2012)

³Open source graphical programming language.

I used two computers, a Lenovo X61s running Linux Debian, and a Acer Netbook running Linux Puredyne.

The Netbook was displaying video in real-time, it was connected via VGA to a large video projection at the back of the stage.

The video patch I programmed was receiving the integrated webcam device and sending it to the video output device (VGA). The patch didn't use any of the effects included in the Pure Data standard library (objects), but I programmed a very simple yet astonishing visual trick, drawing inspiration from the Uncertainty principle. Pure Data requires the user/developer to create a window, or frame, within which a video can be displayed, played, mixed and manipulated in real-time. This frame has, obviously, a width and a length. According to Heisenberg (Heisenberg, 1958), we can only know what happens to a particle in a fragment of time, in a sort of duration, but its coordinates are unclear, or mutually exclusive, in terms of numerical definition, at each point of the trajectory. Thus, if you know the position of a particle, the momentum is unknown, and vice versa. Although a video is obviously not a particle, being time-based it has a similar range of coordinates. What happens, then, if we imagine the frame of a video changing its spatial properties in time, so that the limits and the size of the screen become unknown in the momentum, even though its trajectory is clear? Practically speaking, the spatial dimensions of the frame mutated constantly in time deforming the image.

The result of this simple, tiny block of code was a creepy, sublime and unstable video image whose size and proportions kept changing indefinitely. The computer screen became a little mirror, into which I would look at my own image, with the difference that this very intimate and private gesture was then projected to the public, creating a contradictory fracture between the form of a fairy tale - with its solipsistic gesture, and the gigantic, almost scary image projected at my back, intimately staring at the

self and the audience at the same time.

The other computer was running an oracular version of a patch called Noisez, which I programmed in 2006 and used for a few years, constantly updating it, to compose live electronic music. Noisez has six cabalistic noise generators and three sample players, which featured an integrated, quite peculiar, pitch/tempo changer (it's effect, which recalls a change of pitch, has a singular granularity that distinguishes it from any other player). It is very hard to describe the functioning of this patch in technical terms, because at the time of programming it, I had no formal knowledge of signal processing or sound theory. It was an empiric piece, and the code was written following a musical aesthetic rather than a computational framework. The patch used the Mandelbrot object and other aleatoric objects to randomize the mathematics of its numbers. I didn't develop this patch for the Oracle Machine project, but a specific version of it was designed for the purpose.

The performance lasted seven minutes: I became scared by the first answer of the oracle and concluded it. It was supposed to last between 14 and 20 minutes.

Besides the technological infrastructure, I used a number of objects to create a form of interaction that wasn't only generated by electronic media, so as to involve also a symbolic, semiotic and allusive plane of signification that established the space of the illusion, favouring the rituality of the play.

Each object had a different abstract function: a silver key simulated the possibility to open a portal to another dimension, a hat was placed on the floor to collect votive donations from the public (offers to the oracle), an old landline telephone of the late seventies originally in my parents' house in Milan was the device used to appeal to the oracle and enact the form of presence and absence that the sacrality of everyday remote communication made universally familiar.

If performing always implies a form of masquerade and trespass on an activated

space where gestures acquire a specific meaning within the frame of the peculiar liveness that is displayed, in this particular case I decided to wear a special dress to impersonate the sybil or prophetess. It was a blue dress made of veil, an old dress I found many years before in a second hand theater shop. I didn't wear any shoes, to keep a physical contact with the ground and reconnect to the special tradition of dance that uses bare feet for acts where the fantastic element is particularly pronounced.

Blue was also the colour of the telephone, and of the pigment I used to draw iambic lines on my face, looking at myself in the digital magic mirror: lines of powder that created a mask, altering my expression, purporting my body towards the supernatural realm, the realm of heroes and fantastic creatures.

Once the performance was introduced, I invited the audience to leave offers in the hat, and the sound began.

One of the sample players of the PD patch contained fragments of discourses, decomposed words from Antonin Artaud, Marcel Duchamp, Otto Rössler, et al. This material would have constituted the Bakhtinian source of the oracular speech, the language of otherness. This performance required an intense psychological concentration, a sort of mimesis of a paradigmatic situation, because what I wanted to enact was a ritual initiated in response to a moment of crisis, a mental breakdown. So the performance had to start almost assuming a panic attack at its background.

When I found myself on stage I started to think that I didn't know what to do, that I needed some advice because I could make no action. Then I thought of calling someone on the phone, so as to get a clue or a fresh perspective on the situation, as I was on stage and maybe it was time to make some fundamental decision about my life, or the next five minutes... So, after drawing the blue lines on my face, I grab the telephone... 666 23 whatever... Noise music was invading the theater,

a bizarre collage of generated sounds, from digital and analogue devices, and the paranoid effect of distorted melodies of crudely cut classics were creating a surreal atmosphere, an obsessive electric carillon. Suddenly a voice exploded in the room, its volume was extremely loud, louder than anything else. This composite voice said:

“You ask me a question...”

The voice was resonating, it didn't sound human at all, although it was composed of fragments of human voices.

“Would you also do everything that God requires from you to do?”

The voice changed in the last fragment of this second sentence, from adult it transformed into a child speech - probably due to an automated change of pitch.

The music reached its climax, I was frantic, I couldn't go on, the sound increased again, and again, then it was only silence.

The performance finished, the public was quite shocked, and divided. I ran away.

Some found the act amazing, others didn't understand what was going on, wondered whether I was having any technical problems, why did it end? Because it had already reached its point in seven minutes, I had no idea whether that was good or bad.

Miller Puckette, the inventor of Pure Data and Max/MSP⁴, was sitting in the audience. He loved this performance.

“That was fun...!” He told me with his *mad professor's* slightly perverse and parabolic smile.

During the following days, various people approached me with donations: they didn't expect the performance to be so short and didn't have enough time to leave a present in the hat. A cloud of mystery obfuscated the event, and my person was at

⁴Max/MSP is the commercial, non open source version of Pure Data.

times received with a sentiment of superstitious reverence. Besides the money left in the hat, the oracle received a banana, few coins, a blue pen, and...

The second performance happened about a week later in Salvador do Bahia, in the tropical forest surrounding the Federal University. Some of the attendees of the previous event were present, and many Brazilians manifested the desire to participate more actively and interact with the *show*. This time there was no stage, and no theater: I wanted to perform open air, challenging the rain season of the Southern hemisphere. I decided to create a so called *Oracle Computer Orchestra*, and invited various local artists to participate. A clear distinction between performer and audience was abolished, while my computer running the noise patch and the defragmented oracular voices assumed a central position, a sort of altar in the middle of a circle. The symbolic objects were spread inside the circle, whereas the video image lost its importance and became a sort of horizontal light illuminating the scene in particular moments. The performance required a period of preparation: for a few days I disappeared, almost removing myself from any contact with other humans⁵. During these days I made all the decisions regarding the act, how to use the space, where to position the selected objects, how to find the necessary concentration. I also avoided certain food, and arrived at the decisive day extremely clean and purified. During the isolation, I reflected on the offerings: in all traditions, shamans, oracles and prophets should be paid, and the value of the gift is totally symbolic, but the lack of any gift is imbued with superstition. It could procure bad luck, or the antipathy of daemons, spirits or gods. If in the first performance my offer was a beautiful image, the reflection of myself through the mirror of uncertainty, the terrific appearance of the inherently unstable image of an unbearable subjectivity,

⁵Also in Sao Paulo I hid for a couple of days in the apartment of the festival organizer, sitting in between my two computers and the blue telephone, staring at the screen trying to make sense of the real, or taking inspiration from solitaire bus rides through the city.

I knew that in the forest the beam of light would have lost its definition, hence its power. On the other hand, a reflection on the material properties of the forest - and the different setup of the new situation, gave me another idea: not differently from the colorful rituals of the polytheistic religions of the ancient Greece, whose mythological history narrates the most famous oracles of Western culture, my votes could resemble organic, biological, nourishing elements, but purged of any violence. For this reason I procured milk and flour, and used the milk to wash my body in the middle of the circle, covering the expanded space of the ritual with flour. Obviously I didn't want to look like a novel, naïf Cleopatra, thus these actions were accompanied with the ironic grace of Capoeira de Angola, a Brazilian sacred and theatrical dance I practiced intensely in one of my previous lives. It worked.

Following a little drawing representing the score, my movements directed the musicians. The performance lasted for almost an hour, and involved the public in asking questions and interacting with the techno-magical infrastructure built and the supernatural world around it. The situation wasn't as scary as in Sao Paulo, the flow was calm, the Oracle became a collective ritualistic game, where the act of asking a question in front of others was primarily liberating the individual, even in the eventuality that the question wasn't spoken out loud. This psycho-magic technique⁶ was favoured by Brazilian mentality, that doesn't question so easily what is real and what is wrong, what is true and what is false.

In very general terms, the anthropophagic Brazilian mentality doesn't have a problem with the ineffable, or that which cannot be proved or fully understood. It doesn't create incommensurable fractures in front of divergences in spiritual visions: Brazil hasn't been washed for centuries with the blood of religious wars, and there is a form of tolerance that is more similar to that of certain phases of the Roman empire. It

⁶Confront the technological therapies practiced by Brazilian psychologist Fabi Borges (Oreggia, 2012), whose work draws on Guattari's Schizoanalysis.

doesn't matter if what one thinks is different from what the other believes, they can still collaborate and exchange an experience, and the two credo have an equal right to exist.

Although everyone has fear in Brazil, and there is a serious security issue due to an economical divide that is still too wide, there is something light about life that is missing in Europe. And an enthusiasm towards culture makes any philosophy, music, idea incredibly actual, so that extremely interesting forms of experimentation can emerge from such akin spirit to collaboration, where collaboration is more common than competition. It is cultural bricolage: everything can be patched with anything, there are no restrictions to what imagination can make, and imagination has an ontological value. Thus, not only this diffused spiritism is infused of Spinozian ethical values (what is good for you might be poison for someone else, but that doesn't mean that that good is not real good just because it isn't good for everybody), there is also a more democratic ontology of belief, perhaps because belief is the only thing that everyone can afford in Brazil, so no one would deny the existence of the sole resource that everybody has in common, the socialism of belief. Differently from the European religions of the middle ages, in this *spiritual welfare* belief doesn't assume any temporal power.

To conclude, in my performances, inherently experimental in nature, and, similarly to this thesis, intrinsically exploratory, different practices and disciplines, such as ritual dance, music, body art, critical theory and live video, among others, have been intertwined, and their teachings brought into effective action. The result, this sort of psychological noise drama, this conceptual theatrical act where the audience is never innocent because the spectator is somewhat involved in an emotional or physical reaction, is a new form of abstract performance whose shape, bringing together such a diverse range of techniques that I recognize as belonging to me, or

to which I belong, such as visual art, electronics, software, music, dance, gesture, ritual, technology, but also spoken words, represents one of the ultimate expressions of my artistic research. This strand, that has been slowly developing over the last few years, and that, due to its cross disciplinary nature and the impact that it receives, requires a certain maturity and confidence to be fully mastered and investigated, which has started with *The Oracle Machine* to develop and recurs in my work over the past five years⁷.

The video documentation of these performances was never published or distributed because these art works are to be experienced, not watched.

A.2. Robot

*Buridan, an indecisive robot*⁸, is, like the Advice Taker described in chapter 3, an hypothetical project, or a project whose development is still in progress. It is the story of a robot who suffers from indecision. When Buridan is affected by a condition of undecidability, he has panic attacks: he stops doing what he was doing and starts looking from right to left and from left to right compulsively, and the crisis continues until a *homo ex machina*, or human intervention, takes place, so to say, until someone doesn't pat his head. Under certain determined conditions, in fact, Buridan cannot choose between two stimula and gets extremely distressed. The resolution is a moment of affection between human and robot: this element,

⁷The rare examples are: *A descent into the Maelstrom*. Bergen, 2008. More than half of the audience thought I had gone completely insane, few saw it as a masterpiece. *Will-o'-the-wisps*. Suffolk, 2011. Ended with one of the participating spectators having a hysteric attack thinking I was going to set her on fire. *Can you please touch me?* London, 2013. No major dramas, only a member of the public having a minor freakout verbally attacked me. *Observing the Witness*. London, 2013. Upcoming.

⁸Buridan is the name of an indecisive robot project whose construction started during a workshop offered by the Department of Computing at Goldsmiths College, at the course of Creative Robotics. Buridan's group was formed by Eleanor Dare, Nanda Khaorapapong and the author of this paper.

the third stimulus which dissolves the previous two, introduces, like Alan Turing's analogue tape, a substantially different entity or form in the solution of an apparently unsolvable problem⁹. The problem of Buridan's ass refers to a hypothetical situation wherein an ass is placed midway between a stack of hay and a pail of water. Since the paradox assumes the ass will always go to whichever is closer, it will die of both hunger and thirst since it cannot make any rational decision to choose one over the other.

The paradox is named after Jean Buridan, a French priest and influential philosopher of the late Middle Ages, who should be best known for his concept of impetus which prepared the terrain for the Copernican revolution in Europe (Knowles, 2006). This paradox, satirising his philosophy of moral, dates back to antiquity, being first found in Aristotle's *De Caelo* (Aristotle, 350 BC), where Aristotle mentions an example of a man who makes no move because he is as hungry as he is thirsty and is positioned exactly between food and drink. Buridan nowhere discusses this specific problem, but his position advocated a moral determinism whereby, save for ignorance or impediment, a human faced by alternative courses of action must always choose the greater good. Buridan allowed that the will could delay the choice to more fully assess the possible outcomes of the choice, justifying this way the indecision time that was inherently in contradiction with his deterministic vision. Later writers satirised this view in terms of an ass which, confronted by both food and water, must necessarily die of both hunger and thirst while pondering a decision.

A common variant substitutes two identical piles of hay for both hay and water and advances that the ass, unable to choose between the two, dies of hunger alone. Buridan's prototype is made using a simple implementation of the Bioloid Robot System, a modular robotics system kit based around graphical programming and se-

⁹If Turing's Oracle operates on the plane from digital to analogue, and vice versa, here the play is between organic and inorganic, or biological and electromechanical, etcetera.

rially controlled actuators which provide access to sensory feedback such as position, speed, temperature, current draw and voltage of each servo.

The idea of constructing an indecisive robot was favoured and suggested by the structure of URBI, acronym for Universal Robot Body Interface (or Universal Real-time Behavior Interface), an open source software platform in C++ used to develop applications for robotics and complex systems. Urbi is a client/server based interpreted language based on the UObject distributed C++ component architecture. It also includes the urbiscript orchestration language which is a parallel and event-driven script language. The urbiscript language has been developed since 2003 by Jean-Christophe Baillie in the Cognitive Robotics Lab of ENSTA, Paris. It is now actively and further developed in the industry through the Gostai company founded in 2006. What makes this language particularly interesting for the purpose is its event based parallelism, which means that URBI can work as an orchestrator coordinating components in a parallel and event driven way providing the possibility to create tags which can be successively called, giving it functions similar to those of an operating system. Another peculiarity of URBI and robotics in general is that each instruction is based on a specific time (time operators) whereas the computation of a linear piece of code normally implements an internal time of execution which is dependent on the RAM and CPU of the system computing but does not necessarily relate to other external time-space coordinates. In URBI, instead, every command has a duration, while the execution time required by the processor is considered to be negligible. Here is the initial description which informed the development of the piece:

The robot is unhinged, confused.

In certain conditions, it enters in conflict and starts behaving in a confused way, until a certain condition does not change.

What the robot does normally:

- the bot moves in a straight line, when it hears sound it moves towards it. (**whenever**)
- the bot is attracted by light, so if the bot sees light it will turn and move towards it. (**whenever**)

Condition for panic:

- Buridan detects both signals at the same time in the crucial range of intensity. (**whenever**)

Behaviour for panic:

- the bot starts looking towards the right, then towards the left, and again to the right, then it starts moving towards the left but it immediately stops, then it starts moving towards the right, but it immediately stops. (**LOOP**)

Panic resolution:

- a human is petting Buridan; the bot detects this proximity and is then *comforted* this allows it to make a random decision between vision and audition. (**whenever**)

Here is the pseudocode:

```
whenever (sound.audible)
{
    goto.sound;
}

whenever (light.visible)
{
    goto.light;
}

whenever (sound.audible && light.visible)
{
    mypanic.loop;
}

whenever (hand.touch.head.sensor)
{
    mypanic.stop
    random.decision
}

mypanic : {
    look right
    look left
    look right
    look left
    goto.right, stop
    goto.left, stop
}
```

Buridan is a twist in relation to the paradigm of the Oracle Machine project: instead of using technology to overcome human limits, a robot suddenly displays uncertain behaviour. An affective gesture becomes the intervention that resolves the situation. Yet, at a deeper level Buridan doesn't betray Turing's Oracle Machine paradigm, that is the introduction of a substance of a different kind that halts the looping process allowing the decision to happen (or a program to end). The robots suggests the use of simulation for the construction of theoretical concepts rather than for testing scientific discoveries.

A.3. Internet

The online dimension of this research develops in three different directions and domain names. All the website are installed on 'xname', a virtual server kindly hosted by Tuxic in Amsterdam at XS4ALL. This server is running Debian and is used for art experiments in the Net. The creation and maintenance of this server has been part of this research and its learning process. The server was created in 2008 and was also notably hacked by Romanian script-kiddies at the end of August 2011. The machine and all the information have been restored.

There is a research website that uses a wiki at the url:

<http://research.theoraclemachine.net/>

This is a slightly modified version of MediaWiki¹⁰ and serves as an extended immaterial note book always at hand in the Net and, in some cases, it has been used to write collective pieces of text to be edited in real-time with collaborators located in other remote places. This website is partially in dark-net, which means no other website is pointing there, and it is not indexed by search engines (such as Google) or spiders. This wiki was installed in spring 2009 and used to have open access. The access has been restricted due to heavy spam attacks. There are currently four active users, including the author. I started writing this thesis on that Wiki, and collected there a lot of material and research I made online.

The second site is a portal in Drupal¹¹ also installed in spring 2009:

<http://theoraclemachine.net/>

This is a public face for the project and allows external interaction and divination through the 'contact form'. The main sections of the site are '*events*', '*research*' and

¹⁰MediaWiki is a free software open source wiki written in php. <http://www.mediawiki.org/>

¹¹Drupal is an open source Content Management System (CMS). <http://drupal.org/>

'*writings*'. In Drupal's internal architecture the posts in these sections are 'stories' while the three sections are 'books'. The events can be performances, publications or presentations. The research posts are referenced quotes from various literature that has been relevant to the work; the text is in *Italic* to indicate that those are somebody else's words¹². Writings are original thoughts composed by the author of the project. The images are divided in albums, that are: esoteric iconography, maps and cartography related to oracles, performances documentation, schemes and graphical abstractions of natural, physical, mathematical and other phenomena, symbols and telephones.

The third page is an online oracle written in python¹³ whose Git¹⁴ repository is at:

<http://code.xname.cc>

A.4. Images

This section contains a selection of images that contributed to document and describe the research and art work, mainly screenshots from the two performances. They are publicly available on the project's website (url and description are in the Internet section).

¹²This design convention, diverging from Harvard's referencing guidelines, is commonly used in websites (like in the case described here) where the main rules are consistency and usability.

¹³Python is a high-level general-purpose programming language. It is interpreted, interactive and object oriented. <http://python.org>

¹⁴Git is a distributed version control system initially designed and developed by Linus Torvalds, the inventor of the Linux Kernel. <http://git-scm.com/>

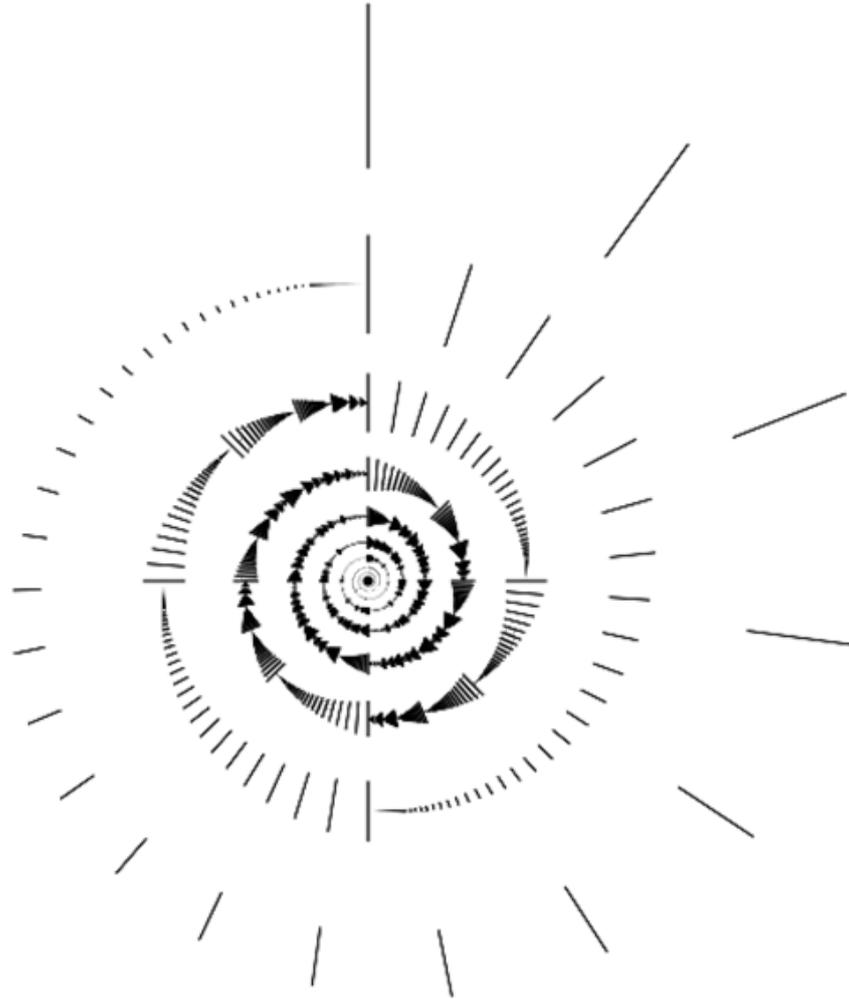


Figure A.1.: Representation of the ordinal numbers up to ω power of ω

In set theory, an ordinal number, or just ordinal, is the order type of a well-ordered set. Ordinals are an extension of the natural numbers different from integers and from cardinals. Like other kinds of numbers, ordinals can be added, multiplied, and exponentiated. Each turn of the spiral represents one power of ω .

Confront Turing's "System of Logic based on Ordinals" dated 1939.



Figure A.2.: The Oracle Machine, initial image representing this project



Figure A.3.: Twin telephones

Pair of vintage telephones with box attached, representing Turing's analogue box.

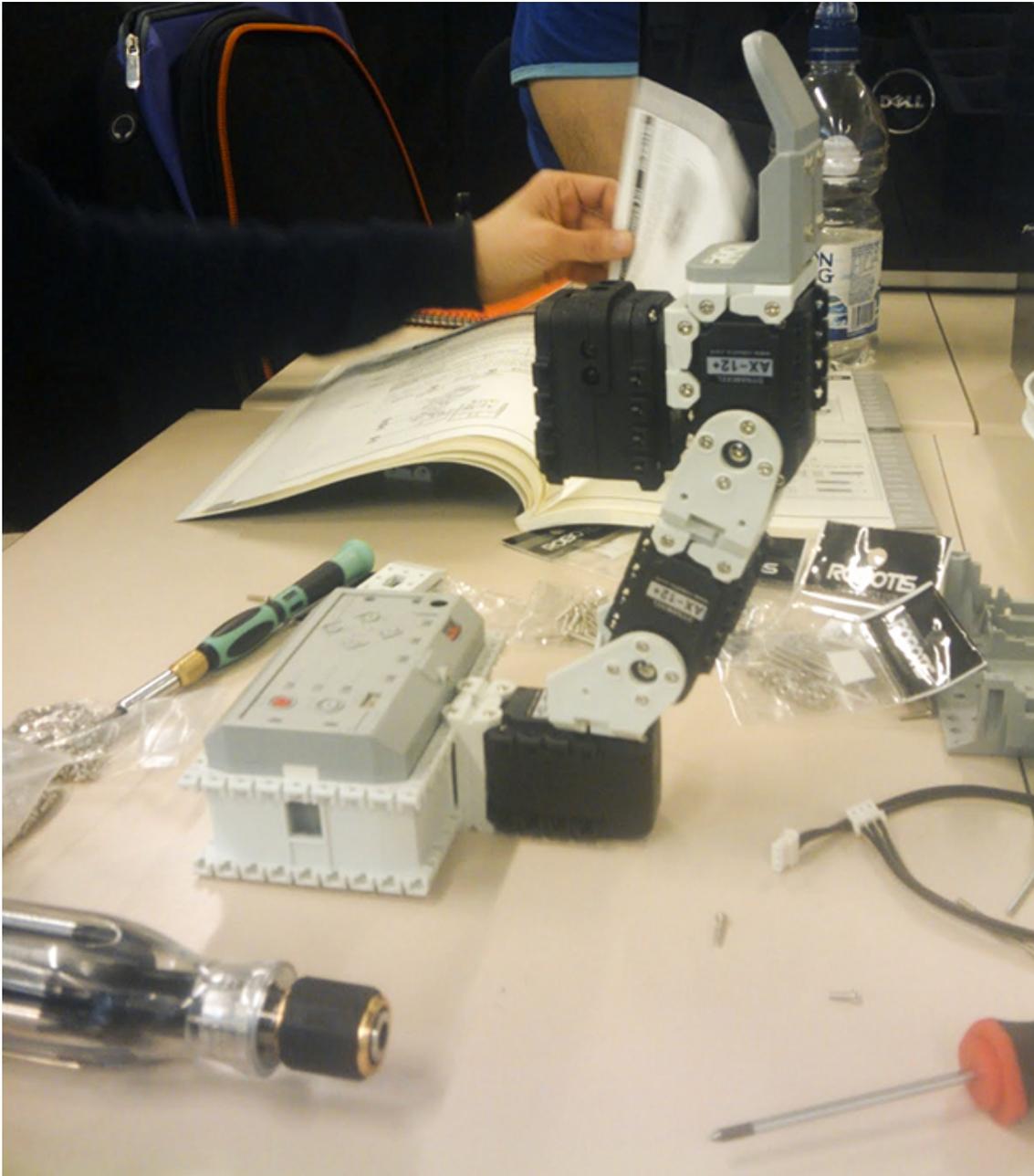


Figure A.4.: Buridan's arm.

A.4.1. Performance in Sao Paulo



Figure A.5.: The Oracle Machine, 2009. Picture series 1.1

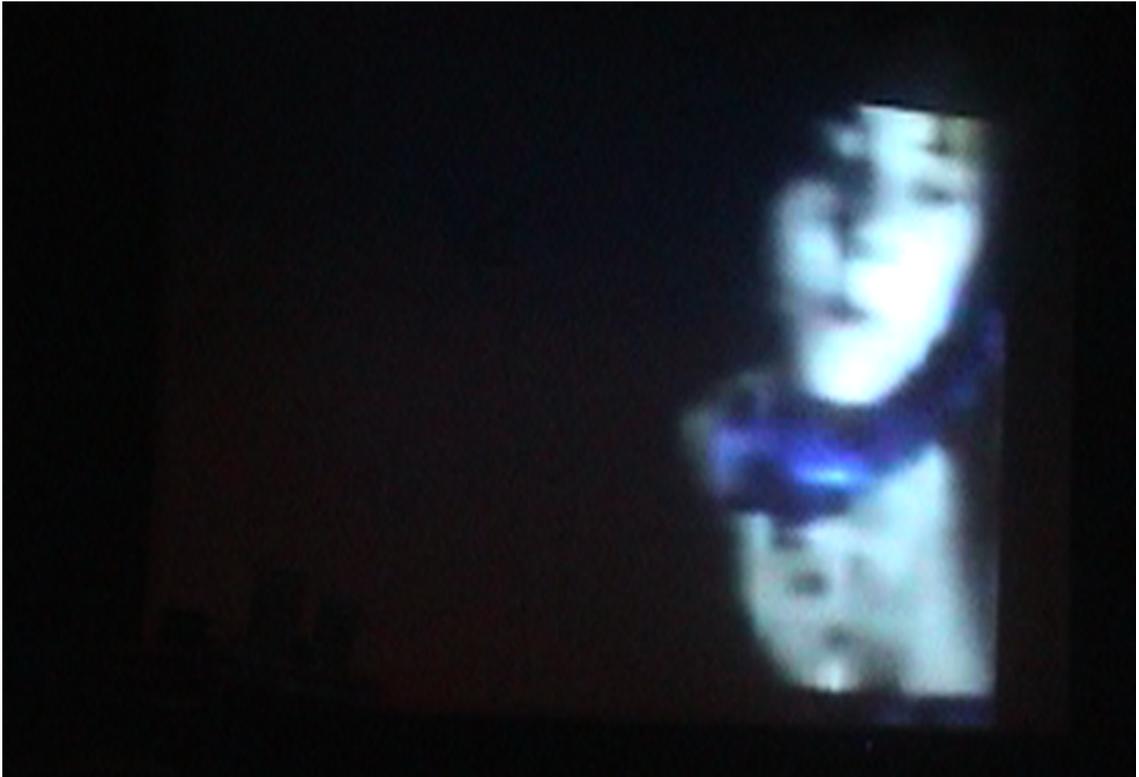


Figure A.6.: The Oracle Machine, 2009. Picture series 1.2

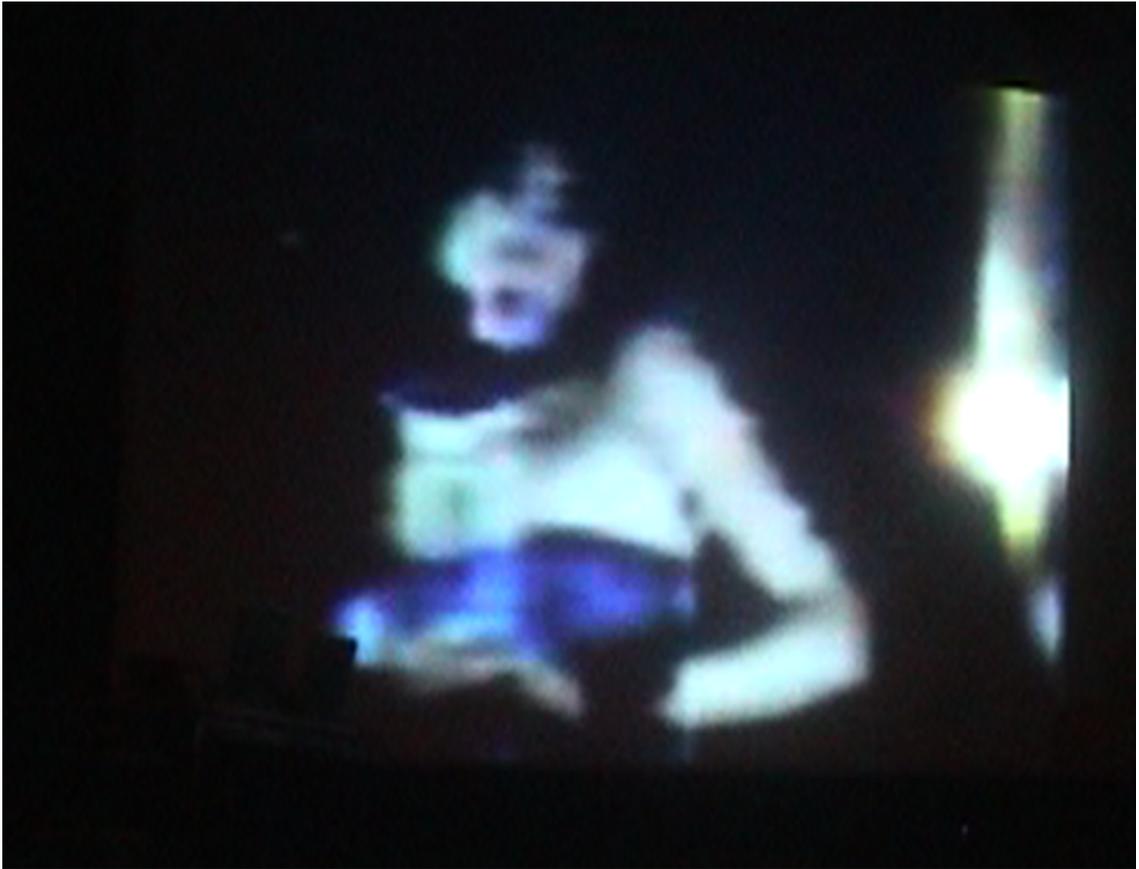


Table A.1.: The Oracle Machine, 2009. Picture series 1.3



Figure A.7.: The Oracle Machine, 2009. Picture series 1.4



Figure A.8.: The Oracle Machine, 2009. Picture series 1.5



Figure A.9.: The Oracle Machine, 2009. Picture series 1.6



Figure A.10.: The Oracle Machine, 2009. Picture series 1.7



Figure A.11.: The Oracle Machine, 2009. Picture series 1.8



Figure A.12.: The Oracle Machine, 2009. Picture series 1.9



Figure A.13.: The Oracle Machine, 2009. Picture series 1.10



Figure A.14.: The Oracle Machine, 2009. Picture series 1.11



Figure A.15.: The Oracle Machine, 2009. Picture series 1.12



Figure A.16.: The Oracle Machine, 2009. Picture series 1.13



Figure A.17.: The Oracle Machine, 2009. Picture series 1.14



Figure A.18.: The Oracle Machine, 2009. Picture series 1.15



Figure A.19.: The Oracle Machine, 2009. Picture series 1.16



Figure A.20.: The Oracle Machine, 2009. Picture series 1.17



Figure A.21.: The Oracle Machine, 2009. Picture series 1.18



Figure A.22.: The Oracle Machine, 2009. Picture series 1.19



Figure A.23.: The Oracle Machine, 2009. Picture series 1.20

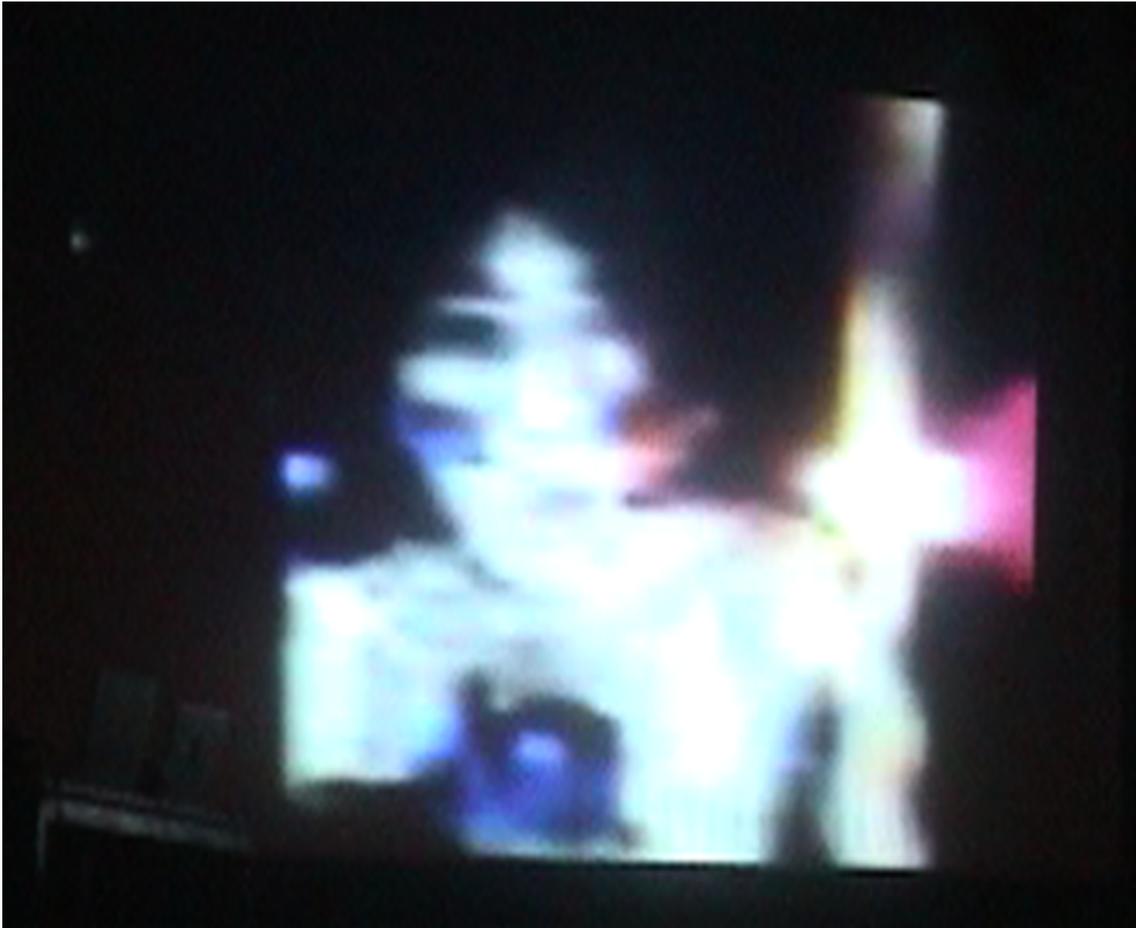


Figure A.24.: The Oracle Machine, 2009. Picture series 1.21

A.4.2. Performance in Salvador



Figure A.25.: The Oracle Machine, 2009. Picture series 1.22



Figure A.26.: The Oracle Machine, 2009. Picture series 1.23



Figure A.27.: The Oracle Machine, 2009. Picture series 1.24



Table A.2.: The Oracle Machine, 2009. Picture series 2.1



Figure A.28.: The Oracle Machine, 2009. Picture series 2.2



Figure A.29.: The Oracle Machine, 2009. Picture series 2.3



Figure A.30.: The Oracle Machine, 2009. Picture series 2.4



Figure A.31.: The Oracle Machine, 2009. Picture series 2.5



Figure A.32.: The Oracle Machine, 2009. Picture series 2.6



Figure A.33.: The Oracle Machine, 2009. Picture series 2.7



Figure A.34.: The Oracle Machine, 2009. Picture series 2.8



Figure A.35.: The Oracle Machine, 2009. Picture series 2.9

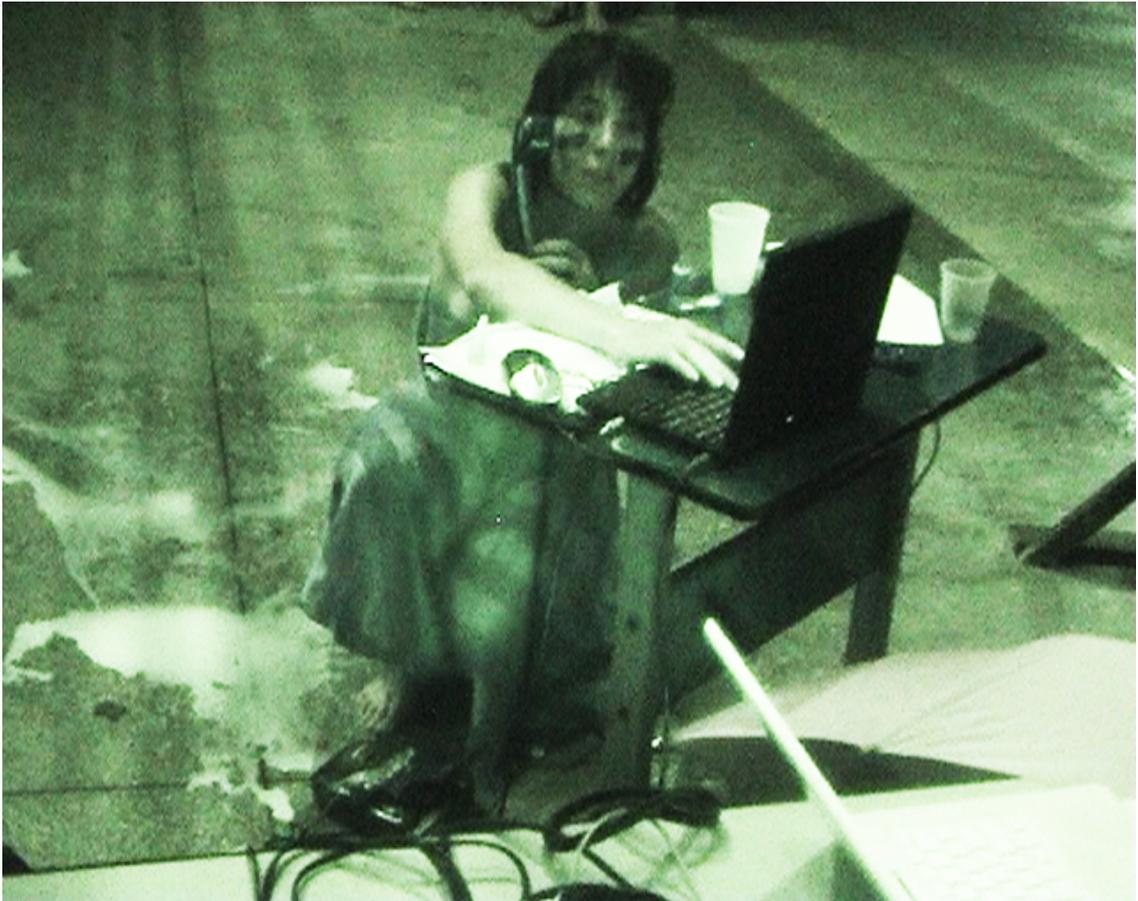


Figure A.36.: The Oracle Machine, 2009. Picture series 2.10



Figure A.37.: The Oracle Machine, 2009. Picture series 2.11



Figure A.38.: The Oracle Machine, 2009. Picture series 2.12



Figure A.39.: The Oracle Machine, 2009. Picture series 2.13



Figure A.40.: The Oracle Machine, 2009. Picture series 2.14



Figure A.41.: The Oracle Machine, 2009. Picture series 2.15



Figure A.42.: The Oracle Machine, 2009. Picture series 2.16



Figure A.43.: The Oracle Machine, 2009. Picture series 2.17



Figure A.44.: The Oracle Machine, 2009. Picture series 2.18

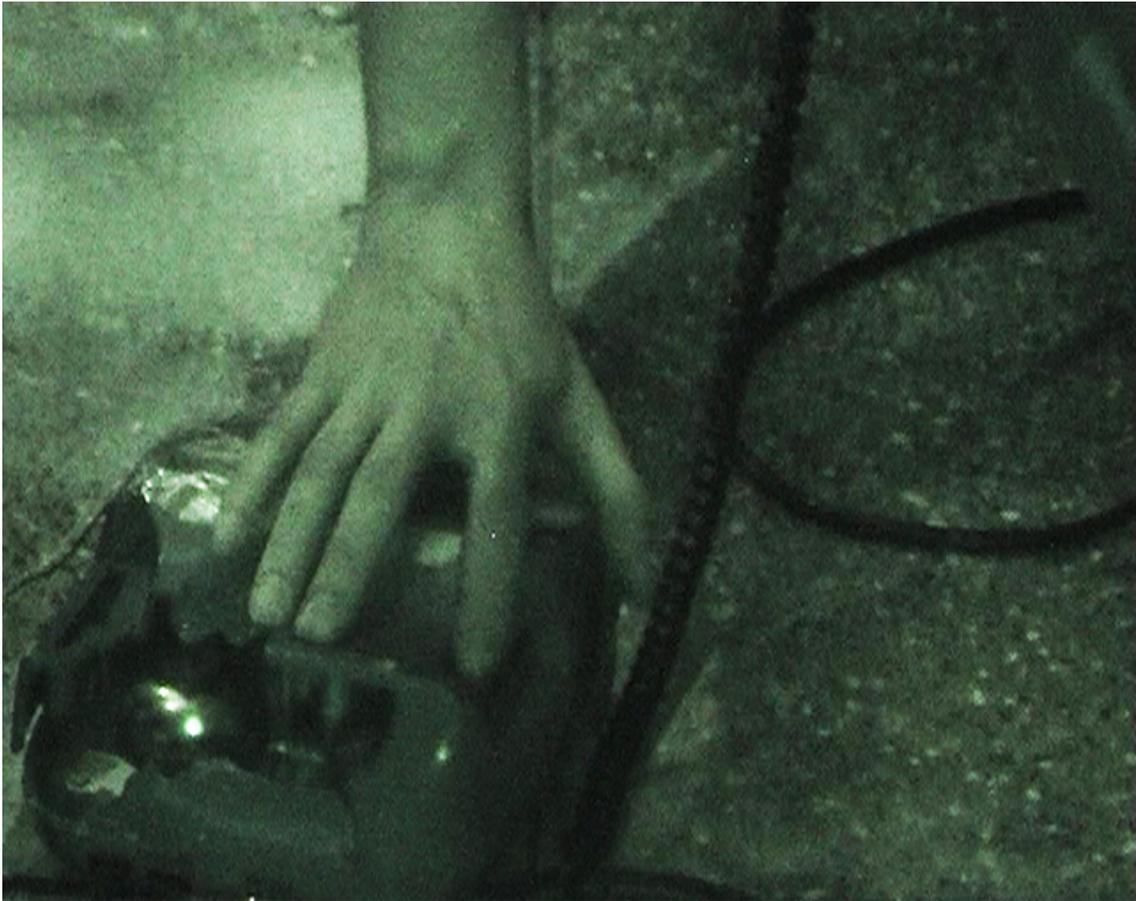


Figure A.45.: The Oracle Machine, 2009. Picture series 2.19



Figure A.46.: The Oracle Machine, 2009. Picture series 2.20



Figure A.47.: The Oracle Machine, 2009. Picture series 2.21

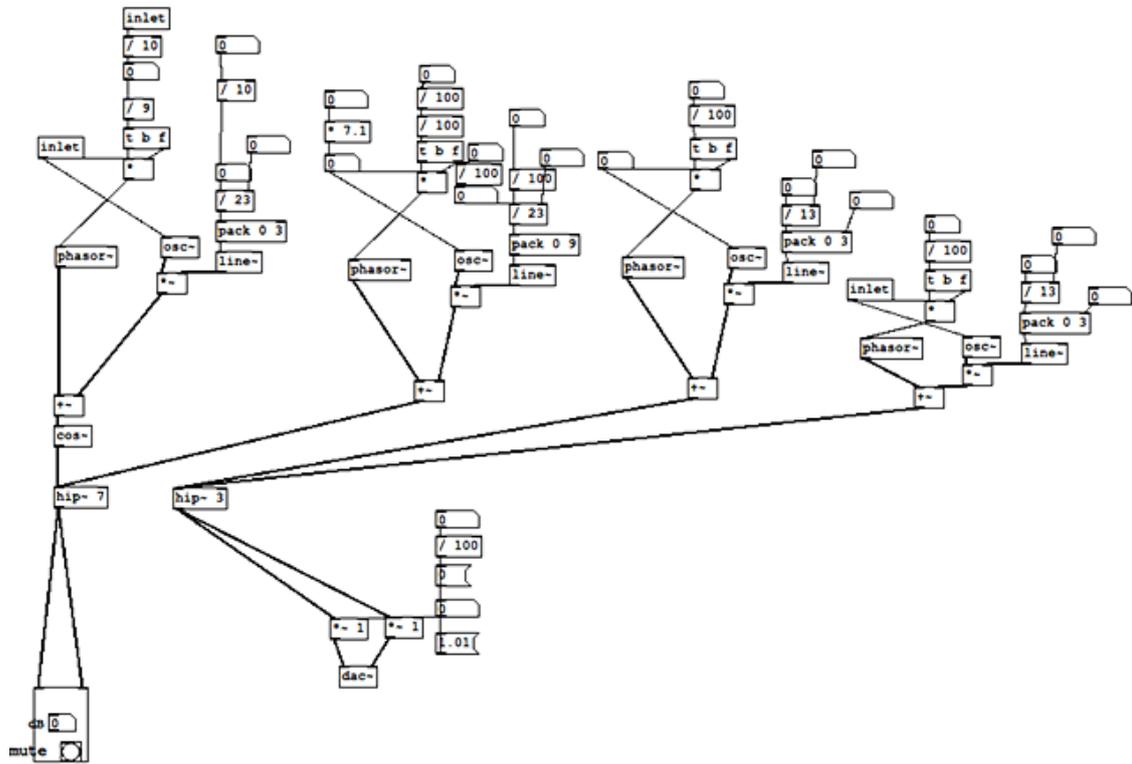


Figure A.49.: Example of cabalistic noise generator

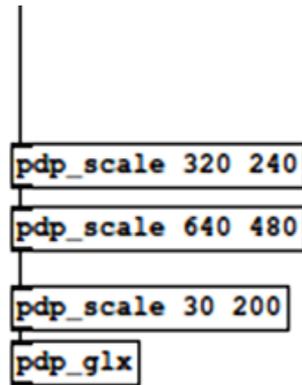


Figure A.50.: The Uncertainty video effect

A.6. Code

```
#!/usr/bin/python
#SPAM oracle class
#####
from __future__ import division
import nltk, re, pprint
from xgoogle.search import GoogleSearch, SearchError
from urllib2 import *
import urllib, time, os, string
from xgoogle.BeautifulSoup import *
from sys import stderr
#####

user_agents = [
    'Mozilla/5.0 (Windows; U; Windows NT 5.1; it; rv:1.8.1.11) Gecko/20071127 Firefox/2.0.0.11',
    'Opera/9.25 (Windows NT 5.1; U; en)'
    'Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1; .NET CLR 1.1.4322; .NET CLR 2.0.50727)',
    'Mozilla/5.0 (compatible; Konqueror/3.5; Linux) KHTML/3.5.5 (like Gecko) (Kubuntu)',
    'Mozilla/5.0 (X11; U; Linux i686; en-US; rv:1.8.0.12) Gecko/20070731 Ubuntu/dapper-security Firefox/1.5.0.12',
    'Lynx/2.8.5rel.1 libwww-FM/2.14 SSL-MM/1.4.1 GNUTLS/1.2.9',
    'Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; en) Opera 8.50 Opera 8.5, Windows XP',
    'Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; en) Opera 8.0 Opera 8.0, Windows XP',
    'Mozilla/4.0 (compatible; MSIE 6.0; MSIE 5.5; Windows NT 5.1) Opera 7.02 [en] Opera 7.02, Windows XP',
    'Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.7.5) Gecko/20060127 Netscape/8.1'
]

class MyOpener(urllib.URLopener):
    version = choice(user_agents)

class SmartRedirectHandler(HTTPRedirectHandler):
    def http_error_301(self, req, fp, code, msg, headers):
        result = urllib2.HTTPRedirectHandler.http_error_301(self, req, fp, code, msg, headers)
        result.status = code
        return result
```

```
#####  
  
class Oracle():  
    def __init__(self):  
        self.cached_results = {}  
        self.results = []  
        self.retry = 5  
        self.words = []  
        self.url = ""  
        self.zzz = 12  
        self.wordlist = [w for w in nltk.corpus.brown.words() if w.islower()]  
    def seed(self):  
        """come up with a magic number to use as a seed """  
        t=list(time.gmtime())  
        n=t[3]+t[4]  
        n=list(str(n))  
        if len(n) == 1:  
            num=int(n[0])  
        else:  
            num=int(n[0])+int(n[1])  
        return num  
  
    def cachedresults(self,word,new_results=[]):  
        """Return cached results for word if we have them  
        otherwise add them to the dictionary  
        """  
        if word in self.cached_results:  
            print "----Cached results for :", word  
            return self.cached_results[word]  
        else:  
            self.cached_results[word]=new_results  
            return self.cached_results[word]  
  
    def opener(self,url):  
        """Open a url and return raw html """  
        try:  
            print "--opening : ", url  
            self.zzz=(random.random()+random.choice([0.3,1,1.2,2,0.3]))  
            time.sleep(self.zzz) #random sleep before we hit the web  
            w = MyOpener()  
            #print w.version  
            request = w.open(url)  
            f=request.read()  
            request.close()  
            print "--closed "  
            return f  
  
        except Exception,e:  
            raise e
```

```

def goggle(self,word):
    """Get results from google """
    try:
        results = []
        gs = GoogleSearch(word,random_agent=True)
        gs.results_per_page = 50
        hits = gs.get_results()
        for hit in hits:
            results.append(hit.url.encode('utf8'))
        return results
    except SearchError, e:
        print "Search failed: %s" % e

def get_word(self,number,url):
    """Extracts words from url """
    try:
        print "----get word starts"
        html=self.opener(url)
        if html:
            soup = BeautifulSoup(html.decode('utf-8', 'ignore'))
            clean = nltk.clean_html(html)
            tokens = nltk.word_tokenize(clean)
            tokens = [b for b in tokens if len(b) > 1]
            tokens = [c for c in tokens if not c.istitle()]
            #
            tokens = [d for d in tokens if not d[0].isdigit()]
            print "New list"
            print len(tokens), number
            if len(tokens) < 24:
                tokens = [x for x in tokens if x not in set(tokens).difference(self.wordlist)]
            else:
                print 'more than 24'
                print int(len(tokens)/2)
                #tokens = tokens[int(len(tokens))/2:len(tokens)-1]
                tokens = tokens[int(len(tokens)/2):int((len(tokens)/2)+20)]
                tokens = [x for x in tokens if x not in set(tokens).difference(self.wordlist)]
            print tokens
            print "-----t-----"
            if len(tokens) < number:
                word = tokens[-1]
            else:
                word = tokens[number]+" "+tokens[number+1]
            print word
        else:
            print "----Nothing came back. What Do I do? "
            return
    except Exception,e:
        raise e
        print e

    print "----get words end"
    return word

```

```

def makeoracle(self,words):
    s = ' '.join(self.words)
    tokens = nltk.word_tokenize(s)
    text = nltk.Text(tokens)
    tagged = nltk.pos_tag(tokens)
    grammar = "NP: {<NNS><TO><VB>}"
    cp = nltk.RegexpParser(grammar)
    result = cp.parse(tagged)
    return tokens

def oracle(self,word,x):
    self.word=word
    self.words.append(word)

    while len(self.words) < x and self.retry > 0:
        y=x

        print self.words
        print "|Number: %s |Current Word: %s |Word Count : %s" % (x, self.word, len(self.words))
        self.results = self.goggle(self.word)
        #print self.results
        try:
            print "PASS: ", x, y
            print len(self.results) ##
            if self.results:
                if len(self.results) < x:
                    print "We got Less Results than expected"
                    url=self.results[len(self.results)-1]
                else:
                    url=self.results[x]
                #print "-URL: %s For Word: %s" % (url, self.word)

                for i in range(len(self.results)):
                    #we try all results until we hit one that returns the word.
                    try:
                        self.word = self.get_word(23+x,url)
                        if self.word:
                            print "We Got The Word?", self.word
                            self.words.append(self.word)
                            self.retry=5
                            print "Retry => ", self.retry
                            break
                    except:
                        y=y-1
                        url=self.results[y]
                        print "We crapped out while trying for a word. Decrement y", y, url
                        time.sleep(self.zzz)

            else:
                print "-No results from google. Try Again"
                print "Sleeping for %s seconds... " % self.zzz
                self.zzz=(self.zzz+5)
                time.sleep(self.zzz)

        except Exception,e:
            print "Ouch !!!" ,e

```

```
        y=y-1
        self.retry=self.retry-1
        print "Retry: " , self.retry
        continue
if self.words:
    #print self.makeoracle(self.words)
    return self.makeoracle(self.words)
```

Search for *word* where *word* is something given by user interrogating.

Use a pseudo random seed '*n*' derived from the time of execution of the program

10 Pick the word which is in the *nth* result google hit, *nth* word in the resulting page

20 Get the new word and add it to the list

Do we have *n* amount of words?

If true GOTO 50 ELSE

40 GOTO 10

50 Try to make a sentence out of these words with NLTK¹⁵ (never worked perfectly)

60 END

A.7. Disclaimer

What we cannot speak about we must pass over in silence.

Wittgenstein (1921:89)

¹⁵Natural Language Toolkit.

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