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Polyphibianism: Evolving Transdisciplinarity into an Imaginary Organism of Living Knowledge

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Evolving Transdisciplinarity into an Imaginary Organism of Living Knowledge

by

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Abstract

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Polyphibianism

Evolving Transdisciplinarity into an Imaginary Organism of Living Knowledge

Transdisciplinarity emerged from the urge to grasp the elusive knowledge in the most fertile zone in between and beyond disciplines that escapes even the most elaborate interdisciplinary operations. While interdisciplinary protocol enables experts to operate within foreign disciplines, in the extreme case as diverse as art and science (by inviting artists into scientific departments and vice versa), the production of knowledge remains confined to particular domains. To transcend these confinements and access the knowledge that evades institutionalisation Basarab Nicolescu's Manifesto of Transdisciplinarity sets up conditions for an open structure to be grown outside the current compartmentalisation into a living knowledge.

This thesis imagines a possible evolution of transdisciplinarity into knowledge to be lived internally rather than learnt externally in order to overcome the anxiety in transcending the established culture of disciplinary research. By entering the transdisciplinary zone, the identity of experts-specialists dissolves, even the crudest separation into artists and scientists becomes obsolete. From the illusion of losing control over knowledge arises the fear of a return to archaic, mystic or even shamanic ways of knowing. Far from proposing a return to shamanism in its ancient forms this thesis imagines the way of polyphibianism – an imaginary

solution to navigate efficiently the protoplasmic state of knowledge that would be indigenous to culture of disciplinary researchers.

With every significant discovery the disciplinary researchers already intuitively trespass into the very zone that the Manifesto of Transdisciplinarity invites them to enter intentionally. From examination of documented introspective inquiries into their act of discovery the thesis infers the necessary sensibilities and adaptabilities of the individuals to cross the borders of their disciplines. Their seemingly lost identity is temporarily restored with the term polyphibian (analogous to amphibian) designating their ability to survive and explore multiple environments. With each change of circumstances in research a polyphibian adapts by swiftly reinventing its instinctive instruments, mutating its organs of knowing, indifferently to conventional habits of thought.

Through their introspective writings this thesis investigates the polyphibic aptitude of Henri Poincaré, Henri Bergson and Marcel Duchamp to scout at the periphery of physics, metaphysics and 'pataphysics, to intuitively anticipate the role of chance, chaos and complexity in both arts and sciences. A threshold of complexity has to be surpassed in order to bring the current apparatus of knowledge to life. Bergson's insight on laughter and dreams suggests how intellect could transcend itself. The thesis proposes to consider laughter as faculty that could induce self-awareness in the intellectual apparatus while dreams are considered to facilitate self-organisation of intellect on higher orders of awareness. In Deleuzian manner of mutating Bergson's work into Bergsonism, polyphibianism is a mutation in transcribing the code of Creative Evolution

where Bergson insisted on interdependency between the theory of knowledge and the theory of evolution.

The scholarly dispute on Bergsonian and anti-Bergsonian tendencies present in Marcel Duchamp's work is revisited in the thesis by interpreting the higher dimensional Bride as a polyphibic organism of living knowledge with access to higher orders of awareness, able to guide the Bachelor's apparatus of mechanical production and preservation of knowledge out of its predicament. Informed by peculiar Duchampian experiments that challenged both the domain of art and science the research projects in this thesis consist of an intervention at CERN that tested the impenetrability of institutionalised art-science collaborations and installation of the Interval of Suspended Judgement with high mathematical precision at the threshold between physics and 'pataphysics. With these projects the problems of categorising researchers into artists and scientists are revealed. As Deleuze suggested, to effectively formulate the problem, to realize it in multiplicity of contexts, a new concept must be invented, a new organism must be conceived. This thesis gave birth to an imaginary organism of living knowledge in order to relieve the unnecessary anxieties and to fully engage in transdisciplinary research.

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Author's declaration

Thesis submitted for the degree of Doctor of Philosophy at Plymouth University has been composed by the author, and has not been submitted for any other degree or professional qualification. The research conducted herein is the work of the author and has not formed part of any other research degree programme either at Plymouth University or at any other establishment. At no time during the registration for the degree of Doctor of Philosophy at Plymouth University has the author registered the research for any other University award without prior agreement of the Graduate Committee. The research was partially financed with the scholarship granted by the Ministry of Culture of the Republic of Slovenia.

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1. Introduction

1.1. A note on temporary terminology

Invention of auxiliary, provisional concepts is rather indispensable in resolving the issues encountered in transition from disciplinary to transdisciplinarity research, as outlined in this thesis. For this reason the reader is kindly advised to consult the appendix[i] with a provisional dictionary of terms introduced for the purpose of this thesis and terms borrowed from referential literature. Besides the notice on the temporary terms - the neologisms such as polyphibian, polyphibianism, protoplasmagora, etc., that can be safely discarded after use - a note must be taken on terminology of categories and concepts that are considered by the author to be obsolete in the context of transdisciplinarity, but are nonetheless cautiously used in combination with neologisms for a gradual transition into a territory of transdisciplinary knowledge, independent of categories and concepts.

With intermittent demonstrations of obsoleteness of specific terms throughout the thesis, the reader is invited to reflect upon the purpose and consequences of exact categorisation of research activities or "creative acts"[ii] into arts, sciences, scientific disciplines, etc., as encountered in the thesis. Considering a discovery

[i] see appendix A
[ii] see chapter 4.2.

or an invention as essentially a transdisciplinary event the role of these categorical terms appertaining to disciplinary domains is to be amended. This thesis takes account of such alterations, and attempts to grasp the most pertinent aspects of these obsolete terms, before provisionally substituting them with suggested neologisms - the always renewed neologisms, that are mutating with every usage.

The term aesthetics, for instance, is used in this thesis according to its most rudimental, original definition by Alexander Baumgarten (Hammermeister, 2002, p. 4), as a theory of sensibility, where sensibility is considered as a gnoseological faculty, that is, a faculty that produces a certain type of knowledge. In considering the aesthetic sensibility of the artist this thesis further focuses on the sensibility of the "serious artist" defined by Marshall McLuhan (1994, p. 18) as the "expert aware of the changes in sense perception." Marcel Duchamp's practice broadens the category of artist with the complementary anti-artist and an-artist, as well as by introducing the scientist into the arts (Molderings, 2010). The evolution of these categories trespassing the disciplinary is covered under the term polyphibianism.

1.2. Formulating the thesis: why polyphibianism?

1.2.1. The context of two cultures[i] and transcultures[ii]

"As a cultural anxiety, concern about the divide between the 'two cultures' essentially dates from the nineteenth century," begins S. Collini (Snow, 2012, p. ix) in his introduction to the C. P. Snow's widely known book "The Two Cultures." Before seventeenth century and the advent of "the scientific revolution" that was to establish criteria for "genuine knowledge" production, knowing nature was undertaken by the "all-embracing enterprise of philosophy," yet even with the raising standards and introducing the "experimental method" in the eighteen century, Collini (Snow, 2012, p. x) does not observe a significant separation: "the great cultural map provided by the Enlightenment's great intellectual monument, L'Encyclopédie, did not represent human knowledge as structured around a division corresponding to the later divide between 'the sciences' and 'the humanities.'"

It is therefore only relatively recently that division of knowledge and know-how divided categorically not only arts, philosophy and science, but science itself underwent disintegration into increasingly specialised scientific disciplines. In seventeenth century the "method of experiment" was shared among craftsmen,

[i] term borrowed from 1959 Rede Lecture, Two Cultures (Snow, 2012)
[ii] term borrowed from 1994 Charter of Transdisciplinarity (Nicolescu, 2002)

artisans, alchemists, metalworkers, etc. It was only in the nineteenth century that the science went through the process of isolation externally, from the "non-scientific" practices of research, and furthermore internally among sciences themselves, by disabling the communication of knowledge across disciplines. Since 1959, when C. P. Snow warned about the ostensibly irreconcilable division of researchers in two cultures, dividing and multiplying of disciplines only accelerated, but surprisingly, new hybrid cross cultures emerged.

As will be shown, with the advancement of chaos theory and theory of complexity the specialisation and separation of disciplines proliferated, while the ubiquity of complexity provided that collective protoplasmic background from which emerged the idea of transdisciplinarity - the idea of a non-empty set of knowledge in between and beyond disciplines (Nicolescu, 2002). The theory of complexity therefore reverses its effect and reintegrates in an intricate way the highly specialised disciplines into which it disintegrated science. This thesis is set in the hybrid heterogeneous cultural background where cultures of researchers as overly alienated and overly generalized as those of artists and scientists meet again in the transdisciplinary zone.

The concept of transdisciplinarity as it first occurred contemporaneously in the 1970's writings of academic researchers from dissimilar fields, such as Jean Piaget (developmental psychology and genetic epistemology), Erich Jantsch (astrophysics and cosmology), and Edgar Morin (philosophy and sociology), is recovered again in the 1990's when a Charter of Transdisciplinarity is signed by

Edgar Morin, Lima de Freitas and Basarab Nicolescu. A decade later the charter is extended by Nicolescu (2002) into a Manifesto of Transdisciplinarity, setting up conditions for transdisciplinary research to cope with increasing complexity of world problems. The evolution of transdisciplinarity into an imaginary organism of living knowledge, as proposed in this thesis, is derived from the premises of this manifesto.

1.2.2. The challenges of transdisciplinary practice

While scientific disciplines form closed structures, Nicolescu's (2002) Manifesto of Transdisciplinarity opens up the structure of knowledge to the unknown territories holistically. Even though in theory the manifesto resolves the problem of constriction and reduction of knowledge to one or few particular disciplinary domains by inviting researchers to deliberately move beyond these domains, transdisciplinary research is rarely intentionally achieved in practice. But even with the best intentions of steering a transdisciplinary project – the research is frequently reduced to inter- or multi- disciplinary project, therefore conducted within a, to some extent expanded, but nonetheless disciplinary framework.

The research questions within this thesis revolve around the problem of practicing transdisciplinarity. Although every major breakthrough discovery results from spontaneous transgression, breaking of constrictions of scientific disciplines, and is therefore, in essence, born within the transdisciplinary zone, a deliberate practice of transdisciplinary research has not yet developed. Could such practice evolve by imagining a solution? Establishing any alternative

framework would obstruct the transdisciplinary flow, segregating the transdisciplinary knowledge back into disciplines. To evolve transdisciplinary practice, this thesis instead proposes a movement of polyphibianism.

The open structure of transdisciplinarity leaves the researcher trained in disciplines disoriented. Trespassing the borders of the safe and solid framework of the known into the vague and unknown reinstates the fear of archaic, abstruse, mystic or esoteric knowledge. To avoid anxiety from transforming the area of disciplinary research environment to that of an ancient or alien culture, the purpose of this thesis is to imagine research environment indigenous to disciplinary researchers. Through study cases of introspection into processes of invention and discovery such environment can be reimagined to be recognized by researchers as their own - an environment they already inhabit spontaneously and unintentionally when the drive of curiosity is too strong to resist, and the disciplinary conventions are transgressed.

Confronting the seemingly disorienting, disorganised open structure of transdisciplinary zone poses a challenge for the disciplinary researcher. The choice to exit the safely bounded and carefully compartmentalised disciplinary structure is accompanied with anxiety. The researcher must break the habits of reasoning from a fixed standpoint and within a firm framework, resist the urge for repetition of results, and refrain from abstraction, from categorising and archiving the knowledge. Most of all, the researcher must resist representation – by suspending the reflex to model a representational system for transdisciplinary

experience only the traces are left behind the trespasser of disciplinary borders, traces without any imposing or enclosing structure, open traces inviting fellow researchers to follow in the footsteps, but to live the experience on their own terms, before returning to their disciplines.

The search for exemplary transdisciplinary practice in this thesis begins with a visual artist's refusal of visual manifestation. Marcel Duchamp, trained as "retinal" artist refused to succumb to the hegemony of the retina, of the visually dominated culture and explored what he termed the "non-retinal" art. This exploration lead to transdisciplinary practice of pseudo-artistic and pseudo-scientific experiments avoiding repetitive results of experiments – that is according to McLuhan (Picnic in Space, 1967) again the consequence of dominance of visual culture. The challenges of human sense organs, such as the all-pervading habits of visual sense based culture, obstruct the flow of transdisciplinary practice. For this reason invention of new organs of sensing and knowing in transdisciplinarity is proposed in this thesis.

Institutionalisation of disciplinary structures presents another challenge for trespassing into transdisciplinarity. Following the example of Marcel Duchamp, that submitted a readymade art anonymously under the pseudonym of R. Mutt in order to test the assertions of an art institution, another readymade was submitted under the same pseudonym licence for the purposes of this thesis to test the transdisciplinary openness to collaboration between institutions of art and science. A strong presence of institutions inhibits the incessant questioning

of categories and concepts – replacing of obsolete categories is postponed indefinitely at the cost of posing the wrong questions. Without the rigour and discipline maintained by institutions there is allegedly no exactitude in knowledge production. The aim of this thesis is to show the opposite and to introduce a mode of precision that is not limited to quantitative analysis but develops into a qualitative accuracy. Transdisciplinarity evolves organs to proficiently navigate elusive knowledge, knowledge in creation that is ceaselessly changing and evades any attempt of institutions to capture it.

To tackle the problem of engagement with the ineffable and indefinable this thesis returns to the least disciplined of disciplines – to art and its attempts to infiltrate itself in between disciplinary sciences. Marcel Duchamp, as an artist that transcended the limitations of arts, sets up the environment for transdisciplinary research by inviting the spectator to participate in his creative act, where "the spectator experiences the phenomenon of transmutation," (Duchamp, 1989, p. 139). With this invitation Duchamp is already contemplating the main inhibitor in transdisciplinary practice – the reluctance to transcend one's limitations, the aversion to one's spontaneous transmutation.

Without transmutation of the researchers into transdisciplinarians there is no transformation of disciplinary knowledge. Institutional pretension of practicing transdisciplinarity without allowing the transmutation yields inadequate results, and therefore, only strengthens the impenetrable disciplinary fortress. Whilst transmutation is effortless, Bergson (1914, p. 47) claims effort and energy is

invested in keeping the common sense, the conventions, the habits and the "discipline" of mind in place. This thesis follows Bergson's suggestions to investigate trough introspection other faculties of mind in order to liberate the intellect from its constrains, to evolve the instruments of knowing, to reintegrate the way of knowing with the environment, to eliminate the unnecessary scaffolding obstructing the direct experience of knowledge.

1.2.3. Supplanting frameworks of disciplinary research

The term polyphibian is introduced in order to substitute the classification of researchers within the context of scientific or artistic disciplines that become obsolete in the transdisciplinary territory. The neologism polyphibian, as a new term, is avoiding any connotation with the human species-specific research. Polyphibians, as researchers, are not confined to the faculty of human intellect, to the current reach of human reasoning. Rather, polyphibians relate to that faculty of research emerging from the mutual dependence between the animal and its ambient – polyphibians are the animating agent of the ambient that is driven by pure curiosity. The term polyphibian is derived from the term amphibian, denoting an animal adapted to two media, able to inhabit both aquatic and non-aquatic environments. A polyphibian is therefore apt to explore more than two environments as a transdisciplinarian, trespassing between multiple media, unconstricted by conventions of a specific artistic or scientific discipline.

Polyphibianism is the evolutionary movement of transdisciplinarity, of disciplinary knowledge transcending its boundaries by becoming self-aware, by introspectively correcting itself, by mutating and evolving into living organisms of knowledge. Polyphibianism is an imaginary solution of living the knowledge internally, through invention of organs of knowing, rather than through learning externally, extracting the knowledge via preconceived frameworks.

Polyphibianism therefore does not replace the inter-, multi-, cross- or trans-disciplinary frameworks with a new theoretical framework, but offers an interval of suspended judgement[i], where research is to be imagined as a spontaneously self-organising process, as a creative act[ii], inviting disciplinary trespassers to co-create new organs of knowing, to become newborn organisms of living knowledge. In such immediate knowing no external guidance is needed - navigation is spontaneous.

The aim of this thesis is to study the prototypes for transdisciplinary zone, how to set up the intervals of suspended judgement, what is the setting of a creative act, etc. Transdisciplinarity does not require a rigid architecture or an apparatus if transmutation into polyphibianism is effortless. All that is required for prosperous transdisciplinary practice is to reverse the effort of scientific disciplines invested in preventing such transmutation. To release the pressure of

[i] see chapter 4.2.4. on the interval of suspended judgement
[ii] see chapter 4.2. on participation in creative act

conventional science the creative act is set up by Duchamp, whose presence in public is more often in a role of a curator than in a role of an exhibiting artist. This thesis suggests to reconsider curatorship as that crucial catalytic ingredient that accelerates the creative chain reactions – the transmutations of researchers.

Suspension of judgement, participation in creative act, transmutation into polyphibians, the movement of polyphibianism - these are all effortless, spontaneous reactions, independent of any framework - activities resisting the existing framework, or working in spite of it. Proposing such effortless solution, this thesis therefore does not try to replace the closed disciplinary structure but rather carefully studies how to open it further.

The opening is initiated by removing obstructions, such as obsolete terms, that are to be supplanted by catalytic substances, such as a provisional terminology, that induces growth and expansion of imaginary solutions. With advancement of the thesis the intricacy of incisions into disciplinary structure gradually increases. The thesis is an effort to comply with the standards of disciplinary research, while concurrently emerging from transdisciplinarity, communicating the uncommunicable - the indirect immediate knowledge, demonstrating a complex complementary relation between disciplinary domain and transdisciplinarity.

1.3. Thesis Outline: a guide to polyphibianism

Polyphibianism was invented as an imaginary solution by participating in creative acts of researchers creating new knowledge on the periphery of their respective research domains and by trespassing into the transdisciplinary zone. This brief guide serves to orient the reader within the process of imagining a solution for the outlined problems of transdisciplinarity, the process of experimenting with this imaginary solution and exploring through it the transdisciplinary territory. Divided in three sections (from manifestos to methods and actions undertaken in this research) the content of each of the three chapters of the main body of the thesis is presented as a short summary of key ideas.

1.3.1. The manifestos – introduction to the second chapter

Chapter *2. Literature review* is more than a basic review of existing writings on the theme of transdisciplinarity. Rather than an extensive summary of numerous papers published in journals and conference proceedings, resulting from collaborations between researchers based in most disparate disciplinary domains, attempting to apply transdisciplinarity to a variety of specific problems, this literature review focuses thoroughly on the most fundamental ideas of transdisciplinarity, as established in the Manifesto of Transdisciplinarity, composed by Basarab Nicolescu.

While subchapter *2.2. Manifesto of Transdisciplinarity* reviews and opens up new views by imagining possible evolutionary trajectories for transdisciplinarity, the

subchapter *2.1. Across disciplines: from meta- to 'pata-* begins by returning to the disciplinary divisions and unconventional attempts to reach beyond and to overcome the separation. Just as metaphysics was established as a science beyond physics, 'pataphysics, notwithstanding serious humour, was inaugurated as science of sciences, that "lies as far beyond metaphysics as metaphysics lies beyond physics" (Shattuck, 1960, p. 29).

Although based on humour, the 'pataphysical method is not unknown to the most "serious" scientists. Even Basarab Nicolescu, as a quantum physicist, for instance, is "well acquainted with pataphysical literature" (Hugill, 2012, p. 227), and his Manifesto of Transdisciplinarity demonstrates open-mindedness to unique approaches in research. Since 'pataphysics offers valuable insights to knowledge production outside disciplinary compartments and their respective conventions, 'pataphysical literature and literature on 'pataphysics are studied as an important resource in imagining possible evolutionary trajectories for transdisciplinarity. The opportunity is taken in this chapter to compare the strategies of 'pataphysics and transdisciplinarity, side by side, as a significant reference of the context in which the research herein was conducted.

Special attention is paid to laughter, a method of comical corrective, as defined by Henri Bergson in his Essay on Laughter. The metaphysicist Bergson, namely,

is said to have influenced Alfred Jarry[i], the official originator of 'pataphysics, while other indications point to Bergson's influence on the artist and 'pataphysicist Marcel Duchamp and his method of serious humour. As is shown later in the thesis, of all physical sciences 'pataphysics comes closest to quantum physics, as well as to the theory of complexity and chaos theory. Bergson brings the faculty of laughter in connection with the faculty of imagination and dreams. Both his essay on laughter and dreams are not reviewed in the second chapter, since they are thoroughly examined in the fourth chapter.

Extensive search for transdisciplinary-inspired research across various disciplines uncovered many interesting authors, some of them listed in the first subchapter of the second chapter, whose books do not necessarily belong on a particular disciplinary shelf, but rather contribute to and borrow from many disciplines. Such would be the studies of second order cybernetic systems, natural and technological ecosystems, introspective inquiries in nature of invention and various approaches to the mystery of life and the difficulties in determining the meaning of term "living." These themes were pertinent in forecasting a possible evolution of transdisciplinarity into the imaginary organism of living knowledge – where systems of knowledge could become self-aware, awaken into life by self-correcting its limitations through humour.

[i] Alfred Jarry was Henri Bergson's student at the Lycée Henry IV in Paris.

The second subchapter begins by examining the articles of the Charter of Transdisciplinarity signed in 1994 and putting in comparison the motivation behind transdisciplinarity as envisioned in the charter and its imagined evolution. What charter outlines is then elaborated upon in the manifesto: the break of modern science from ancient ways of knowing, and consequently the separation of the observer and the observed. While the modern researcher observes from outside, the ancient researcher takes a stance within the object of knowledge - the ancient way of knowing is living the mythological knowledge (Nicolescu, 2002, p. 9). Polyphibianism reinvents the myth within the transdisciplinary zone. Polyphibians transgress the conventions of research from an "objective" point of view and move through "subjective" points of being[i] that through the movement of polyphibianism resonate into a coherent mythological organism of living knowledge.

By imagining a coherent organism of knowledge, knowing becomes immediate - the researcher is immersed in the knowledge that changes and experiences the changes by living them. Living the knowledge through points of being facilitates the most challenging requirement of transdisciplinarity – the leap from one level of reality to another – to abruptly change the point of view. Instead of considering the levels of reality as separate parallel planes with separate points of view and separate rules of reasoning, polyphibianism reintegrates the points of being into

[i] "point of being" is a term introduced by Derrick de Kerckhove (1997, p. 187), see appendix A

an organism. Whereas there is no hint in the manifesto how to switch from one viewpoint to another or from one to many, leaving the disciplinary researcher in front of an insurmountable gap between the levels, polyphibianism has an imaginary solution already incorporated: all points of being become attainable by inventing new organs of knowing with every change in the organism.

With every transdisciplinary leap new organs are invented. If organs do not mutate, the living knowledge is experienced with old organs – the polyphibian experiences abstraction of knowledge even though the living knowledge is rooted in concreteness. An example of unease at such inadequate experience is given by Nicolescu (2002, p. 19) in the case of a leap from classical to quantum mechanics: in abstract terms it is comprehensible by human intelligence, whilst in the concrete it is inaccessible to human experience as long as organs of knowing do not mutate and adapt to a different level.

By opening new levels of reality old concepts gain new values: precision on the level of quantum mechanics, for instance, is, in a sense, incomparable to that of classical mechanics. Polyphibianism takes old concepts, or even concepts becoming obsolete with the transition into transdisciplinarity, carefully into account. The concept of precision is reconsidered for the purposes of this thesis by practicing polyphibianism and precisely determining the threshold between physics and 'pataphysics. In this case the precision within the interval between the two levels of reality needs to be set up so as to satisfy both physical and

'pataphysical expectation and open up new insights. At this threshold the old concepts are to be replaced with the new organs of knowing.

Intellect, rules of reasoning, and logic are context specific. In the manifesto the relation between the environment and logic is examined – the experiential component is crucial in determining the logic (Nicolescu, 2002, p. 27). Transdisciplinarity is advised to readjust the classical logic to the logic of the included middle. 'Pataphysically, the logic that does not fit the empirical evidence can be corrected by a comical element. Again, these correctives are already built into polyphibianism. Polyphibianism and the environment are interdependent: if the medium changes the rules of reasoning change; the knowing is interrupted until the organs of knowing adapt by mutation to recent changes. The logic is immanent in the organs moving through the environment – the logic is part of what animates the environment.

In transition to quantum mechanics the "one true value" monovalent monophibic logic opened up to versions of multivalent polyphibic logic. This transition does not switch between true values or true viewpoints – all points of being are experienced in a coherent way – the polyphibian sets all the organs of knowing to a state of readiness, of awareness in which dichotomies, or rather, polychotomies[i] coexist. To the emerging versions of multivalent logic Nicolescu

[i] see Appendix A: temporary terminology, for more on polychotomies

(2002, p. 28) adds the Lupasco's logic of the included middle, or the logic of the included third, that enables all three terms of a trichotomy to exist simultaneously.

Lupasco's logic that Nicolescu assumes as suitable for transdisciplinary operations is already a significant corrective of two thirds of axioms of the classical logic. The third axiom, the axiom of identity, is corrected by polyphibianism. A monophibian transmuting into a polyphibian cannot experience a single identity through multiple points of being – A is not only A - but a multiplicity of values. The dynamics of dichotomies and polychotomies in general is what informs the invention of new instruments for new levels, or rather, new organs of knowing.

Invention of instinctive organs of knowing is problem dependent – in contrast to intellectual instruments that are generalised and therefore imperfect to serve multiple purposes, to be reused for many problems, the instinctive organs of knowing adapt immediately to a unique experience of a unique problem solution. No organ of knowing is to be transferred to another experience neither of this or another problem. This requirement is added to transdisciplinarity in its evolution into polyphibianism. The disciplinary sciences are already sensing the need for these highly specialised inventions. The reintegration of sciences within the transdisciplinary zone is to happen through accelerated hyper specialisation. Surpassing the speed of intellect brings the instrument in the immediate reach of the organism that knows itself. The instruments become the instinctive organs

that specialise for the unique rather than generalise. In the economy of knowledge where the exceptional is cheaper than the general in the long run, the physics of invention is becoming 'pataphysical.

As was explained before, complexity increased the specialisation and the exit is on the other side – specialisation and customisation of techno scientific solution needs to increase to a critical point where it comically corrects itself into a coherent resonating cramps of laughter. Transdisciplinary goes against simplification – polyphibianism evolves transdisciplinarity by multiplication of organs of knowing and points of being into a system so complex that a form of organisation emerges – an organism comes to life. The living knowledge is not about clarifying everything within a few laws – the knowledge is not to be comprehended by lesser number of laws – to know more directly and immediately is to experience the entirety of the knowledge by becoming the organism of knowledge.

It is important to highlight that the disciplines are reintegrating within the transdisciplinary zone due to theory of complexity that caused disciplinary specialisation in the first place. Like laughter, complexity caused a burst of the disciplinary apparatus into even more disciplines that are now so interdependent that the reintegration within transdisciplinarity becomes inevitable. But for this only one factor is missing – it is the adaptability of the human intellect that must just as well correct itself by bursting into laughter and then recollect itself on emerging orders of organisation – in other words the human reasoning and

judgement needs to be halted – suspended for a moment to be able to reorganise and adapt to different orders of awareness.

The manifesto (Nicolescu, 2002, p. 54) proposes to resist the manifestation, the representation, preservation and the intermediary interfaces between the observer and the observed. Immediate knowledge must resist these interfaces, these instruments and categories of knowing, resist the convenience of old habits, old sense, old organs and invent new organs. The manifesto finds resistance in the interior knowledge, the introspective, internalised speculation. This is taken as the entry point into polyphibianism. Polyphibianism comes from resisting representation, suspending judgement, avoiding translation, working through silence, accepting the noise, chance, chaos, complexity.

1.3.2. The methods – introduction to the third chapter

Chapter *3. Research Methodology* is divided into three subchapters, each of which presents a different aspect of methodology applied in this research: the method of introspection, the method of indifference and an attempt not to invent concepts but conceive organisms of knowledge. In this attempt an auxiliary method of infradifferentiation is applied through which dichotomies, trichotomies and even polychotomies are resolved into new organs of knowing. The methods are studied within the historical context of this thesis as practiced by the three individuals – the three case studies of this research – Marcel Duchamp, Henri Bergson and Henri Poincaré. This chapter therefore serves as methodological as well as a historical and theoretical background for this research. The methods

described herein are applied by participating in creative act as described in the fourth chapter.

Subchapter *3.1. Anticipating chaos: method of introspection* describes the impact of discovering chance, serendipity and unpredictability within deterministic systems on scientific, philosophic and artistic research. Chance only occurs in a contained, isolated, deterministically-sterile, chance–free system, if the system develops a sensitivity to certain initial conditions. To anticipate chaos one needs to develop a sensitivity to sense such sensitivity. It is shown how Poincaré not only anticipates chaos, but invents unprecedented tools of knowing such chaotically behaving dynamical systems by introducing qualitative analysis in science of physics that until then relied on quantitative analysis.

In order to cause such a paradigm shift in science the scientist must be willing to inspect thoroughly the scientific method, and this inspection includes the introspection in one's own method of thinking. Poincaré, in his extensive writings on scientific method, expands on the reach of sensitivity required to detect chance in deterministic systems to detect "chance" in the way science proceeds – concluding that science is founded on "conventions" (Poincaré, 1913). Transdisciplinarity enables the shifting of paradigms by finding the inconvenient convention within contained and sterile disciplines. While containment is convenient in ordinary conditions, facilitating disciplined research, for certain initial conditions, inconvenience might arise and cause disciplinary chaos – which only a trained transdisciplinarian can manage.

Poincaré, faced with a problem where an unattainable amount of information is required to determine the behaviour of a deterministic system, did not surrender. Instead, he faced the problem differently, from different points of being. Poincaré switched from a quantifiable analysis to a new kind of analysis of qualities of the system for which the instruments yet needed to be invented. Poincaré's sensibility to detect chaos and his ability to invent tools for further detection and description of chaotic behaviour comes from his critical approach to existent research methods. Namely Poincaré introspectively questioned why, as a scientist, one seeks to know a system in a certain way, examining whether the choice is simply one of convenience, and if there are even more convenient choices, imagining how one could know the system in another unconventional way that would uncover even more pertinent information about it.

While Poincaré was formalising qualitative analysis in physics, Bergson was struggling to express his preference over qualitative way of knowing in metaphysics. It takes almost half a century and invention of computers for the chaos theory to be established, for state space to supplement classical space, for fractal dimension to enrich integer spatial dimensions, etc. Chaos theory informs and influences most diverse disciplines. In philosophy, suddenly, the irreconcilable dichotomies can be imagined as mapped on diagrams and resolved as a system of tensions that operate in proximity and yet diverge far apart. Paul Harris (2004) shows how difficulties encountered by Bergson in representing his metaphysical ideas can be resolved diagrammatically, analogous to diagrams of chaotic systems.

The complexity of nature that Bergson discerned through intuition is hardly conveyable in linear language of intellect. These difficulties are comparable to Poincaré's frustrations in describing the complexity of a seemingly simple deterministic system with available mathematical tools, leading to invention of new instruments. Harris (2004) proposes to apply these instruments to Bergson's metaphysics by "reverse- translating" Bergson's intuition from linear language to nonlinear diagrams.

In so doing the term of movement, for instance, that Bergson tries to differentiate from projection of trajectory onto a homogeneous space, becomes presentable in a phase space, as envisioned by Poincaré. This new kind of space, in which movement is to be comprehended, is not anymore homogeneously articulated but follows the articulation of the movement. A mutual dependence between a movement and the phase space, in which it is represented, is in fact an interdependence between a phenomenon and the instrument.

The most important thing that Duchamp learned from Poincaré is that scientific methods are guided by convenience and not by "truth" and that with every new intuition new instruments must be invented. Duchamp, in his most "iconic" art-science experiment, the 3 Standard Stoppages, questions the conventions and gains an insight into problems of the unit of length, problems of Euclidian geometry, and humorously devises new instruments to form new kind of non-Euclidian, heterogeneous spaces. Duchamp gradually becomes aware of the

extent of implications the 3 standard stoppages, as a chance operation based work, had on his entire oeuvre.

Transdisciplinarity emerges when chance operations are introduced into a sterile disciplinary methodology. The search for transdisciplinarity niches within the disciplinary compartments is based on finding the sensitivity of disciplinary methodology to initial conditions. The role of the artist entering the scientific department is to test what happens if conditions in reasoning slightly change. If a long term divergence into multiple trajectories of research is imaginable, the disciplinary scientist transmutes into a transdisciplinarian – a polyphibian able to imagine a diagram of all trajectories of the system in a state space.

Dependence of methodology on initial conditions is dependence on conventions, on scientific apparatus. The independence is regained in the transdisciplinary zone. If introducing chance in regulated disciplinary departments causes chaos that only transdisciplinarians can handle, it is worth remembering that chaos has windows of periodicity and that order can be re-established. Transdisciplinarity accommodates windows of disciplined standardised research. Bergson, Poincaré and even Duchamp to some extent recognise and benefit from such windows of orderly experience. The organism of living knowledge is precisely such self-organising system in which ever new patterns of order appear and disappear again.

Subchapter *3.2. Aesthetic Anaesthesia: method of indifference* confronts the role of aesthetics in a scientific discovery, as presented by Poincaré, with Duchamp's

proposal of complete aesthetic indifference. Dichotomous tension between Poincaré's and Duchamp's approach to aesthetics intensifies with the concept of a "sieve," used by both as a selectively permeable membrane. The term aesthetics is reconsidered within its original definition as the faculty of sensitivity (Hammermeister, 2002), and compared to the specific sensitivity in a "serious artists," as identified by McLuhan.

To understand the sensibility of the artist one needs to reconsider the use of the sense organs. Marshall McLuhan (1994) studies artist's recognition of changes in sensing caused by changes in the technological media landscape. It is shown through the theories of sense perception that human senses, as they are formally categorised, like any other category questioned in this thesis, might become obsolete. It was James Jerome Gibson (1983) who first proposed obsoleteness of such categorisation in his study of system of perception. Gibson proposes uniting the observer and the observed instead of isolating the senses of perception from the environment that is being perceived.

On the other hand, Georg von Békésy (1960), researching the sense of hearing, suggests that the auditory perception differs from the visual, as a mosaic image differs from an image drawn in perspective. From Békésy's comparison of the ubiquitous multidimensional space of acoustic information to the visual information trapped in the perspectival space reduced to a vanishing point, McLuhan has adopted the mosaic model as the model of ubiquitous multidimensional electronic culture. By associating the space of electronic culture

to the space of acoustic tribal culture, where sounds and meanings come into resonance, McLuhan develops further the model of the mosaic way of knowing.

Gibson (1983) ponders upon how the information is picked up by, what he terms, perceptual systems, wondering whether the perceptual system of what animates the environment evolved so as to resonate with the information from the environment. Following this proposition the polyphibic organs of knowledge are imagined so as to pick up information that resonates with them. The organism of knowledge must invent the organs of knowing so that the observer and the observed come into resonance. The environment introspects itself through the perception systems of the observers; the transdisciplinary organism of knowledge knows itself through its organs.

Gibson (1983) discussing the shifting of the eye in relation to shifting of attention elaborates on a dichotomous tension in attention, that can be simultaneously "selective" as well as "integrative," "distributed" as well as "concentrated," thus providing a mosaic model of a shifting viewpoint from which a polyphibic awareness emerges. Polyphibic awareness is awareness in a mosaic mode where illusion of a single point of view dissolves into multiple points of being, integrating multiplicity of experiences. A coherent experience arising from multiple points of being constitutes a polyphibian. Borrowing Gibson's terms, transdisciplinarity evolves into a polyphibic "act of scanning," where polyphibianism is a movement of knowledge with "no pure fixation," no categorisation, no conceptualisation.

Subchapter *3.3. Inventing concepts - conceiving organisms* takes the Deleuzian philosophical method of inventing concepts within classical format of knowledge to a different order of conceiving organisms of living knowledge. The subchapter begins by "reiterating" Deleuze's "rewriting" of Bergson into Bergsonism until Polyphibianism is obtained. Deleuze (1991, p. 16) in Bergsonism already implies the connection between inventing a concept and imagining a solution as a living organism: "Life is essentially determined in the act of avoiding obstacles, stating and solving a problem. The construction of the organism is both the stating of a problem and a solution."

Bergsonism follows Bergson's criteria of accuracy when stating problems to avoid creation of "false problems." Bergson's examples of false problems include the problem of dis-order. Bergson claims there is no such thing as an absence of order. By trespassing the order of disciplinary domain one does not come across disorder, but rather a different order of knowledge. Transdisciplinarity enables new insights to qualify as a new kind of knowledge, just as intellectual external order of knowing differs in kind from intuitive internalised knowing.

The anxiety of engaging with transdisciplinarity is partially rooted in the false premise that if knowledge is produced by disciplinary science, then anything outside this production line cannot be considered knowledge. The third chapter attempts to distinguish the order of transdisciplinary production or rather growth of living knowledge as complementary to disciplinary methodology, uncovering their intricate interpenetration. Within the transdisciplinary "chaos,"

that is not "dis-order" but different kind of unexpected order, there are windows of expected disciplinary order. Transdisciplinary practice is challenged by the inability of disciplinary research to recognise new kinds of orders. Polyphibianism, as a solution, must thus provide the ability to recognise and move in between particular orders of knowing.

Avoiding falsely stated problems, and being versatile in reformulating problems with precision yields precise instruments or organs of knowing. From attempts to restate these problems accurately, by trial and error, polyphibianism evolves as an imaginary solution at the threshold between disciplinary and transdisciplinary research. Precision in transdisciplinarity is achieved by self-awareness of the critical points at which the organism of knowledge changes in kind – it is newborn. Disciplinary knowledge changes only to a degree, it increases in quantity but it does not mutate in quality. Unaware of its critical points, the disciplinary knowledge is arbitrarily divided into a conveniently homogeneous lifeless structure.

Transdisciplinarity relies on multiplicity of orders. Multiplicity, as proposed by Deleuze (1991), is not numerical, not reducible to difference in degree, but heterogeneous. Polyphibian, as a multiplicity of points of being, each of them irreplaceable and irreducible to the other, complies with this Deleuzian requirement. After examining Deleuze's encounter with Bergson and reinterpreting Bergson through Bergsonism into Polyphibianism, further

encounters are set up in which dichotomies, trichotomies and polychotomies are resolved by recognising new orders with new organs of knowing.

The encounter of Bergson and McLuhan touches a problem in science. Both Bergson and McLuhan independently assert that science relies on continuity and therefore attribute this tendency to the intellect, while instinct, in contrast, according to Bergson and McLuhan, prefers discontinuity. In search for an analogy describing the relation between these two faculties both Bergson and McLuhan turn to senses. Bergson compares vision to instinct and touch to intellect. McLuhan, on the contrary, compares visual culture to intellect, while a cluster of acoustic–tactile–kinetic senses is compared to instinctive, tribal culture. Although both claim the same fact about science, their analogies are exactly the opposite, thus forming a dichotomy.

Unless this dichotomy is taken beyond closed categories, it is meaningless. Examining more closely Bergson's line of thought it becomes clear that vision, as knowing at a distance, and touch, as knowing in continuity, refer to the knowing through senses prior to cultural interpretation of sense data. Namely, visual culture interprets discrete visual information into a more convenient continuous form. It is in this context, of a different order, that McLuhan compares the visual to continuous. From this simple example it is not difficult to see how discerning dichotomies can yield differentiation of existing and growth of new knowledge. The tension in imagining the visual as at once continuous and discontinuous

differentiates the visual knowledge in two different orders, or rather in two different organs of knowing.

The encounter of Duchamp, Bergson and Poincaré is investigated within a detailed historical perspective on the state of affairs in sciences of physics, metaphysics and 'pataphysics. This example shows the complex tension in the much disputed question whether Duchamp was Bergsonist or anti-Bergsonist, whether he was a devoted admirer of Poincaré or just joking about it. The complexity of this debate far surpasses the simple question of the previous example. Rather than trying to finally determine the tendencies of either of these three individuals, this research follows how they trespassed the boundaries of their respective domains from physics to metaphysics into 'pataphysics.

The historical dispute occurring among French intellectuals, documented in the journal "Revue de métaphysique et de morale," questions deeply the values and principles of science (Molderings, 2010). This journal published article after article of Éduard Le Roy, the mathematician, philosopher and proponent of Bergson, and of his opponents. Le Roy was criticising what came to be known as the "conventionalist" science – term appropriated from Poincaré's remark that most of the principles and laws of science were nothing but conventions. The dispute escalated from a critique of the quantitative approach to knowledge vs. qualitative – the only approach Le Roy claimed to be able to access the real source of knowledge. His "antiscientific" views exaggerated Poincaré's remark to the

point that Poincaré himself had to intervene, responding to the same journal by labelling the Bergsonist Le Roy's writings as "anti-intellectual."

As is shown at the beginning of the third chapter both Bergson and Poincaré move beyond quantitative analysis. While Bergson merely prefers the qualitative and heterogeneous experience of knowledge over the homogenised and quantifiable scientific knowledge, Poincaré, confronted with chaos, immediately makes a breakthrough by inventing instruments of qualitative analysis. Without expressing it, Bergson and Poincaré were both fundamentally in accordance with the science of the unique, the science that does not follow conventions but only exceptions, the science of 'pataphysics.

Namely, this historical dispute originates from Poincaré's questioning of the science of the general in his introspective inquiry into scientific method that uncovers the motives and the necessity for generalisation. If one considers the generalisation into laws as a matter of convention, then one could consider physics as no less arbitrary than 'pataphysics. In their introspective investigation of scientific way of knowing, Bergson and Poincaré cross the fields of physics and metaphysics to reach 'pataphysics; both return to their respective domains with analogies of diffusion or random motions of molecules through membranes or filters, in order to describe the process of coming into knowing. For this purpose Bergson mostly applies the term osmosis, Poincaré focuses on the term sieve, and Duchamp puts both terms into practice – the sieves are physically present in the Large Glass, while metaphysically, in the invitation to participate in the creative

act of the Large Glass, the "transference from the artist to the spectator in the form of an aesthetic osmosis [is] taking place through the inert matter" (Duchamp, 1989, p. 139).

Another term used by all three participants in this encounter is "readymade," the use of which is examined separately for Duchamp, Bergson and Poincaré. While Bergson considers readymades in his study on laughter and Poincaré in the form of ideas, Duchamp makes a limited number of readymades per year. Differentiation of the meaning of each such term must be done accurately. For the purposes of this research the method of such precise incision into a concept that includes irreconcilable oppositions is devised – the method of infradifferentiation – differentiation with an infrathin cut that uncovers different points of being through which a phenomenon can be experienced simultaneously in a polyphibic awareness.

1.3.3. The actions – introduction to the fourth chapter

Chapter *4. Research act and its evolution* is an enactment of the methodology devised in the third chapter and of the theory revised in the second chapter. Since the main purpose of the thesis is to encourage engagement in transdisciplinary practice, experiments in practice became part of the research. The experimental practice is based on the lectures Creative Act, by Duchamp (1989), and Act of Creation, by Deleuze (2006). While Duchamp invites the posterity to continue his work, Deleuze sets the example himself by continuing Bergson's work into Bergsonism. Participating in metaphysical and 'pataphysical creations of

Bergson and Duchamp through a set of experiments generated imaginary solutions for participating in the transdisciplinary zone.

The tangentially metaphysical experiment, referred to in the subchapter *4.1. Participating in a creative evolution*, follows Bergson's effort to establish a mutual dependence between the theory of evolution and the theory of life, by suggesting: if life, that is, evolution of life-forms, proceeds by "dissociation," "division," "dichotomy," so should the evolution of forms of knowledge. From imaginary interpretation of his seminal work Creative Evolution, and his two supplementary essays on laughter and dreams, an imaginary organism of living knowledge is grown.

The tangentially 'pataphysical set of experiments, are accounted for in the subchapter *4.2. Participating in a creative act*: from accurately re-enacting Duchampian interventions under Duchamp's pseudonym R. Mutt to upgrading the notion of readymades. Duchamp's seminal unfinished work, the Large Glass, initiated and first announced in the Box of 1914, is reused as a set of instruments in interaction with the Small Glass, in the context of Large Hadron Collider. The outcomes of experiments such as the discovery of the threshold between physics and 'pataphysics with the utmost mathematical precision, or the 'pataphysically derived geometry of phractals, are announced in the Box of 2014.

By practicing participation in transdisciplinary act new insights are gained, new organs of knowing are invented and Duchamp's instructions for participation in Creative Act can be updated. Since, as Duchamp (1989, p. 139) notices, "in the

chain of reactions accompanying the creative act, a link is missing," the purpose of experimentation is to imagine a solution, an imaginary link, a catalytic substance that accelerates the chain reaction between the artist and the spectator. The role of a catalyst is assigned to the curator – whose classical role of mediation between the artist and the spectator is upgraded to acceleration and hence proceeding from disappearance of mediation to immediate experience of living knowledge.

Implementing the curator within Duchamp's instructions for creative act does not come as a surprise, considering how Duchamp in his public role performs, just as much, if not more, as a curator rather than as a prolific artist, curating exhibitions[i] in preference to exhibiting. He is neither eager to promote his art work, nor are his pursuits to "make works which are not works of 'art'"[ii] straightforward artistic. On the other hand, it is clear from his writings and his meticulous preservation and restorations of his works that he is investing in posterity (Duchamp, 1989, p. 140), in an ever changing postproduction of his creative act.

Most of all, Duchamp remains a silent curator. The creative act that Duchamp initiates in silence is a true transdisciplinary act, in the sense Nicolescu (2002, p.

[i] Duchamp was invited to design exhibition spaces for Surrealist shows: in Paris "International Surrealist Exhibition," in 1938, and "Exposition Internationale du Surréalisme," in 1947, and a Surrealist show in New York "First Papers of Surrealism" in 1942

[ii] Duchamp's note of 1913, published in Naumann (1999, p. 74)

101) explains silence as the element resisting representation and interpretation. In the same sense Deleuze (2006, p. 322) treats the act of resisting communication in the context of an act of creation. Duchamp hence is not merely a disruptive artist or an indifferent anartist, but readily enacts the role of the silent element, of the missing link, that he refuses to specify. Duchamp as a curator affords the spectator to participate in immediate creation by resisting communication, or rather, by reducing the interval of communication to the precise dimension of infrathin, in other words, by accelerating mediation to immediacy.

Participating in a transdisciplinarity act is envisioned in this thesis as experiencing immediate knowledge by living it through the movement of polyphibianism, that is, by changing immediately with the changes in the organism of knowledge, by being incessantly newborn into it. Such requirement was stated by Poincaré (1913) as ludicrous and unthinkable or at least impractical in practicing disciplinary science – the science of the general. Poincaré was well aware of the human need to generalise in order to survive, that is, he was well aware of the urge to ignore the pervasive uniqueness of all phenomena, formally recognised only by the science of exceptions.

Equating the unequal is considered a prerequisite for advancement of physics, and yet quantum physics progressing with accelerating speed at the periphery of physics and almost touching 'pataphysics, proved otherwise. Duchamp, as a 'pataphysicist could not have conformed to generalisation and took Poincaré's (1913, p. 363) discouragement from being as a "new-born babe […] before each

new object," as a challenge. The intervention under the pseudonym R. Mutt, as a part of Duchampian transdisciplinary practice undertaken for the purposes of the thesis, is deliberately operating at that threshold between physics and 'pataphysics at the quantum scale, deriving polyphibianism tangentially from 'pataphysics, growing polyphibic organs for knowing the unique - organs that mutate with the organism that is incessantly newborn.

Transdisciplinary zone is envisioned as a safety zone that guaranties survival of the transdisciplinarian species despite their tendency to avoid generalisation. The need for such safety zone was confirmed with the intervention at CERN - the institution of the science of the general, and yet operating at the fringes of the unique. Therefore, for safety reasons, an Interval of Suspended Judgement was requested for the programme Collide@CERN that organised collision of the institutions of art and science – Ars Electronica and CERN – when CERN was at the verge of discovering the particle responsible for mass in 2012. The intervention proposed to upgrade the original design for ASCOT apparatus within ATLAS detector with the readymade ASCO2.T in order to experience their discoveries immediately from multiple points of being, thus, in transdisciplinary manner, resisting representation – resisting the disciplinary urge for processing and presenting enormous quantities of information.

Every installation of the Interval of Suspended Judgement is context-dependent. In the specific context of CERN both the procedures of physics and 'pataphysics were precisely followed in order to locate the infrathin threshold. Intervals of

Suspended Judgement are intricate incisions into the disciplinary structure of knowledge that enable growth by further differentiation of knowledge into different kinds - an evolution of transdisciplinary organism of living knowledge. Participation in the Creative Evolution where Bergson merges the categories of life, evolution and knowledge was instrumental in order to imagine such evolution of living knowledge.

Suspension of judgement is achieved by releasing the tension in the rigid intellectual framework that is obstructing the movement of living knowledge. Bergson suggests that the intellect can self-correct with its faculty of laughter. The comical, as the corrective for the automated or archived lifeless knowledge is, according to Bergson (2008, p. 3b), intimately connected to life: "We shall not aim at imprisoning the comic spirit within a definition. We regard it, above all, as a living thing." An idea for Bergson (2008, p. 12a) "must be changing every moment, for to cease to change would be to cease to live," hence the knowledge that ceases to live becomes a laughing matter.

Bergson's essay on laughter prepares the mind-set necessary for the evolution of living knowledge that ceaselessly corrects itself - mutating and adapting to changes: laughter operates in absence of emotions. Indifference to emotions is complemented with indifference to conventions. Bergson's essay on dreams, namely, considers dreaming as sleeping towards conventional reality and awakening towards its periphery. Bergson furthermore connects the logic of dreams to the logic of laughter. Just as Nicolescu introduces Lupasco's logic of

the included middle to operate on multiple levels of reality, the logic of the absurd and the comical relax the tension of a polychotomy by resolving it from multiple points of being.

Through his introspective exploration of his own dreams Bergson (1914, p. 50) comes to a conclusion: "we perceive still, we remember still, we reason still. Abundance, in the domain of the mind, does not mean effort. What requires an effort is the precision of adjustment." Just like osmosis, the faculty of dreaming, imagining or inventing, is effortless, if there is no energy invested in preventing it. Knowing through transdisciplinarity is spontaneous, while knowing within the disciplinary domains requires the energy for adjustment to convention, for preventing the changes. Likewise Duchamp, as a transdisciplinarian, declared himself as a do-nothing: "the public began to take literally Duchamp's pronouncement that he preferred 'living rather than working,' by accepting his self-description 'I am a breather'" (Judovitz, 1995, p. 196). The method of "do-nothing" is a method of osmosis. Participation in a creative transdisciplinary act, is not a matter of assembling, but rather of disassembling the structures that are preventing the transmutation of a disciplinary researcher.

The evolution of transdisciplinary knowledge in this thesis is imagined as evolution of an organism, while taking into account the interdependent relation of the organism and its environment. Polyphibianism could be envisioned as an animating agent, and its ambient would be a protoplasmic background – an arena nurturing polyphibians with the substance of life – a protoplasmagora.

And yet such predetermined interdependency, as a fixed set of active and passive roles, would not suffice for the level of complexity required for the living knowledge to emerge. Rather, the roles of figure and ground must be dynamically interchangeable. Like a protoplasm differentiates itself into living and non-living constituents through metabolism, the role of the living and non-living is intermittently switching. The protoplasmagora metabolises polyphibianism into itself, while polyphibianism in turn feeds on protoplasmagora. The metabolic products of this process are extracted as disciplinary knowledge or employed to grow new transdisciplinary knowledge.

The open structure of transdisciplinary knowledge, as anticipated by Nicolescu (2002), implies its unconstrained growth. Polyphibianism is an elaboration on how such growth could be conceivable without compromising the assumptions of living knowledge. The archived and conserved disciplinary knowledge never grows old, and yet it is never young, never newborn. To preserve life of transdisciplinary knowledge it must remain young while growing and maturing. Transdisciplinary zone covers a limited area in between the disciplinary compartments that expands with eventual further compartmentalisation of disciplines, but this expansion within the closed disciplinary structure is, in principle, restricted. The growth of transdisciplinary knowledge therefore is not so much in the direction of expansion, of conquering more disciplinary space, as it is in direction of intensifying – growing increasingly intricate structures internally.

Bergson (2005, p. 23) facilitates imagination of such open living structure: "what is properly vital in growing old is the insensible, infinitely graduated, continuance of the change of form." Anticipating chaos theory and theory of complexity in his inquiries in living, evolving systems, Bergson's descriptions surpass the then existing notions of space and spatial geometry. If invention of fractal geometry brought scientific descriptions closer to complexity of nature what kind of geometry would bring them even closer to life? What would be a comical corrective to limitations of fractals – a corrective to their overall disciplined repetitiveness? As 'pataphysics corrects finances into phynances (Jarry, 1994, p. 58), the self-similarity of fractals is complemented with self-diversity of phractals.

As was exposed in the third chapter, Bergson, limited by linear language, lacked the instruments to express his ideas that anticipated the chaotic, complex reality. Only with the advent of chaos theory could his ideas be translated into diagrams of chaotic systems. The fourth chapter attempts to imagine new tools for the anticipated transdisciplinary practice. The language in this chapter occasionally escapes over the threshold of transdisciplinarity, by complementing mathematical and poetical language, the rare languages that transcend the disciplinary borders.

Polyphibianism can at best be referred to in a language indifferent to conventions, in the language of the imaginary. Conceiving a polyphibic geometry of phractals as a crossover of mathematics and poetry is already a form of

inventing new organs of knowing. Conceiving a geometry that becomes self-aware, that is self-correcting its fractal repetitiveness, might be just a question of precision in imagination. Phractals are pseudo-recursive transdisciplinary formulas that are bending the rules and enfolding exceptions within the pores, to live the knowledge in a continuity of change.

2. Literature review

Although it is not the most recommended order of things, the sequence in which the research for this thesis proceeded is surely no exception. Rather than reading thoroughly the literature on a specific topic to form an idea of a hypothesis, this research was driven by a readymade idea, an imaginary proposition that was only post festum, after first manifestations, provided a context within existing literature and that found purposefulness in possible applications to the area of art - science collaborations and within the transdisciplinary zone in general. Literature that would confirm similar line of though was sought for, literature that seems rather similar but is only tangentially concerned with the matter is also mentioned. This chapter does not only present and summarise the most relevant items from this thesis' bibliography, it serves also as an introduction to most pertinent topics in the specific context of this research. Most emphasis will be given here to domain of 'pataphysics that transcends both physics and metaphysics and of course to transdisciplinarity that is beyond all enclosed disciplinary domains.

2.1. Across disciplines: from meta- to 'pata-

Reviewing literature across disciplines will not be limited to established disciplines with long tradition, like physics or metaphysics. On the contrary, with the intention of a critical stance in this thesis, this literature review begins within disciplines that critiqued or even offered a comical corrective to the traditional

disciplines. Such is the pseudo-discipline of 'pataphysics that has a non-negligible tradition of more than a century of practice, with laughter being its most elaborate technique. A quote of 'pataphysicist Rene Daumal (2012, pp. 3-5) that wrote extensively on the topic of 'pataphysical laughter, serves as an appropriate introduction:

> I maintain and I know that pataphysics is not a simple laughing matter. And if we pataphysicians often feel our limbs shaken by laughter, it is the dreadful laughter from facing the evidence that each thing is precisely (and how arbitrarily!) just as it is and not otherwise, that I exist without being everything, that it's grotesque and that all defined existence is a scandal. […] Pataphysical laughter is the keen awareness of a duality both absurd and undeniable. In this sense it is the one human expression of the identity of opposites (and, what is remarkable, in a universal language). […] laughter is begotten in its dialectical forward march:
>
> I am Universal, I burst;
>
> I am particular, I contract;
>
> I become the Universal, *I laugh*.

Since the inventor of science of 'pataphysics, Alfred Jarry, whose work is by and large humorous, has attended classes of professor Henri Bergson, who wrote an essay on laughter[i], it has been inferred by experts[ii] on 'pataphysics that Bergson's work, had a great impact on Jarry and can be considered as fundamental in

[i] see chapter 4.1.1. for more in depth exploration of Bergson's notion of laughter

[ii] Anthony Enns, the author of the chapter "Beyond Laughter" published in (Clements, 2002) mentions Roger Shattuck, as a proponent of Bergson's theory of laughter being highly influential for Jarry, and yet Enns argues for Nietzsche's theory of laughter to be even more relevant. It is beyond the scope of this thesis to pursue this dispute.

appreciating Jarry's work (Clements, 2002, p. 42). By relating laughter to intellect, that is, by taking laughter seriously, as an intellectual faculty, Bergson unravelled the peripheral area of the intellect, crucial for the research undertaken in this thesis, where the intellect can self-correct, by applying a sort of comical corrective. His essays on laughter (Bergson, 2008) and dreams (Bergson, 1914) are very closely related and extensively dealt with in this thesis.

Undoubtedly the 'pataphysical mind-set played an important role in setting up the art-research projects for this thesis, but unfortunately it is quite impossible to delineate 'pataphysical methodology, without falling into trap, let alone to define 'pataphysics itself. As Hugill (2012, p. 1) explains: "To define it is merely to indicate a possible meaning, which when diurnally interpolated with the first meaning, will point toward a third meaning which will in turn elude definition because of the fourth element that is missing."

More specifically, Hugill (2012, p. 3) finds the concept of definition in itself "unpataphysical," asking "how can a definition be exceptional, or contain its own contradictions." Definition, by definition, therefore does not fulfil even the most rudimentary of 'pataphysical requirements. Nonetheless the readers of this thesis should familiarise themselves with the "theory" of 'pataphysics, and the most suitable place to search for a "definition" would be in the chapter "Elements of Pataphysics" from the book *Exploits and Opinions of Doctor Faustroll, Pataphysician*, written by Jarry (1996, pp. 21, 22):

> An epiphenomenon is that which is superinduced upon a phenomenon. Pataphysics, whose etymological spelling should be επι (μετα τα φυσικα) and actual orthography 'pataphysics, preceded by an apostrophe so as to avoid a simple pun, is the science of that which is superinduced upon metaphysics, whether within or beyond the latter's limitations, extending as far beyond metaphysics as the latter extends beyond physics. Ex: an epiphenomenon being often accidental, pataphysics will be, above all, the science of the particular, despite the common opinion that the only science is that of the general. Pataphysics will examine the laws governing exceptions, and will explain the universe supplementary to this one; or, less ambitiously, will describe a universe which can be - and perhaps should be - envisaged in the place of the traditional one, since the laws that are supposed to have been discovered in the traditional universe are also correlations of exceptions, albeit more frequent ones, but in any case accidental data which, reduced to the status of unexceptional exceptions, possess no longer even the virtue of originality. DEFINITION. Pataphysics is the science of imaginary solutions, which symbolically attributes the properties of objects, described by their virtuality, to their lineaments.

This thesis takes such an imaginary solution and examines it thoroughly, testing it in various contexts with the aim to assess the potential of authentic art research as an alternative model to knowledge production. The value of such a speculative research is precisely in its originality, in imagining the yet unimaginable, in invention of instruments and imaginary solutions. Shattuck summarises the main principles of 'pataphyics that to a certain extent guided also the thought experiments conducted for this thesis. What follows is an abridged version of Shattuck's (1960, pp. 27-30) attempt to explain 'pataphysics to outsiders, outside its domain, in "non-pataphysical terms:"

> 1. 'Pataphysics is the science of the realm beyond metaphysics; or, 'Pataphysics lies as far beyond metaphysics as metaphysics lies beyond physics - in one direction or another. Now, metaphysics is a word which can mean exactly what one wants

it to mean, whence its continuing popularity. To Aristotle it meant merely the field of speculation he took up after physics. The pataphysician beholds the entire created universe, and all others with it, and sees that they are neither good nor bad but pataphysical. […]

2. 'Pataphysics is the science of the particular, of laws governing exceptions. The realm beyond metaphysics will not be reached by vaster and vaster generalities; this has been the error of contemporary thought. A return to the particular shows that every event determines a law, a particular law. 'Pataphysics relates each thing and each event not to any generality (a mere plastering over of exceptions) but to the singularity that makes it an exception. Thus the science of 'Pataphysics attempts no cures, envisages no progress, distrusts all claims of "improvement" in the state of things, and remains innocent of any message. 'Pataphysics is pure science, lawless and therefore impossible to outlaw.

3. 'Pataphysics is the science of imaginary solutions. In the realm of the particular, every event arises from an infinite number of causes. All solutions, therefore, to particular problems, all attributions of cause and effect, are based on arbitrary choice, another term for scientific imagination. […] 'Pataphysics welcomes all scientific theories (they are getting better and better) and treats each one not as a generality but as an attempt, sometimes heroic and sometimes pathetic, to pin down one point of view as "real." […] The idea of "truth" is the most imaginary of all solutions.

4. For 'Pataphysics, all things are equal. The pataphysician not only accepts no final scientific explanation of the universe, he also rejects all values, moral, esthetic, and otherwise. The principle of universal equivalence and the conversion of opposites reduces the world in its pataphysical reality to particular cases only. […] 'Pataphysics preaches no rebellion and no acquiescence, no new morality nor immorality, no political reform nor reaction and certainly no promise of happiness nor unhappiness. What would be the use, all things being equal?

5. 'Pataphysics is, in aspect, imperturbable. […] Only the comic is serious. The pataphysician, therefore, remains entirely serious, attentive, imperturbable. […] Imperturbability is not just a dignified version of "cool kicks." "Playing it cool" means indifference and is, at best, an indifferent game. The pataphysician is concerned; not through engagement in an attempt to create human values, but in the manner of the child

> looking through a kaleidoscope or the astronomer studying the galaxy.
>
> 6. All things are pataphysical; yet few men practice 'Pataphysics consciously. No difference in value, only in state, exists between ordinary men and those who are consciously aware of the 'pataphysical nature of the world, including themselves. What science but 'Pataphysics can cope with consciousness, "selfconsciousness perpetually twisting out of itself into the reaches of ethernity? […]
>
> 7. Beyond 'Pataphysics lies nothing; 'Pataphysics is the ultimate defence. Like the sorcerer's apprentice, we have become victims of our own knowledge - principally of our scientific and technological knowledge. In 'Pataphysics resides our only defence against ourselves. […] 'Pataphysics allows a few individuals, beneath their imperturbability, to live up to their particular selves. […] 'Pataphysics, then, is an inner attitude, a discipline, a science, and an art, which allows each man to live his life as an exception, proving no law but his own.

The 'pataphysical "inner attitude" of indifference, of "treating all things equally" and of "rejecting values" prepares one to safely detach oneself from disciplinary research and to search across and beyond disciplines, even beyond meta disciplines. It is of no surprise to learn from Hugill (2012, p. 227) that the author of the Manifesto of Transdisciplinarity[i], the quantum physicist Basarab Nicolescu, is in fact "well acquainted with pataphysical literature." It will be shown throughout this thesis, that attempts to imagine further evolutionary trajectories for transdisciplinarity, have been guided by these 'pataphysical principles: consciously or unconsciously – artists and scientists or meta-scientists

[i] see chapter 2.1. where Manifesto of Transdisciplinarity is extensively dealt with

have transgressed the laws of the general and followed the exceptional in their efforts to rethink the traditional ways of knowledge production.

The seriousness of the 'pataphysical humour has been proven with the passing of time – 'pataphysics has survived and thrived in occult and out in the open for more than a century. Long after the founding father has passed away essays have been written on 'pataphysics by the most prominent thinkers of twentieth century. Among others this thesis has consulted essays written by Deleuze. In the first essay entitled "How Jarry's Pataphysics Opened the Way for Phenomenology" Deleuze (2004, p. 74), inspired by Jarry, sets up conditions to transcend the boundaries of thought: "metaphysics is and must be surpassed. In so far as its fate is conceived as metaphysics, philosophy makes room and must make room for other forms of thought, other forms of thinking." In his next essay entitled "An Unrecognized Precursor to Heidegger: Alfred Jarry" Deleuze (1998, p. 91) further elaborates on Jarry's phenomenology with emphasis on "planetary technology" and technical vs. poetic language.

Since the imaginary solution, proposed to be examined in this thesis, is to evolve transdisciplinarity into an organism of living knowledge, the auxiliary literature was surveyed on the concept of life: from Erwin Schrodinger's (1992) question "What is Life?" to Fritjof Capra's (1997) "Web of Life: A New Scientific Understanding of Living Systems." It is, of course, far beyond the scope of this thesis to define yet another unfathomable concept, such as life, leaving it open to define itself through further evolution, 'pataphysically or otherwise. Namely,

within the thesis the notion of living knowledge will tangentially approach complexity theory, by imagining self-organising structures that become self-aware through comical corrective, linking it back to 'pataphysical element, allowing the notion of awareness and consciousness to escape a general definition.

The idea of living the knowledge is one of immediate knowledge where there can be no distinction between the observer and the observed, where the environment and the animal animating it form an inseparable and interdependent entity. This ecological shift in understanding is supported with existing literature on notions raging from Gregory Bateson's "ecology of mind" to James Jerome Gibson's "ecological approach to perception." Important in this respects were also Deleuze's and Foucaults's essays on life and the writings of Jakob Johann von Uexküll, Giorgo Agamben, Jussi Parikka, and others.

Besides the natural environment, the interdependence of the artist-researcher-inventor on technological environment and vice versa is examined within the media theory of Marshall McLuhan. If life is taken as an open second order system, with the possibility of its ecosystem to become self-aware, the classical works of Heinz von Foerster, Norbert Wiener, Gordon Pask and others become relevant sources of inspiration. From the standpoint of self-reflecting introspective system of knowledge the writings on the phenomena of invention, such as those of Jacques Salomon Hadamard and Henri Poincaré, are again

indispensable. The crucial introspective writings of Poincaré, Bergson and Duchamp are elaborated upon throughout this thesis.

2.2. Manifesto of transdisciplinarity

There are numerous books, articles and conferences proceedings addressing transdisciplinarity as a promising approach to complex problems in various fields of research. The scope of most of these publications is too broad to be pertinent to specific questions of this thesis, nonetheless some books, such as "A Vision of Transdisciplinarity: Laying Foundations for a World Knowledge Dialogue" (Darbellay, et al., 2008), have contributed to a deeper understanding of how transdisciplinarity could operate. For the purposes of this research the main reference to the very definition of transdisciplinarity will be found in the Manifesto of Transdisciplinarity (Nicolescu, 2002). This chapter summarises ideas presented in this manifesto, that are in relation to the proposed evolution of the transdisciplinarity, as a basis and reference for chapters that follow.

At the First World Congress of Transdisciplinarity (on 6th of November 1994, in Portugal), a Charter was signed by the Editorial Committee comprising Lima de Freitas, Edgar Morin and Basarab Nicolescu. This Charter of Transdisciplinarity, with its accompanying book, Manifesto of Transdiscipilinarity, written by Nicolescu and published in 2002, is taken in this thesis as a departure point in deviation from standard knowledge production towards evolving transdisciplinarity into an organism of living knowledge.

In the preamble to the Charter the Editorial Committee describes the current state of affairs in disciplinary research, or what Nicolescu (2002, p. 34) terms the "disciplinary big bang," remaining hopeful in spite of a list of concerns about the future: "a hope that this extraordinary development of knowledge could eventually lead to an evolution not unlike the development of primates into human beings" (Nicolescu, 2002, p. 148). The preamble therefore already presupposes a potential evolution of knowledge – an evolution from which emerges a different kind of knowledge, or, as will be shown throughout this thesis, a different organism of living knowledge. Polyphibianism, or the evolutionary movement of the living knowledge, is in accordance with all the Articles of the Charter of Transdisciplinarity starting from the first:

> Any attempt to reduce the human being by formally defining what a human being is and subjecting the human being to reductive analyses within a framework of formal structures, no matter what they are, is incompatible with the transdisciplinary vision. (Nicolescu, 2002, p. 148)

The "transdisciplinary vision" is thus open to speculative transmutations of human beings into polyphibians: transdisciplinary openness does not merely allow the human being to mutate into beings of different kind of awareness – such mutation within transdisciplinary zone become inevitable. That is, "transdisciplinary vision" is not compatible with any limitations imposed on such mutations, on the contrary, such reorganizing of awareness outside the "framework of formal structures" is required for transdisciplinary research.

Polyphibianism, although seemingly unforeseeable phenomenon, is in fact imaginable, or rather, perceivable by the "transdisciplinary vision." Further consideration of the Articles of the Charter will show that polyphibianism can be imagined as an extreme execution of transdisciplinarity; it takes its most vital elements and accelerates the evolution into imaginary solutions. At its core, polyphibianism is a transdisciplinary movement propelled tangentially from transdisciplinary charter. If "transdisciplinarity complements disciplinary approaches" (Nicolescu, 2002, p. 148), or, more precisely, if it "occasions the emergence of new data and new interactions from out of the encounter between disciplines" (Nicolescu, 2002, p. 149), polyphibianism is just such emergence of new kind of awareness, that is, awareness emerging from knowledge reorganising itself into a living organism of knowledge.

On the other hand "transdisciplinarity does not strive for mastery of several disciplines but aims to open all disciplines to that which they share and to that which lies beyond them" (Nicolescu, 2002, p. 149). Mastery is according to Bergson (2005, p. 201) the goal of the intellect – by not striving at particular mastery of specific discipline transdisciplinarity is therefore moving beyond mere intellectual comprehension. Moreover, in aiming "to open all the disciplines" to new awareness, new experience of knowledge, transdisciplinarity is allowing one to be newborn in front of the phenomenon of one's study. The charter foresees the opening as an "acceptance of the unknown, the unexpected and the unpredictable" (Nicolescu, 2002, p. 151), the willingness to open one's eyes to novelty.

The "transdisciplinary attitude," as postulated in the Charter, calls for the "recognition of the existence of different levels of reality governed by different types of logic" (Nicolescu, 2002, p. 149). Rather than recognising the levels, layers, planes or platforms of reality, the "polyphibic practice" is to experience reality through different imaginary organs – where each of organ variations instinctively executes a "logic" of a different kind. Incessantly mutating its organs, a polyphibian is not to be firmly defined once and for all, on the contrary, it is an ephemeral and evolving organic concept.

Likewise are the transdisciplinarians "re-examining the concepts of 'definition' [...] An excess of formalism, rigidity of definitions and a claim to total objectivity, entailing the exclusion of the subject, can only have a life-negating effect" (Nicolescu, 2002, p. 149). This "life-negating effect" is what polyphibianism is trying to avoid – polyphibianism is the movement of knowledge towards life – towards an organism of living knowledge that can survive and thrive only by avoidance of firm frameworks, traditional schemas and matrices of facts, categories and concepts.

The charter distinguishes trans-disciplinarity from inter- and multi-disciplinarity: "In comparison with interdisciplinarity and multidisciplinarity, transdisciplinarity is multireferential and multidimensional." (Nicolescu, 2002, p. 149). A parallel comparison is obtainable between mono- and poly- phibians where polyphibians multiply a fixed monophibic point of view into multiple

points of being[i]. Polyphibianism, as a transdisciplinary spin-off, is just as multireferential - the references multiply through mutations of polyphibic organs. Regarding multidimensionality, which is attributed to transdisciplinarity through the so-called levels of Reality (that are rather levels of emerging orders or patterns of organisation), polyphibianism is not of integer dimensions, it pervades the state space with the evolutionary trajectory of fractal dimensions.

Polyphibianism fulfils the following transdisciplinary conditions: "Transdisciplinarity constitutes neither a new religion, nor a new philosophy, nor a new metaphysics, nor a science of sciences," and just as well goes beyond cultural and national affiliations as transdisciplinarians are "transnational" and "transcultural" (Nicolescu, 2002, pp. 149, 150). While transdisciplinarity "leads to an open attitude towards myths" (Nicolescu, 2002, p. 150), polyphibic imaginary solutions are living the myths[ii].

Transdisciplinarity is returning to Bergson's idea of a science of intuition as complementary to the science of intellect: "Transdisciplinary education revalues the role of intuition, imagination, sensibility and the body in the transmission of knowledge" (Nicolescu, 2002, p. 150). Polyphibianism, by inventing imaginary solutions, overcomes intellectual abstraction by boosting intuition which leads to using the sensibility of the body "in the transmission of knowledge" and thus

[i] "point of being" is a term introduced by Derrick de Kerckhove (1997, p. 187), see appendix A
[ii] see chapter 4.2.3. on myths in polyphibianism

avoiding the need of indirect communication (communication mediated through other insensible bodies).

The charter requires other approaches to knowledge, beyond the generalization and abstraction of intellectual reasoning: "Authentic education cannot value abstraction over other forms of knowledge. It must teach contextual, concrete and global approaches" (Nicolescu, 2002, p. 150). Polyphibianism is organising knowing into organic processes by inventing organs for metabolising knowledge on the abstract level with the utmost concreteness of a lived experience – the experience that is unrepeatable, unpresentable[i]. Polyphibianism is an imaginary solution of organising abstract knowledge into organic structures that can be maintained alive. The advantage of polyphibianism, the movement of the living knowledge, over classical principles of knowledge preservation, lies in the evolution of higher order organisms able to experience the accumulated metabolic products of knowing.

Nicolescu (2002, p. 1) traces back the first appearance of the term transdisciplinarity to writings of Jean Piaget, Edgar Morin, and Erich Jantsch in 1970s as a response "to a need that was perceived [...] to celebrate the transgression of disciplinary boundaries." This thesis explores the conditions that

[i] see chapter 4.2.1. for an example of a lived experience, where the spectator is invited to participate in the creative act of the artist – neither to represent the experience of the artist, nor to relive it or repeat it – the spectator is concretely experiencing a "transmutation," mutating the organs of knowing

provoke such transgressions where intuition of another kind of knowledge induces self-awareness of limitations of intellectual reasoning – the intellect becomes self-critical and allows intuition to navigate the unknown territories of transdisciplinary zone.

The immediate consequence of transgressing the conventionally "objective" reality is the sense of losing oneself in imaginary "subjective" experience that differs significantly from one point of being to another. The imaginary realm gains in coherence when the points of being resonate, self-organise in a coherent but ephemeral pattern – an imaginary solution – a mythological organism of living knowledge. That polyphibianism (a movement of polyphibians trespassing from one medium to another), as a tangential movement to transdisciplinarity, is an imaginary movement, would come of no surprise to Nicolescu who contrasts the reality as imposed by science with reality lived by myths before the science established its dominion:

> The ancients [...] created the metaphysical, mythological and metaphorical idea of cosmos [...] they came up with a multidimensional reality peopled with various entities, from man to gods, potentially passing through a whole series of intermediaries. […] Modern science was born through a violent break with this ancient vision of the world. It was founded on the idea [...] of a total separation between the knowing subject and Reality, which was assumed to be completely independent from the subject who observed it. (Nicolescu, 2002, p. 9)

Multidimensionality is experienced by this trespassing from one kind of species to another. The subject cannot know the multidimensional reality merely by being able to imagine it from different viewpoints as an external observer –

higher dimensions are to be lived through self-aware imaginary organs. When intellect prevailed, and modern science took over, the observer was removed from the observed. Intellectual abstraction maintains the distance between the observer and the observed, demanding a complicated apparatus for remote communication of knowledge.

The intuitive knowledge, on the other hand, can only be immediate: the polyphibic organism is at the same time the observed phenomenon and the organism observing itself, the problem and the imaginary solution invented for the problem that is lived. The polyphibic instruments know themselves and grow themselves on a higher order of awareness, intuitively induced at the periphery of the intellect. Since there is no limit to emerging orders of self-awareness, one returns, in a way, to the mythological idea of comprehending reality by "passing through a whole series of intermediaries." These intermediary orders are neither lower nor higher, as Nicolescu (2002, p. 52) advises, "words high and low here have no other meaning than that which is topologically associated with the flow of transmission of information."

Nicolescu (2002, p. 10) further examines the foundations of modern science that asserts control over reality as its territory, by inspecting how modern science postulates the existence of "universal laws of a mathematical character" that can only be "discovered by scientific experiment" where "such experiments could be perfectly replicated." These agreements that are rarely questioned in depth might

have their origin in the broader cultural context. Marshal McLuhan attributes such scientific assertiveness to the dominance of visual culture:

> If you can do it again then you've got a proof - scientific proof - can you do it again - that is visual space - anything that can be exactly repeatable is visual. As science gets more sophisticated it realizes that all experiments are subtly non-repetitive, and that repetition is not a proof, and no two experiments are ever alike, and visual space, in fact, has disappeared from science. (Picnic in Space, 1967)

Indeed with "sophistication" of science, as in quantum theory or theory of complexity, science is carefully withdrawing from its pursuit to control, from the pursuit of pure universality, accepting even the exceptions and the unique as valid ingredients. Parallel to this shift in science the culture shaped by electronic technology is becoming less dominated by the renaissance notion of visual space - by a fixed view point in perspective - and more by a multiplicity of omnipresent points of being.

With advancements from science of deterministic linear systems to nonlinear sciences of complexity the transgression of disciplinary boundaries became inevitable. Constrained by disciplinary research with established methodology, some researchers have turned to transdisciplinarity that offers no universal method. In the obscure transdisciplinary zone the nonvisual spaces interfere with the intellectually visualised schemas. Culture dominated by visual space that strived for one unified reality is spontaneously reorganising itself into a new culture, where reality multiplies itself, and new media emerge, infiltrating the existing cultural ecosystem.

In order to operate at a periphery of a discipline where a different kind of knowledge is available, to recognise the interface of a new medium infiltrating the old, the monophibians need to transmute into polyphibians, the linear perspective from a fixed viewpoint must multiply into self-organised network of points of being. Nicolescu (2002, p. 15) observes great disturbance in researchers that have detected such infiltration of the different kind of knowledge into their discipline: "Planck made a discovery that, according to his own testimony, provoked a real inner turmoil. The reason for this was that he unwittingly witnessed the entry of discontinuity into the realm of physics."

With the dawn of quantum mechanics the idea of continuity, and with it the idea of causality, was profoundly shaken. How can the human organism prepare itself to experience knowledge that is intellectually accessible and yet it contradicts the experience of the accepted reality? In other words, how can one prepare oneself for another level of reality? To avoid the inner turmoil, which even today doesn't give quantum physicist a rest of mind, a new organisation of knowledge needs to be invented – new organs need to be imagined for immediate explorations of different levels of organisation of reality:

> "How can we understand real discontinuity? That is to say, how can we imagine that there is nothing between two points [...]? Here our ordinary imagination experiences an intense vertigo, whereas mathematical language, which is based on another type of Imagination, experiences no difficulty whatsoever." (Nicolescu, 2002, p. 16)

Manifesto of transdisciplinarity relies on mathematical language and invests in alternative mathematical logics to provide means of operating on humanly unimaginable terms. Polyphibianism, on the other hand, invents organs for imagining the yet unimaginable. If mathematics of complex systems is the underlying instrument of the transdisciplinary zone, can polyphibianism drive it to a critical point, exaggerating the mathematics to extreme, where mathematical systems become self-aware organisms, where fractals self-organise into living phractals[i]?

In the inner turmoil, such as described in the case of Max Planck, the polyphibian internalises the problem and mutates in a solution. To remain agile, a polyphibian cannot indulge in a mastery of mathematics, on the contrary a polyphibian is always on the way out of the comfort zone - the mastery over a problem is not a goal but a by-product to be discarded when appropriate. A plurality of organs-solutions in orchestration forms the organism that is to experience the problem-solution and to live the new knowledge. Nicolescu further compares the plurality in transdisciplinarity to that encountered in nondeterministic quantum domain to form new notion of causality:

> According to quantum mechanics, a physical quantity has several possible values, each of which is associated with a specific probability. However, in experimental measurement one obviously obtains a single result for the physical quantity in

[i] see chapter 4.1.3. and 4.2.6. where phractal geometry is derived by imagining fractals that become self-aware

> question. To abruptly deny the plurality of possible values for this physical 'observable' quantity through the act of measurement may have seemed obscure, but it certainly indicated the existence of a new type of causality. (Nicolescu, 2002, p. 17)

The clash of plurality of potential and single actualization induced a tectonic movement on the fringes of the intellectually comprehensible. The causality and continuity needed readjustments to accommodate intellectual expansion: "the nature of this new type of causality has been clarified thanks to a rigorous theorem - Bell's theorem - together with some extremely precise experiments. Thus, a new concept entered physics – that of nonseparability" (Nicolescu, 2002, p. 17). With discontinuity and nonseparability the local causality was replaced with global causality: "global causality which concerns the system of all physical entities in its entirety" (Nicolescu, 2002, p. 18). In spite of separation between entities, the communication on quantum level persists – the quantum reality forms an organism of immediate knowing.

The intellect, stretching when confronted with collapse of virtual multiplicity and singular actualization, has outgrown its apparatus and cries for new organs that could metabolise directly what it could only infer indirectly. The periphery of the intellect is agitated by quantum shatter of traditional continuity and causality. The 'pataphysical corrections of physics came just in time for quantum shock, but what neither quantum physics nor 'pataphysics provided was an adaptation of organisation of knowledge – invention of new organs of knowing, a new metabolism for otherwise indigestible knowledge.

Polyphibianism is one of imaginary solutions generating new organisms to live within the plurality of knowledge. Polyphibianism is a dispersive movement of an individual actualisation into a plurality of options. Global causality is not in conflict with what Bergson (2005) assigns to the original impetus present in evolution – the evolution according to Bergson does not work towards a whole, but originates as a whole. Not surprisingly Nicolescu (2002, p. 18) comes to a similar conclusion: "at least at a certain level there is a coherence, a unity of laws that assure the evolution of totality of natural systems."

Protoplasmagora[i] is imagined as just such wholeness that differentiates but preserves coherence. Protoplasmagora is an imaginary organic analogue to quantum vacuum as described by Nicolescu (2002, p. 60): "The quantum fluctuation of the void determine the sudden appearance of virtual particle / antiparticle pairs which are annihilated in the course of extremely short intervals of time." Rather than stating it as a "fluctuation between being and nonbeing" (Nicolescu, 2002, p. 61) that is, according to Bergson (2005), a falsely stated problem, protoplasmagora extends that fluctuation on the order between living and non-living, into a fluctuation of self-awareness.

> By supplying energy to quantum vacuum we can help it to materialize its potentiality. This is precisely what we do when we build the particle accelerators: When certain threshold energies are attained, real particles suddenly materialize at that point – being literally drawn out of nothing. These particles have

[i] see appendix A

> an artificial character, in true sense of that word. (Nicolescu, 2002, p. 61)

Intellect is able to conceive of an apparatus that can harnesses potentiality of fluctuating vacuum, but this apparatus, as Nicolescu (2002, p. 61) elucidates, is discovering nature by creating nature: the particle accelerator is, in a way, practicing the "artificial science" rather than natural science or science of nature. The particles produced in the accelerator are an actualized potentiality of nature: "protons, neutrons and electrons are enough to build almost all of our visible universe. But scientist have succeeded in creating hundreds of other particles out of nothingness: hadrons, leptons, electro-weak bosons, etc."

Particle accelerators are apparatuses actualising artificial, virtual, imaginary solutions. For the purposes of this research a part of the particle accelerator ATLAS at CERN, with the acronym ASCOT (Apparatus with Super Conducting Toroids) (Norton, 1992), has been upgraded into a polyphibic prototype with the acronym ASCO2.T (Apparatus with Super COnducting Thought Transduction).[i] Only via a comical corrective can an intellectually conceived ASCOT be upgraded into ASCO2.T - a cyborganic detector of imaginary solutions. This polyphibic prototype is to experience the plurality of fluctuating potential, to live the knowledge in all its possible forms. The organism of the living knowledge in

[i] see chapter 4.2.3. for more on project ASCO2.T AT.LAST

this sense is imagining and inventing the "nature" that can be "artificially" actualised at demand.

Quantum reality requires a different kind of knowledge organisation - the tools devised by intellect to classify and conceptualize knowledge are insufficient, ineffective in quantum domain, where communication is direct and immediate. While intellect depends on intermediary data representation, that is, on manifestation of the knowledge in an intermediary form, Nicolescu (2002, p. 19) shows that such representation of even the simplest phenomena is problematic in the quantum domain: "it is impossible to localize a quanton at a specific point in space and time ... in other words ... it is impossible to assign a specific trajectory to a quantum particle."

Trajectories, which are an indispensable intellectual constituent in construction of local causality, lose their meaning when causality is considered as global. No classical indirect approach suffices to gain adequate knowledge of the quantum domain; no trace, no memory, no history. Instead of mastering dead concepts there seems to be an urge for direct experience, for awakening the intuition and creating living organs for knowing, self-assembling into organisms that live the knowledge directly. The pace of evolution of the organism of living knowledge is synchronised with the rhythm of creation and annihilation of imaginary solutions in protoplasmagora.

In pointing out that "localisable trajectory," just as "local causality," become obsolete notions in quantum mechanics, Nicolescu (2002, p. 19) stresses that

although localising in space-time is not a priority in quantum domain, the predictions in quantum theory do not lose in precision: "Until now, the predictions of quantum mechanics have always been verified with great precision, but this precision pertains to attributes proper to quantum entities, and not to those of classical objects" (Nicolescu, 2002, p. 20).

Polyphibianism redefines the notion of precision accordingly - in relation to the domain it passes through. In polyphibic research conducted for the purposes of this thesis the precise threshold between physics and 'pataphysics was sought for. Out of potential plurality the accurate graph was drawn in specific context of ASCOT and ASCO2.T detectors at ATLAS, CERN – the singular solution was actualised in accordance with the rules of both physical and 'pataphysical domain and with utmost mathematical precision.[i]

Nicolescu (2002, p. 19) concludes: "'Indeterminism' is by no means 'imprecision.'" To avoid any accidental associations with quantum randomness, he categorises chance as a classical concept, and states: "'Quantum randomness' is not 'chance.'" This thesis will examine how intellect coped with the notion of chance where there shouldn't be any - within the comfort zone of classical deterministic science - the chance lurked in, creating a dichotomy of unpredictable determinism. First attempts[ii] by Henri Poincaré to deal with

[i] see chapter 4.2.4. for more on the threshold between physics and pataphysics
[ii] see chapter 3.1.

chance in science, were complemented with Marcel Duchamp's artistic experiments on "canned chance" exploring the precision and conventionality of chance. Indeterminism was not the only threat to classical thought, determinism itself was full of traps.

It is important to note the distinction Nicolescu (2002, p. 22) makes between what he terms "levels of reality" and "levels of organisation." While different levels of reality are incomparable and incompatible in their most fundamental schemas, levels of organisation can coexist and interpenetrate on the same level of reality. Polyphibianism does not operate only across the great gaps between the "levels of reality" but on subtler intricate intervals between "levels of organisation." Polyphibianism is growing organs across all scales and territories, organs for experiencing the tension of indeterminism as well as conflicts within determinism.

The evolution of transdisciplinarity into polyphibianism traces continuous mutations, adjustments of individual polyphibic organs, necessary for a leap between the "levels of organisation," and a thorough cumulative mutation into an ever new kind of polyphibic species, able to leap between "levels of reality." According to Nicolescu (2002, pp. 21, 22) "levels of organisation correspond to different structurings of the same fundamental laws," whereas "two levels of Reality are different if, while passing from one to the other, there is a break in the laws and a break in fundamental concepts." When that break happens, when monophibians breakdown their individuality and disperse into polyphibians,

old concepts become obsolete. These obsolete monophibic remnants are not to be simply replaced by the same kind of substitute, by new intellectual, abstract concepts, but by intuitive organic concepts – organs of knowing replace the concepts in knowledge.

Nicolescu (2002, p. 22) considers the "emergence of at least two different levels of Reality in the study of natural systems," in particular, the quantum level of reality as opposed to the level described by classical physics, to be a "major event in the history of knowledge." Nicolescu (2002, p. 22) does not derive the proof for "existence of different levels of Reality" exclusively for science but among other explorations "this affirmation was founded [...] on exploration of the interior universe." Introspection is the main gateway to transdisciplinarity, questioning the fundamental conventions from within the human nature. It will be shown in this thesis that Henri Bergson's introspection led to falsification of inappropriately stated problems and invention of new problem-solutions[i].

The intuitive and introspective metaphysical explorations helped Bergson restate the physical problem of time in terms of duration. Nicolescu (2002, p. 24) seems to agree with Bergson in that "the time of physicists is only a gross approximation of the time of philosophers. The present time of the philosophers is a living time. It contains in itself both the past and the future, but is neither past nor future."

[i] see chapter 3.3.1. for Bergson's method of eliminating false problems in Bergsonism

Properties of time on one "level of reality" are violated on another. Temporal invariance or reversibility of time on quantum level are exceptions to the rule of increasing entropy. From entropy and evolution that differentiate the unity in a "disorderly" manner, new orders arise - new levels of organisation emerge at different scales.

Polyphibianism moves through protoplasmagora - protoplasmic meta-environments of living knowledge. This movement is adaptation of organs of knowing to the multiplicity of changing environmental conditions - it enables polyphibic organism to mutate, rather than remaining perfectly carved out and crafted for a single stagnant environment where only automatic habits are executed. The ability to know the environment and the environment itself are interdependent just as Gibson (1986, p. 8) elucidates the mutual dependence between the animal and its environment. As the movement of the animal changes the landscape[i], so does the movement of the organism of living knowledge. The environment becomes self-aware and aware of the organism that senses the environment, in other words, the environment senses itself through the sense organs of organisms inhabiting it: the living knowledge knows and lives itself.

Nicolescu (2002, p. 27) recognises "a direct relation between logic and the environment," therefore, with changes in environment changes in logic,

[i] see chapter 3.2.2. for Gibson's interdependency between animal and its environment

reasoning, understanding and knowing in general are inevitable: "logic can only have an empirical foundation." To adapt to the quantum environment the classical logic was required to change. Nicolescu (2002, p. 28) identifies the proposed changes in the axioms of classical logic in order to accommodate for seemingly "illogical" quantum behaviour. The preferred "correction" by quantum physicists is to adjust the second axiom of classical logic that accommodates only a pair of truth values A and non-A to accommodate multiple truths. This correction generates a multivalent logic.

Nicolescu (2002, p. 28), not entirely convinced by the predictive abilities of multivalent logic, proposes the option to "correct" the third axiom of classical logic that excludes the existence of a value that is neither A nor non-A. Nicolescu, for this purpose, introduces the logic of Stéphane Lupasco, whose "philosophy, which takes quantum physics as its point of departure, has been marginalized by physicist and philosophers." Nonetheless, Nicolescu (2002, p. 28) believes that "history will credit Stéphane Lupasco with having shown that the logic of the included middle is a true logic, formalizable and formalized, multivalent (with three values A, non-A, and T) and noncontradictory." Lupasco's logic that Nicolescu assumes as suitable for transdisciplinary operations is already a significant corrective of two thirds of axioms of the classical logic.

Polyphibianism evolves transdisciplinarity even further by departing entirely from classical logic – even the first axiom of identity is brought under scrutiny. It is the polyphibic attack on the first axiom – the axiom of identity – that starts the

movement of polyphibianism. This is an attack on indivisibility of the individual – I am not one I, I am many, I am a multiplicity – the indivisible individual divides. The dynamics of polyphibianism is a dynamics of multiple points of being. Embracing and experiencing several truth values of multivalent logics can be imagined as living the polyphibiologics[i]. The tension in dichotomous contradictions, problematic for classical logic, is resolved in polyphibianism not merely into a third element but in multiple elements, but in a new complex invention - the interconnectedness of multiple new organs for knowing experiences as a new kind of organism. The force field of this multiplied tension is what forms the organism.

Nicolescu (2002, p. 30) observes how the third element that reconciles the existing dichotomy emerges on another level of Reality: "In the logic of the included middle the opposites are, rather, contradictories: the tension between contradictories builds unity that includes and goes beyond the sum of two terms. The rules of logical implication concerns not just two terms but three (A, non-A and T), all coexisting at the same moment in time." Nicolescu (2002, p. 30) presumes there is a great advantage in the three terms coexisting simultaneously: "The logic of the included middle is perhaps the privileged logic of complexity; privileged in the sense that it allows us to cross different areas of knowledge in a coherent way." The coexistence of dichotomy on one level and its resolution on

[i] see Appendix A

another creates a gateway. Polyphibians are trespassing in between realities coherently – although a mutation occurs, the logic is shattered, the individual dispersed, but the awareness remains coherent.

Nicolescu (2002, p. 34) examines carefully the scientific research as it is categorised and managed within scientific disciplines: "In the classical viewpoint, the disciplines as a whole were conceptualized as a pyramid, the base of which was physics. Complexity literally pulverised this pyramid, provoking a veritable disciplinary big bang." Even though theory of complex systems has disturbed the hierarchy and categorisation of knowledge, fertilizing production of numerous new disciplines, combining and multiplying them, the disciplinary research ground has not reformed its foundations.

The problem in fragmentation of knowledge through multiplication of scientific disciplines, as Nicolescu (2002, p. 34) maintains, is in reduction of area of disciplinary domains. The specialisation confines researchers to narrower areas and the flow of information between the disciplines is obstructed and reduced. Evolving transdisciplinarity into an imaginary organism of living knowledge removes the dependence on the channels of information flow between disciplines, by replacing the indirect communication with the direct experience of knowledge. The knowledge is not communicated from one organ to another by gradual translation but through instantaneous transduction.

In determining the consequences of the disciplinary disintegration Nicolescu (2002, p. 34) recognises its origin: "the fundamental cause is perhaps easy to

discern: the disciplinary big bang is the response to the demands of technoscience without brakes, without values, without any end other than utilitarianism." Extreme utilitarianism of science driven by intellect results in production of instruments for external use, for separation of the observer and the observed. Polyphibianism guides transdisciplinarity back towards internalisation of tools, intuitive introspection that invents organic custom made instruments – organs for experience rather than mechanisms for representing knowledge.

Nonetheless, Nicolescu (2002, p. 34) admits some benefits of such extreme utilitarianism of science: "this disciplinary big bang also has enormous positive consequences because it has led to an unprecedented understanding of the knowledge of exterior universe, as well as contributing new impetus to the establishment of a new world viewpoint." The intellectual drive increased the rate of production of both problems and solutions approaching a critical point where the intellect could transcend itself. The acceleration of techno-science has shown that there is not only space for a single monophibic view but enough imagination for plurality of polyphibic points of being.

Accumulation of practical knowledge about systems is becoming system specific. Advancement of knowledge is not headed so much towards universal theory as it is towards specific solutions - applying to specific conditions. No matter how far the observer and the observed have been separated in the process of generalisation of solutions due to increased rate of solving problems, and increased specialisation and customization, they will meet again on another level

of organisation. Devising the instruments for highly complex and specialised tasks is surpassing the speed of intellect and becomes, so to speak, instinctive – operating on subconscious internal know-how appertaining to particular discipline. These particular instruments are disciplinarily internalised and cannot be directly shared externally, among other disciplines. From the science of the general has emerged the techno-science of particular. Nicolescu wonders what kind of knowledge is being produced in these complex conditions:

> The knowledge of complexity, in order to be recognised as knowledge, bypasses one preliminary question: Is the complexity of which we speak a complexity without order, in which case its knowledge would have no meaning, or does it contain a new order and a new kind of simplicity which could appropriately become the object of a new knowledge? (Nicolescu, 2002, pp. 37, 38)

Introduction of complex systems in science has instigated a turmoil in otherwise stable disciplinary hierarchy. New orders and new structures emerged in production of scientific knowledge. The aim of transdisciplinarity is not to simplify these structures or confine the research to simplest possible patterns. On the contrary, the aim is to invent new approaches to explore complexity efficiently. Polyphibianism invents new organs through which the complex emerging orders can be lived. With each new emerging order new organs are conceived – giving rise to even more complexity in the organism of knowledge. Although the overall complexity rises the organs as imaginary solutions are grown so as to fit the specific problem with ever greater precision. The organism of knowledge is therefore not gaining in universality but in comprehensiveness.

Disparate specialised organs of knowing are not isolated, as disciplinary specialists are bounded to their respective domains, but associate to the whole organism of knowledge inadvertently, through the emergent structures of order that connects over all scales in self-affinity that is again the prerequisite for self-awareness of the organism of knowledge. The knowledge appertaining to one organ becomes a part of an organism and yet the organism in its potentiality was the implicate whole from which the organs differentiated. The organism of living knowledge is therefore the phenomenon that emerges and re-emerges on certain levels of organisation where it wakes up into greater or lesser degrees of self-awareness.

Embracing chance, chaos and complexity became unavoidable for advancement of disciplinary knowledge and with it the disciplinary research outgrew itself into transdisciplinarity. Evolution of transdisciplinarity into an organism is just as inescapable – whether it be the imaginary organism proposed in this thesis or some other kind. Polyphibianism, in one form or another, is bound to happen whether in human society or bypassing human intelligence altogether. Polyphibianism as evolutionary movement is not driven by basic survival strategies, rather, as Nicolescu predicts:

> Our evolution is self-transcendence. No one is obliged to evolve. The natural constraints of the environment that have obliged man to evolve biologically are no longer exercised. Biological evolution has reached full term. A new kind of evolution is emerging, linked to culture, science, consciousness. (Nicolescu, 2002, p. 73)

A disciplinary researcher is often confronted with challenges for which the expertise of her or his discipline does not suffice. Collaborating with specialists from other disciplines and merging their know-how is what Nicolescu (2002, p. 42) is concerned about: "the sum total of competencies is not competence: on the technical level, the intersection between different domains of knowledge is an empty ensemble." Division of knowledge in disciplines separates the disciplines and dries out the interstitial area. Transdisciplinary zone, on the contrary, provides the living protoplasmic substance in between these artificial separations so the disciplines are connected into an organism and their instruments are correlated as organs with fluids and flows of information.

The organs of knowledge do not combine linearly – no new knowledge or knowledge of a different kind arises from linear combinations of existent knowledge. The combinatorics of living knowledge intertwines strands of knowledge into complex geometries of life. The plurality of points of being ensures intervals of overlapping knowledge rather than, as Nicolescu noticed, the empty intersections between disciplines. Transdisciplinary zone in between disciplines needs to be filled with movement: this thesis imagines such a movement as polyphibianism. Polyphibianism encounters the problems that are of concern to many disciplines but are adequately addressed by none. For this problems polyphibianism grows imaginary organs solutions, unconstrained by disciplinary limitations.

Polyphibianism is a pioneering adventure of disciplinary specialists breaking free from the constraints of the obsolete apparatus of knowledge. Knowledge is released by polyphibians from disciplinary containers into organic vessels. The membrane of the container is not simply mechanically pierced to allow the leakage of knowledge. The membrane needs to be intricately organised so as to enable the transduction of knowledge from one form to another. The uniform and sterile separation of disciplines can be adjusted by allowing for evolution of transdisciplinarity. For this reason Nicolescu (2002, p. 42) finds a simple exchange of expertise inefficient - "the sum total of competencies is not competence."

Comparing attempts for such exchange of competencies between disciplines, Nicolescu consistently finds the same deficiency in all approaches: whether inter-, cross-, or multi-disciplinary - none of them transcends the disciplines in the proper meaning of the word - the research remains within one of the disciplines. In multidisciplinarity, for instance, where the research subject of one discipline is introduced to several different disciplines, claims Nicolescu (2002, p. 42), "multidisciplinarity brings a plus to the discipline in question but [...] this 'plus' is always in the exclusive service of the home discipline." Interdisciplinarity does more than multidisciplinarity in the sense that it introduces the methodology of other disciplines into the discipline in question, and yet, for Nicolescu (2002, p. 43), "like multidisciplinary, interdisciplinarity overflows the disciplines, but its goal remains within the framework of disciplinary research."

The advantage of transdisciplinarity, according to Nicolescu is in moving the research out of the discipline, that is, in truly transcending the discipline. Nicolescu (2002, p. 44) must hence first verify if there is "something between and across the disciplines and beyond all disciplines," but within the disciplinary mind-set such proposition is impossible to prove: "from the point of view of classical thought there is absolutely nothing [...] transdisciplinarity appears absurd because it has no object." There are no leftovers predicted in this schema - all knowledge is to be accommodated within containers. In other words, no scientifically viable knowledge can be produced outside scientific disciplines. If the viewpoint is reversed, "in contrast, within the framework of transdisciplinarity, classical thought does not appear absurd; it simply appears to have a restricted sphere of applicability" (Nicolescu, 2002, p. 44). Transdisciplinarity in this sense has a greater scope.

Nicolescu (2002, p. 45) understands disciplinary and transdisciplinary research as "complementary" rather than "antagonistic" since "transdisciplinarity is nourished by disciplinary research" and "in turn, disciplinary research is clarified by transdisciplinary knowledge." The evolving transdisciplinarity depends less and less on the outcomes of disciplinary research and is driven more by an inner movement that enables incessant reorganisation of the organism of living knowledge. While a metabolic movement digests the disciplinary research outcomes and nurtures the polyphibic organs, the evolutionary movement enables the mutation and rebirth of the polyphibic organism.

What disciplinary research supplies to transdisciplinarity are dichotomies – transdisciplinarity is driven by tensions of contradictions arising in disciplinary research. Transdisciplinary movement is the movement from one level of reality to another, as Nicolescu (2002, p. 50) explains: "Two adjacent levels are connected by the logic of the included middle in the sense that the T-state present at a certain level is connected to a pair of contradictories (A and non-A) at an immediately adjacent level." Transdisciplinarity provides the means of transport from one level to another without any limits or borders in the growth of knowledge: "The iterative process continues indefinitely, [...] open structure of the unity of levels of Reality [...] implies the impossibility of a self-enclosed complete knowledge."

Transdisciplinary movement emerges from the ephemeral nature of levels of reality, as Nicolescu (2002, p. 51) envisions them - as soon as a level of reality is established by resolution of a dichotomy another contradiction is already being constructed, urging for yet another level of reality. These levels form a transitory scaffolding towards an infinitely growing knowledge. Just as Nicolescu presupposes occurrence of contradictions on every new level which in turn drives the movement towards the next level, the tensions in polyphibic organs that are growing out of one experience into another drives the movement of transmutation from one ephemeral imaginary solution into another.

What is of utmost importance in transcending the disciplinary methodologies is to imagine non-disciplinary ways of organising and experiencing knowledge. This means that the general mutual dependency between disciplinary and

transdisciplinary research is only an outline of the potential imaginary evolution of knowledge organisation. First and foremost the difference in kind of knowledge production must be comprehended. The transdisciplinary research is not meant only to feed back onto the disciplinary research - it is also meant to reorganise the disciplinary knowledge into organs, so as to enable further unlimited growth and self-organisation into different kind of organisms.

The conditions for growth and evolution of transdisciplinary knowledge are guaranteed with its open structure that Nicolescu (2002, p. 52) ascribes to the fact that dichotomies will never cease to occur: "without ever reaching absolute noncontradiction, we can speak of an evolution of knowledge, which encompasses all levels of Reality: knowledge that is forever open." This evolution is, as Nicolescu (2002, p. 52) asserts, not reversible: "that which is above is like that which is below, but that which is below is not like that which is above. Finer matter penetrates coarser matter but the reverse is not true." With polyphibianism the organism of living knowledge, although ceaselessly newborn, inevitably and irreversibly matures.

Nicolescu's denial of "absolute noncontradiction" that is a prerequisite for open, indefinite growth of knowledge finds mathematical attestation in Gödel's theorem: "sufficiently rich system of axioms inevitably leads to results that are either indecisive or contradictory" (Nicolescu, 2002, p. 52). With evolution of transdisciplinarity the differentiation of the original impetus, that is the "axiom" of evolution, advances with each mutation. Evolution drives the complementary

threads of the "axiom" to grow apart, independently, in opposite direction until they meet again in a new context, irreconcilably contradictive. Rather than reusing the same combination in a changed context, a new organ is invented, and the tension is temporarily suspended.

With Gödel's theorem, not only does the knowledge remain an open conundrum, the theory of knowledge as well can never be completed: "The Gödelian structure of the unity of all levels of Reality, associated with the logic of included middle, implies that it is impossible to construct a complete theory for describing the passage from one level to the other, and, a fortiori, for describing the unity of all levels of Reality" (Nicolescu, 2002, p. 53). The lack of a complete guide for trespassing into the transdisciplinary zone presents a problem only for monophibians anxious about the experience of trespassing, unwilling to trespass themselves. For polyphibians no such navigation guide is needed, not even a manifesto, since the knowledge is lived internally rather than learnt externally and indirectly through manifestations.

> To be sure, there is a coherence of the unity of levels of Reality, but this coherence is oriented in certain direction: there is an arrow associated with transmission of information from one level to the other. As a consequence of this, if coherence is limited only to certain levels of Reality, it stops both at the 'highest' and at the 'lowest' level. If we wish to suggest the idea of a coherence that continues beyond these two limiting levels, so that there is an open unity, we must conceive the unity of levels of Reality as a unity that extends by a zone of nonresistance to our experiences, representations, descriptions, images, and mathematical formulations. (Nicolescu, 2002, pp. 53, 54)

According to Nicolescu, the coherence of knowledge on different levels of interpretation confines knowledge to a limited number of levels that can be comprehended with conventional human faculties of knowing. Human beings cannot resist to know through "experiences, representations, descriptions, images, and mathematical formulations." Without introducing a "zone of non-resistance" Nicolescu (2002, p. 54) cannot discuss "an infinite human knowledge […] while simultaneously affirming the limitations of our body and our sense organs." Nicolescu (2002, p. 54) further explains "the non-resistance of this zone [...] is due to the limitations of our bodies and of our sense organs – limitations that apply regardless of what measuring tools we use to extend these sense organs."

Only the knowledge that is experienced directly resists intermediaries. For knowing to be immediate, to experience each new level of reality, each new emerging order directly, human intellect must develop new organs for immediate knowing. A polyphibic organ imagined in this thesis is indifferent to intellectual abstraction and distancing of the observer and the observed. It resists the temptations of the intellect to jump from one level of reality to another without direct experience.

Nicolescu (2002, p. 54) compares the zone of non-resistance "to that which does not submit to any rationalization," to the interval of suspended judgement[i] in which the organs mutate without reluctance or reservations. In this interval nothing can resist the immediate experience and with acceptance an immediate imaginary response is generated – the imaginary organ. Since in this interval all intellectual attempts of generalisation are avoided, the generated organs are unique, instinctive and precise instruments, perfectly fitting the unique, specific problem.

The human knowledge is, as Nicolescu discerns, confined on the outside with human sense organs, and even if these are augmented with prostheses and apparatuses, the limits are merely stretched, never removed. On the inside the knowledge is unlimited, humans are able to grow imaginary organs indefinitely. Nicolescu's reference to transdisciplinarity as a "zone of non-resistance" or "zone no-rationalization," etc. is complemented in this thesis with the evolution of transdisciplinarity that can be referred to as a zone of infinite refinement of knowledge.

The levels of reality as described by Nicolescu (2002, p. 55) are not simply layered independently, in parallel: "A level of Reality is what it is because all other levels coexist at the same time." There is more to that level, that flat plane of thought,

[i] see chapter 4.2.4. for more on the interval of suspended judgement

than a two dimensional plane could present. The stack of transdisciplinary levels of reality functions as a mosaic of infrathin[i] membranes with potential and actual fluctuations coming into resonance. With evolution of transdisciplinarity into polyphibianism the membranes articulate the protoplasmagora.

Knowledge for Nicolescu (2002, p. 55) "is neither exterior nor interior: it is simultaneously exterior and interior." This requirement for transdisciplinarity appears as a contradiction only from the disciplinary point of view, and is further resolved in polyphibianism: with the organism-solution evolved or invented as an instrument for direct problem-experience the observed becomes the observer. The experience of knowledge is not mediated from the exterior - it is and remains an interior experience. The exterior that is observed is metabolised instinctively by the newly invented instruments.

Examining the etymological source of transcendence and transdisciplinarity, Nicolescu (2002, p. 56) discovers that both terms "three" and "trans-" have the same etymological root where "three signifies transgression of the two, that which goes beyond the two." For Nicolescu "Transdisciplinarity transgresses the duality of opposing binary pairs […] by the open unity." In Marcel Duchamp's work 3 Standard Stoppages, which is of great importance for this thesis, the

[i] see Appendix A

number three signifies infinity. Executing the experiment three times opens up the standard of meter to infinite possibilities.

Modern science was formed with intention to comprehend "nature." Nicolescu (2002, p. 58) is aware of the effect the notion of nature has on knowledge formation: "the image of Nature exercises influence on all areas of knowledge," and observes how changing the stance toward nature happens: "the passage from one viewpoint to another is not progressive, continuous – it happens by sharp, radical, discontinuous breaks. Several contradictory viewpoints can coexist."

Comparing the magical take on nature to the mechanistic conquest of nature, Nicolescu (2002, p. 58) finds both inadequate in transdisciplinary context, but the later approach was fatal for the very notion of nature: "the logical end result of the mechanistic viewpoint was the death of Nature - the very disappearance of the concept of Nature from the scientific field." Through fragmentation of nature mechanistic science has forgotten the origin that ties the fragments of isolated system together - nature as a concept became obsolete.

In the aftermath Nicolescu (2002, p. 59) concludes: "Nature was dead, but complexity remained." Facing the remaining complexity the mechanistic approach is found inadequate to comprehend it and slowly retreats - with retreat of mechanical attack the idea of conquering nature, and therefore the very idea of nature fades. Nicolescu (2002, p. 59) announces that "nature is dead only for a certain viewpoint of the world: the viewpoint of classical thought." Sterilization

of knowledge in "classical thought" prevented the subtle self-organisation of knowledge necessary for recognising the entire complexity in nature.

Polyphibianism is directly linked to the bios – biotic knowing – a lived experience. The same tendencies are expressed in Nicolescu's manifesto of transdisciplinarity. Nicolescu (2002, p. 64), by broadening the classical viewpoint, reintroduces the surviving concept of nature, defining it more precisely as living nature: "This nature is living because it is there that life is present in all its degrees and its study demands the integration of lived experience." Knowing by living the experience needs to be rediscovered - for that purpose Nicolescu (2002, p. 64) prepares a proposal: "The study of living Nature asks for a new methodology - transdisciplinary methodology – which is different from the methodology of modern science and from the methodology of the ancient science of being."

If transdisciplinarity begins in between and beyond disciplines, does evolution of transdisciplinarity render the disciplines obsolete? Does the disciplinary research evolve as complementary to transdisciplinarity or are disciplinary containers to be discarded? This thesis imagines evolution of knowledge formation into an organism of living knowledge, from the very first transmutation of disciplinary monophibic instruments into polyphibic organs, where the methodology is not determined in advance but follows the self-organising principles. Just as for Bergson (2005, p. xxiii) theory of evolution and

theory of knowledge[i] are inseparable, Nicolescu (2002, p. 64), in search for transdisciplinary methodology of knowledge production, turns to evolution: "It is the coevolution of the human being and of the universe which asks for a new methodology." This thesis supplements such coevolution with the coevolution of polyphibians and their media.

In hope to resolve the confrontations between disciplinary domains Nicolescu (2002, p. 65) puts "an attempt to elaborate a new philosophy of Nature, a privileged mediator of a dialogue between all areas of knowledge," as "one of the highest priority in transdisciplinarity." Similarly, polyphibianism priorities living knowledge where diverse organs grow and self-organise in a harmonious organism. Nicolescu (2002, p. 65) recognises that the expression "living Nature is a pleonasm", since "the root of the Latin word natura is nasci and designates the action of giving birth." Such pleonasm in the context of evolving transdisciplinarity reinforces the drive behind polyphibianism - the recursive rebirth of the polyphibian in front of every challenge - the very opposite of classical disciplinary research leading to the "death of nature" (Nicolescu, 2002, p. 58). Nicolescu (2002, p. 65) accordingly notes: "Living Nature is the womb of the self-engendering of the human being."

[i] see chapter 4.3.1.

Questioning the traditional ways of transmitting knowledge, of learning from the books, from representations of nature, Nicolescu (2002, p. 65) proposes instead to try and learn directly from nature, hence making the metaphorical connection between nature and the book obsolete: "Nature seems more like a book in the process of being written: the book of Nature is therefore not so much to be read as experienced." The living knowledge is "transmitted" by growing it within itself - the organism of knowledge mutates and matures. Nicolescu (2002, p. 66) compares the classical world of disciplinary research to a "world of figuration" and the transdisciplinary world to a "world of transfiguration" – the polyphibic world of transmutation of organs of knowing.

In the culture that is predominantly visual Nicolescu (2002, p. 68) comes across an exception, a "transgression of the field of sight" pointing to the threshold where visual experience becomes irrelevant: "microscopes encountered the quantum barrier." The reason the quantum particles are "nonvisual" or "invisible," explains Nicolescu, is the fact that they are "non-localisable." The shift to non-local causality has disintegrated the primal dominance of the visual representations in science.

Similarly Duchamp's pseudo-scientific experiments have shaken the foundations of "retinal art" unveiling the world that escapes the retina. In the newly established "non-retinal art" localising, mapping, representing, measuring, and relating by local causality is to be avoided. Abstaining from visual manifestation is, in essence, going against the intellectual current, against extraction and

externalisation. By overcoming the visual Duchamp is also trespassing the intellectual, moving beyond the intellectually homogenised visual space, bringing back from heterogeneity only visually incomprehensible items.

The art-research project[i] ASCO2.T AT.LAST in this thesis follows Duchamp into the non-retinal realm: the optical instruments of the visual that Duchamp submits to comical corrective[ii] are replaced by instruments of invisible collisions or in Nicolescu's (2002, p. 68) words: "Particle accelerators are for the quantum world what microscopes and telescopes are for the classical world. Particles indicate their presence by the number of pulses recorded by electronic computers. Their properties are electronically reconstructed." The cyborganic ASCO2.T upgrade of ASCOT apparatus designed for CERN particle accelerator is an imaginary solution to knowledge production outside the visually dominated domains, without the urge to return to reconstruction and representation.

Nicolescu and McLuhan both comment on the disappearance of the visual space, on the turn "toward the invisible: toward that which is beyond visible" (Nicolescu, 2002, p. 69), with the advent of nonlocal and nondeterministic quantum mechanics. Relating the "exactly repeatable" to "visual," McLuhan (Picnic in Space, 1967) follows science in its advancements out of the visual conditioning, away from the compulsion to repeat the results of scientific

[i] see chapter 4.2.3. for more on ASCO2.T AT.LAST project
[ii] see chapter 4.1.1. for more on comical corrective

experiments: "as science gets more sophisticated it realizes that all experiments are subtly non-repetitive […] and visual space, in fact, has disappeared from science." Nicolescu (2002, p. 68) continues: "The transgression of the field of vision leads to transvision: a new level of Reality that can be explored by means of science." This non-retinal level is where the phenomenon does not return to the retina via representation. The "transvision" is visionary but not necessarily visual, just as the imaginary is not necessarily image related. The organs of imagination are independent of visual senses. The invisible and nonvisual knowledge requires different sense organs.

Nothing essentially new is learnt by rendering the invisible visible, nothing of a new kind. For direct experience of invisible phenomena sense organs must become one with the phenomena. If human senses do not suffice for imagined reality new imaginary organs are called for. In turning towards "that which is beyond visible" alone does not guarantee independence from externalisation of experience - scientific research still depends on external detectors and instruments. For that reason Nicolescu (2002, p. 69) emphasises the "interior perception, the manifestation of what one can call quantum imagination" as a complementary drive in research. This introspective, internalized speculation is the only access to experience of the otherwise unimaginable, unpresentable. In order to experience it, this thesis proposes evolution of internalized instruments-organs. The prerequisite for invention of internal instruments is the silence of "habitual thought:"

> Since we are not quantum entities we cannot ourselves explore this quantum world, but we can nevertheless perceive it if we make the effort to integrate within ourselves the paradoxical information that is provided to us by scientific theory and experiments. This effort must penetrate an interior silence by quieting habitual thought based on perception of macrophysical level. (Nicolescu, 2002, p. 69)

Duchamp practiced indifference towards the visual by introspectively approaching the non-retinal realm. Practicing indifference towards the visual culture, the culture of repetition, increases sensibility towards the non-repetitive, towards novelty as such. Even in experiencing the same phenomenon, novelty arises if the experience changes in kind. In fact, Duchamp strived to be newborn[i] in front of every experience of a phenomenon (Molderings, 2010, pp. 2257-63). Nicolescu (2002, p. 70) finds the same advantages in the state of being newborn: "at the door of the quantum world we can become again as infants by sacrificing our habits of thought, our certainties, our imagery, because the quantum imagination is an imagination without imagery." As Nicolescu anticipates the different kind of imagination, the Manifesto of transdisciplinarity opens up to polyphibianism. Polyphibianism resumes where the Manifesto pauses:

> Comprehension of the quantum world therefore passes through a lived experience that integrates knowing based on scientific theory and experiment into our very being, while making us discover a new level of perception within ourselves. (Nicolescu, 2002, p. 70)

[i] see chapter 4. for more on concept of being newborn as explained by Duchamp and Poincaré

Can the quantum world and other worlds of different orders of organisation than the human order be known by living the experience? Can humans be inventive enough to integrate themselves within such living knowledge? Manifesto of transdisciplinarity is an inexplicit list of intents to be actualized both internally and externally. It therefore serves to this thesis as a signed treaty upon the current state of affairs and fundamental guidelines to resolve the tensions. Specific imaginary solutions need to be invented upon this agreement: integration of knowing with being, and theory of knowledge with theory of evolution, as Bergson (2005, p. xxiii) proposed. The imaginary solutions are not necessarily representable as imagery, but can nonetheless, for the purposes of trespassing between disciplinary apparatus of visual culture and the nonvisual transdisciplinary zone, be manifested as notes[i], sketches, graphs, diagrams, etc.

Nicolescu (2002, p. 71) offers further support in imagining solutions: "In the transdisciplinary vision the classic real/imaginary dichotomy disappears. The real is a fold of imagination and the imagination is a fold of the real." Like the potential and the actualised, the real and the imaginary are intricately intertwined. Nicolescu continues: "From fold to fold we invent ourselves." From this reinventing oneself, by folding imaginary realities, one is reborn as a polyphibian. With folds the indivisible individual divides and disperses oneself

[i] see chapter 4.2.5. The Box of 1914, 4.2.6. The Box of 2014, and the Appendix B: the Box of 2014, as an example of notes on imaginary solutions

over the protoplasm of knowledge. Transdisciplinary zone begins where the disciplinary researchers are reborn in a common researching organism. Nicolescu (2002, p. 74) notes the implicit potential for rebirth in the disciplinary researcher trespassing beyond her or his discipline: "Homo sui transcendentalis is in the process of being born. He is not some new man but man reborn. This new birth is potentially inscribed in our very being."

Returning to the roots of the term transgression, Nicolescu (2002, p. 74) explains it in its simplest original meaning, "to pass to the other side, to cross," that only later assumed the meaning of "the violation of law," therefore, his proclamation of transdisciplinarity as "a generalized transgression" returns to its broader, primary meaning. Although far from violation of law and order, transdisciplinarity, as it evolves, trespasses from one order to another. Once accessed, the transdisciplinary zone is not to be appropriated, rather, Nicolescu (2002, p. 82) envisions "a transnational space, a space that does not belong to anyone." This thesis proposes protoplasmic agora as such "transnational space," a dynamic space of turbulent inventiveness without any imposed preconceptions. The movement of polyphibianism requires protoplasmagora just as a movement in art or science needs a fertile safety zone.[i]

> If one engages exclusively in the crossing of different levels of Reality, this new behaviour, to be with, neither for nor against,

[i] see chapter 4.2.3. for more the on safety zone for artists: from salon of the refused to the interval of suspended judgement

> but both for and against, traps one in a new dogmatic […] It is only through the harmony of levels of Reality and levels of perception, that is to say, through an accord between thought and one's own experience of life, that this trap may be avoided. (Nicolescu, 2002, p. 87)

Transdisciplinarity is not a quest for knowledge. Rather than trying to conquer within and beyond disciplines, transgressing domain boundaries, transdisciplinarity evolves in order to live knowledge more fully, fine tuning the organs of knowing. Self-organising into an imaginary organism, knowledge ceases to be a commodity, something to be extracted and externalised from the organs. Self-awareness of such complex organism of living knowledge renders any separation into the observer and the observed impossible – awakening organs into an organism prevents disintegration and fragmentation of knowledge. Polyphibianism is an evolutionary movement that is keeping the organism supple, stretching and contracting it, preventing the stiffening of knowledge by making it contradict itself only to subsequently resolve contradictions in transmutation.

Within the protoplasm of transdisciplinary zone unexpected connections are discovered between disparate and incomparable disciplinary methodologies and between incompatible mind-sets of researchers coming from different disciplines. Nicolescu (2002, p. 89) understands transdisciplinarity as "the science and art of discovering […] bridges […] between different areas of knowledge and different beings," where "we find the framework for an authentic revolution in intelligence." It is only through introspection into the depths of

transdisciplinarity, where intellect prospers in its protoplasmic state, that intelligence becomes self-aware and is able to self-organise on another order.

"Today, revolution can only be revolution in intelligence, which transforms our individual and social life into [...] an act that unveils the poetic dimension of existence," where, for Nicolescu (2002, p. 90), the Greek term poetic, means to make, "to do, today, means to reconcile contradictories." Polyphibianism feeds on contradictions and indecisiveness, occurring in sufficiently complex intellectual system of presumptions, as demonstrated by mathematician Gödel. With self-organisation the complexity of newborn organs of intelligence sporadically increases, ensuring the driving force for this evolutionary movement.

Emerging from transdisciplinary research, the levels of reality in themselves, according to Nicolescu (2002, p. 87), do not yet prevent another dogmatic system. Polyphibianism inhibits a set of axioms, to form a dogma, by evolving a self-aware curiosity. A pure inner curiosity of living knowledge to know itself questions any such set with multiple organs of knowing, being always newborn in front of dogmatic schemes. Driven by incessant curiosity, polyphibianism maintains the illusion of static and stable harmony within the dynamic organism of living knowledge.

Identifying a new culture of apparitions as an alternative to the old culture of appearances Roy Ascott (2003, p. 281) criticises in the later the tendency towards formation of homogeneous dogmatic systems: "A culture concerned with

appearances bases itself on certainties, a definitive description of reality. Uniformity of dogma, uniformity of outlook and goals, cultural continuity and consensus, semiotic stability: these are its distinguishing features." With advent of cyberspace Ascott sees a new culture on the rise, a culture of changing emergent phenomena, a culture of apparitions:

> What both the art and technologies of cyberculture are able to show is that there is a radical shift in our perceived relationship with reality, where the emphasis has moved from appearance to apparition; that is, from the outward and visible look of things to the inward and emergent processes of becoming. In this culture, neither the precise state of art nor its cultural status can be fixed or defined; it is in a constant state of transformation. This is not a state of transition between two known and fixed definitions or destinations, rather, it is transformation itself as a defining characteristic, as intrinsic to the identity of interactive art as the composed and finite object was to its classical predecessor. Interactive art is art in a state of endless becoming. It is art in flux. (Ascott, 2003, p. 281)

The shift from retinal to non-retinal art initiated by Duchamp is now reinforced by technological infrastructure. Duchamp escaped the dominance of visual culture, by avoiding visual representation, repetitiveness, formation of habits of thought and taste. Trespassing into the territories beyond the visible became widely accessible and navigable with computer networks. Cyberspace was not to become another visual space, observed from a fixed point of view. Visualisation of cyberspace does not enhance it, added visual dimension of cyberspace does not contribute to its essence. Cyberspace exists as interactions of multiple points

of being[i], of nodes appearing and disappearing in the complex web of relationships. Both Ascott and Nicolescu recognise artists as forefront explorers of cyberspace where cyberspace serves as an operational prototype for the transdisciplinary zone. Nicolescu observes how transference of "computer methods to the realm of art" transubstantiates the medium:

> Art […] uses incredible information circulation on the internet as if it were new matter. Information rediscovers its original meaning of "in-formation:" to create new forms, ceaselessly changing new forms, arising out of the collective imagination of artists. The interconnectivity of computer networks allows such connections between artists, who come together in real time on the Internet to create together [...] a world that arises from somewhere else. This "somewhere else" is found in the inner worlds of artists […] These experimental researchers constitute the germ of a genuine transdisciplinary research. (Nicolescu, 2002, p. 98)

As has been shown before, the individuality of a disciplinary researcher trespassing into the transdisciplinary zone divides and disperses. Ascott (2003, p. 376) reports the same divisibility of classical notion of indivisible self in cyberspace: the "cyberself" or the "embodiment of technoetic relativity" is an individual "made up of many selves: de-centred, distributed, and constructively schizophrenic." Cyberculture cannot be formed by monophibians. Every monophibian entering the cyberspace is instantaneously dispersed in a polyphibic network. Cyberself is therefore proto-polyphibic. Any centralised

[i] term point of being is borrowed from Derrick de Kerckhove, see Appendix A

monophibic tendency to manifest a unique identity is superficial, existing only on the interface with the classical reality. Polyphibic creativity is initiated deep within the decentralised peer to peer exchange network of organs of knowing that mutate with the evolving source code.

With the shift from the culture of appearances to the culture of apparition Ascott (2003, p. 280) predicts a shift to a "radically new role of the artist." No longer concerned with appearances, the artist does not visualise the observed phenomena as an external observer, but rather immerses himself in emergent phenomena: "Instead of creating, expressing, or transmitting content, he is now involved in designing context," inventing the transformative environment, the protoplasmic agora of participation in creative act. "Connectivity, interaction, and emergence are now the watchwords of artistic culture […] Art is no longer a window onto the world but a doorway through which the observer is invited to enter into a world of interaction and transformation." (Ascott, 2003, p. 280) Protoplasmagora is shaped by the organism of living knowledge, welcoming new visitors, new mutations of the polyphibic species.

> Cyberspace is the space of apparition, in which the virtual and real not only co-exist, but co-evolve in a cultural complexity. Apparition implies action, just as appearance implies inertia. Apparition is about the coming into being of a new identity, which is often, at first, unexpected, surprising, disturbing. If appearance is claimed as the face of reality, of things as they are, apparition is the emergence of things as they could be. (Ascott, 2003, p. 279)

Polyphibian, being incessantly newborn, is not concerned with external appearances but only with internal experience of the emerging new orders of knowledge organisation. With increasing complexity higher and higher orders of organisation emerge in cyberspace. This tendency suffices for Nicolescu (2002, p. 99) to treat cyberspace as proto-transdisciplinarian: "It is here that the transdisciplinary method is shown to be indispensable because all creation encounters a wall of representation." Transdisciplinarity evolves into a living organism of knowledge by evading the "wall of representation," deflecting the trajectory of the artist (transdisciplinary explorer) and dispersing the artist's identity: "True artistic creation arises at the moment of crossing several levels of perception simultaneously, engendering a transperception" (Nicolescu, 2002, p. 99). An artist can participate in multiplicity of emerging orders only with a polyphibic awareness.

Ascott (2003, p. 283) envisions art in cybernetic culture that he terms "telematic art" independently of cybernetic technology, its principles are transferable to advancements beyond cyberspace: "Working with networks is a matter of attitude before it is anything to do with machines. Telematic art is conceptually driven, not technologically led." Ascott (2003, p. 283) enlisting the "fundamental concepts of art as action, interaction with the art-in-process, […] art as transformation, change, flux and flow," conceives of "the art-work as arena." This thesis imagines the evolution of such arena into protoplasmic agora, where the artist – the forefront transdisciplinary explorer – transmutes into a

polyphibian and co-creates the agora: protoplasmagora is formed and in-formed by the movement of polyphibianism.

Polyphibian passes from one medium to another, from one culture to another, in silence. Polyphibian leaves traces behind but no translations. "Translation, be it partial or general, between different cultures is inconceivable, because cultures emerge from the silence between the words," and for Nicolescu (2002, p. 101) "this silence cannot be translated." Silence[i] opens up the interval – the interval of suspended judgement[ii]. Judgement and prejudice results from habitual automatic translations. To be transcendental, translations must be original, relentlessly mutating the meaning. By introducing chaos into communication more of the silent meaning is transferred directly, by resonance: direct, silent communication is about adjusting the rhythm of intervals, leading into resonance.

Direct communication of the living knowledge between polyphibians is nonrepresentational. Protoplasmagora is silent, knowing is immediate. The in-formation passed between polyphibic organs is internal and private, nothing is extracted for public presentation. Translation of silence between cultures of monophibians, on the other hand, results in silence devoid of meaning. The

[i] see chapter 4.2.2. for more on silence as resistance to communicate indirectly in case of Duchamp and Deleuze
[ii] see chapter 4.2.4. for more on the interval of suspended judgement

meaningful silence is not hesitation, not thought of before execution, but emerging spontaneously. Silence organises the intervals. It has an active organising role. Nicolescu (2002, p. 105) compares this silence to quantum vacuum: "It is a full silence, structured in levels."

Protoplasmagora is a structured interval of silent tension between the irreconcilable, incompatible opposites. This interval includes everything – nothing is left out by silence. The interlude of complexity and simplicity of such silent vacuum of potentiality is what makes protoplasmagora able to afford the creation of organisms of living knowledge. Living knowledge is not about speaking out, it is the direct active in-formation[i]. Nicolescu explains: "silence appears to us as an unknowable, because it is the unfathomable well of knowledge, but this unknowable is luminous because it illumines the very structure of knowledge" (2002, p. 105). The form of knowledge informs and reforms the organism - by yielding to the form the organism and the living knowledge become one.

> If there is a universal language, it goes beyond words, because it concerns the silence between the words and the unfathomable silence that is expressed by each word. Universal language is not a language that can be captured in a dictionary; it is the experience of the totality of our being, reunited at last, beyond all its myriad forms. (Nicolescu, 2002, p. 106)

[i] term active in-formation is borrowed from David Bohm

Mastering more than one discipline, being fluent in more than one language, belonging to more than one culture is undoubtedly an arduous task. Nicolescu (2002, pp. 105, 106) instead proposes a transdisciplinary, transcultural and translinguistic attitude, where transculture is "first of all an experience, because it concerns the silence of different actualizations," while translanguage is "an organic language, which captures the spontaneity of the world, beyond the infernal chain of abstraction after abstraction." Rather than learning from multiple disciplines, cultures and languages externally, the transdisciplinary method is to internalise this universal experience. The aim of this thesis is to imagine how such knowledge could be lived by examining to what degree categorisation of knowledge into disciplines, cultures and languages becomes obsolete with evolution of transdisciplinarity.

3. Research methodology

3.1. Anticipating chaos: the method of introspection

3.1.1. Quality over quantity, smooth over striated

In contrast to well devised research methodologies specific to each disciplinary domain the transdisciplinary zone lacks such protocols – any attempt to establish a set of rules would reduce transdisciplinarity to yet another discipline. The challenge of describing transdisciplinary mode of exploration can only be compared to the challenging moment of a major breakthrough within a discipline ripping apart the disciplinary scaffolding that was for long considered a stable ground and suddenly become obsolete.

An example will be given in the field of physics where, within safely deterministic systems, indeterminism lurked in at fin de siècle: chance emerged where by definition should be none, and the existing methodology that was to predict the behaviour of the system failed – in some cases literally catastrophically. With this unexpected encounter with chaos in physics the method of approaching systems, deterministic or not, needed to be entirely reconsidered. The customary thinking in terms of quantities about the systems, where chaos is inevitable, had to be replaced with qualitative observations.

Another example will follow from the field of metaphysics, where the difficulties to express the complex ideas (of coming into knowing, of knowing by intuition) in linear language become insurmountable. The linearity of intellectual reasoning impedes the interpenetrating intuitive notions from being experienced. The same inclination towards the qualitative, mosaic approach, rather than the quantitative, sequential approach in representations of research results is noticed in advancements of both metaphysics and physics.

At the same time that chaos was anticipated in physics, through Poincaré's explorations of unorganised matter, and in metaphysics, through Bergson's studies referring to evolution of organised matter, Duchamp grasped chaos in both domains, dealing 'pataphysically with occurrence of chance in systems so conventionally standardised that chance should not occur. Infecting systems with chance and, at the same time, conserving or canning the chance was his way of overcoming the limitations of intellect with humour.

The case of Henri Poincaré anticipating the theory of chaos is well known and well documented (Barrow-Green, 1997). After supposedly resolving the stability of the "three-body problem" (the problem of determining the motion of three bodies from their given initial conditions), Poincaré revised again his award-winning paper that was being prepared for print. By discovering an error in one of his proofs, Poincaré reached quite the opposite conclusion: the three-body system was far from stable and impossible to resolve with the available methods of classical mechanics. Left without adequate tools for reasoning in the given

situation, Poincaré had to devise his own method, turning away from quantitative to qualitative analysis:

> From Poincaré onward, then, celestial mechanics becomes a new discipline, namely, qualitative dynamics. New mathematics, in the forms of measure theory and topology, supplements the older methods of analysis. New devices, the Poincaré section and shifts on it, for example, become the stable method of the subject. The questions asked are no longer so much how to find an appropriate approximation method for determining the details of some celestial orbit, but, rather, the qualitative, often global, questions about the nature of the phase portrait for some especially interesting, or especially tractable, dynamical structures. (Sklar, 2013, p. 178)

Unable to quantitatively determine the trajectories of the three bodies due to unavoidable error in approximating initial conditions or, in other words, the sensitivity to the initial conditions, now known as the trademark of chaos, Poincaré invented new qualitative ways of coming into knowing the movement. Bergson develops a similar preference towards quality or rather avoidance of quantification. Like Poincaré in physics, Bergson attempts to invent new tools for metaphysical comprehension of movement and time, by introspectively questioning the existent methods.

Poincaré devised an abstract mapping of the system to show not the actual trajectories of the system but to depict the overall tendencies of the system. One is not preoccupied any longer with the measurement of time intervals, of velocity and positions of the three bodies in units of a classical uniform space construct. Rather, one discerns a peculiar non-uniform articulation of a different kind of space, a state space growing together with evolution of the system, where the

insight can be gained about two seemingly very close tendencies that subsequently diverge and generate immense complexity:

> When we try to represent the figure formed by these two curves and their intersections in a finite number, each of which corresponds to a doubly asymptotic solution, these intersections form a type of trellis, tissue, or grid with infinitely serrated mesh. Neither of the two curves must ever cut across itself again, but it must bend back upon itself in a very complex manner in order to cut across all of the meshes in the grid an infinite number of times. The complexity of this figure will be striking and I shall not even try to draw it. (Poincaré, 1957, pp. 380, 381)

It took more than half a century and invention of computers before the first attempts were made to draw such entangling figure that Poincaré named "homoclinic tangle." Concurrently with rediscovery of chaotic phenomena in the sixties, when sensitivity to initial conditions detected by meteorologist Edward N. Lorenz, in 1961, lead to formalisation of chaos theory as part of physics, on metaphysical level, Gilles Deleuze was responsible for revival of Bergson's philosophy that lead to Bergsonism in 1966. To advance Bergson's ideas the before mentioned difficulties with linear language were avoided by Deleuzian practice of entangled, enfolded writing and diagrammatical thinking.

It has been shown (Harris, 2004) that it is possible to resolve the potential, virtual ideas implicit in Bergson's writing with precisely such tangled diagrams and strange attractors that Poincaré had in mind when studying the potential form, the virtual state that the system of the three bodies tended to. In his attempt to diagram Bergson's specific method of knowing a process in its multiplicity and heterogeneity, of knowing movement and duration, Paul Harris (2004, p. 98)

proceeds cautiously: "if we were to state Bergson's particular dilemma, we might use his own terms and say that the very act of representing multiplicity in words presents a potential trap, that to do so is to transpose a virtual concept into an actualized symbolic entity."

Harris (2004, p. 100) suggests that Bergson finds the metaphors he employs to depict complexities of his notions inadequate to the degree that they lack the intricate structure of chaos. Examining, for instance, how Bergson compares the internal experience of life and of duration to a simple unrolling of a thread, Harris (2004, p. 104) notes Bergson's struggle to show how such simple unrolling of time as a thread described in classical Euclidian geometry and Newtonian mechanics does not suffice to describe the unfolding thread of duration. What Bergson was looking for, according to Harris, was fractal geometry that would allow for interpenetration of the past and the present, a fractal dimension to accommodate a lived experience of time:

> Bergson lacks any notion of "space" or spatial metaphors which would accommodate the definitive characteristics of his concept of multiplicity. The chief impasse lies in that fact that qualitative or continuous multiplicity entails "reciprocal penetration," a tangled weave of sorts, and Bergson could not find a visual or spatial analogue because he equated space in general with the Euclidean space of common sense. Quite simply, the main reason that chaos diagrams serve as such effective heuristic supplements for Bergson's metaphors for multiplicity is that they are constructed in fractional dimensional spaces where successive magnifications reveal "reciprocal penetration" across different scales. (Harris, 2004, pp. 102,103)

Just as Poincaré found himself without appropriate tools and had to devise new mathematics for the physical phenomena he encountered, Bergson was stuck with the existent spatial concept and could not continue his metaphysical quest without reinventing his philosophical method. Harrison shows how Bergson's metaphysics urged for the same changes in classical spatial notions as did Poincaré's physical conundrum at the threshold of chaos. Harris exposes a qualitative difference between the two kinds of spatial representations of motion:

> Chaos dynamics differs crucially from classical dynamics in that space no longer precedes movement in the same way. A chaotic motion or "orbit" does not occupy a fixed, box-like space; it rather outlines the space needed to hold it as it unfolds; it produces its own spatial form as it evolves. Deleuze and Guattari conceptualize this kind of diagramming in terms of "smooth space" (Harris, 2004, p. 109)

The space of chaos diagrams, or the "smooth space," is a heterogeneously articulated space that Deleuze and Guattari (1987, p. 392) oppose to the "striated space," a homogenised space that is arbitrarily divided into uniform units. The heterogeneous state space structure of fractal dimensions grows with the movement of the system through its potentialities. The state space is free to expand to as many dimensions as needed to accommodate all the variables of the system and at the same time it follows and forms according to the system's evolution: dimensionality of the attractor or tendency of the system is accurately fractured into the finest fractal dimensions. It is to this "smooth" infinitely intricate fractal structures that Harris tries to map Bergson's thought:

> The fractal maps onto the discussion of Bergson's descriptions of how the past gathers itself and folds into the present, that is, this folding cannot be reduced to a single heuristic metaphor or image, but must be figured as a process of continual remixture and redistribution. The fractal as actual object, we might say, has a presence in the present only as a virtual fissuring. Apprehended this way, the fractal functions not as an ideal object outside thought, but a diagram that filters thought into a mobile form. (Harris, 2004, p. 114)

Chaos theory invents tools for operating with dichotomies, the opposing terms that intricately interpenetrate without contact – operating in proximity and yet tending far apart – forming a dichotomous tangle. Before these tools such interpenetration was hard to conceive, as Harris (2004, p. 111) notes: "For Bergson, the insurmountable difficulty in finding the proper conceptual figure for duration is that no image can represent duration as both continuous with itself and differing from itself." Harris envisions how Bergson would present his ideas if these instruments of thought were available to him:

> If Bergson's image is diagrammed using tools from chaos theory, it would unfold as follows. The body contracted to a point, from which a line extends out, becomes a tangled mesh, a spreading shape of constant volume that occupies more and more of a multi-dimensional phase space. What Bergson imagined as a linear trajectory "in" space (which he then had to extract from the space) gives way to a fractal-dimensional, shifting form that creates the space it occupies. (Harris, 2004, p. 110)

In order to avoid the uniformity of space the movement does not need to be extracted from it – in state space the movement articulates space naturally, grows and expands itself indefinitely within a confined volume. This thesis continues the efforts of reviving Bergson's thought by translating it from linear language to nonlinear diagrams. Focusing on Bergson's attempt to form a theory of

knowledge in mutual dependence with the theory of evolution this thesis, equipped with diagrammatical methods, is aiming to conceive a living knowledge. The growth of living knowledge is precisely this indefinite swelling within a confined space, forming an intricate tangle – of fractal and even phractal dimensions[i]. Without the fear of heterogeneity the living knowledge is inventing new organs for resolving dichotomous by-products of disciplinary research within a transdisciplinary zone.

3.1.2. Canned chance – a standard for exceptions

> If we could know exactly the laws of nature and the situation of the universe at the initial instant, we should be able to predict exactly the situation of this same universe at a subsequent instant. But even when the natural laws should have no further secret for us, we could know the initial situation only approximately. If that permits us to foresee the subsequent situation with the same degree of approximation, this is all we require, we say the phenomenon has been predicted, that it is ruled by laws. But this is not always the case; it may happen that slight differences in the initial conditions produce very great differences in the final phenomena […] (Poincaré, 1913, p. 398)

As has been shown by Poincaré, chance can emerge even in chance-free, deterministic systems, if they happen to be sensitive to initial conditions. Although a system has been constructed and conceptualized so as to determine a precise solution, the simulation of the system can only be initiated with approximation - under certain circumstances the slightest imprecision can yield

[i] see chapter 4.1.3 for more on living knowledge and phractal geometry

catastrophically divergent results. No convention can set up a standard measure for acceptable approximations in order to maintain chance-free predictability of the system.

Determinism, measurement and standards are conventions that are advantageous in a rather limited domain – as soon as the threshold of that domain is crossed they become inadequate. To avoid chance, science avoided the non-deterministic systems, but Poincaré has brought to light the occurrence of chaos within the otherwise orderly deterministic systems. In the words of David Ruelle (1991, p. 48), Poincaré "wanted to understand how chance crept in" - he needed to negotiate this inevitable conundrum in his own terms. Ruelle (1991, p. 49) recognises Poincaré's faith in determinism and his attempt to resolve this dichotomy, since the non-deterministic quantum physics was not yet developed: "essential point made by Poincaré is that chance and determinism are reconciled by long-term unpredictability."

It is well known that Marcel Duchamp read extensively Poincaré's later writings and, undoubtedly, his ponderings on chance. Namely, Duchamp instinctively reacted to Poincaré's ideas on chance and conventions in science. Duchamp also questioned the authority that prescribed the standardisation, such as standards in measurement, and pointed to the arbitrariness of their choice. In 1913 he fabricated a new standard for meter - the metrical unit of length - that was his country's pride and joy. The new standard unit of meter was to be based on chance. Duchamp documented the instructions for fabrication of the new

standard that was to be determined experimentally and entitled it 3 standard stoppages. With these instructions the experiment was to be reproduced three times with irreproducible outcomes: a thread one meter long was to fall from a height of one meter onto a horizontal plane (Duchamp, 1989, p. 22). Shaped by chance the threads were subsequently fixed on a canvas and preserved in a box. Choosing three curved threads to present one standard out of infinite possible curves by pure chance is conserving the chance or in Duchamp's (1989, p. 33) own words: "3 Standard Stops = canned chance."

Poincaré must have had realized that with every new intuitive idea we need to devise new measurement tools, tools to experiment with our intuition. Namely, by encountering chaos, Poincaré invented many such mathematical instruments that allowed him to cope with chance as the underlying principle of nature. Herbert Molderings (2010) recounts how Duchamp might have implemented Poincaré's findings and inventions in his own peculiar manner, referring to Poincaré's introduction of qualitative geometry or "analysis situ." Indeed, Duchamp seems to have released the unit of meter from its quantitative role and turned it into a qualitative measure of relations.

Roberto Giunti (2002) proposed that Duchamp might have disregarded both the last axiom on parallel lines and the first axiom that allows no more than a single straight line to connect two points, thus liberating himself from constraints of Euclidean geometry. Riemannian geometry's disregard to the last axiom can be demonstrated on a sphere. Through two given points on a sphere, we can in

general draw only one great circle – the equivalent of a straight line – with one exception: if the two given points are at the ends of a diameter, an infinite number of great circles can be drawn through them.

Riemannian geometry therefore includes outstanding cases in which through two points an infinite number of "straight lines" can be drawn. Duchamp might have meticulously set the experiment to satisfy the conditions of such exceptional case, therefore choosing the Riemannian geometry as the basis for his measurement standard. If three treads from the box are put one on top of the other, Giunti (2002) observes, all three of them pass through the same two points, as if Duchamp would on purpose make them equivalent to the shortest path between these two points, while at the same time preserving their unique forms.

Duchamp admits his "joke about the meter - a humorous application of Riemann's post-Euclidean geometry" in a response to a questionnaire concerning the 3 Standard Stoppages (Naumann, 1984).[i] Consequences of this joke would be a shift from Euclidean standpoint, where there is only one straight line that connects two points, two things, two events, two facts, to the Riemannian standpoint, that allows for infinity of lines, infinity of paths between two things, infinity of causes linking two events, infinity of theories connecting two facts.

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[i] Marcel Duchamp as cited in Henderson (2005, p. 61), chapter 5, notes 26, 39: Artist's files, Department of Painting and Sculpture, the Museum of Modern Art, New York; first published by Naumann, The Mary and William Sisler Collection, pages 170-71

Duchamp was aware his gesture as an artist to find the adequate geometry for conveying the idea of probabilistic worldview will not reach his audience immediately, stating: "I don't think that the public is prepared to accept it [...] my canned chance. This depending on coincidence is too difficult for them. They think everything has to be done on purpose by complete deliberation […] in time they will come to accept chance as a possibility to produce things" (Roberts, 1968). Poincaré (1913, p. 66), who considered the choice of geometry a matter of convenience, could not have agreed more – choices made in science can be, in a sense, quite arbitrary.

It is proposed in this thesis that transdisciplinary methodology is to be based precisely on such acceptance of chance. With the 3 Standard Stoppages Duchamp exits the idealized deterministic domain and enters the transdisciplinary zone of no fixed standards, no conventions, no measures. And yet within transdisciplinarity there are orderly windows, windows of periodicity and short term predictability. Duchamp applies his game with humour by reintroducing comical standards and reusing the canned chance at carefully selected windows of opportunity. Not only is 'pataphysics laughing at physics - the science of the general, the science of standards - Duchamp, at every such window of periodicity within chaos laughs back at 'pataphysics - the science of exception - by standardising the exceptional.

Contrary to Duchamp, Bergson and Poincaré, although aware of the traps present in idealisation of scientific theories, remain reserved to a degree and

appreciate some of the benefits of disciplinary confinement (as in the case of avoiding non-determinism). Bergson (2005, p. 94), for instance, tries to rationalize why science must limit itself to a very narrow domain: "Perhaps even it is necessary that a theory should restrict itself exclusively to a particular point of view, in order to remain scientific, i.e. to give a precise direction to researches into detail." These are conventional windows of periodicity, of lawfulness in the chaos of reality. These are disciplinary islands within the transdisciplinary ocean, where, as expected, methodology developed specifically for thriving on an island cannot guarantee survival when diving into the ocean.

If, as Bergson's proposed, theory of knowledge and theory of life are considered in essence inextricable, then the periodicity windows and the non-periodic rhythms of life need to be taken into account. While the living knowledge is imagined within this thesis to grow outside conventions and standards, there are quasi-periodic or perfectly ordered openings where new disciplined knowledge can form temporary standards and conventions. These landscapes of living knowledge are incessantly changing – orders emerging and disappearing into other kind of orders. Only ephemeral scaffolding of standards are beneficial - erecting a permanent structure would impede the flow of living knowledge, while the scaffolding is to self-organise and self-assemble with each new emerging order.

Duchamp was aware of this interchanging nature of knowledge – of areas where intellect reigns intertwined with areas where navigation is possible only by

power of intuition. As was shown, the first step towards transdisciplinary navigation was a shift from quantitative to qualitative research method applied to unpredictable zones opening up in disciplinary research. Further dissolving of disciplinary boundaries was caused by Duchamp, Bergson and Poincaré with questioning the extent to which concepts and categories, such as a category of space, of unit, of uniformity, of standard, of determinism etc., could be taken for granted. While Duchamp was "merely" joking about it and Bergson has only had an intuition of it, Poincaré has proven that there is much to be gained in knowledge if these categories are temporarily discarded – demonstrating how exploration outside categories and conventions is not only possible, but opens up the scope of research to a much wider zone.

3.2. Aesthetic Anaesthesia: the method of indifference

> "My first accidental experience (that we commonly call chance) happened with the Three Standard Stoppages, and, as I said before, it was a great experience. The idea of letting a piece of thread fall on a canvas was accidental, but from this accident came a carefully planned work. Most important was accepting and recognizing this accidental stimulation. Many of my highly organized works were initially suggested by just such chance encounters." Duchamp as quoted in Kuh (1962, p. 92)

Does a discovery happen by chance or by choice, or both? This chapter begins by examining how "spontaneous" a scientific discovery actually is, and whether or not it is as effortless as a process of osmosis. Do ideas that occur by chance pass through a selectively permeable "sieve," as suggests Poincaré's introspective inquiry? While the second subchapter performs an "anaesthesia" on aesthetics in

general, as commonly referred to in art, and tries to re-awaken the authentic sensibility in an artist, the first subchapter discusses aesthetics as it was originally defined and its role in science. The sensibility common to both artist and scientists will be clarified by resolving the tension between seemingly opposing stances of Duchamp (indifference to aesthetics) and Poincaré (reliance on aesthetics).

3.2.1. Chance and choice – spontaneous aesthetics of discovery[i]

Aesthetic, as such, was first defined by Alexander Baumgarten (Hammermeister, 2002, p. 4) in his 1735 text entitled 'Philosophical meditations on some requirements of the poem'. Derived from Greek aisthetikos, meaning sensitive, or from aisthanesthai, to perceive, to feel, Baumgarten characterizes this new branch of philosophy as a theory of sensibility. Suddenly sensibility is recognised as a gnoseological faculty, that is, a faculty that produces a certain type of knowledge. Baumgarten is defending the relevance of the sensual in confrontation with the rational.

Building upon the spectrum of cognition, divided by Gottfried Wilhelm Leibniz into obscure and clear cognition, followed by further division of clear cognition in the confused and the distinct, and furthermore division of the clear distinct cognition into adequate, and inadequate, intuitive, symbolic, etc., Baumgarten

[i] this subchapter is taken from the abridged article (Ljubec, 2012a)

(Hammermeister, 2002, p. 5) focuses attention on the clear and confused cognitive insight – at first sight a contradictory state. While obscure cognition is not fully conscious without concepts, Baumgarten explores within the clear cognition, which Leibniz otherwise classifies as conscious and conceptual, the element of confusion.

In clear and distinct cognitive insight one can fragment the object of perception and enumerate all features, while in clear and confused cognitive insight the multiple features of the object cannot be separated or listed, according to Leibniz. The subject is aware of the complexity of the object but this awareness is not analytic. Rather the cognition is lively and emotionally charged. With emotions come the likes and dislikes, the attraction and repulsion. It is the balance between such involvement and indifference that we have to master, according to Duchamp. In order to "clarify our understanding of the word 'art' - to be sure, without any attempt at a definition," Duchamp (1989, p. 139) states "that art may be bad, good or indifferent, but, whatever adjective is used, we must call it art, and bad art is still art in the same way that a bad emotion is still an emotion."

In this sense to be attracted to, repulsed or even indifferent are only three tendencies on a continuous scale of aesthetic sensibilities. With refinement of our sensibility we are accessing a wider spectrum of possible cognition – from obscure, intuitive and whole to rational, conceptual and fragmented. Baumgarten (Hammermeister, 2002, p. 6) argues that there are no direct leaps possible between extremities of this spectrum, that is, from obscurity to distinct

insight. To make a leap we always need an artefact, a work of art that functions as a membrane, allowing for osmosis to happen.

It is known through his writings that Henri Poincaré observed himself very closely during his scientific inquiry. A discovery of a mathematical law for Poincaré is precisely that leap from obscurity to distinct idea through what he terms a "sieve," a sort of filter, not unlike the selectively permeable membrane. The role of the "sieve" in the process of discovery is described in the following passage from Poincaré's (Brown, et al., 1981, pp. 10-18) lecture "Mathematical discovery:"

> [...] mathematical work is not a simple mechanical work, [...] it is not merely a question of applying certain rules, of manufacturing as many combinations as possible according to certain fixed laws. The combinations so obtained would be extremely numerous, useless, and encumbering. The real work of the discoverer consists in choosing between these combinations with a view to eliminating those that are useless, or rather not giving himself the trouble of making them at all. The rules which must guide this choice are extremely subtle and delicate, and it is practically impossible to state them in precise language; they must be felt rather than formulated.
>
> Under these conditions, how can we imagine a sieve capable of applying them mechanically? How can we explain the fact that, of the thousand products of our unconscious activity, some are invited to cross the threshold, while others remain outside? Is it mere chance that gives them this privilege? Evidently not. For instance, of all the excitements of our senses, it is only the most intense that retain our attention, unless it has been directed upon them by other causes. More commonly the privileged unconscious phenomena, those that are capable of becoming conscious, are those which, directly or indirectly, most deeply affect our sensibility.
>
> It may appear surprising that sensibility should be introduced in connexion with mathematical demonstrations, which, it would

> seem, can only interest the intellect. But not if we bear in mind the feeling of mathematical beauty, of the harmony of numbers and forms and of geometric elegance. It is a real aesthetic feeling that all true mathematicians recognize, and this is truly sensibility.
>
> Now, what are the mathematical entities to which we attribute this character of beauty and elegance, which are capable of developing in us a kind of aesthetic emotion? Those whose elements are harmoniously arranged so that the mind can, without effort, take in the whole without neglecting the details. This harmony is at once a satisfaction to our aesthetic requirements, and assistance to the mind which it supports and guides.

Poincaré clearly talks of aesthetics in the way Baumgarten originally formulated it. It is not a mechanical procedure nor a pure rational knowledge that facilitates discovery, but a special sensibility that attracts the distinct from the obscurity. At the core of philosophy of aesthetics, whose goal is to defend the role of sensual experience, lies the confidence that the inability to transform an idea that is confused into a distinct idea should not be dismissed as a failure, on the contrary, it should be considered as another kind of cognitive achievement. But in this game of sensual, and therefore emotional involvement, the neutral involvement or complete indifference also plays a significant role.

At first indifference in the sensual and emotional involvement sounds as contradictory as the Liebnitz's clear and confused cognition. Indifference is recognised on the spectrum of aesthetic sensibility by Duchamp (1989, p. 141) in his lecture 'Apropos of Readymades', held in 1961, as a "total absence of good or bad taste – in fact a complete anaesthesia." He devotedly employed indifference when choosing his readymades. Why would Duchamp be aesthetically

indifferent, why would he be reacting only to objects that do not visually attract him, choosing only those to which his eye is emotionally neutral, insensible?

One has to bear in mind that Duchamp was probably well acquainted with Poincaré's introspective analysis. Duchamp's notes include remarks on Poincaré's findings and some of Poincaré's ideas (for instance the idea of the sieve) are even present in Duchamp's work. The sieve as the interface, as the selectively permeable membrane, is reconfigured by Duchamp: it is only to visual sensibility that Duchamp is indifferent to. Indifference in one sensual area reconfigures the interface to reality to permit other ideas to get through.

3.2.2. Aesthetic sensibilities of a serious artist

If de-categorization occurs within scientific disciplines a new methodology usually develops, on the basis of which new disciplines and categories are founded. In contrast to such presumably unavoidable re-categorisation this research relies only on ephemeral scaffolding, in order to prevent any permanent structure from being instituted, or methodology to become established. Rather than pursuing a generalised methodology, this research is focused on specific and exceptional sensibilities – the unnoticed and underdeveloped ones - such as the vaguely defined vocation of the artist that has been generalised to the degree of losing relevance.

To rediscover the role of the artist in the contemporary world, Marshall McLuhan's (1994, p. 18) remarks remain of great value. McLuhan defines the

artist as the "expert aware of the changes in sense perception," the one that is "always the first to discover how to enable one medium to use or release the power of another." McLuhan in fact continues the Ezra Pound's recognition of the role of the artist as the "antennae of the race:" the artist according to McLuhan (1992, p. 5) is namely "constantly making raids on the inarticulate." More precisely, "the artist picks up the message of cultural and technological challenge decades before its transforming impact occurs," (McLuhan, 1994, p. 65) or, in other words, the artist is "always the first to discover how to enable one medium to use or to release the power of another" (McLuhan, 1994, p. 54).

McLuhan's spotlight on sensibility returns, or better, refuels art with the original scope of aesthetics defined by Alexander Baumgarten (Hammermeister, 2002, p. 5), as a theory of sensibility, where sensibility, functioning as a gnoseological faculty, produces a certain type of knowledge. Baumgarten is defending the relevance of sensual in confrontation with the rational. That rational science depends on the sensual is confirmed by scientists themselves, as has been shown, Henri Poincaré reveals the role of aesthetics[i] in mathematical discovery.

The constrictions of the category of art were, most of all, challenging for artists. Marcel Duchamp would confront territories beyond art, not only those opposing art, or anti-art, but also those indifferent to art, or simply anart[ii]. The artist for

[i] see chapter 3.2.1. for more on the role of aesthetics in mathematical discovery
[ii] see appendix A for more on the difference between art, anart and anti-art

Duchamp (1983, p. 138) would become a "mediumistic being" not to be considered independently but in a process of creative act that includes the spectator. The phenomenon of being "mediumistic" is further explored and expanded on in this thesis, beginning with the ecological relationship of the artist to the medium.

James Gibson's (1986, p. 8) observation of mutual dependency between the animal and its medium, made him rethink the entire approach to the perception faculty in the animal. The same precautions were taken approaching art in this research: exploration of the specific sensibilities of the artist has led to considering the artist as a being able to trespass from one medium to another as soon as it senses the change in the rate of flow. Animals, whose technology has been evolved for the primary medium, but are resilient enough to journey into the adjacent medium are termed amphibians. Artists, sensible to any new emerging media, would therefore be tempted to trespass through a multiplicity of media and should therefore be termed polyphibians.

The equilibrium state for a polyphibian is "with one foot in an unknown territory," always trespassing and breaking through the interfaces that separate adjacent media. Sometimes the traces of the breakthrough that the polyphibian leaves behind on the interface are categorised as art. These are nothing but traces - not to be mistaken for representations of a system. These traces are merely the consequence of the raw matter on the periphery of the existent medium being modified under the peculiar rules of the next medium.

Marcel Duchamp's readymades[i] are an example of such conflicting situation connecting opposing systems. The readymade is the raw matter modified under alien conditions where the awareness of the artist and that of the spectator meet. It is important to note that this awareness is not necessarily visual. Duchamp was not only avoiding the visual representation - as a member of a predominantly visual culture he trespassed beyond the limitations of the retina by engaging in "non-retinal" art. Throughout this thesis the inconveniences of the visual medium are brought forth as encountered in the western culture, where the visible was raised to almost legislative role and the invisible was almost ignored.

In the context of transdisciplinarity, the dependency between the animal and the medium is further examined in order to understand how to set free a disciplinary researcher from constrains of her or his discipline, for instance, how to liberate a visual artist from constrains of the visual medium. The innate sensitivity of the artist is to be awaken and applied to transdisciplinary research methodology. The arguments are derived from J. J. Gibson's consideration in the field of visual perception. According to Gibson (1986, p. 16) the animal implies the environment, just as the environment implies the animal. Their interdependence is implicit in their structure, but this structure, as Gibson argues, is not effectively described by physical sciences in terms of basic mathematical concepts such as space, time, matter and energy. The physical reality without life does not yet

[i] see chapter 3.3.3. for more on readymades

constitute the environment. Gibson therefore decides to rethink this interdependency in a more adequate terminology comprising media, substances and surfaces rather than abstract planes and spaces.[i]

In order to comprehend the trespassing from one medium to another, a more profound understanding of media is needed. The role of sensibility and indifference in trespassing is made clearer by McLuhan who introduces the laws of media through the familiar notions of figure and ground. While figure is the area of attention, ground is the area of inattention or indifference. Ground, for McLuhan (1992, p. 5), is "con-figurational" – all figures are present at once – making it difficult to discern:

> The study of ground "on its own terms" is virtually impossible; by definition it is at any moment environmental and subliminal. The only possible strategy for such study entails constructing an anti-environment: such is the normal activity of the artist; the only person in our culture whose whole business has been the retraining and updating of sensibility. […] Once the old ground becomes content of a new situation it appears to ordinary attention as aesthetic figure […] The business of the artist has been to report on the current status of ground by exploring those forms of sensibility made available by each new mode of culture long before the average man suspects that anything has changed. (McLuhan & McLuhan, 1992, p. 5)

This approach is reminiscent of Bergson's quest for the science of intuition as complementary to the science of intellect. Instead of formulating the problem

[i] see chapter 4.2.1. for more on Gibson's terminology that describes the interdependency of the animal and its environment

within the known theoretical context, the science of intuitive sensibility would take the problem outside the context, into its anti-environment, not subjecting it to laws, but treating it as exception, studying the relations within specified area, with methodology that is officially recognised only by 'pataphysics.

Contemplating on findings of the twentieth century physics and the independently evolved metaphysics of that time, McLuhan (1992, p. 55) quotes quantum physicist de Broglie: "If Bergson could have studied quantum theory in detail he would have observed that in the image of the evolution of the physical world which it offers us, at each instant nature is described as if hesitating between a multiplicity of possibilities, and he could doubtless have repeated as in The Creative Mind that time is this very hesitation or it's nothing'."

To continue de Broglie's line of thought, McLuhan (1992, p. 56) adds: "Quantum theory also seemed to de Broglie to have confirmed Bergson's insight that reality was characterized by interpenetration, by fusion of its components, individualities such as atoms or sensations." In de Broglie's words, quantum mechanics has given up individualising particles, distancing itself from the most convenient and trivial modes of fragmentation, recognising the infinitely intricate articulation of reality.

To escape the entrapment of classical researcher's perspective from a fixed viewpoint McLuhan adopted a more fluid model of a non-reductionist research with multiple points of view. This approach, termed mosaic, was introduced by

Nobel laureate Georg von Békésy[i] (1960), in order to contrast the notion of perspective. The dynamic advantage of a mosaic lies in its two-dimensionality, where the viewpoints are floating, as opposed to the inert perspective, with a fixed viewpoint that McLuhan (1962, p. 15) condemns as a "three-dimensional anguish." Namely, "in extreme contrast to 'point of view', which assumes a fixed position from which to examine each situation and to assert one's preference," McLuhan poses the mosaic which requires "constant readjustment to our surroundings." In other words, McLuhan (1992, p. 63) concludes:

> Ground cannot be dealt with conceptually or abstractly: it is ceaselessly changing, dynamic, discontinuous and heterogeneous, a mosaic of intervals and contours. As von Bekesy discovered, the appropriate form of awareness is acoustic-tactile-kinetic and alive to the stress and coercion that each exerts on the other.

The multi-sensuous awareness due to the interplay among the figures of the flat ground is a prerequisite for the transdisciplinary inquiry, as proposed in this research project. The configuration implies hesitation between multiple models and possible modes of comprehension. McLuhan (1962, p. 31) observes: "the method of the twentieth century is to use not single but multiple models for

[i] Georg von Békésy, while researching the auditory spaces, writes about the metaphor of mosaic in his essay 'Experiments in Hearing' as that flat field that contains multidimensional spaces coming into resonance. With McLuhan's comparison of electric culture to the acoustic tribal culture (the acoustic space is to return and overshadow the visual space), it is not surprising that McLuhan found this model, derived from research on auditory perception, relevant. The acoustic information does not come from one fixed perspectival point, rather, many points come together to form a mosaic.

experimental exploration - the technique of the suspended judgment." Suspended judgement[i] provides delay or distance required – the interval in which dichotomies can coexist and interpenetrate. Hesitation to individualise allows for osmosis or interpenetration in the interval of multiplicities.

New questions arise with the new mosaic approach. How do figure and ground interpenetrate in the mosaic model? How are the animal and the medium it animates distinguished in the mosaic? How is the sensibility of the artist to the medium to be understood according to the mosaic model? In an attempt to answer such questions a return to Gibson's approach to perception is necessary. If the shift from the model of perspective to mosaic model resulted from Georg von Békésy comparison of visual and acoustic perception, Gibson's (1983, p. 319) approach to perceptual systems opens up even wider possibilities:

> When the senses are considered as perceptual systems all theories of perception become at one stroke unnecessary. It is no longer a question of how the mind operates on the deliverances of sense, or how past experience can organise the data, or even how the brain can process the inputs from the nerves, but simply how information is picked up.

Gibson transfers the emphasis from the sense organs to a wider perceptual system that is in tune with the ecosystem and therefore eliminates the need to investigate how information reaches the specific sense, or in terms of

[i] see chapter 4.2.4. for more on the interval of suspended judgement

polyphibianism, how knowledge is accessed and processed by organs of knowledge. The sensibility of the artist relies on tuning into the system, where the information is, according to Gibson (1983, p. 319), recognised by a sort of resonance: "Active perceptual systems as contrasted with passive receptors have so developed during evolution that they can resonate to this information."

The remaining question for Gibson (1983, p. 319) is how the information articulates itself. The animal or the artist, for that matter, does not work directly with physical quantities – its sensibilities recognise the invariants and relationship to variables of the system: "This stimulus information is available in the everyday environment. The individual does not have to construct an awareness of the world from bare intensities and frequencies of energy; he has to detect the world from invariant properties in the flux of energy." Gibson (1983, p. 320) disposes of the classical notion of sense organs, the obsolete categorisation of senses:

> When it is recognised that receptors, nerve boundless, and the corresponding modalities of sensory experience do not provide a fixed number of senses or permit a fixed inventory of sense impressions, we are free to study the redundant overlapping activity of perceptual systems unhindered by the old doctrines.

This freedom is granted to McLuhan in transition from the visually dominated culture to a culture that due to advent of electric media becomes again an orchestration of all senses, where original sense organs are complemented with interpenetration of newly invented organs of knowing. Gibson (1983, p. 319) furthermore decentralises the perception system by discrediting the brain as the

central organ, rather, in accordance with McLuhan's idea of an overwhelming, omnipresent environment of electronic media, the perceiver is positioned within the environment as a perception system co-perceiving itself.

The observer and the observed are in relation of introspection, interpenetrating each other. The polyphibian is part of polyphibianism, the organism of living knowledge, therefore it co-knows itself. In terms of transdisciplinarity, the information is articulated in various forms that resonate with various organs of knowing. The movement of polyphibianism through protoplasmagora tunes the mutations of polyphibic organs – the organs are invented by fine tuning to the protoplasmic environment.

The transition from perceiving in perspective mode to perceiving in mosaic mode is better understood when taking in consideration Gibson's (1986, p. 212) explanation of the scanning movement of the eye: "just as there is no pure fixation, there is also no pure movement. There are postures of the eyes that are relatively stable and movements of the eyes from one such posture to another, but they grade into each other. Moving and fixating are complementary. They combine in the act of scanning." From this "mosaic perception" Gibson (1986, p. 213) infers thought-provoking facts about attention and awareness:

> It is also a fallacy, if a little more plausible, to assume that a series of fixations is a series of acts of selective attention to the different objects in the world. Each fixation would then be a centering of foveal attention on one object to the exclusion of another. Each saccade must then be a movement of attention from one object to another. But the truth is that attention is not only selective, it

> is also integrative. Attention can be distributed as well as being concentrated.

If the attention of the serious artist is to be distributed over the entire environment and at the same time concentrated, the point of view of an individual artist must divide into multiple points of being. The coherence of these points of being constitutes a polyphibian - a mode of being that resolves the dichotomy between selective separation and integration of knowledge. This mode implies arising of polyphibic awareness of interpenetrating heterogeneous reality that cannot be conveniently homogenised. Gibson (1986, p. 213) continues:

> The awareness of the details is not inconsistent with the awareness of the whole. Each in fact implies the other. One can perfectly well pay attention to some aspect of the environment that extends over a large angle of ambient array, such as the gradient of the ground that goes all the way from one's feet out to the horizon. Hence a whole series of fixations can be a single act of attention.

The mosaic mode, as elaborated by McLuhan, is exactly one single act of attention arising from scanning and shifting viewpoints, that is, attention of a floating viewpoint. The series of fixations in polyphibianism does not compromise the wholeness of the organism of living knowledge, since, as Gibson explained, there is "no pure fixation," and there is also "no pure movement" – polyphibianism as evolutionary movement is a series of organ mutations. The rhythm of this single act of attention with its intervals of shifting is crucial in inventing organs of knowing in resonance with the whole movement of the living knowledge.

A specialist within a discipline with all the appertaining instruments and expertise forms a monophibic organ of knowing. Once these organs become aware of each other they can self-organise in a polyphibic organism that solves the problems on transdisciplinary level of knowledge organisation. If new disciplines were to be established at this point, they would be of a higher order than the disciplines of monophibians, and yet they are never established, never fixed. Due to complexity and uniqueness of polyphibic problem-solutions there is no stability to constitute a methodological tradition of a discipline - the habits break as soon as the problem is experienced from a different point of being. In terms of Gibson, evolution of transdisciplinarity is a polyphibic "act of scanning," an unlimited movement of knowledge with "no pure fixation," categorisation or conceptualisation.

A monophibian that awakened its sensitivity of the "serious artist" through introspection, that is, by inspection of environment through itself, "senses the changes in the rate of perception." A solution, an intellectual instrument that has overgrown its confined applicability, is beginning to influence and interpenetrate foreign domains. In the contact with other media the intellectual mechanism bursts in laughter into a multiplicity of fragments that spontaneously articulate and self-organise organs of knowing.

While the neighbouring monophibians, caught in their habitual operability, not noticing these changes in the medium, simply continue their quest under the old rules, the monophibian that transcended into a polyphibian develops new ways

of operating and navigating the new medium. The medium is not necessarily a realised technology - it suffices to be merely a potential, imaginary technology in the minds of several human beings that changes the course of action in a standardised research methodology.

The new born polyphibians meeting for the first time in the protoplasmagora, meet not in person but introspectively, intra-personally, collaborating inadvertently. This collaboration is not a teamwork of a few individuals but of dispersed dividuals. There is no indirect communication but immediately shared instinct and intuition. If individuation of human beings into individuals is nothing but evolutionary stratification - all the individual strata come from the same origin and share the same instincts - these need to be awaken into intuition in a multitude of dispersed dividuals that recognise their organs emphatically. No organs of knowing belong to a foreign body.

3.3. Inventing concepts – conceiving organisms

3.3.1. Bergson, Bergsonism, Polyphibianism

> My way of getting out of it at that time, was, I really think, to conceive of the history of philosophy as a kind of buggery or, what comes to the same thing immaculate conception. I imagined myself getting onto the back of an author, and giving him a child, which would be his and which would at the same time be a monster. It is very important that it should be his child, because the author actually had to say everything that I made him say. But it also had to be a monster because it was necessary to go through all kinds of decenterings, slips, breakings, secret emissions, which I really enjoyed. My book on Bergson seems to me a classic case of this. (Deleuze, 1991, p. 8)

From his letter to Michel Cressole it is already clear that Deleuze was more than a commentator to Bergson: he not only revived Bergson's philosophy - from Bergson Bergsonism was born as a mutated species. This procedure will be reiterated throughout this thesis especially through participation in Creative Act and Creative Evolution[i], with polyphibianism being born out of Bergson as a next generation of Bergsonism. The growth of polyphibianism out of Bergson is, in accordance with Bergsonism, gradual - but then, suddenly, it makes a leap.

With Bergsonism intuition becomes a method - a method of precision[ii] (Deleuze, 1991, p. 13). By attributing precision to intuitive method and practicing it as equivalent to any intellectual method in its scope, knowledge outside the reach of the intellectual disciplinary science becomes relevant and accessible to a different kind of science, a science based on intuition, as often proposed by Bergson, accepting the possibility that there are other ways of gaining accurate knowledge. But how is precision to be achieved beyond the constraints of a scientific discipline?

Taking Bergson's advice to state the problems accurately, just as life does, Deleuze (1991, p. 16), in a sense, introduces a proto-method of a living knowledge: "Life is essentially determined in the act of avoiding obstacles, stating and solving a problem. The construction of the organism is both the

[i] see chapter 4.1. where Bergson's seminal work Creative Evolution is elaborated upon
[ii] see chapter 2.2. for more on the changing notion of precision in transdisciplinarity

stating of a problem and a solution." Achieving precision within transdisciplinary zone, where intellect mutates aided and guided by intuition, requires reversal and deviation from the predetermined methods of intellectual reasoning that ensure precision within scientific disciplines. In contrast to disciplinary approach transdisciplinarity solves problems outside domains of concepts or precepts, it is stating a problem as an organism: it is living the knowledge.

The most indispensable critique offered by Bergson in this regard is, according to Deleuze (1991, p. 18), the "critique of the negative and negation in all its forms as sources of false problems." Deleuze (1991, p. 19) recounts the two examples of the false problems encountered by Bergson: that of non-being and that of dis-order: "The idea of disorder appears when instead of seeing that there are two or more irreducible orders (for example that of life and that of mechanism each present when the other is absent), we retain only a general idea of order that we confine ourselves to opposing to disorder." The same goes with the "being in general […] which can only be opposed to nothingness" (Deleuze, 1991, p. 18).

Another example of a false problem, pertinent to this thesis, is the problem of crossing disciplinary boundaries. Since disciplinary research has been proven successful in production of knowledge, there is a fear of knowledge produced without such discipline. Transdisciplinarity, although always welcomed in theory, is negated the possibility to access knowledge in practice – what is practiced are only forms of disciplinary exchanges (interdisciplinarity,

multidisciplinarity, etc.). Referring to the previous example - transdisciplinarity is considered disorderly because it does not fit the disciplinary order, in other words, knowledge that was not orderly institutionalized, cannot count as knowledge. From such questionable reasoning follows: if knowledge is a disciplinary domain, there cannot be any knowledge that is not already, at least potentially, accommodated by scientific disciplines.

Rhizome, as proposed by Deleuze, is a convenient first aid in realizing the transdisciplinary potential: transdisciplinarity feeds on the roots of trees of knowledge rhizomatically, growing smaller refined networks to feed other trees and connecting them underground. Transdisciplinarity is essentially an underground activity that invents a rhizomatic organism as a response to the problem of efficiently supplying the tree of knowledge. But the evolution of transdisciplinarity does not end at one such imaginary organism – this thesis proposes ceaselessly evolving organism-solution termed polyphibian, while the impetus or the movement of this evolution is termed polyphibianism.

The example of order / dis-order, provided by Bergson as a false dichotomy, as a deceitfully stated problem, demonstrates how to restating problems with more precision generates instruments leading to solutions: therefore polyphibianism, as a solution, must be born out of a precisely stated problem. Here the ability of

Bergson to anticipate the subtle chaotic structures[i] becomes even clearer – Bergson accurately intuits orderly substructures intertwined in the overall chaotic structure that could be mistaken as lacking in order. Polyphibian must be created so as to be aware of a phenomenon through all possible orders - polyphibian is a protoplasmic vessel invented to accommodate knowledge not only of any order, but of intertwining orders.

This thesis applied the method of imagining the organism-solution not only to transdisciplinarity in general, but to a particular case of disciplinary "collision" between art and science. The new program Collide@CERN, introduced in 2012 by Ars Electronica in partnership with CERN, was chosen as a test bed for plasticity of art-science collaborations, by testing the stretch in imagination that AEC-CERN partnership would tolerate.[ii] For this purpose the project ASCO2.T AT.LAST was proposed where ASCO2.T is an organic solution to a technical problem. Instead of the intellectually programed existing apparatus ASCOT this project suggested the use of intuitive and precise cyborganic ASCO2.T apparatus. With precision matching and even slightly surpassing that of intellect the threshold between physics and 'pataphysics has been located. Over that threshold 'pataphysics, as science of exceptions, differentiates in kind rather than

[i] see chapter 3.1.1. for more on anticipation of chaos theory in physics and metaphysics
[ii] see more in chapter 4.2.3.

to a degree. Therefore it cannot mislead us to false problems that are, according to Bergson, a consequence of differentiation in degree.

Bergson imputes the tendency to recognise only the differences in degree and not the differences in kind to mechanical thinking, whereas Deleuze (1991, p. 24) expounds on linearity of such thinking that is not limited only to mechanic but spreads in the organic domain, by criticising how it: "postulates a unilinear evolution and takes us from one living organization to another by simple intermediaries." Unilinear evolutionary changes are changes confined to one dimension – therefore to differences in degree. It is only in nonlinear thinking that sudden shifts in kind are possible. A complex system has the potential of abrupt changes, of leaps over different order, when crossing a critical point.

In a reductionist monophibic science that is uniformly fragmenting systems a multiplicity of interpenetrating phenomena can be mistaken for a single homogeneous phenomenon. Even if the same phenomenon is given several different names, by monophibic habit the phenomenon is not grasped in all its heterogeneity, but switching between its appearances - one aspect at a time. To live the knowledge in all its complexity one must transcend the current human condition and invent polyphibic organs of knowing. Bergson uses notion of duration to introduce the potential of intuition that opens up human awareness to the uncompromised complexity:

> Bergson is not one of those philosophers who ascribes a properly human wisdom and equilibrium to philosophy. To open us up to the inhuman and the superhuman (durations which are

> inferior or superior to our own), to go beyond the human condition: This is the meaning of philosophy, in so far as our condition condemns us to live among badly analyzed composites, and to be badly analyzed composites ourselves. (Deleuze, 1991, p. 28)

For Bergson it is only by intuition that this is possible. Intellectual activities, the action driven intellect must be halted, the judgement suspended. For this reason and for the purposes of this thesis the Interval of Suspended Judgement[i], has been established in the specific context of ASCO2.T AT.LAST intervention at the precise location of the threshold between physics and 'pataphysics. Within this interval the knowledge is not to be collected, comprehended, conceptualized, categorized and archived, rather, these activities are to be suspended and the polyphibian is to be born anew, growing new organs of knowing. Similar avoidance of conceptualisation and other intellectual activities appertain to Bergson and Bergsonism:

> But this broadening out, or even this going-beyond does not consist in going beyond experience toward concepts. For concepts only define […] the conditions of all possible experience in general. Here, on the other hand, it is a case of real experience in all its peculiarities. (Deleuze, 1991, p. 28)

With linear habits of mind that McLuhan would attribute to the visual culture, conditioned by invention of print, linear narratives and linear perspective, the awareness of change itself succumbs to linearity – differentiation is only

[i] see chapter 4.2.4. for more on Interval of Suspended Judgement

comprehended as a linear gradation of differences in degree. With the advent of electric – acoustic culture that according to McLuhan (1994) obscured the visual culture, the fixed point-of-view, necessary in perspective, becomes obsolete and is replaced, as suggested by McLuhan's scholar Derrick de Kerckhove (1997), with the point-of-being[i]. Living knowledge arises from coherent awareness of multiple points of being. Instead of one dimensional, monophibic, fixed and sequenced external observations, the polyphibic awareness imagined in this thesis emerges from the fluidity of internal multiplicity.

For Deleuze (1991, p. 39), the "word multiplicity is fundamental in terms of the construction of the method." As was shown with the comparison between the point of view and the point of being, it is not enough to collect and concatenate multiple elements. The linear, numerical multiplicity with its own fixed metric based on the number of elements it contains, is already actual, Deleuze explains, while a virtual multiplicity can be only found in duration. This virtuality ensures that changes are not conceivable beforehand, on the linear, numerical scale, but rather, with each division in this virtual multiplicity, there is a change in kind. In contrast to the actual multiplicity, the virtual multiplicity can only be defined through the difference in kind.

[i] see appendix A for more on "point of being," a term introduced by Derrick de Kerckhove (1997, p. 187)

Transdisciplinarity is such multiplicity – it evolves by differentiation, by divisions that change it in kind. The individual participants in transdisciplinarity are divided and dispersed only to be self-organised in polyphibic organs of knowledge. Just as for the landscape of a complex system the strategy for getting to the highest peak is impossible to devise as soon as multiple agents interact with the landscape, so in transdisciplinarity every agent becomes an active ingredient of the landscape, changing the landscape ceaselessly. The transdisciplinary landscape becomes self-aware from every point of being of each agent. The landscape reacts upon itself by reacting on those points of being, by further differentiating, dividing the individuals into different species, a different kind.

> […] duration was not simply the indivisible, nor was it the nonmeasurable. Rather, it was that which divided only by changing in kind, that which was susceptible to measurement only by varying its metrical principle at each stage of the division. […] the multiplicity proper to duration had, for its part, a "precision" as great as that of science. (Deleuze, 1991, p. 40)

The precision that this thesis proposes for transdisciplinarity is inherent in any complex system – at any scale of organisation there is a precise critical point at which a new kind of order emerges in the system. Transdisciplinarity, as it evolves, becomes self-aware of its critical points – it can divide its knowledge according to this critical articulation. Lack of such self-awareness of criticalities in disciplinary science results in arbitrary fragmentation, homogenising of differences in kind into differences in degree. Transdisciplinarity, on the other hand, knows its critical points, knows when it will change in kind, mutate,

become newborn. For transdisciplinarity it matters where and how precisely it is divided and cut - with each cut transdisciplinary knowledge begins a new kind of life.

While disciplinary research prides itself in applying high standards of objectivity, there is much to be gained from subjectivity in transdisciplinarity. Subjective, lived experiences of a phenomena differ in kind, they are in essence irreducible, incomparable. Objective experience can be repeated many times, reinterpreted in many ways, but interpretations can only differ in degree if the objectivity is to remain intact. In Bergson's terms (1910, p. 83), objective is applied to "what is known in such a way that a constantly increasing number of new impressions could be substituted for the idea which we actually have of it," implying a certain redundancy and stagnation. Furthermore Bergson finds the subjective in "what seems to be completely and adequately known," confirming the wholeness of the lived knowledge.

Polyphibianism can be imagined as a bifurcation diagram of an evolutionary movement – a diagram of a precise bifurcating cut, of critical differentiation of the organism of the living knowledge into different kind of evolutionary trajectories. At each cut a new organism is born, a new life-form of knowledge emerges. This movement is obstructed by conceptualisation and yet it is by this very movement that concepts entangled into dichotomies can be resolved, that is, through polyphibianism dysfunctional, dead concepts are accurately disentangled into a multiplicity to be lived. "A multiplicity of this kind has

essentially the three properties of continuity, heterogeneity, and simplicity," says Deleuze (1991, p. 43), adding that "the concrete will never be attained by combining the inadequacy of one concept with the inadequacy of its opposite. The singular will never be attained by correcting a generality with another generality" (Deleuze, 1991, p. 44).

A concept is invented as an instrument that will overcome the limitations of the user, a tool that will enable the user to build even better tools. But an innocent temporary invention, a heuristic method, can soon be heavily relied upon, making users dependent of their habits. At the moment the invention begins to control the user and not the other way around, it changes in kind. Such change in kind comes as no surprise to Bergson (1992, p. 155), who distinguishes in an intellectually conceived apparatus a heterogeneity of kinds. Intellect, on the contrary to instinct, devises tools open to general problems. While an insect, for instance, creates a tool instinctively for a specific task, perfectly adapting and confining the tool to that task, intellect builds in the freedom to improve the instrument with every new challenge, adapting itself to an ever more general problem.

Considering these changes in the apparatus, the different kinds implied within one system become apparent to the monophibian only when they are actualized. Namely, to recognise the potential of the virtually heterogeneous composite of different kinds, a polyphibic awareness is required. The process of actualising is sequencing one kind after another, blending them on a linear scale so as to forge

a mere difference in degree. While the plurality of such potentiality resonates with polyphibic awareness, the actual and the drive to actualise events in a sequence is essentially a monophibic tendency.

To resist a tool one has to ceaselessly create new tools: tools not devised in accordance with a rule but in search for an exception to the rule. One must avoid forming habits and applying the same tool to different situations. Although the openness of intellectual invention is inspiring, it is the generalization that is the drive behind such inventions. This thesis imagines obtaining the same kind of intellectual openness in inventions combined with its instinctive specificity. Organisms instinctively invent and use organs for exceptional tasks – every organ is a solution to a specific problem. Could an imaginary organism of living knowledge ceaselessly create new organs for every new problem in order to know the unique, unrepeatable, and irreducible, rather than to know in general?

A composite analysed by method of Bergsonism is split by a precise cut at the critical threshold between two different kinds only to be synthesised "at a turn in experience" (Deleuze, 1991, p. 93), converging again, but elsewhere, in something else. This movement of analysis-synthesis and diverging-converging between plurality and singularity, heterogeneity and simplicity, is the prerequisite for transformation from monophibian to polyphibian: the indivisible individual is divided into a coherent multiplicity that at a critical point forms a

new individuality. As proposed before[i], this diverging-converging method is currently best explained diagrammatically – as a state space diagram of a complex structure.

To sum up the discussion on the method of intuition, Deleuze (1991, p. 94) finds life to be Bergson's all-encompassing analogy and therefore tries to compare life to duration and differentiation: "it is as if life were merged into the very movement of differentiation." Knowing by intuition is intuitively differentiating within heterogeneity, finding differences in kind between intertwined phenomena. The theory of knowledge and the theory of evolution, as Bergson proposed[ii], can converge within the movement of differentiation. Likewise, as argued in this thesis, the evolution of transdisciplinarity into an imaginary organism of living knowledge gets its impetus from this same movement:

> What does Bergson mean when he talks about élan vital? It is always a case of a virtuality in the process of being actualized, a simplicity in the process of differentiating, a totality in the process of dividing up: Proceeding "by dissociation and division," by "dichotomy," is the essence of life. (Deleuze, 1991, p. 94)

Following Bergson (2005, p. xxiii) in his attempt to establish a relationship between the theory of evolution and theory of life, this thesis suggests: if life, that

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[i] see chapter 3.1.1. where diagrams of chaos are applied to Bergson's concepts of duration, interpenetration, etc.

[ii] see chapter 4.1.3. where Bergson's thesis on inseparability of theory of knowledge and theory of evolution is explained

is, evolution of life-forms, proceeds by "dissociation," "division," and "dichotomy," so should the evolution of forms of knowledge. With explorations of the potential evolution of transdisciplinarity it became clear that dichotomies arising in disciplinary research are the very point of departure in the transdisciplinary zone. In Manifesto of Transdisciplinarity, as noted before[i], Nicolescu (2002) shows a possible way in which transdisciplinarity could resolve a dichotomy by opening up new levels of reality. Just as Bergson after dissecting something in analysis proposes synthesis somewhere else into something else, so Nicolescu relying on Lupasco's logic of the included middle, proposes resolution or synthesis on another level, different from the level of analysis.

The entanglement of complementary yet incompatible tendencies in a dichotomy can be grasped in a complex cut separating the tendencies that grew infinitely close together without intersecting each other. This differentiation by precise intuitive cut, as Deleuze could name Bergson's method, does not only coincide with direction of transdisciplinary methodology: far from being merely Bergson's metaphysical whim, it is applied, as will be shown, also by Duchamp, as well as Poincaré, in their physical or 'pataphysical inquiries. Duchamp, fascinated by all sorts of cuts in modern science, encountered in technology of x-rays as cuts, in theory of electromagnetism, in theory of higher dimensions where

[i] see chapter 2.2. for more on the Manifesto of Transdisciplinarity

cut gains a topological notion, etc., was "following Poincaré's definition of an n-dimensional continuum as that which can be cut completely by a continuum of n-1 dimensions" (Henderson, 2005, p. 83). Duchamp even invents a very subtle notion of infrathin cut (Duchamp, 1983).

By rewriting Bergson in his own creative act, Deleuze brings Bergson closer to the pertinent needs of transdisciplinarity. This can be observed by comparing Deleuze's Bergsonism and Nicolescu's Manifesto of Transdisciplinarity: both resolve dichotomous tensions, caused by intellectual reasoning, on different planes. These planes or levels of reality are part of "Open Unity" or "Whole" and both authors envisage how human condition could be transcended. Just as was shown before[i], it is the chaotic complex structure, anticipated by Bergson and diagrammed by Deleuze, that plays a role in Nicolescu's fundamental relation between science of complexity and transdisciplinarity. To summarize in Deleuze's words:

> Man therefore creates a differentiation that is valid for the Whole, and he alone traces out an open direction that is able to express a whole that is itself open. Whereas the other directions are closed and go round in circles, whereas a distinct "plane" of nature corresponds to each one, man is capable of scrambling the planes, of going beyond his own plane as his own condition, in order finally to express naturing Nature. (Deleuze, 1991, p. 107)

[i] see chapter 3.1.1.

3.3.2. Bergson – McLuhan: sample pseudo organism

Transdisciplinarity, as proposed by Nicolescu (2002), resolves a given dichotomy on separate levels of reality – with every level bringing about both resolution of the old dichotomy, from the old level, and eventually the emergence of a new dichotomy, resolvable only on the next new level. Evolution of transdisciplinarity into polyphibianism offers instead a resolution of tension through metabolism, resulting in formation of organs of knowing and knowledge by-products. Wherever a tension arises, metabolic processes tear apart and stratify the existing knowledge enabling unexpected new ways of knowing.

For instance, reading separately the writings of authors as independent as Bergson and McLuhan (independent to a degree that there is no direct influence on one another), one in general notices neither a strongly manifested support nor opposition between their lines of thought. Yet, one might accidentally come across a notion used by both authors – the notion of vision and the visual – that is inadvertently explained in opposing terms while they are both trying to explain analogous opinion. At this point one could either dismiss this accidental discovery or examine it further, digest it and inspect its by-products.

Having difficulties in finding a correspondence between visual and tactile faculties Bergson (2007, p. 66) asks: "how could there be anything common, in the matter of quality, between an elementary visual sensation and a tactile sensation, since they belong to two different genera?" To ruminate on relation of

both senses, one would need to introduce a new order: "so we are now obliged to suppose, over and above visual sensations, over and above tactile sensations, a certain order which is common to both, and which consequently must be independent of either." Considering the visual and tactile senses as of different kind, Bergson compares them to instinct and intellect respectively. Instinct and intellect are according to Bergson (2005, pp. 184, 185) just as incomparable:

> The reason is that instinct and intelligence are two divergent developments of one and the same principle, which in the one case remains within itself, in the other steps out of itself and becomes absorbed in the utilization of inert matter. This gradual divergence testifies to a radical incompatibility, and points to the fact that it is impossible for intelligence to re-absorb instinct. That which is instinctive in instinct cannot be expressed in terms of intelligence, nor, consequently, can it be analysed.

While touching depends on continuous contact, uninterrupted immediate proximity with the object, seeing, for Bergson (2005, p. 185), is knowing at a distance or "the possibility of perceiving a distant object without first perceiving all the objects in between." According to Bergson (2005, p. 191), instinct employs sympathy that works remotely as well - from his understanding,[i] insects, for instance, accurately empathise with their prey by knowing precisely their inner workings, instinctively recognising their weaknesses at a distance, from their own point of being.

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[i] Bergson (2005, pp. 190, 191) often cites examples of instinct in insects. Whether or not his interpretations of the scientific findings of that time are still valid, is not important for development of the argument in this chapter.

Bergson (2005, p. 185) therefore concludes that like vision "instinct also is a knowledge at a distance" - both faculties enable focus on a specific distant object that the observer is not locally connected to. Intellectual endeavours for which Bergson (2005, p. 185) finds analogy in touch are on the contrary aiming towards continuity, towards local causality: "the function of science is just to express all perceptions in terms of touch." To make precisely the same point in regards to science, that is to critique its dependence on continuity, McLuhan (Picnic in Space, 1967) on the other hand compares intelligence to vision:

> If you can do it again then you've got a proof - scientific proof - can you do it again - that is visual space - anything that can be exactly repeatable is visual. As science gets more sophisticated it realizes that all experiments are subtly non-repetitive, and that repetition is not a proof, and no two experiments are ever alike, and visual space, in fact, has disappeared from science.[i]

Namely, while both Bergson and McLuhan would agree on the basic intellectual tendency to ensure continuity, McLuhan in contrast ascribes the preference for continuous, sequential, linear, homogeneous and static to visual culture of the rational, intellectual, literate society, whereas the culture that relies more on the acoustic – kinetic – tactile senses operates instinctively and irrationally, forming a tribal society. Despite seemingly opposing cross references between visual and tactile vs. intellectual and instinctive, there is no fundamental disagreement

[i] see also chapter 2.2.

between Bergson and McLuhan. Rather, by examining closely this discrepancy, one witnesses the inconsistency between how senses work and how the culture around the senses forms.

It is the workings of the visual sense and not the workings of visual culture that Bergson recognises as discontinuous. It is culture of intellect formed around the sense of vision that interprets discrete visual data continuously, interpolating intellectually the continuous sequence where it is missing. Reconciling the apparent conflict between Bergson and McLuhan triggers new questions on formation of culture around a sensorium. McLuhan and Bergson are participators in protoplasmagora evolving a polyphibic organism around the same problem. Where the tension arises new polyphibic organs of knowing emerge. In polyphibianism one is attentive to turbulences in the flow: switching incomparable asymmetric terms around and yet deriving the same conclusions signals a new threshold. It is a signature of a new access point, an opportunity for speculation, of new knowledge that becomes readily available from new points of being.

3.3.3. Bergson – Duchamp – Poincaré: "pseudo all in all"

As was shown in the case of Bergson and McLuhan, that tangentially shared one opinion but diverged in exactly the opposite direction in the terms of explanation, a new organism can be conceived from such contact, new organs of knowledge can be grown out of this divergence. Not quite as trivially resolvable is a polyphibian growing out of independent work of Duchamp, Bergson and

Poincaré. Duchampian scholars are still struggling with evidence on Duchamp's appreciation of either Bergson or Poincaré, where for every indication of Duchamp's endorsement, there is a clue of disapproval or at least disinterest.

This thesis proposes that a "final verdict,"[i] if necessary, should not only be ambivalent towards Duchamp being Bergsonist or anti-Bergsonist and admirer of Poincaré with or without tongue-in-cheek. The virtual contact of the three Parisians in protoplasmagora, rather than a contact in Paris that could have had, but never actually took place, should result in conceiving a new polyphibic organism to handle the dissolution of rather obsolete categories of artists and scientists with Duchampian meticulousness and inspire mutation and invention of new organs of knowledge.

In his interviews, Duchamp is often found praising science, eager to adopt the scientific method in art, and just as often revealing his scepticism, inventing new ways to circumvent the traps: "The word 'law' is against my principles. Science is evidently a closed circuit, but every fifty years or so a new 'law' is discovered that changes everything. I just didn't see why we should have such reverence for science, and so I had to give another sort of pseudo explanation." (Tomkins, 1965, pp. 36, 37).

[i] see chapter 4.2.1. for more on Duchamp's explanation of the final verdict of posterity

By admitting his "pseudo" attitude and by not attaching himself to any discipline Duchamp becomes a true transdisciplinarian, achieving precision[i] in his work in his own anti-disciplinary manner. It is only with serious humour that one can pass indifferently from one scientific paradigm to another, escaping cunningly all aesthetic tendencies in art: "I'm pseudo all in all, that's my characteristic. I never could stand the seriousness of life, but when the serious is tinted with humour it makes a nicer color." (Tomkins, 1965, pp. 36, 37)

Paris in the early twentieth century was a historical and geographical interval, gathering artists that were reinventing art. At that moment Paris was the urban interface where poets and painters would mutate in painters and poets (as for instance Guillaume Apollinaire would expand half way in one direction or as Joan Miró would in the other direction). These and other transmutations took place in the city of Paris where right on its outskirts an International Committee for Weights and Measures convened annually at the International Bureau of Weights and Measures since 1875.

It wasn't long before the Metric System, the joy and pride of France, became a joke. In 1913 Duchamp set up the unrepeatable experiment of "3 Standard Stoppages" also known as the "Joke on Meter," in which the standard of meter is redefined through a chance operation and preserved in 3 versions as "canned

[i] see chapter 2.2. and 3.3.1. for more on different aspects of precision

chance." Such simple gesture triggered a cascade of questions: from what is the role of choice and what is the role of chance, to questioning the role of conventions and convenience in science - as a consequence of Poincaré's (1913, p. 65) statement on how there is no true geometry, only a more convenient one.

The insinuation that the shape of geometry and science could be chosen according to convenience instigated a fierce debate in France at the end of the 19th century, continuing in the early 20th century. In his exhaustive study devoted to 3 Standard Stoppages Molderings (2010, p. 1839) investigates the context of philosophical disputes on conventionalism, that could have informed and influenced Duchamp to take such casual approach to choosing standards: "Henri Poincaré, the outstanding scientific authority of his time, put forward a theory that not only the axioms of geometry but also most of the principles of physics […] were based on mere conventions."

The story becomes interesting when "conventionalist" theory of Poincaré is exaggerated by a mathematician and philosopher Éduard Le Roy - "a comrade in arms of Bergson," reports Molderings (2010, p. 1852). Considering the "arbitrariness" of science, Le Roy's "antiscientific" conclusion is that intellectual quantitative knowledge cannot grasp the "truth," reserved only to intuitive qualitative knowing. Poincaré, in defence, responded to Le Roy - the response was published in the chapter "Is Science Artificial" of Poincaré's book "The Value of Science," and Molderings (2010, p. 1878) asserts Duchamp must have had read it and in this dispute "clearly sided with Le Roy."

Taking the side of intuition would affiliate Duchamp with Bergson, although he is in general considered anti-Bergsonist. Molderings (2010, p. 1878) argues: "like Le Roy, Duchamp radicalized Poincaré's conventionalist theories […] that scientific laws are merely academic constructs and generalized Poincaré's observations on the relativity of scientific axioms, principles, and laws to the point of total scepticism." Specifically, in the context of convenient geometry and conventional standards, Molderings (2010, p. 1950) affirms Duchamp's irony in overstating Poincaré: "Duchamp radicalized Poincaré's thesis […] to the point that all units of measure are valid, no matter how personal, fortuitous, or arbitrary they might be."

In contrast to convenient uniformity of spatial and temporal constructs, Bergson strived for experience of heterogeneous qualities, with arguments against arbitrarily homogeneous fragmentation, such as the infinite and uniform division of space and consequently essentially "spatial" conceptualizations of time. In early 20th century Paris – the cosmopolitan centre of culture of visual hegemony and freshly homogenized space with metric measures - there were many disruptions and breakthroughs of polyphibic nature preferring the openness of protoplasmagora over scientific categorisations.

Duchamp, Bergson and Poincaré, admitting it to a greater or lesser degree, were all aware of a threshold between the conventional scientific knowledge and knowledge in inconveniently protoplasmic state. These three individuals left behind a valuable record of their introspective inspection of their methods,

whether in science, philosophy or art. As metaphysics goes beyond physics, and 'pataphysics - as a science of all sciences - goes even beyond metaphysics, the study of their introspective writings unveils 'pataphysical traces in their attempts to overcome insurmountable obstacles in visual manifestation of their insights.

The selection of these three individuals for the comparative study is based on the fact that they all come from approximately the same historical and geographical interval and, in this sense, from the same initial conditions in cultural background. Furthermore, there was no personal cross contamination between them: no collaboration, communication, or contact was noted among them, although they might and probably were aware of one another, considering their influence in Parisian scene.

The comparative study begins with the search for the same traits. One of them, barely noticeable, yet significant, is the use of the term osmosis in both Duchamp and Bergson. Literal meaning of osmosis was defined in 1867 as the passage of a solvent through a semi-permeable membrane from a less concentrated to a more concentrated solution until both solutions are of the same concentration. Later in 1900s a figurative meaning was adopted for gradual or unconscious assimilation of ideas, for instance McLuhan (1967, p. 8) would claim that the alphabet is technology absorbed by osmosis. Bergson and Duchamp use the term osmosis not just in figurative, but almost in instrumental way.

Bergson (1910, p. 112) refers to diffusion, endosmosis, as a principle of "intermingling of the purely intensive sensation of mobility with the extensive

representation of the space traversed." He explains how "between this succession without externality and this externality without succession, a kind of exchange takes place, very similar to what physicists call the phenomenon of endosmosis" (Bergson, 1910, p. 109), and how "by a real process of endosmosis we get the mixed idea of a measurable time, which is space in so far as it is homogeneity, and duration in so far as it is succession, that is to say, at bottom, the contradictory idea of succession in simultaneity" (Bergson, 1910, p. 228). Duchamp (1989, p. 139), on the other hand, talks of "transference from the artist to the spectator in the form of an aesthetic osmosis taking place through the inert matter."

The spontaneous effortless diffusion is bound to happen through a selectively permeable interface, if there is no pressure opposing it. The artificial pressure that requires investment of energy to keep substances fixed in place is termed osmotic pressure. Taken in a figurative way, the osmotic pressure implies that to maintain habitual uniform intellectual structures demands energy, while creation of novelty is as spontaneous as osmosis, no energy is required. The concept of filter was also focus of Henri Poincaré's introspection in the discovery of a new mathematical law. Poincaré attributed the crucial selection of ideas to peculiar delicate sieves[i] functioning as a selectively permeable membrane. In Poincaré's (Brown, et al., 1981, p. 18) words "aesthetic sensibility […] plays the

[i] see chapter 3.2.1. for more on Poincaré's introspection in mathematical discovery

part of a delicate sieve." Sieves were later incorporated in mechanics of Duchamp's Large Glass.

A comparative case study of Bergson, Duchamp and Poincaré cannot be simply a linear comparison, since these individuals continue trespassing from physical, beyond metaphysical, into 'pataphysical inquiry, and back. The indivisible individuals divide, becoming dividuals, extending the limits of their respective professions and even exchanging personalities[i]. Although there was no actual contact between them, they did not simply work in parallel – a comparison of their movement forms organic configurations of polyphibianism. In this formation of polyphibic organs of knowing Duchamp plays the role of a catalyst[ii] "infradifferentiating" Bergson's and Poincaré's ideas.

Henderson (2014, p. 1), discussing the anti-Bergsonist vs. Bergsonist stance of Duchamp, relates his "shifting identities" to the "paradigm shifts" in science. Within the given historical context Henderson demonstrates how Duchamp's identity shifted away from the spatial fourth dimension with the dawn of Einstein's theory of four-dimensional space-time. Duchamp first became interested in the spatial fourth dimension through his engagement with Cubism,

[i] Duchamp occasionally worked under pseudonyms
[ii] see chapter 4.2.2. for more on the role of a catalyst in the creative act

but as he deviated from this movement, Henderson claims, he also rejected all the Bergsonian ideas that Cubism endorsed.

In this context of rebelling against Cubism, and, allegedly, indirectly against Bergsonism, another term is to be noted in this threefold case study – the term readymade. Applied in slightly different sense by each of the three dividuals – it is again a matter of establishing the "infradifference" between the readymades that opens up to new knowledge. In short, Bergson considers readymades in his study on laughter, Poincaré in the form of ideas and Duchamp makes a limited number of readymades per year. Henderson assumes:

> Duchamp's use of ready-made may derive from Bergson, who associated it with the very qualities Duchamp was seeking in art: the intellectual, the external, and the mechanical versus the expression of the organic "fundamental self" of the artist. Challenging the Puteaux Cubist's belief that taste, beauty and the touch of the artist were manifestations of profound self-expression, Duchamp found a means for "unloading ideas" via pre-existing objects. (Henderson, 2005, p. 200)

> Although Henderson recognizes the diffuse presence in Duchamp of various Bergsonian motives, because she regards Bergson as the antiscientific philosopher of the "inner self" and of "profound self-expression," Bergsonian notions seem to her incompatible with the artistic revolution prompted by Duchamp. […] Herein lies Henderson's solution: since Duchamp rejects the aesthetic principles of the Puteaux Cubists, he also abandons Bergsonism, which represents their philosophical matrix. Thus, the Bergsonian ideas "undoubtedly" present in Duchamp's artistic lexicon are nothing but debris accumulated in the course of his battle with the cubist disciples of Bergson. (Luisetti, 2008, p. 77)

Federico Luisetti nonetheless proposes to further examine the role of Bergsonian readymades by focusing on Duchamp's (1989, p. 74) crucial question:

"Speculations. Can one make works which are not works of 'art'?" Luisetti (2008, p. 79) is convinced that "Duchamp's answer is the readymade," when the readymade is understood as "a nonartistic work, a postponement of the aesthetic delectation of the work of art." Duchamp is working on a bifurcation, simultaneously in two directions, exaggerating the tension to untangle the dichotomy. Bergson (2008, p. 41a) contrasts "the rigid, the readymade, the mechanical" with "the supple, the ever-changing and the living, absentmindedness in contrast with attention, in a word, automatism in contrast with free activity, such are the defects that laughter singles out and would fain correct." Can Duchamp's comical corrective on the readymade achieve Bergson's aim?

> As a parody of the phenomenological return to the perceptual consistency of the "things themselves," they [readymades] appear to be merely existing objects, pieces of the external world without symbolic connotations. Yet, because of their provocative "thingness," they refuse to be assimilated to the mechanisms of representation and stand as something in between, occupying the interval between everyday objects and artworks. At this level of perception, the readymades' enigmatic presence is nothing but a form of existence that has abandoned the heavy machinery of representation: logical and linguistic definitions, conceptual schemes, analogical connections, iconographic references—in Duchampian words, "visual memory." […] Since the readymades have lost their connection with the instruments of representation, they don't criticize or negate artistic representation and its mighty institutions, […] humbly, they have found a collocation in the incommensurable intervals of a new method of appearance. (Luisetti, 2008, pp. 79, 80)

This "new method of appearance" exaggerates both Bergson's and Poincaré's concern of anything readymade, critically opening up intelligence to new possibilities of knowledge production, awakening intelligence to the underlying

complexity in the growth of knowledge. Poincaré, like Bergson, is aware of the living knowledge – invention is not a result of an automaton, it is not simply an output of a readymade soution – invention is born, it is organic and it mutates. Duchamp reads Poincaré's statement with deliberate irony to uncover a higher order of organisation:

> It never happens that the unconscious work gives us the result of a somewhat long calculation all made, where we have only to apply fixed rules. We might think the wholly automatic subliminal self particularly apt for this sort of work, which is in a way exclusively mechanical. It seems that thinking in the evening upon the factors of a multiplication we might hope to find the product ready made upon our awakening, or again that an algebraic calculation, for example a verification, would be made unconsciously. Nothing of the sort, as observation proves. (Poincaré, 1913, p. 394)

Regardless of his seemingly contradictory statements in the interviews – whether he admits it or not (and he sometimes does and other times doesn't) – Duchamp is living in between the disciplines, shifting his point of being between art and science within the transdisciplinary zone. With his sense of humour Duchamp corrects two concepts at the price of one – however he mocks art and tries to disinfect the subjective by conducting himself pseudo scientifically by attempting objectivism – he at the same time, on the other hand, mocks science and corrects it by introducing the subjective, the unique, the chance, the exception in a field of all general and objective.

Duchamp's aesthetic indifference and indifference to all the mechanical habits of scientific mind is fulfilling Bergson's requirement of absence of emotion - if

humour is to be effective as a corrective of the mechanical thinking, that is, if the mechanical thought is to correct itself through laughter. Consequently, serious humour is the key ingredient in polyphibianism that is to evolve transdisciplinarity from mechanical to organic, living knowledge. Such academic disputes among Duchampian scholars that keep the debate from the early 20th century alive, by inserting Duchamp as a catalyst in the chain reaction, form a fertile ground for growth of transdisciplinary knowledge.

4. Research act and its evolution

4.1. Participating in a creative evolution

4.1.1. Essay on laughter: knowledge is a laughing matter

> […] laughter's shaking is for the body a blast of bones and muscles torn apart by the great wave of anguish and panic–stricken love piercing into the last inner intimate atom, and then with that smack form the absolute, pieces of pataphysician jump inside the guy's skin and pounce on the appalling lies lining indefinite roads in space and spring at length toward chaos; the individual who has known himself within the whole can well believe for a moment that he will scatter into a dust so homogeneous that it will spread like a dust filling an absence of dust in no place, at no time: he explodes, that lucky Earthling, but his all too solid skin, that elastic sack holds him together and puckers only at them most flexible parts of his face, makes the corners of his mouth rise and his eyelids tighten, and distended as far as it can be, it all suddenly contracts and snaps back on itself as the lungs fill up with air and then empty out; thus is born the rhythm of laughter, realised and sensed in oneself, observed just as clearly as in the eyes of another laugher. Each time he thinks he is going to burst once and for all, the laugher is held back by his skin, I mean his form, by the bounds of his own particular law whose form is outer expression, by the absurd formula, the irrational equation of his existence which he has not yet solved. He constantly bounces back off that absolute star that pulls him, never standing still, and heating up from all the repeated impacts, he turns maroon, then cherry-red, then white, and shoots of boiling corpuscles and bursts again even more violently, and his laughter becomes the mad rage of wild planets, and the fellow breaks something, yucking it up like that […] (Daumal, 2012, pp. 3, 4)

As is evident from the extract quoted above, René Daumal offers an extensive description of physical processes unfolding along with 'pataphysical laughter[i]. The foundations for applying "serious humour" to research, as is practiced in 'pataphysics, are provided in Bergson's (2008) essay on laughter. This essay will serve as a preliminary training in methods tangentially 'pataphysical, before attempting to participate in Bergson's (2005) seminal work 'Creative Evolution', where the theory of knowledge and the theory of evolution are merged, thus facilitating imagining an evolving organism of living knowledge.

Laughter, or the "comical corrective," as considered by Bergson (2008), is therefore the most expedient approach to the domain of "intellectual knowledge," since, as Bergson (2008) implies, laughter occurs at the very extreme of the intellect – at the critical point on intellectual periphery - at which the intellect halts and looks into the abyss. This introspective jump into the depths of the unknown never ends in fatality but somehow resolves in a successful, although sometimes bitter, overcoming of the gap, expanding the intellectual territory.

Laughter, operating at the forefront of the intellect, is propelling the intellect through the physical, bodily turmoil into the 'pataphysical mind-set. Whenever life is in a hurry to optimize itself, to adapt itself optimally to the current

[i] see chapter 2.1. for introduction to 'pataphysical laughter

environment, it forgets it is also a crucial interpenetrating ingredient of that ever-changing environment. When a habit is introduced into life, it is only by recognition of the comical aspect of a repetitive, rigid, mechanical response that life can be released from such constraints. Bergson (2008, p. 3b) finds laughter so vital that he refuses to extract it from life: "We shall not aim at imprisoning the comic spirit within a definition. We regard it, above all, as a living thing."

Bergson recognises in human intelligence this unique response with humour whenever it encounters mechanical obstructions in the flow of life. The comical, according to Bergson (2008), serves as a corrective to society - it is a solution to rigid repetitiveness in automation driven human societies. When the utilitarian attitude causes malfunction in the society, the comic relief resets its livelihood. This research elaborates on Bergson's methods of inducing the comical response by injecting humour into the mechanical stiffness. The methodology of the comical in this thesis is crafted so as to enable the transition out of the disciplinary into the transdisciplinary research.

Bergson considers the comical primarily as a social corrective – the benefits of this corrective are largely notable at the scale of human society, consequently correcting the individual human character as well. Furthermore, the comical corrects specific characteristics of the individual in question, it divides the human according to these characteristics and repackages it in various social contexts. The general individual characteristics, predictable according to laws of physics, are

redistributed through humour to accommodate the 'pataphysical exceptions. From here polyphibianism proceeds, giving birth to mutating dividuals.

Namely, polyphibianism departs from the utilitarian human endeavour that is goal oriented, seeking to conquer and categorise nature, forming a classified knowledge. Polyphibianism differs from the typical production of knowledge in the Western human society precisely in its tendency to incessantly differentiate. The bottom level of human society is fixed and sealed - there is no further differentiation - the human individual is the unit, whereas there is no predetermined basic unit in polyphibianism – polyphibians are dividuals, always ready to be further differentiated through the adaptive, comically corrective mutations.

A monophibic human being, the standard unit of human society, can be differentiated into a polyphibic organism by dissolving and dispersing individuality over a network of attention – a network of knowing through multiple organs and multiple points of being. In this highly alert network the observer changes the observed through changes in its self-observing nodes: polyphibic organs of knowing mutate along with the evolutionary movement of the living knowledge. Polyphibianism moves in the opposite direction of conquering nature or conquering the knowledge about nature. Namely, the imaginary organism of living knowledge is by definition an open system and therefore cannot be captured in its entirety.

Since there are no objectives in polyphibianism, there are no categorisations of conquered objects in the classical sense – what remains reminiscent of a methodology are modes of navigation. Whenever a propensity arises to categorise encountered features of the living knowledge and to fit them into existing or, for this purpose, expanded scaffolding of scientific disciplines, polyphibianism takes a turn – it deviates into a comical relief. These comical correctives awaken any part of polyphibic network to propel the movement further, to ensure incessant change. Transdisciplinary is always on the move in between and beyond disciplines.

How to imagine laughter of an imaginary organism of living knowledge? What ensures the plasticity of the protoplasmic agora that nourishes polyphibianism? If chemicals in the primordial soup are responsible for the change of rate of reactions there must be a role for a catalyst in protoplasmagora.[i] When the human individual is stripped of its human agenda, when the ego dissolves and the individuality is lost, to maintain a coherence in the movement, the dispersed individual tunes into the somnolent[ii] frequency through which the communication is accelerated to the extreme of immediate knowing. As in

[i] see chapter 4.2.2. for more on catalysts in creative act, where the role of the curator is imagined as a catalyst

[ii] see chapter 4.1.2. for more on dreams – the relation of sleeping towards one aspect of reality and awakening towards another

telepathy the network of polyphibic awareness attunes and corrects itself instantaneously.

How do the somnolent and the comical relate? Bergson detects the presence of the absurd in the comic and tries to justify their interdependence by finding a direct link between humour and dreams. After proving that the comical exists in absence of emotion Bergson searches for the most sterile setup for laughter – conditions that are not emotionally affective. Absurdity that results from mental illness is already contaminated with sympathy, therefore the only absurdity that can be laughable is that of a sane person, the absurdity that the audience can emotionally detach from.

Absurdity of the sane is only encountered in dreams. The logic of absurdity differs from the classical logic, customary in most scientific reasoning. In his manifesto of transdisciplinarity, Nicolescu had to introduce a new logic that seems absurd from the viewpoint of the classical logic – it is the logic of the included middle[i]. On the other hand, Bergson equates that sane absurdity with the dreaming logic – the logic of intellectual relaxation – relaxation to the point of including middle terms, of resolving dichotomies. In dreams the most contradictory phenomena can coexist without tension, in most unusual superposition. Only a relaxed intellectual faculty can attune to such coherent

[i] see chapter 2.2. for more on the logic of the included middle

multidimensional attention. Bergson (2008, pp. 3b, 4a) assumes in the logic of the comic the roots of collective imagination:

> For the comic spirit has a logic of its own, even in its wildest eccentricities. It has a method in its madness. It dreams, I admit, but it conjures up, in its dreams, visions that are at once accepted and understood by the whole of a social group. Can it then fail to throw light for us on the way that human imagination works, and more particularly social, collective, and popular imagination?

Laughter is emotionally neutral, as Bergson (2008, p. 4a) diagnoses: "Indifference is its natural environment, for laughter has no greater foe than emotion." Serious artists[i] working in such neutral medium of indifference, develop a different kind of sensibility, a different kind of aesthetics with indifference to taste. Duchamp (1989, p. 139), whose art "bad, good, or indifferent" is based on serious humour, practices abstinence from taste by comical corrective: "I have forced myself to contradict myself in order to avoid conforming to my own taste" (Janis & Janis, 1945, p. 257).

Indifference is the side effect of the medium, of technology, of intellectual invention. According to McLuhan (1994, p. 43), any technology that extends the senses also cuts off the senses. Laughter as technology allows human beings to look farther, to see a broader picture or to extend the current use of intellect, at the price of cutting off emotions and empathy. Such anaesthesia of feelings serves

[i] see chapter 3.2.2. for more on McLuhan's notion of "serious artist"

Bergson (2008, p. 4b) as a critique of the comic itself – a second order critique of the culmination of intellect in laughter: "In a society composed of pure intelligences there would probably be no more tears, though perhaps there would still be laughter."

Is the comical then just the extreme separation of the observer and the observed, the ultimate isolation of the individual? Even if the second order comical corrective attempts to correct the prerequisite first order comical distancing from the observed, the attempt would result in reintroducing sympathy, which has to be avoided at all costs, in order to remain comical. Therefore, how could laughter possibly induce movement of polyphibianism in direction of reintegrating the observer and the observed into the imaginary organism of living knowledge? Namely, the overall presence of the observer within the observed is achieved only by empathy. The observer knows the observed through immediate intuition, through interpenetration of feelings, in becoming one and the same entity of knowledge with the observed, rather than through intellectual analysis.

From monophibic standpoint an irreconcilable dichotomy arises, if the extreme intellectual and intuitive activities are considered in unison – the indifference of laughter and the involvement of empathy cannot coexist in a monophibic scheme. Such dichotomy can only be resolved on a different level of intellectual and intuitive organisation. Imagine an immensely intricate organism that is emotionally detached from each and every part of itself, while the parts remain empathically engaged. Every part undergoes critique, being ceaselessly

corrected. While the corrections are instantaneously propagated through the entire organism the parts are able to self-organise accordingly, thus correcting themselves in self-awareness of the whole.

Whereas a monophibian observes the observed either by subjective immersion or by objective detachment, the polyphibian is able to intertwine both modalities, merging the observer and the observed through infinite differentiation. In a monophibic attempt to combine the methods of involvement and indifference, one method corrupts or contaminates the results of the other. The subjective synthesis contaminates the sterilised objective analysis, while the later fragments and corrupts the wholeness of the former.

Monophibic corrective to inaccessibility of knowledge in between the disciplines is to continuously establish auxiliary disciplines, to prevent disciplinary leaks of knowledge, escaping the conventions of science, in hope to complete the picture of a given phenomenon, but no matter how many new disciplines are provided the pieces of the puzzle never quite fit together. Within the transdisciplinary zone that contains all disciplinary leakages, a polyphibian is imagined as a solution to the problem of maintaining the coherent intellectual capabilities without losing the intuitive awareness of the whole.

Polyphibian, is an imaginary solution – imagined temporary solution for a transitory interval – a transition in which one evolves oneself, one's being, one's body into a less fragile system, that is, into a more adaptable and enduring system. Endurance provided, that is, after one is set to empower oneself

incessantly by technology that repairs itself, then the edge that intellect affords to human species, will no longer be necessary. Intellect was required to trigger the avalanche. The tipping point of the comical slide was the critical point for awakening the intellectual structures to self-organise and become self-aware.

Imagining a resolution of dichotomous tension between involvement and indifference in the form of a polyphibian could resolve the tension between subjective and objective, or artistic and scientific, research. But the usage of such obsolete categories does not come without a warning: just as artists and scientists come to their major discoveries by bypassing this division, by submerging into protoplasmic state of knowing, so are the subjective and objective experience never really divided, but their impurity does not obstruct the researcher, because independently of these divisions the insight is gained and cultivated in the protoplasm.

Polyphibianism moves in opposition to the arbitrary fragmentation, indifferent to convenience, comically correcting the conventions. Rather than dissecting the knowledge in arbitrary manner until separation into sections causes the death of knowledge, polyphibianism searches for natural articulations and with precise incision inspires multiplication of life within knowledge. By differentiation, dissolving, dispersing, disseminating the life, the knowledge is set free to propagate. Growing the knowledge is therefore directly correlated with growing

the imaginary life-forms, not unlike the aspirations for the living knowledge in Nicolescu's manifesto of transdisciplinarity[i].

This infrathin incision is a fractal cut of the two irreconcilable yet infinitely intertwined tendencies of comic indifference and emphatic involvement, forming an intricate fractal geometry[ii]. Such dichotomous tension cannot be resolved by adding yet another integer dimension, but by revealing the dimensions in between – the fractal dimensions. Only then the comic and the empathic can come infinitely close together without disturbance, even though, by definition, they cancel each other out when in contact.

In the same manner an infrathin incision in the mind-set of an individual monophibian dissolves the monophibic individuality into a polyphibian. No other effort is required in this imagination, the method of introspection is spontaneously followed, dispersing one person into multiple personalities, as in a dream, correcting the monophibic personality by laughing at oneself from multiple points of being. In what way is a polyphibian more alive than a monophibian? Polyphibianism, by ceaseless differentiation and division, multiplies life into a living knowledge. If incisions of differentiation are accurate, the living knowledge will grow indefinitely.

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[i] see chapter 2.2. for more on transdisciplinarity
[ii] see chapter 4.1.3. for more on fractals, phractals and polyphibianism

A polyphibian is a transitory being, spasmodically laughing at itself from different points of being. To get into a state of being transient, one first needs to cultivate empathy with multiple points of being, rather than focusing on one. The comical corrective keeps the polyphibian in movement, always in transition in between the media, driven by curiosity, free from fear of the unknown, free, in fact, from any other emotion, be it attachment or detachment. With the fractal geometry of closely packed emotional indifference and involvement, the anxiety in confronting the transdisciplinary zone becomes unnecessary. Curiosity of a transdisciplinarian spontaneously reaches areas of knowledge that disciplinary science has denied itself the access.

Bergson (2008, p. 5a) expresses the complicit nature of laughter: "However spontaneous it seems, laughter always implies a kind of secret freemasonry, or even complicity, with other laughers, real or imaginary." Laughter unites the disciplinary researchers prepared to enter the transdisciplinary zone, a zone in which one is allowed to be newborn as an imaginary organism and to research, navigate, cultivate and grow organs of knowing. Polyphibianism, as a gathering of beings with similar tendencies for growing knowledge, forms a guild in ecological sense, rather than sociologically. Although the entrance into the polyphibic guild is not straightforward, it is accessible to anyone through introspection.

In a group of disciplinary researchers, preparing to trespass the disciplinary borders, any automatism "closely akin to mere absentmindedness" entices

laughter. In other words, Bergson (2008, p. 8a) finds a comic character "comic in proportion to his ignorance of himself. The comic person is unconscious." Through introspection, a monophibian becoming a polyphibian laughs at itself: at its comic character, at the automatism of its actions, of its habits, of its ignorance of itself.

To realise the consequences of such spontaneous invention as laughter, McLuhan's (1994, p. 45) clarification is on offer: "Any invention or technology is an extension or self-amputation of our physical bodies, and such extension also demands new ratios or new equilibriums among the other organs and extensions of the body." Likewise, the technology of laughter, as any other technology, at the same time extends oneself into new senses, new organs of knowing, and amputates the old: laughter alleviates the pain of transformation by multiplication of one's points of being.

The mechanical automatism, acquired through optimisation of an individual for a single way of perceiving, reacting, reproducing, and representing, cracks in laughter. Just as the mechanical that accumulates over the lifespan of a monophibian numbs and desensitises the monophibian, in the same manner the comic is a technology that relies on numbness in order to painlessly dismantle the mechanical. But once the joke is over – what replaces the painkiller? What kind of prosthesis can provide sufficient distraction to substitute the sensual experience, after the senses have been self-amputated? What kind of technology

protects this being in transition, in direct exposure to the bare protoplasmic environment?

The danger a disciplinary researcher, willing to trespass disciplinary borders, confronts is to turn back to the old habits before reaching the transdisciplinary zone. Whether trapped in transdisciplinary surrogates, such as interdisciplinarity or multidisciplinarity, or simply establishing new disciplines, this researcher has not utilised the comical corrective to its fullest. Loosening up the habits does not break them, while forming new habits is counterproductive, contributing to the overpowering apparatus of disciplinary science. The comical needs to be perpetually applied until complete transformation takes place.

To become a polyphibian out of a joke on monophibic deficiencies means not to return to serious research after the joke has subsided, but to continue researching with serious humour that enables one to grow knowledge through oneself, through unique, exceptional organs invented as serious comical correctives. A polyphibian does not provide knowledge externally to some apparatus for archiving it, because it consumes, it lives the knowledge in its protoplasmic state. There is no need to externalise and manifest the extracts of knowledge to other members of polyphibianism, since the knowledge is lived immediately through all points of being – there is nothing external to the imaginary organism of living knowledge.

The movement of trespassers, transdisciplinarians or polyphibians, granted the awareness of its origins, does not revolve around conventional society - in

Bergson's (2008, p. 8b) words - the movement that "inclines to swerve from the common centre round which society gravitates," resists the centripetal force of the social apparatus. A propensity of simply swerving away would be, for Bergson (2008, p. 8b), a "sign of an eccentricity" and "inelasticity of character." Polyphibians are indeed eccentric, inasmuch as they are driven to the periphery of society, working at the fringes of the intellect, self-organising into new forms of intelligence, without any strong intention to resume the monophibic mode of awareness. And yet, polyphibianism, as evolutionary movement, never loses the original impetus, which is evident in all the forms of mutations of organs of knowing.

Rather than "elasticity of character" that would reset a polyphibian back to a monophibic state of mind, it is plasticity that is required to be incessantly newborn. Plasticity enables the polyphibic organism to take on all the possible forms, to empathise with any form of life, to ceaselessly mutate its organs of knowing. If "inelasticity of character," the inability to return to the centre, is corrected by monophibic humour, as Bergson (2008, p. 8b) claims, the polyphibic humour upgrades elasticity into "plasticity of character." Polyphibianism, with poly-distributed points of being, never separates from the origin, it lives in contact with its origin, but its advantage is in its ability to diverge far from it.

This thesis, almost arbitrarily, derives the polyphibian from the "category" or rather the "character" of a "serious artist," defined by McLuhan as the being that is aware of changes in the media landscape. The suggested methodology for the

serious artist is serious humour. Bergson (2008, p. 8b) notes that the comical, although utilitarian by nature, comes close to art in the following sense: "the comic comes into being just when society and the individual, freed from the worry of self-preservation, begin to regard themselves as works of art." Comically induced polyphibic growth of living knowledge is in that manner related to art, to incessant creation, imaginary solutions and invention through mutation. Being the imaginary organism of living knowledge, the polyphibian is by definition a living "artform."

By inventing new organs of knowing, a polyphibian is newborn into technology of knowledge. Through this intimate relationship with technology a polyphibian empathises with monophibic inventions from a distance, from different points of being, realising the changes before they are registered by monophibians. McLuhan (1994, p. 22) attributes such ability to artists, considering "art, at its most significant, as a DEW line, a Distant Early Warning System that can always be relied on to tell the old culture what is beginning to happen to it." From monophibic perspective such distant "eccentric" art that offers no guarantee of return to the old centre occasionally induces laugher in despair.

Art is mainly comic to the spectator who approaches art with rigidity: art feeds back the comical corrective to the spectator. A monophibic spectator receiving such feedbacks laughs at its own stereotyped, standardized, coagulated, rigid, habitual condition: being stuck in a medium is comic. In trespassing that medium, that is, in becoming polyphibic, one unplugs oneself from the existing

apparatus and invents new "breathing" organs for the new medium. For the remaining monophibians the actions of the newborn polyphibian could seem disorderly, even anarchic through the old medium - the old societal structures might not appreciate the changes. And yet, polyphibian is the embodied knowledge, the embodied technology arising from comical correctives that transform - transformations, even if ignored by monophibians, nonetheless happen on another order of organisation.

In disciplinary research, every encountered methodological repetition, whether in theory or experimentation, could potentially induce laughter. The very representation of research results is already comically challenging. In contrast to the process of creation, to the birth of ideas, Bergson (2008, p. 12b) gives the example of communicating the preserved ideas in a public speech: "a certain movement of head or arm, a movement always the same, seems to return at regular intervals. If I notice it and it succeeds in diverting my attention, if I wait for it to occur and it occurs when I expect it, then involuntarily I laugh. Why? Because I now have before me a machine that works automatically. This is no longer life, it is automatism established in life and imitating it. It belongs to the comic."

In transdisciplinarity there is no need for repetition of experiments, not even memorization by repetition, in fact, there is no need to organise past experiences - as Bergson (2005, p. 7) ensures - "the past is preserved by itself." Transdisciplinary knowledge is preserved by being lived rather than recorded,

represented, filed and classified. Transdisciplinary "communication" can only happen inadvertently, if the thought torrent of a transdisciplinary researcher is spoken out loud. "An idea is something that grows, buds, blossoms and ripens from the beginning to the end of a speech. It never halts, never repeats itself. It must be changing every moment, for to cease to change would be to cease to live." (Bergson, 2008, p. 12a) Knowledge that ceases to live becomes a laughing matter.

The transdisciplinary researcher is not to write down a final thought – if it is to be kept alive, it must ceaselessly change – it must keep being rewritten. Avoiding the need for writing down, escaping the culture of print, culture of reproduction and representation, at the extreme, exiting the visual culture and the retinal art altogether, is a shift from disciplinary to transdisciplinary research. This cultural and scientific paradigm shift that is already sporadically occurring, has not been and cannot be formalised within scientific disciplines, even though it has been noticed by thinkers that transcend the disciplinary domains. McLuhan (Picnic in Space, 1967) observed the pseudo-return of science to the non-repetitive and non-representational:

> If you can do it again then you've got a proof - scientific proof - can you do it again - that is visual space - anything that can be exactly repeatable is visual. As science gets more sophisticated it realizes that all experiments are subtly non-repetitive, and that

> repetition is not a proof, and no two experiments are ever alike,
> and visual space, in fact, has disappeared from science.[i]

Whilst disciplinary science supposedly relies on repetition of results to ensure the advancement of knowledge, transdisciplinarity, avoiding repetition, has nowhere and no intention to advance, it merely intensifies the experience of knowing. Transdisciplinarity is a comical corrective to the machinery of repetition that is aiming at interpretation of unrepeatable phenomena. The methods based on repetition are clearly not the means of progress, on the contrary, the major discoveries are disruptive to the existing disciplinary methodologies. The advancement after such disruption is customarily merely a re-adjustment of disciplinary protocols to a different direction. The researchers are not freed from habits, but trained to follow altered habits, by shifting their opinions rather than their awareness.

Laughter on its own does not provide instructions on how to set up an experiment that yields only exceptions and never a repetitive, generalizable result, or how to set up the apparatus that never reproduces or recognises identity. And yet, laughter is induced with the very idea of such apparatus - laughter therefore consists in correcting the apparatus for experiments in the field of physics, for instance, by imagining an upgraded apparatus for experimentation in the realm of 'pataphysics, the realm of the unique and

[i] see also chapter 3.3.2.

exceptional. The apparatus that crosses over the threshold of physics into 'pataphysical domain is fuelled by the comical[i]. The laughter is therefore the catalyst for imaginary solutions. While bursting in laughter the imagination blossoms.

> There is a logic of the imagination which is not the logic of reason, one which at times is even opposed to the latter, with which, however, philosophy must reckon, not only in the study of the comic, but in every other investigation of the same kind. It is something like the logic of dreams, though of dreams that have not been left to the whim of individual fancy, being the dreams dreamt by the whole of society. In order to reconstruct this hidden logic, a special kind of effort is needed, by which the outer crust of carefully stratified judgments and firmly established ideas will be lifted, and we shall behold in the depths of our mind, like a sheet of subterranean water, the flow of an unbroken stream of images which pass from one into another. This interpenetration of images does not come about by chance. It obeys laws, or rather habits, which hold the same relation to imagination that logic does to thought. (Bergson, 2008, p. 15a)

By relating the comical and the imaginary in this important passage of his essay on laughter, Bergson crosses over to the 'pataphysical domain, where imaginary solutions emerge from serious humour. Just as Shattuck (1960, p. 27) measures the distances on the map of sciences: "'pataphysics lies as far beyond metaphysics as metaphysics lies beyond physics - in one direction or another," Bergson maps the "logic of imagination" closer to "logic of dreams" than to the "logic of reason."

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[i] see chapter 4.2.3. for more on upgrading the apparatus of physics to 'pataphysics and beyond

Bergson differentiates between the inattentive dreams of an individual and the dreams in a coherent self-awareness of a collective. A monophibian, unprepared for a polyphibic transformation, that loses the thread, drifts off with the dream, in an eccentric, inelastic manner, not able to return to the centre. The trained polyphibian dreams not as an individual, but as multiple dividuals, as a coherent multiplicity of points of being, not losing the thread to the centre of the dream, but relocating it in dynamics of polyphibianism.

To operate within the "logic of dreams" Bergson suggests the judgement is to be lifted. Without securing the interval of suspended judgement[i] there is no flow, no "stream of images," no turbulent imaginary solutions. Bergson finds in the "interpenetration of images" a certain principle of self-organisation, an emergent pattern from which arise imaginary solutions that could be related to the way thinking structures arise from the rules of logical reasoning.

Composing the Manifesto of Transdisciplinarity, Nicolescu (2002, p. 28) proposes a shift in the rules of reasoning - from classical logic to a logic of included middle, in which a solution to unresolvable dichotomies in disciplinary research could emerge within transdisciplinary research. If laughter is that necessary trigger for spontaneous imaginary solutions to tensions caused by the rigidity of "exclusive

[i] see chapter 4.2.4. for more on the Interval of Suspended Judgement

logic," then a "Manifesto of Laughter" should, in accordance with Bergson's and Nicolescu's suggestions, accommodate a kind of "logic of inclusiveness:"

> Many a comic form, that cannot be explained by itself, can indeed only be understood from its resemblance to another, which only makes us laugh by reason of its relationship with a third, and so on indefinitely. […] Where does this progressive continuity come from? What can be the driving force, the strange impulse which causes the comic to glide thus from image to image, farther and farther away from the starting-point, until it is broken up and lost in infinitely remote analogies? But what is that force which divides and subdivides the branches of a tree into smaller boughs and its roots into radicles? An inexorable law dooms every living energy, during the brief interval allotted to it in time, to cover the widest possible extent in space. Now, comic fancy is indeed a living energy, a strange plant that has nourished on the stony portions of the social soil, until such time as culture should allow it to vie with the most refined products of art. (Bergson, 2008, p. 22a)

The relation between transdisciplinary living knowledge and laughter is revealed in this significant passage, in which the drive in propagation of the comical and the imaginary is compared to the drive of propagating life. The bursts of laughter on the periphery of a bounded scientific discipline ruptures the boundaries, so as "to cover the widest possible extent," the entire transdisciplinary zone. The comical gives the conserved knowledge a "living energy," it awakens the knowledge into life by dynamics of dispersion, division, and differentiation.

In fertile conditions of laughter the living knowledge grows as a lush tropic vegetation, spreading by method of suggestion, association and resonance, rhizomatically "subdividing […] its roots into radicles." The rhizomatic tendency

of the comical to "cover the widest possible extent in space" ensures efficiency as a social corrective to reach the widest possible audience. Considering the differences in sense of humour within society the comic idea needs to spread via incremental analogies. The comic effect propagates by slight variations.

Bergson is convinced that comic "is a strange plant," competing with other strands of art. The artistry of rhizome-like spreading of laughter resembles the fractal geometry, able to remain self-affine across several scales and therefore to reach the most remote and minute spots in the territory. The sensibility of an artist relies on mastery of such geometry to scan the territory as a Distant Early Warning System (McLuhan, 1994, p. 22). The broadcasting of laughter by free association on all scales and orders awakens a synaesthesia between organs of knowing.

Free association, or "the flow of an unbroken stream of images which pass from one into another," is the avalanche that occurs on the top of the pile as soon as the protection net of reasoning is removed: "a special kind of effort is needed, by which the outer crust of carefully stratified judgments and firmly established ideas will be lifted" (Bergson, 2008, p. 15a). The schemas of judgement are providing the resistance to osmosis. Once the schemas are removed osmosis releases the energy that fuels associations.

Free associations multiply and proliferate growth of the organism of living knowledge within itself, by swelling, inflating, and imploding in fractal rhizomatic networks of all possible mutations and innovations of organs of

knowing. But the differentiation in this growth is not random, just as "interpenetration of images does not come about by chance" (Bergson, 2008, p. 15a). Only clear-cut incisions, following the particular articulation in the organism of knowledge, encourage growth into a resilient network of knowledge.

Bergson (2008, p. 20b) briefly sketches the "method of suggestion" and the "logic of imagination," noting how one brings out from "this state of mental chaos the precise form of the object of which he wishes to create a hallucination." The protoplasmic transdisciplinary zone is chaotic, but in spite of the turbulence, for a polyphibian on the way back to the monophibic reality, it is effortless to pick up with precision the proto-forms that will induce "hallucination" among monophibians.

Proceeding by suggestion, according to Bergson (2008, p. 21a), drives one into a drowsy state where one is losing consciousness and suspending judgement: "they see those coloured, fluid, shapeless masses, which occupy the field of vision, insensibly solidifying into distinct objects. Consequently, the gradual passing from the dim and vague to the clear and distinct is the method of suggestion par excellence." A polyphibian exits the dynamic heterogeneous protoplasmagora into a static monophibic archive with a lucid and clear, but ephemeral vision, only to submerge again in the protoplasm.

Bergson (2008, p. 21a) will attribute this lucid vision, these precisely distilled ideas and meanings, to "a certain arrangement of rhythm, rhyme and

assonance," by which "it is possible to lull the imagination, to rock it to and fro between like and like with a regular see-saw motion, and thus prepare it submissively to accept the vision suggested." The imaginary solution is realised, it gains reality, by resonance. The monophibic mind comprehends the polyphibic wisdom as long as the frequency of hypnotism is maintained.

4.1.2. Essay on dreams: awakening imaginary knowledge

Bergson's essay on dreams is yet another report from the periphery of the intellect. Dreaming is knowing internally - dream is immediate experience of interior sensations through the dreamer's viscera (Bergson, 1914, p. 26) - vibrations in the internal organs of the dreamer are transforming, transmuting them into organs of knowing. Through dreams the polyphibian is newborn. Living this internal knowledge does not require any external representation, nothing in dreams is to be exactly repeated, fixed or frozen for examination. The details of the dream escape the dreamer by providing new details. The movement towards more detailed living knowledge is therefore the movement of dreaming, imagining and inventing – polyphibianism. Dreamers communicate only internally within the dream, living the same protoplasmic experience from different points of being, cohabiting and co-creating protoplasmic agora of inexistent conversations:

> To dream a whole conversation, and then, all of a sudden, a singular phenomenon strikes the attention of the dreamer. He perceives that he does not speak, that he has not spoken, that his interlocutor has not uttered a single word, that it was a simple exchange of thought between them, a very clear conversation, in

> which, nevertheless, nothing has been heard. (Bergson, 1914, p. 22)

In the dreams there is no need to speak out, no need for intermediary signifiers and outwardly signalling systems, since the in-formation is immediate. It is digested and metabolised by the transformed visceral organs into always already new meaning – there is no need to preserve the meaning or to memorize, to store the message. In dreams the message is indeed the medium, as McLuhan (1994, p. 7) phrased it. Dreaming is communicating within oneself as the organism of living knowledge – dreams are communication between different organs of knowing, comprehending and metabolising information at different speeds. Protoplasm-agora, where conversations are taking place, is phantasm-agoria, the place of varying, shifting scenes of phantasms. Protoplasmagora is privately, introspectively accessible public space for emphatic exchange of thought.

The method of introspection is as spontaneous as falling asleep - turning attention away from social apparatus back towards personal immediate perception. Bergson (1914, p. 26) observes: "We live outside of ourselves. But sleep makes us retire into ourselves." One thus falls asleep outwardly, and awakens internally. In dreams the subtlest sensation from one's environment vibrates through one's senses and, instead of reacting by habit, one is newborn with original actions and blossoms into myriad of imaginary solutions. The body suddenly gains in degrees of refined sensibility and is able not only to amplify but also to actualize within itself any among the vast potentiality of meanings.

Knowledge grows from infinitesimal amounts of input, metamorphosing existing sensory organs into ephemeral new organs of knowing.

Bergson (1914, p. 26) refers to the bodily sensations that induce imaginary solutions in the dreamer as "internal touch, deep-seated sensations emanating from all points of the organism and, more particularly, from the viscera. One cannot imagine the degree of sharpness, of acuity, which may be obtained during sleep by these interior sensations." Indeed, from infinitesimal environmental input the dreamer imagines infinitely intricate output, which is not in fact an output back to the environment, as it cannot be examined externally, because the dreaming process cannot be halted in order to inspect a snapshot of the dream. Once one tries to focus onto a detail in a dream, the detail morphs with every approaching step. The sharpness that Bergson mentions is not in fixity, but rather in fluidity of the detail - the detail always escapes us - deeper and deeper one looks the more astonishing details are invented, generated on finer and finer scales.

The introspective method practiced by Bergson in his investigations of dreaming activity in human beings could be hastily condemned and dismissed as a subjective method that fails to secure reproducibility of results. Objective studies of dreams tend to be conducted with the purpose of finding the general properties of human dreams, properties that do not change from human to human, that are measurable and can be measured in an average healthy human

individual.[i] In such studies only external signs of the dreaming process would be observed. With the advancements in technology it is conceivable how the raw content of the dream could be registered[ii] and represented. A possibility of such extraction and objectification of the dream by the ever more invasive technocratic apparatus, intruding[iii] into the utmost private worlds in order to control the will of the individual, is a warning sign and the last call to experiment with alternative methods.

Bergson, although approaching the dreams as a unique individual, narrates his introspective discoveries with a confidence that there is some generality to his dreaming experience. Furthermore, Bergson infers from his observations causes of such experiences. The so-called scientific value[iv] of his reasoning on dreams could be determined by rigorous scientific testing, but there are other values of such intuitive method that should not be overlooked, outcomes that match the scientific results in precision, as Bergson often reassures the reader. To ensure comparability between the intellectual and the intuitive, Bergson wrote his essay on dreams as a classic observer's account on the observed while, in fact, the

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[i] studies with such general scope become problematic already when considering what is an average healthy dreaming specimen

[ii] for instance, by processing the data of neural activities during sleep and comparing them with previously collected sense impressions in awaken state, meticulously linked to neural imaging

[iii] falling asleep is the last retreat from the invasive technocratic apparatus and even that is imminent to disappear with technological advancements

[iv] "scientific value" of a research through intuitive subjective introspection, rather than through objective observation, remains as questionable as a 'pataphysical experiment always yielding an exception, rather than ensuring repeatability of results expected from a physical experiment, and yet, Bergson is able to demonstrate that the level of precision required in physics can be also achieved in metaphysics

observer and the observed were merged. Report therefore differs greatly from the method itself. Report following research of this kind can only serve as an invitation for the reader to complete the creative act[i], to relive the experience.

By observing closely the acuity of senses in the somnolent state, Bergson (1914, p. 28) finds the "faculty of sense perception, far from being narrowed during sleep at all points […] on the contrary [it is] extended, at least in certain directions, in its field of operations. It is true that it often loses in energy, in tension, what it gains in extension." Relaxing the intellect, losing in tension and gaining in the extension of the intuitive field is the opening up to protoplasmagora. For Bergson (1914, p. 28), the sensations from the environment in the somnolent state are "the materials of our dreams." From such "vague and indeterminate" material grow immensely detailed creations.

> When the mind creates, I would say when it is capable of giving the effort of organization and synthesis which is necessary to triumph over a certain difficulty, to solve a problem, to produce a living work of the imagination, we are not really asleep, or at least that part of ourselves which labours is not the same as that which sleeps. We cannot say, then, that it is a dream. (Bergson, 1914, p. 30)

Dreaming, creating "a living work of the imagination," is therefore achievable by the intermediary apparatuses and awakening towards certain aspects of directly perceivable reality. Polyphibianism is the movement away from such

[i] see chapter 4.2.1. for more on how to complete the creative act

apparatuses. Woken out of monophibic hypnosis, polyphibians keep direct contact with the medium, disregarding all sorts of mediation, assertively trespassing the interfaces. While a dreamless monophibian simply shuts the eyes and inserts the earplugs to diminish the stimulation of senses, a monophibian transmuting into a polyphibian, on the contrary, increases the alertness to stimuli, by removing the filters of conventions, by falling asleep towards conventional reality.

The entryway into protoplasmagora, into a state of hyper-creativity and hyper-awareness, is seemingly drowsy, inaccurate and lacking automatism from the monophibic point of view. Polyphibian entering the protoplasmic environment utilizes the indeterminacy of the point of being as a leverage in most precise inventions for the most accurate adaptations. For Bergson (1914, p. 31), the acuity of intellect is not diminished in somnolence, "far from surrendering the reasoning faculty during sleep," new orders of reasoning emerge from dynamics of protoplasmagora. Furthermore, Bergson (1914, p. 34) generalises somnolence to any form of indifference, any retirement of interest: "suppose that, at a given moment, I become disinterested in the present situation."

Paradoxically, indifference to present situation means to be fully in the present, that is, to be interested and engaged in the entire present, gaining the universal access rather than superficially engaging with the interface. Bergson (1914, p. 37) alleges that dreams emerge out of utterly integrated present and past, sensation and memory: "The sensation is warm, colored, vibrant and almost living, but

vague. The memory is complete, but airy and lifeless. The sensation wishes to find a form on which to mold the vagueness of its contours." The lifeless memory is archived in the apparatus. The living, sensed memory, on the other hand, preserves itself by being incessantly newborn.

Integrating lifeless memory with the living sensation, as suggested by Bergson, resembles the transdisciplinary flow in between the memoirs of disciplinary research. With the imagination of the transdisciplinary dreamer, the disciplinary knowledge is metabolized into new organs of knowledge through anabolism, or into energy supply for transdisciplinary movement through catabolism. The process of digesting and dissolving the structure of disciplinary apparatus in a somnolent transdisciplinary state of mind causes drowsiness, the figure – ground relations alternate, the environment is filled with dynamic substance of life: protoplasmagora yields the living knowledge.

By practicing indifference to the disciplinary apparatus, polyphibians return to the essence of life, beginning a protoplasmic, nondeterministic discourse, imbued with potentialities of living organisation. In spite of lack of symbols and systems for communication, the knowledge grows consistently into a coherent organism. Like in dreams, polyphibic discourse is not an ordinary conversation – unlike disciplinary researchers, transdisciplinarians do not publish the results of their research, they do not speak out publicly. Rather, the conversation is held privately, internally, in a personal undetermined, continuously evolving language, a proto-language that is in itself an imaginary solution.

The technocratic apparatus built from disciplinary knowledge is increasing in complexity and is outgrowing the original scope allocated by its inventors, feeding on its inventors. One could even hypothesise that this disciplinary apparatus will take life of its own, acknowledging or not the free flow of transdisciplinary knowledge. The problem of this apparatus is first and foremost that its users are not awakening with it into another order of life, but are consumed by it.

For this reason this thesis proposes firstly the awakening of the researcher into polyphibic awareness and growing within and into the living organism of knowledge, instead of separating oneself from knowledge production. The imagined evolution of transdisciplinarity therefore reverses the tendency in the existing apparatus coming to life by reducing the life-form of its users. The imaginary organism of living knowledge enables the user to experience itself in a myriad of life-forms by being incessantly newborn into a new solution.

To reconcile the memory with the sensations in conventional reality, Bergson (1914, p. 47) maintains, one needs to invest effort to keep up with the common sense, effort that far exceeds that of dreaming, since everything must fall in its common place. Apparatus of disciplinary knowledge propagates the use of common sense, optimizing the arduous tasks with automation. The price the user pays for the habitual, automated action is a loss of all potential solutions, of the potential in the individual.

Giorgio Agamben (2009, p. 21), in his essay 'What is apparatus?', highlights the process of "desubjectification" of the user that is not compensated by a new subject, rather, the subject simply disappears. Likewise the individuality of the researcher is consumed but not replaced by the apparatus of disciplinary science. While Nicolescu's (2002, p. 21) 'Manifesto of transdisciplinarity' identifies the "transubjective," this thesis imagines evolution of the transdisciplinary organism that rather than simply consuming individuality, multiplies the individual through infinite series of transmutations.

While the apparatus of disciplinary knowledge has been assembled as a discrete, disconnected structure, the organism of transdisciplinarity connects knowledge in between and beyond disciplines. The advancements in technology are forcing the user to adapt rapidly to changes in the apparatus. Although the hastened varying of habits is beneficial to break the old habits, the newly invented instincts to survive under technocracy of apparatus are learnt from apparatus, rather than innate in a reborn user. The user is never integrated in the apparatus as a living being - by taking away the subjective individuality, the apparatus only connects lifeless data.

Dreams, as the last retreat from the apparatus, provide the test ground for integration of the unique subjective research within the knowledge production. Bergson (1914, p. 45) is aware of the importance of this individual introspective approach that should complement the archived knowledge: "Something else is essential. We need something more than theories. We need an intimate contact

with the facts. One must make the decisive experiment upon oneself." One must experiment with one's own equipment for awaking without being hypnotised by the apparatus.

For the purpose of dream explorations Bergson (1914, p. 45) gives specific instructions: "It is necessary that on coming out of a dream, since we cannot analyse ourselves in the dream itself, we should watch the transition from sleeping to waking, follow upon the transition as closely as possible, and try to express by words what we experience in this passage. This is very difficult, but may be accomplished by forcing the attention." After guiding the reader to the threshold in theory Bergson (1914, pp. 45-50) asks the reader for permission to narrate his own personal experience of crossing the threshold:

> Now the dreamer dreamed that he was speaking before an assembly, that he was making a political speech before a political assembly. Then in the midst of the auditorium a murmur rose. The murmur augmented; it became a muttering. Then it became a roar, a frightful tumult, and finally there resounded from all parts timed to a uniform rhythm the cries, "Out! Out!" At that moment he wakened. A dog was baying in a neighboring garden, and with each one of his "Wow-wows" one of the cries of "Out! Out!" seemed to be identical. Well, here was the infinitesimal moment which it is necessary to seize.
>
> The waking ego, just reappearing, should turn to the dreaming ego, which is still there, and, during some instants at least, hold it without letting it go. "I have caught you at it! You thought it was a crowd shouting and it was a dog barking. Now, I shall not let go of you until you tell me just what you were doing!" To which the dreaming ego would answer, "I was doing nothing; and this is just where you and I differ from one another. You imagine that in order to hear a dog barking, and to know that it is a dog that barks, you have nothing to do. That is a great mistake. You accomplish, without suspecting it, a considerable effort. You take your entire memory, all your accumulated

experience, and you bring this formidable mass of memories to converge upon a single point, in such a way as to insert exactly in the sounds you heard that one of your memories which is the most capable of being adapted to it. Nay, you must obtain a perfect adherence, for between the memory that you evoke and the crude sensation that you perceive there must not be the least discrepancy; otherwise you would be just dreaming. This adjustment you can only obtain by an effort of the memory and an effort of the perception, just as the tailor who is trying on a new coat pulls together the pieces of cloth that he adjusts to the shape of your body in order to pin them. You exert, then, continually, every moment of the day, an enormous effort. Your life in a waking state is a life of labor, even when you think you are doing nothing, for at every minute you have to choose and every minute exclude. You choose among your sensations, since you reject from your consciousness a thousand subjective sensations which come back in the night when you sleep. You choose, and with extreme precision and delicacy, among your memories, since you reject all that do not exactly suit your present state. This choice which you continually accomplish, this adaptation, ceaselessly renewed, is the first and most essential condition of what is called common sense. But all this keeps you in a state of uninterrupted tension. You do not feel it at the moment, any more than you feel the pressure of the atmosphere, but it fatigues you in the long run. Common sense is very fatiguing."

"So, I repeat, I differ from you precisely in that I do nothing. The effort that you give without cessation I simply abstain from giving. In place of attaching myself to life, I detach myself from it. Everything has become indifferent to me. I have become disinterested in everything. To sleep is to become disinterested. One sleeps to the exact extent to which he becomes disinterested. A mother who sleeps by the side of her child will not stir at the sound of thunder, but the sigh of the child will wake her. Does she really sleep in regard to her child? We do not sleep in regard to what continues to interest us."

"You ask me what it is that I do when I dream? I will tell you what you do when you are awake. You take me, the me of dreams, me the totality of your past, and you force me, by making me smaller and smaller, to fit into the little circle that you trace around your present action. That is what it is to be awake. That is what it is to live the normal psychical life. It is to battle. It is to will. As for the dream, have you really any need that I should explain it? It is the state into which you naturally fall when you let yourself go, when you no longer have the

> power to concentrate yourself upon a single point, when you have ceased to will. What needs much more to be explained is the marvellous mechanism by which at any moment your will obtains instantly, and almost unconsciously, the concentration of all that you have within you upon one and the same point, the point that interests you. But to explain this is the task of normal psychology, of the psychology of waking, for willing and waking are one and the same thing."
>
> This is what the dreaming ego would say. And it would tell us a great many other things still if we could let it talk freely.

The report on the encounter between the "waking ego" and the "dreaming ego," which Bergson (1914, p. 46) experiences for an infinitesimal moment, is examined in this thesis as an important document of introspection[i]. Namely, the passage above recounts the indecisiveness experienced in a somnolent state, on the threshold where one awakens into a dream or back into conventional reality, or both – when one awakens into a lucid dream awareness. Bergson manages to maintain the balance on the threshold to the dream, thus turning it for a moment into a lucid dream, where two realities are intricately unfolding in parallel. A lucid dreamer could be defined as an amphibian, aware of both realities, but since every dream is by default a multiplicity of potential dreams – a dreamer that is awaken into this plurality is therefore awaken into polyphibic awareness.

[i] the quoted passage of introspection is important for the three cases studied in this thesis - Duchamp, Bergson and Poincaré - see chapter 3.2.1 for example of Poincaré's introspection into the process of mathematical discovery and chapter 4.2.1 for example of Duchamp's introspection in the process of creative act

In this infinitesimal moment, when the polyphibian becomes aware of its plurality, a single question is posed by individual to its dividual self: "just what were you doing?" The answer that follows from Bergson (1914, p. 46) on the other side of the threshold, that is, from protoplasmagora, is simple: "I was doing nothing." This is the typical answer of a polyphibian. Duchamp was known to proclaim himself as a do-nothing, "the public began to take literally Duchamp's pronouncement that he preferred 'living rather than working', by accepting his self-description 'I am a breather'" (Judovitz, 1995, p. 196), but there is more to it. Dreaming happens with no effort, no energy investment, one finds oneself in a dream spontaneously, as if by osmosis. Duchamp worked in the same manner, effortlessly but carefully, not to prevent the osmosis from happening.

What is a polyphibian abstaining from by doing nothing? Bergson (1914, p. 48) compares the energy invested by the non-dreamer in "a state of uninterrupted tension," trying to prevent osmosis into a dream, to "the pressure of the atmosphere," not unlike the so-called osmotic pressure that inhibits the spontaneous inward flow through the semi permeable membrane. A polyphibian is adjusting the permeability of the interfaces. Bergson reveals how the common sense, with all the conventions of the technocratic apparatus, is continually exhausting the monophibians, without them being aware of it. Polyphibians release this pressure, remove the apparatus, to breathe freely.

Bergson (1914, p. 48) formulates with precision: "To sleep is to become disinterested. One sleeps to the exact extent to which he becomes disinterested."

By becoming disinterested to the noise of the apparatus, one's innermost interests surface. The dreamer that remains interested in a certain aspect of a certain phenomenon invents by dreaming up the solution. Such solution lies exactly at the intersection of all involved realities[i] and follows the logic of the intellect at its periphery – where "relaxed reasoning" applies. Dreaming relaxes tensions, resolves problems into solutions that are otherwise inconceivable by strict rationality.

By making a distinction between the effort "to concentrate […] on a single point" and inability or unwillingness to do so in dreams, Bergson (1914, p. 49) prepares the analogy to be drawn in distinguishing monophibic and polyphibic awareness. A dreamer lets herself go, dispersing herself all over protoplasmagora, while the awaken person will concentrate, condense her entire past to solve a single isolated problem at hand. Evolutionary transmutation into a polyphibian is driven by the original impetus – pure curiosity – the individual spontaneously dissolves into a multiplicity of points of being because a single viewpoint does not satisfy the urge to know.

While the monophibian updates and downloads instructions and requirements for new instincts issued by the apparatus, the polyphibian discards all warnings to upgrade to new versions and decides to follow "low-tech" intuition instead.

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[i] see chapter 4.2.4. for a practical example of such solution, determined at the precise threshold between physics and 'pataphysics that abides by the principles of both domains

Polyphibian is a self-evicted outcast that by passive indifference disassembles the apparatus. Monophibian is working hard to keep up, polyphibian is a Duchampian do-nothing. Polyphibianism is therefore the tendency to detach oneself from implanted and imposed instincts only to plunge oneself intuitively into protoplasmagora.

Studying the faculties of a dream Bergson (1914, p. 50) summarises: "we perceive still, we remember still, we reason still. Abundance, in the domain of the mind, does not mean effort. What requires an effort is the precision of adjustment." While opening to the wholeness in protoplasmagora is a spontaneous osmotic event, closing into a detail, concentration, fixation on a single point is working against osmosis. No detail is revealed in protoplasmagora without a mesmerising revelation of infinitely intricate structure beneath it. Polyphibianism, just as dreaming, is a flux, it is not to be interrupted for the observer to observe – any such inquiry is a waste of energy. There is no need for confirmation of observation, for adjustment of perception to conventional conception.

Apparent incoherence in a dream is not to be mistaken as imprecision, on the contrary, it is an intricate opening, elaborated stratifying into a multiplicity of dreams. Polyphibian does not aim for precise attunement with a single strata but attempts to coexist coherently in a plurality of realities. The term precision in protoplasmagora is analogous to coming into resonance – a polyphibian fine-tunes the fluctuations of layered dreams until a new order emerges. Unlike monophibic precision in measurement, such as accurate comparisons in terms of

congruence, a polyphibic precision does not compare from a single point of view, but experiences plurality in resonance from incomparable points of being.

A dreamer is incapable of "that attention to life which is necessary in order that the inner may be regulated by the outer." The attention to life that Bergson (1914, p. 53) mentions is the regulator between arbitrary realities and the apparatus. A monophibian regulates the precise adjustment to mono-reality approved by the apparatus. A polyphibian is not fully attentive to the ordinary life, to this order of life, but disperses over many orders, experiences the imaginary living organisations, multiplies and intensifies the life. Dreams often seem more intense than "life."

Bergson (1914, p. 54) observes that attention of the dreamer is not towards the most relevant issues in life – quite the opposite, dreams for Bergson (1914, p. 55) "concern themselves," dreams are made of stuff one disregards and ignores during the day: "the events which reappear by preference in the dream are those of which we have thought most distractedly." Indifference to waking life is where the data leaks in – paying attention by not paying attention, in other words, effortless attention is what absorbs the dreamer through osmosis: "The ego of the dream is an ego that is relaxed; the memories which it gathers most readily are the memories of relaxation and distraction, those which do not bear the mark of effort" (Bergson, 1914, p. 55).

A successful dreamer masters relaxation into attention - the more relaxed become the boundaries of a dream, the more the dreamer awakens. Bergson (1914, p. 55)

assumes the experiences in most "profound slumber" are so alien, that they are forgotten and discarded after waking back to conventional reality. "Sometimes, nevertheless, we recover something of them. And then it is a very peculiar feeling, strange, indescribable, that we experience. It seems to us that we have returned from afar in space and afar in time" (Bergson, 1914, p. 55). The indescribability of such dreams is due to the fact that no interface is available to represent the knowledge that was grasped directly. No language within the technocratic apparatus will suffice to report on such experiences - it is only by inventing new organs of knowing that this knowledge can be shared, grown and evolved.

This thesis relies on the human ability to relax and expand the limits of disciplinary research and to confidently dream up, imagine, concoct and conceive the organism of living knowledge through which the inexpressible in transdisciplinarity could evolve and propagate the experience among researchers. Polyphibianism is the movement of such dreamers that communicate their transcending experiences, in a sense, telepathically – through imaginary organs of knowing[i] - their experiences are emphatically absorbed and lived in non-local protoplasmagora. Bergson alleges the possibility of shared dreams that lead to other orders of awareness, and yet, for the time being, he

[i] while the imaginary is, in general, considered as the domain of imagination of the individual, in this thesis the imaginary organs are shared among individuals that have divided into dividuals, as in a shared dream – see chapter 4.1.3.4. for more on the notion of individual and dividual

remains reserved about describing it further, perhaps simply because it is indescribable:

> I do not dare express an opinion upon phenomena of this class, but I cannot avoid attaching some importance to the observations gathered by so rigorous a method and with such indefatigable zeal by the Society for Psychical Research. If telepathy influences our dreams, it is quite likely that in this profound slumber it would have the greatest chance to manifest itself. But I repeat, I cannot express an opinion upon this point. I have gone forward with you as far as I can; I stop upon the threshold of the mystery. To explore the most secret depths of the unconscious, to labor in what I have just called the subsoil of consciousness, that will be the principal task of psychology in the century which is opening. I do not doubt that wonderful discoveries await it there, as important perhaps as have been in the preceding centuries the discoveries of the physical and natural sciences. That at least is the promise which I make for it, that is the wish that in closing I have for it. (Bergson, 1914, p. 56)

4.1.3. Creative evolution of living knowledge

4.1.3.1. Theory of knowledge – theory of evolution

Living knowledge is to be born out of Creative Evolution, yet another work by Bergson (2005). Just as life begins in protoplasm, to give birth to a living knowledge, a protoplasmic stage termed protoplasmagora is set up, for the purposes of this thesis. This term was already briefly introduced[i], where the resemblance of a protoplasmic, pre-conventional states of awareness to the various states of dreams was pointed out in Bergson's (1914) essay on dreams.

[i] see chapter 4.1.2. and appendix A for more on protoplasmagora

Just as a figure needs a ground, or just as the animal cannot exist without the environment, so does the polyphibian require a protoplasmic medium. Polyphibianism as a movement cannot be suitably defined without a background - the polyphibian explores the transdisciplinary territory.

If protoplasm is considered to be the primordial living substance, then protoplasmagora is the primordial generator of the living knowledge. Polyphibian is conceived as a being-solution, a being that is coming into knowing through adaption. The self-organising experiences of the polyphibian are forming an ever new organism that is born in front of every new problem. Polyphibian is the living knowledge incarnated – it has the impetus required to reorganise itself wherever there is a fertile territory. It is this mutual dependence with its environment that defines the polyphibian. To comprehend the living knowledge it needs to be non-arbitrarily dissected in two agents – each of them alternating between active and passive role, in other words, assuming in turn the role of agent and ambient.

From a previous line of discussion on methodology[i] a question arises: can a newly invented concept operate on its own, without a context? In organic terms: can a newly conceived organism survive on its own, without the environment? The interdependence here is not simply complementary, one is not merely the

[i] see chapter 3.3. for more on distinction between inventing concepts and conceiving organisms

opposite of the other, but rather a heterogeneous amalgam of one and the other. A clear cut separation of a polyphibian and protoplasmagora into a homogeneous agent and ambient would be artificial and restrictive, just as a division between the observer and the observed prevents certain problems to be resolved. To start the evolution of these terms either agency could be defined by both: [polyphibian = polyphibian + protoplasmagora] and [protoplasmagora = protoplasmagora + polyphibian].

Protoplasmagora is therefore as much auxiliary to a polyphibian, as is polyphibian auxiliary to protoplasmagora, both are organisms at the service of each other. In simple terms, the protoplasm, as a proto-living substance, already differentiates its metabolism into anabolic processes that internalise the material input, transforming the material into organism's own vital substance, thus the material becomes alive, and catabolic processes that externalise the input into a lifeless substance output, serving the organism as a prosthesis. In the same manner one might imagine an organism of knowledge metabolising its material into living internalised substance and external lifeless substance that can be worn as prosthetic apparatus until it becomes obsolete and is simply cut off, as hair or nails, and archived.

Polyphibians, regarded as a product of anabolism within the protoplasmic transdisciplinary metabolism, are intricately integrated and internalised by protoplasmagora. By-products of catabolism, on the other hand, are monophibic, mechanical and lifeless, and therefore externalised, expelled to the periphery,

where they are subject to comical corrective, as discussed before[i]. Although monophibians lose touch with living knowledge and, at best, simulate it with crude approximations, they can be born again into the living knowledge if digested by protoplasmagora. Laughter facilitates metabolism of living knowledge through contractions and relaxations of a constipated reasoning – the spasms of a comical corrective. Nonetheless laughter does not simplify metabolism – the products of a metabolic equation that operates on monophibians are complex, retaining both monophibic and polyphibic components. Upon entering the transdisciplinary territory one is consumed by this territory – one's energy dissipates and is redistributed in both disciplinary and transdisciplinary research.

Transdisciplinary metabolism can only gain momentum with the growing number of disciplines - rupturing borders of disciplinary domains yields new disciplines. This continuous supply of new disciplines is crucial to maintain the dynamics of the metabolising disciplinary knowledge into a living knowledge, which is only possible at the ruptures, the cracks, the thresholds. Living knowledge in turn generates more knowledge to be archived in auxiliary disciplines. Transdisciplinary territory cannot therefore be simply associated with non-disciplinary products, knowledge captured in disciplines is just as well part of transdisciplinary metabolic process. Defining transdisciplinarity or

[i] see chapter 4.1.1. on comical corrective of the mechanical intellectual habits

protoplasmagora in this recursive process ensures the protoplasmic instability, the ceaseless change, the state of flux, and sustains life in the knowledge.

The introduction to Bergson's book Creative Evolution contains a daring statement that equates comprehension of life with comprehension of knowledge: "theory of knowledge and theory of life seem to us inseparable" (Bergson, 2005, p. xxiii). As inspiring as this conjecture sounds, it raises doubts – one could argue about the accuracy of this proposition by simply comparing the size of theory of knowledge to that of life. On the one hand, the arguments would abound that knowledge of life, however life is defined, is but reduction of life, that knowledge cannot encompass all life in its entirety, that it cannot be bigger than life. On the other hand, theory of knowledge could be argued to be bigger than theory of life if knowledge is to encompass both the living and the non-living.

Once the domain of one theory is at the same time shown to be bigger and smaller than the domain of the other, the doubts on the unequal size of domains become redundant – both must be of the same size. Further doubts on the structural incompatibility of both domains are carefully swept away by Bergson, as the reader learns how evolution of life and that of intellect intertwine. From "the perfect fitting of our body to its environment" Bergson (2005, p. xix) demonstrates how intellect evolved for the purpose "to think matter," and yet intellect is only one strand of evolution:

> […] the line of evolution that ends in man is not the only one. On other paths, divergent from it, other forms of consciousness have been developed, which have not been able to free themselves

> from external constraints or to regain control over themselves, as the human intellect has done, but which, none the less, also express something that is immanent and essential in the evolutionary movement. Suppose these other forms of consciousness brought together and amalgamated with intellect: would not the result be a consciousness as wide as life? And such a consciousness, turning around suddenly against the push of life which it feels behind, would have a vision of life complete […] (Bergson, 2005, pp. xxii - xxiii)

Taken from this standpoint, all potential forms of awareness are immanent in evolution and would therefore, if operating in unison, be able to grasp life immediately. How is such potentiality to affect a human being that is merely one of evolutionary "experiments" on modes of awareness – the human consciousness? How can human intellect reconnect with other modes of awareness? The comical corrective to the limitations of bare intellectual self-awareness through spasms of laughter might bring intellect in resonance with otherwise intellectually unavailable types of consciousness, amplifying and modifying the intellectual features to a critical point where new patterns of knowing emerge – organisation of knowledge that is aware as both the primary intellectual organism and its mutations. Bergson imagines a variety of awarenesses surrounding and complementing the intellect, modes of awareness which intellect on its own cannot penetrate but could resonate with and harness their power:

> " [...] we do not transcend our intellect, for it is still with our intellect, and through our intellect, that we see the other forms of consciousness. And this would be right if we were pure intellects, if there did not remain, around our conceptual and logical thought, a vague nebulosity, made of the very substance out of which has been formed the luminous nucleus that we call the intellect. Therein reside certain powers that are

> complementary to the understanding, powers of which we have only an indistinct feeling when we remain shut up in ourselves, but which will become clear and distinct when they perceive themselves at work, so to speak, in the evolution of nature. They will thus learn what sort of effort they must make to be intensified and expanded in the very direction of life." (Bergson, 2005, p. xxiii)

From Bergson's essay on laughter it could be inferred that a comical corrective is to be triggered at the periphery of intellect, that this "vague nebulosity" could somehow cause the spasms of laughter. Intellect is awaken into new orders of self-awareness at its very fringes, where it comes in touch with other evolutionary strands of consciousness. Evolved primarily "to think matter" (Bergson, 2005, p. xix), intellect has organised matter to such sophisticated stage of technology that it cannot "think its innovations" on its own. The computational complexity of intellectual gadgets[i] has long escaped the scope of raw intellect and so did the impact of these gadgets on the environmental matter escape the intellectual models of control.[ii] To catch up with rapid changes in the environment, the intellect has to get involved with modes of imagination that was potential in the evolution but was not sufficiently realized in human beings.

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[i] intellectual gadgets are parts of technology apparatus that abstracts a solution to a particular problem and applies it as a model to ever more general category of problems – the abstraction increases and surpasses the ability of raw human intellect to innovate – ever more sophisticated tools are required to upgrade tools

[ii] rather than getting to know the environment intuitively by participating in it, a civilization driven by technological progress aims to conquer the unknown through intellectual models of control, thus separating the observer from the observed and impeding participation by disabling immediate communication with the environment

According to Bergson's suggestion, any being is potentially just as creative as the entire evolution of beings. As a by-product of evolution it virtually includes enfolded all the imagination necessary to diversify and to empathise with strands of evolution that diverted away from it. To harness such potentiality would be to learn immediately, without symbolic interfaces, to self-organize without a blueprint. The schematic intellectual knowledge is growing in quantity but not evolving in quality, losing ability to adapt even to increasingly complex conditions that it creates itself.

By showing how the theory of knowledge and the theory of life cannot reach their full potential one without the other and how their interpenetration is inevitable, Bergson encourages participation beyond that of Bergsonism, a participatory imagination of evolution of living knowledge. A successful merging can, according to Bergson, take place on the basis of mutual quality control (Bergson, 2005, p. xxiii). The theory of life cannot just blindly take on the categories and concepts as made readily available by the theory of knowledge: "It thus obtains a symbolism which is convenient, perhaps even necessary to positive science, but not a direct vision of its object" (Bergson, 2005, p. xxiii).

The theory of knowledge cannot by itself explain the evolution of knowledge. By contemplating the limitation of knowledge, it is therefore imperative to implement the theory of life from the very beginning. "It is necessary that these two inquiries, theory of knowledge and theory of life, should join each other, and, by a circular process, push each other on unceasingly" (Bergson, 2005, p. xxiv).

This is where this thesis picks up and takes Bergson's proposition to extreme (one of many possible extremes) as already announced[i]. This thesis is examining an imaginary solution for transdisciplinary research, imaginary in the sense it takes on any of the possible paths of evolution of consciousness.

If the theory of knowledge does not involve the incessant change of methods of knowing, of ways to be in the know, to live, experience and invent the knowing organism, then only a finite quantity of knowledge can be produced, with a finite resolution – neither additions to the knowledge nor additional refinement will increase certainty or validity of the given knowledge. Knowledge needs to be an open structure, as the Manifesto of Transdisciplinarity requires and demands (Nicolescu, 2002). The living knowledge does not oppose the traditional forms of knowledge, in fact, it builds upon them or rather metabolises them into its own internal or external by-products.

4.1.3.2. Coming into being – growing into knowing

> "For our duration is not merely one instant replacing another; if it were, there would never be anything but the present, no prolonging of the past into the actual, no evolution, no concrete duration. Duration is the continuous progress of the past which gnaws into the future and which swells as it advances. And as the past grows without ceasing, so also there is no limit to its preservation." (Bergson, 2005, pp. 6,7)

[i] see chapter 3.3. Bergson, Bergsonism, Polyphibianism

Disciplinary knowledge is acquired, experienced in the past as well as ready to be reused, reapplied in the present, but the past disciplinary research needs to be externalised, compartmentalised, conceptualised and artificially preserved for future application. To imagine an evolution of living knowledge in the transdisciplinary zone, Bergson (2005, p. 7) hints at the possibility of internal self-preservation: "the past is preserved by itself, automatically." Could the living knowledge be preserved in itself, in its own self-organised organism?

To survive independently of archiving schemas for retrieving information, knowledge must be spontaneously relived, revived and grown – the ability to grow by self-organisation must be inherent in the evolutionary structuring of the living knowledge. A limited archive cannot accommodate unlimited amount of knowledge - with accumulation of compartmentalised disciplinary data the archive clutters and information retrieval becomes obstructed. Addition of new specialised disciplinary compartments merely postpones the cluttering – the stagnating disciplinary knowledge eventually dies off. On the contrary, transdisciplinary zone, as envisioned in this thesis, might as well be finite – the incessant intricate growth of living knowledge prevents the death of knowledge.

To imagine an organism of finite area that could grow indefinitely, is to imagine it in duration - the living knowledge "swells as it advances" - to borrow Bergson's (2005, p. 7) expression. Living knowledge does not grow beyond itself into something else, into another category of knowledge – it does not divide and disintegrate itself into predetermined compartments. Living knowledge grows

within itself. This growth is not necessarily an expansion, as it is an increase in its vitality. Infinite potential for growth within a finite area can be imagined in terms of fractal geometry. The self-organised knowledge is a fractal self-preserving structure.

The scope of transdisciplinarity evolved into an organism of living knowledge is therefore not to increase the number of disciplines or to enlarge the volume of disciplinary domains, but to intensify the zone in between and beyond the disciplines – to bring that zone to life. In order to improve the ability to perceive an object of interest at a higher resolution disciplinary researchers collaborate in taking as many snapshots of the observed object from as many viewpoints as possible. Bergson finds that the same problem persists, even at the highest resolution:

> All knowledge properly so-called is, therefore, turned in a certain direction or taken from a certain point of view. It is true that our interest is often complex. And that is why we sometimes manage to turn our knowledge of the same object in several successive directions and to cause view-points concerning it to vary […] This is what, in the ordinary meaning of these terms, a "wide" and "comprehensive" knowledge of the object consists in: the object, then, is led back, not to a unique concept, but to several concepts […] (Bergson, 1992, p. 177)

Disciplinary knowledge, according to Bergson (1992, p. 177) therefore turns objects into concepts. The more the knowledge is comprehensive, the more concepts come out of the same object of interest. With increase in quantity the quality of knowledge therefore remains the same, but Bergson (1992, p. 173) is worried about the naivety of science in multiplying "indefinitely the points of

view of that object. It is quickly persuaded that putting all the points of view together, it could reconstitute the object."

In the continuous tradition of renaissance culture knowledge production relies on viewpoints taken, but with the inevitable and irreversible changes in conditions brought about by the rise of omnipresent electronic culture Derrick de Kerckhove (1997, p. 187) notes the turn from point-of-view to point-of-being[i]: "My point-of-being is not exclusive but inclusive; it is not a perspective vision that frames reality, but rather, is a place defined by the precision and complexity of my connections with the world."

One cannot live the knowledge by being separated from it through artificial division in the observer and the observed. No matter how many fixed viewpoints one can occupy, how many snapshots of the same phenomena can be obtained – to live the knowledge is to multiply one's points-of-being rather than points-of-view. A disciplinary researcher multiplies her or himself externally by invention of instruments carefully distributed in relation to the researched phenomena, reaching many viewpoints at once. A transdisciplinary researcher evolved into a polyphibian multiplies in poly-organic-being, accessing the experience of the phenomena through internally invented organs of knowing.

[i] see appendix for more on term point-of-being

Through internalisation of knowledge, coming into being becomes coming into knowledge. Instead of knowing through external viewpoints, the knowledge is lived internally through the being. But how is such knowledge self-organised within the transdisciplinary organism where "there is no register, no drawer; there is not even, properly speaking, a faculty, for a faculty works intermittently, when it will or when it can, whilst the piling up of the past upon the past goes on without relaxation" (Bergson, 2005, p. 7)?

With this excerpt, where Bergson in fact observes the organisation of past memories in an ordinary human organism, a transferal to a transdisciplinary organism of living knowledge seems straight-forward. Bergson dismisses the necessity to organise the past, by claiming that past organises itself. Past is not to be retrieved on demand by some laborious procedure but "[...] it is with our entire past [...] that we desire, will and act" (Bergson, 2005, p. 8).

Polyphibian, as a transdisciplinary organism, moves through the transdisciplinary zone - protoplasmagora: an agora of all polyphibic organisms – the entire evolutionary past of polyphibianism. Protoplasmagora affects polyphibic organs holistically, or in the context of human organs of consciousness: "Our past, then, as a whole, is made manifest to us in its impulse, it is felt in the form of tendency, although a small part of it is only known in the form of idea" (Bergson, 2005, p. 8). Polyphibianism, as a movement, gets the impulse from the dynamics of the mutual dependency between the figure and the ground, the polyphibian and the protoplasmagora. The entirety of that

impulse can be compared to transdisciplinary tendency, while only a part of the impulse can be distilled into a disciplinary idea that will turn into action:

> In its entirety, probably, it follows us at every instant […] leaning over the present which is about to join it, pressing against the portals of consciousness that would fain leave it outside […] just so as to drive back into the unconscious almost the whole of this past, and to admit beyond the threshold only that which can cast light on the present situation or further the action now being prepared […] (Bergson, 2005, p. 7)

4.1.3.3. Newborn in front of every experience

> […] before each new object we should be as the new-born babe; like it we could only obey our caprices or our needs. […] In such a world there would be no science; perhaps thought and even life would be impossible, since evolution could not there develop the preservational instincts. (Poincaré, 1913, pp. 363, 364)

If human actions were not driven by survival, which enables generalisation and categorisation of pieces into groups or individuals into species, there would be no recognition – with each encountered object the process of getting to know it would start from scratch. Without the ability to equate the unequal (or the not entirely equal) Poincaré doubts the human species would persist, let alone develop either language or science. Herbert Molderings, researching the influence of Poincaré's writings about science on Duchamp's art, came across the citation above from Poincaré's treatise Science and Method and drew an interesting conjecture:

> This was the idea – "before each new object we should be as the new-born babe" – that had been guiding Duchamp's

> experimental artistic thoughts and actions since 1913. Art should no longer be based on social convention over what is "aesthetic" or what is "artistic" but should be an activity that makes possible the experience of the incomparable, the rare, the unique. (Molderings, 2010, pp. 2257-63)

Duchamp, according to Molderings, solved the conventional restrictions of science by reversing the very drive inherent in humans that enables the formation of science in the first place. As Poincaré explains in Science and Hypothesis, geometry, mathematics, or science in general, is a matter of convention rather than truth, striving for maximum functionality and convenience in given conditions – it is "[…] by natural selection [that] our mind has adapted itself to the conditions of the external world, that it has adopted the geometry most advantageous to the species: or in other words the most convenient" (Poincaré, 1913, p. 91). The price that is paid for this "convenience" has affected several of scientific disciplines. Molderings (2010, pp. 2347-53), for instance, comes across concerns in letters of quantum physicist Wolfgang Pauli (1996, p. 56) for

> […] the loss of the unique in the scientific conceptualization of nature. What we have experienced in quantum mechanics is the occurrence of the essentially unique where it would least be expected, namely in ('non-lawful') individual observation.

In this battle between the science of the general and the science of unique quantum physics leans inadvertently towards a 'pataphysical approach. Duchamp exhibited severe 'pataphysical inclinations, long before he was officially accepted in the Collège de 'Pataphysique. Departing from Poincaré's observation, Duchamp's mission became to be new-born in front of every phenomenon, with each experience of it. A new-born encountering problems

from the same category (that would be ordinarily generalized into the same type of problem, in order to be approached the same way) resolves them in a new way on each encounter. In 3 standard stoppages a standard length of one meter yields a new "standard" for meter each time it is dropped on the floor from the height of one meter. His experiment is set up so the results are always unique, never repeated and impossible to generalize into a law.

Duchamp's pursuit to be relentlessly new-born reverses the very drive of generalisation that enabled the formation of any disciplinary science, that is, science conducted without compromising the discipline of its prescribed methodology. In one stroke the whole disciplinary schema collapses and the convention that an artist should not tackle science and vice versa is suddenly dismantled. Duchamp crosses the threshold into a transdisciplinary zone. In this safety zone any being can survive without generalisation, by approaching any problem in unique way over and over, and treating any result as an exception. The thriving in this protoplasmic zone depends on the rate of new births.

Polyphibians are accumulating knowledge and growing with it in the protoplasmic environment of transdisciplinary placenta. With growth and invention of organs, the tissue of knowledge stiffens, shielding itself from transdisciplinary fluctuations on its periphery with a thickening layer of dead cells. If polyphibic organism of knowledge is not born anew with every protoplasmic turbulence, it coagulates, solidifies and fossilizes into an archive of a long forgotten discipline.

Polyphibians are practicing eternally youthful knowledge by relaxing the structure that they metabolise as external product, therefore with each "breath" and "absorption" of new knowledge, of new imaginary solution, the previous scaffolding is demolished. Since protoplasmagora is by definition self-assembling there is no permanent damage inflicted upon the structure of the living knowledge. Protoplasmagora serves as a re-usable placenta of never-ending process of birth.

With every birth of a polyphibian monophibic individuality is scattered into dividuals and ceaselessly reshuffled. A disciplinary individual trespassing the threshold into transdisciplinarity is immediately multiplied into a polyphibian, a being that is a variable aggregate of multiple dividuals, sharing organs of knowledge with a population of other polyphibians, all gathered within the protoplasmic agora. Bergson (2005, p. 8) carefully observes how such variability is inherent in every individual personality, underlying not only incessant novelty in one's personality but also its unpredictability:

> Our personality, which is being built up each instant with its accumulated experience, changes without ceasing. By changing it prevents any state, although superficially identical with another, from ever repeating it in its very depth. Thus our personality shoots, grows and ripens without ceasing. Each of its moments is something new added to what was before. We may go further: it is not only something new, but something unforeseeable.

Namely, Bergson (2005, p. 9) reasserts: "To predict it would have been to produce it before it was produced." From Bergson's observation it becomes clear that the

difference between disciplinary and transdisciplinary knowledge lies in its divisibility. If inert matter of knowledge is divided arbitrarily in most convenient manner, regardless of its inherent articulation, it remains inert. For the knowledge to live, the organism of knowledge must be self-assembled from dividuals in an open environment, where dividuals are mutually dependent and shared.

Bergson (2005, p. 11) articulates his idea with an abstract example: "the group doesn't grow old." A group of elements that does not experience duration, on which operations in time are reversible is neither old nor young, but simply halted in time. "A group of elements which has gone through a state can always find its way back to that state. Any state of the group should be repeated as often as desired, and consequently the group does not grow old. It has no history" (Bergson, 2005, p. 11). From disciplinary knowledge an entire range of consequences of theorems can be constructed following the logic of that discipline – the implicit implications can be predicted. The process of resolving all the details is foreseeable, because the units form time reversible groups.

In contrast to the stagnant disciplinary knowledge that never grows old but is never young either, the transdisciplinary knowledge must remain young while growing and maturing – in Bergson's (2005, p. 10) words: "to exist is to change, to change is to mature, to mature is to go on creating oneself endlessly." Polyphibic maturity comes out of enduring the changing conditions that in turn ensures novelty, the birth of the unforeseen. Youth can be imagined to persist in

the organism of living knowledge that is increasingly maturing, if this knowledge is lived in duration rather than preserved in time. On the contrary, Bergson observes, in the never young and never old knowledge duration plays no role and time is a mere convention:

> Therefore the flow of time might assume an infinite rapidity, the entire past, present, and future of material objects or of isolated systems might be spread out all at once in space, without there being anything to change either in the formulae of the scientist or even in the language of common sense. (Bergson, 2005, p. 12)

To think the knowledge, the pace of time can be chosen arbitrarily, to live the knowledge, duration is of essence. Bergson (2005, p. 13) observes the experience of duration in the human subject: "[…] my own duration, which I cannot protract or contract as I like. It is no longer something thought, it is something lived. It is no longer a relation, it is an absolute." This protraction or contraction is the wave form of the living knowledge – the rhythm that brings the organs of knowledge in resonance. For Bergson (2005, p. 14) "duration means invention, the creation of forms, the continual elaboration of the absolutely new."

4.1.3.4. Undefinable individuality

If the method of disciplinary research is to cut out systems, the transdisciplinary approach must fold them back in. "The bodies we perceive are, so to speak, cut out of the stuff of nature by our perception, and the scissors follow, in some way, the marking of lines along which action might be taken" (Bergson, 2005, p. 15). Cutting out and isolating systems for disciplinary compartments can only be

interrupted by removing the interest in action, by cultivating indifference to control, by trespassing into transdisciplinary zone, where systems are reunited "reabsorbed in the universal interaction which, without a doubt, is reality itself" (Bergson, 2005, p. 15). It is to the act of cutting out, that Bergson attributes the notion of individuality. He finds in bodies that we individuate, as well as within our own body, the outlines that reveal the potential actions that give the body its individuality, making from the living body a superior example:

> The living body has been separated and closed off by nature herself. It is composed of unlike parts that complete each other. It performs different functions that involve each other. It is individual, and of no other object, not even of the crystal, can this be said, for a crystal has neither a difference of parts nor diversity of functions. (Bergson, 2005, p. 15)

But even if individuality seems an important feature of life, Bergson admits this concept evades every attempt to grasp it: "it is hard to decide, even in the organized world, what is individual and what is not." (Bergson, 2005, p. 15) Elusiveness of individuality reveals an intricate dichotomy that is uncovered by Bergson while pondering on "our inability to give a precise and general definition of individuality."

Bergson (2005, p. 16) first specifies ideal conditions in which the definition of individuality could be concise - in "a complete reality." Yet Bergson (2005, p. 16) is aware that a living system is never complete or closed: "properties are never entirely realized, though always on the way to become so; they are not so much states as tendencies." Individuality is a seemingly independent concept and yet

it cannot be comprehended by method of isolation. To comprehend this concept is to reintegrate it and absorb it in the living knowledge where it will never be resolved into a state but maintained as a tendency. To maintain a tendency, there must be an irreconcilable dichotomy implicit in individuality:

> How, then, could this occur in the domain of life, where, as we shall show, the interaction of antagonistic tendencies is always implied? In particular, it may be said of individuality that, while the tendency to individuate is everywhere present in the organized world, it is everywhere opposed by the tendency toward reproduction. For the individuality to be perfect, it would be necessary that no detached part of the organism could live separately. But then reproduction would be impossible. For what is reproduction, but the building up of a new organism with a detached fragment of the old? Individuality therefore harbors its enemy at home. Its very need of perpetuating itself in time condemns it never to be complete in space. (Bergson, 2005, p. 16)

Polyphibian is a lived coherent individuality emerging from and returning to multiplicity of dividuals. If the definition of polyphibians was "polyphibian_i = polyphibian_{i-1} + protoplasmagora" the recursive definition of an individual would be "individual_i = individual_{i-1} + dividuals." Polyphibian enters protoplasmic agora each time as a unique newborn being, an organism-solution to a conundrum that was encountered. From one organism-solution new organs of knowledge are grown, new organisms are born with new exceptional perception and experience. The living knowledge is a perpetuation of exceptional results to the same experiment, evading generality and defying definitions.

The characteristic property of life that Bergson highlights is not individuality per se, but the chaotic intertwining of two opposing orders, two tendencies, one

towards individuation, and the other towards reproduction. The "organised world," the world of the organisms, is a system of systems separated from each other and from the environment in order to address their action towards the other organisms, organisations of organisms and environment in general. Environment needs agents to animate it and vice versa, agents depend on environment to develop their agency. Just as figures are discerned out of ground, individuation of organisms makes them into agents and therefore facilitates their activity. In the same manner, living knowledge could not survive if not differentiated into agencies.

Protoplasm, as a biological term, has many definitions and none of them is definite. A scientific dispute continues over appropriate approach to protoplasm – allowing for multiple descriptions, custom tailored to the convenience of every specific scientific problem. For the same reasons it is a matter of agreement to allow ambiguity in the term protoplasmagora. Just as dichotomy of individuation and reproduction drives the evolutionary movement, so polyphibianism is the evolutionary movement propelled through protoplasmagora. The opposing tendencies in the living knowledge should never be arbitrarily interrupted or cut – a fatal incision would result in archive or cemetery of knowledge.

In the organised matter Bergson therefore recognises two tendencies – individuation and its opposite – reproduction – none of which is able to realise itself completely. If individuation would succeed to reach an ideal state, then no

part of an individual could lend itself to environment and begin life anew. This would prevent the spread of life. For living substance to survive and thrive it cannot occupy the entire space – space for the non-living is required. Protoplasm – "the substance of life" itself is composed of living and non-living components intermittently being metabolised and switching their agency from animated to inactive.

The prerequisite for dynamics of the living systems is for the system to contain a conflict, a counteracting agency. The same goes for the living knowledge. Time dynamics of a specific organism of living knowledge is a unique heterogeneous rhythm - a specific duration with which that organism lives. If one is to take a step further and allow time to unfold with infinite speed, as was suggested and permitted in an earlier thought experiment, the dynamic substance that contains itself and its adversary would happen all at once. In this "allatoncenessi" the process would be depicted in one state space, that is, as an intricate fractal that meanders infinitely densely but never fills the space entirely. Transdisciplinarity can be imagined as a folding interstitial tissue bringing dichotomies intermittently together and apart.

The environment that does not succumb to artificial cut-outs remains indivisible, therefore an individual. Because it fills the space by definition, there is nothing

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[i] term allatonceness is borrowed from McLuhan (1967, p. 63)

outside environment that would stir up dynamics – dynamics can only come from within, from dividuals constituting the individual. Protoplasmagora is therefore an individual with dividual intervals. No living individual in time can be complete in space: "Its very need of perpetuating itself in time condemns it never to be complete in space" (Bergson, 2005, p. 16). Individuality is a non-local connectivity, entanglement at a distance: it requires intervals between connectivity for dynamics of coexisting opposing orders to develop locally while it remains entangled non-locally.

After enumerating some examples of imaginary and real organisms that from their own detached parts grow new independent organisms, Bergson (2005, p. 17) assumes "because there are several individuals now, it does not follow that there was not a single individual just before." From one individual monophibian that trespasses into transdisciplinarity multiple polyphibians grow. A single individual matures into poly-individuals. Bergson (2005, p. 17) contrasts this fact of life with non-living matter: for "unorganized bodies […] the present contains nothing more than the past, and what is found in the effect was already in the cause." It is unforeseeable to find inorganic matter composed of many parts of different kind if a moment before it was just one – those parts would then be immanent in its oneness.

> But suppose that the distinctive feature of the organized body is that it grows and changes without ceasing, as indeed the most superficial observation testifies, there would be nothing astonishing in the fact that it was one in the first instance, and afterwards many. (Bergson, 2005, p. 17)

Convinced by single cell organisms, that by simple division create more unicellular organisms, and even multicellular organisms, where the faculty of reproduction on a cellular level becomes regeneration of single cells, Bergson is prepared to reconcile dichotomy of individuality and reproduction in the context of systematization, of organised structure:

> In truth, that I may have the right to speak of individuality, it is not necessary that the organism should be without the power to divide into fragments that are able to live. It is sufficient that it should have presented a certain systematization of parts before the division, and that the same systematization tend to be reproduced in each separate portion afterwards. (Bergson, 2005, p. 18)

In transition from a monophibian to a polyphibian the structure of knowledge is reorganised into a living being with faculty of reproduction and regeneration of knowledge, that is, further self-organisation of bodies of knowledge. A polyphibic organism within protoplasmagora comes in resonance with protoplasmic patterns of organisation. Any fragment of knowledge that detaches from a living organism of knowledge maintains the consistency and coherent structure that will enable it to awaken into life and therefore to multiply into new coherent forms of living knowledge.

4.1.3.5. Beyond fractals – phractals

To imagine what transdisciplinarity is or could be, the limits in disciplinary production of knowledge and what prevents it from awakening into living knowledge must not be ignored. Following Bergson's line of thought in

comparing the organic and the inorganic, the organised and the unorganised, the living and the non-living, the conclusion is drawn that only the whole of the material universe can match the living being in its quality. Just as no inorganic thing in particular can compare to an organism, so the individual transdisciplinary knowledge cannot find comparison in any fragment of disciplinary knowledge. Only all possible knowledge, if it could be accumulated all at once, would compare to an organism of living knowledge.

Bergson (2005, p. 18) dismisses the feasibility of such comparison immediately. He notices that to examine the whole of the universe is, to the contrary of observing the living being, impossible in principle: "whilst the whole of the universe is constructed or reconstructed as a thought ... the organism which lives is a thing that endures." The distinction between the two ways of knowing therefore lies in the way the object is (re)constructed or the subject is (re)lived. If disciplinary knowledge production is inadequate to encompass entirely the living systems, is transdisciplinarity, on the other side, inappropriate to deal with non-living systems? Is transdisciplinarity just an excessive use of resources when dealing with isolated inert systems? It is far more convenient for a problem that calls for immediate and habitual reaction to simply follow the "mechanistic instinct" that Bergson (2005, p. 20) blames as responsible for the utilitarian urge to isolate systems.

> In vain does reason prove to us that the more we get away from the objects cut out and the systems isolated by common sense and by science and the deeper we dig beneath them, the more we have to do with a reality which changes as a whole in its

> inmost states, as if an accumulative memory of the past made it impossible to go back again. The mechanistic instinct of the mind is stronger than reason, stronger than immediate experience. (Bergson, 2005, p. 20)

It is a mechanistic drive that conserves and constrains intellect, impeding it to self-organise into organs of knowing. How could these constrains be corrected so the intellect could envision and navigate open systems? With serious humour and method of indifference towards habitual reactions a monophibian gets prepared to become polyphibic. The movement of polyphibianism – the way of the polyphibian or the navigation within the living knowledge – is not driven by automatic reaction, or action that could be automatized. Polyphibianism is teaching the low maintenance, minimal effort without the need to reduce, fragment and cut off the world from the living essence. Polyphibians do not distinguish between the living and non-living knowledge. The definition of living knowledge is dynamic to a monophibian precisely because of this dichotomy: the living knowledge comprises of living and non-living.

Bergson (2005, p. 21) holds responsible the "fixed requirements," "ready-made explanations," and "irreducible propositions" that stand in the way of living the knowledge. He finds the flaw in demands of scientific measurement that the "change must be reducible to an arrangement or rearrangement of parts; the irreversibility of time must be an appearance relative to our ignorance; the impossibility of turning back must be only the inability of man to put things in place again." As a remedy he proposes for the systems of any kind (organic or

inorganic, an individual or an organism of organisms) to "grow old" within, while at the same time generating youth at its periphery:

> A tree never grows old since the tips of its branches are always young, always equally capable of engendering new trees by budding. But in such an organism – which is, after all, a society rather than individual – something ages, if only the leaves and the interior of the trunk. (Bergson, 2005, p. 20)

The knowledge should be organised as life if it is to be lived, which involves the experience of duration. Knowledge cannot be brought to life through time. Time is too abstract, symmetrical and therefore reversible, to have a true impact – it can be speeded up or slowed down and the entire system closed safely within itself would remain the same. Duration, on the other hand, is a heterogeneous unfolding of the process of growth of knowledge that at the same time matures and rejuvenates.

Models for imaginary living knowledge are abundant in life but are there intellectual models that could come anywhere near the real life models? A geometry, perhaps, so infinitely intricate that reaches far towards periphery of intellect and could be corrected with laughter and awakened into a living knowledge? To imagine a geometry that could grasp the complexity of life one could start with fractal geometry and apply a comical corrective by 'pataphysical method of serious humour. Just as 'pataphysics corrects finances into phynances (Jarry, 1994, p. 58) – fractals become phractals. Fractal geometry is already a better fitting, corrected Euclidian geometry in regards to nature – corrected twice – could it awaken to life?

In an imaginary species of geometry that evolved by mutation from geometry of elaborate fractal sets, such as strange attractors, seemingly forming surfaces that never intersect - trajectories folding in and coming infinitely close but never intersecting with their past traces - there is always enough interstitial space for time to grow old and wrinkled, to mature from a uniform arbitrarily divisible matrix to an individual experience. Bergson's writings preceded the formulation of fractal geometry but he anticipated a need for infinite intricacy to describe life: "what is properly vital in growing old is the insensible, infinitely graduated, continuance of the change of form." (Bergson, 2005, p. 23)

To emphasise the distinction between systems growing old and systems undergoing reversible changes, Bergson (2005, p. 21) explains that growing old cannot be simplified into "gradual gain or loss of certain substances." He further criticizes attempts to explain the living changes in terms of reversible changes: "in affirming the constant accumulation or loss of a certain kind of matter, even though they have little in common as to what is gained and lost, shows pretty well that the frame of the explanation has been furnished a priori" (Bergson, 2005, p. 22).

Returning back to the simplest essences of life, Bergson considers the protoplasm as an example. At the time of his writing the current understanding of what "growing old" in the context of protoplasm could mean was a theory "according to which the diminution bears on the quantity of nutritive substance contained in that 'inner environment' in which the organism is being renewed, and the

increase on the quantity of non-excreted residual substances which, accumulating in the body, finally 'crust it over'." (Bergson, 2005, p. 21)

Already from this theory of protoplasm (preferred by Bergson as one of the most refined at the time), the metabolism of protoplasmagora can be imagined: nutrition in the inner environment of protoplasmagora renews the organs of knowledge while the excess of nutrition accumulates on the outer periphery of the organism of living knowledge, forming a crust of archived knowledge. Protoplasmagora is internally transdisciplinary, while disciplinary on the periphery, where it deposits the residual substances in form of disciplinary compartments, categories, matrices and schemas.

Can mathematics, as we know it, operate in the terms of living knowledge? "The world the mathematician deals with is a world that dies and is reborn at every instant," while Bergson (2005, p. 27) points out what needs to be dealt with is the continuous duration in between the instants: "To know a living being or natural system is to get at the very interval of duration, while the knowledge of an artificial or mathematical system applies only to extremity." For Bergson mathematics, and more specifically, differential equations, are unable to grasp the wholeness of life present in the organism:

> Organic creation, [...] the evolutionary phenomena which properly constitute life, we cannot in any way subject to a mathematical treatment. It will be said that this impotence is due only to our ignorance. But it may equally well express the fact that the present moment of a living body does not find its explanation in the moment immediately before, that all the past

> of the organism must be added to that moment […] (Bergson, 2005, p. 24)

If ‘pataphysics is, in contrast to physics, the science of exceptions, can it correct and redirect the main preoccupation of physics, from the results at the end of the intervals – at the very reference of measure – to the unmeasurable in between? A fractal builds its identity in a continuous connected self-affine pattern, from one end of the interval to the other where the interval remains infinitely divisible and uniformly seeded. To correct that identity, to rupture it in a ‘pataphysical laughter a phractal divides fractals to generate a new kind of beings. As was shown above, individuality cannot exist without dividing into new individuals. Can continuity of a fractal be broken off where fragments would detach and live as new individuals – similar, affine or even as a mutation into a new species? Perhaps self-similarity should be complemented with self-diversity. If fractals exist in uniform time, can phractals restructure homogeneous time in heterogeneous duration?

> “Continuity of change, preservation of the past in the present, real duration the living being seems, then, to share these attributes with consciousness. Can we go further and say that life, like conscious activity, is invention, is unceasing creation?” (Bergson, 2005, p. 27)

Phractals are infinite monster fractals awaken into self-awareness, unceasingly creating and inventing new individuals out of their own individuality in a continuity of change that is self-organising into consciousness. Phractals, as well as their cousins fractals, access from any present moment the entire past, but unlike fractals, phractals derive from all possible memory a fresh flow of memory

that was not dried out yet into a set of replicating recursive formulas. Phractals do not remain affine to one species but invent and create new species not unlike evolution. If fractal is self-affine species-bounded family-tree of minor variation, phractal is the trans–species evolution.

Bergson compares the creativity of life directly to the creativity of consciousness. For polyphibians there is no essential difference between living reality, imagining reality or knowing reality. Like recursive equations generating fractals, phractals are recursive transdisciplinary formulas that in order to live the knowledge need to re-new, re-create knowledge in continuity of change – that is the living knowledge is ceaselessly evolving: evolution of living knowledge = growing old + being newborn = keeping past alive + being indifferent to the past. Phractal growth is bending the rules and enfolding exceptions within the pores.

4.2. Participating in a creative act

This chapter serves as a guide to art research practice or rather a participation in creative act initiated by Marcel Duchamp. In his talk entitled Creative Act, given at the meeting of American Federation of Arts in Huston, in 1957, Duchamp reveals the strategy for participating in a work of art – claiming that artist's work is not completed without the participation of the spectator: "the creative act is not performed by the artist alone; the spectator brings the work in contact with the external world by deciphering and interpreting its inner qualification and thus adds his contribution to the creative act." (Duchamp, 1983, p. 140)

In the following subchapter the artist-spectator interaction is explored in a broader sense. By recognising the animal-ambient-like mutual dependence between the artist and the medium, the ability to survive and thrive in two media, as observed in amphibians is transferred to polyphibic ability of artists[i] to thrive among multiple media. Namely, the artwork is considered as a trace, a side effect of the artist moving in between the media. If the artwork is considered as a manifestation of a side effect, of a trace that the artist leaves behind by disrupting the interfaces whilst moving in between the media, then the real challenge shifts to the spectator that is completing the creative act. The spectator "brings the work in contact" with the medium she or he is inhabiting "by deciphering and interpreting" the new medium in the terms of the old.

In the succeeding subchapter a third link joins the chain: artist – curator – spectator. With flourishing intellectual engagement of the early 20th century artists, questions were raised about other means of transference of ideas to the audience. Creative act was not merely Duchamp's preoccupation – his "unconventional artistic mentor" (Henderson, 2005, p. 3) František Kupka, for instance, who introduced Duchamp to the scientific and esoteric revolutions,[ii] was searching for means that would enable a "direct transfer of thought" (Henderson, 2005, p. 67). With the difficulties revealed in the first subchapter, in

[i] in Creative Act Duchamp (1989, p. 138) refers to the artists as a mediumistic being trying to escape the conventional medium of space-time

[ii] such as findings in electromagnetism "applied to" telepathy, see more in (Henderson, 2005)

transferal between a polyphibic artist and monophibic audience, there is a need for a special kind of curator that is to be added as a catalyst to the chain reaction, speeding up the process of "transubstantiation[i]," "transmutation[ii]," and "polyphibianisation."

As soon as Duchamp declares his work Large Glass officially unfinished, the work opens up to spectators, to be completed in specific interactions, possibly resulting in another open work. Large Glass and all complementary Duchamp's endeavours remain open to his posterity to reuse and reutilize his apparatuses. The art research in this thesis begun as a participation in Duchamp's work by imagining an organism of living knowledge that could perform all three roles of artist, curator and spectator, through interventions, under the licence of R. Mutt, from pseudoscientific resolving of conundrums in physics and 'pataphysics, to curating the results of the research in a box of notes declaring the work again "unfinished" within a new context and in anticipation of all new possible completions. The ideas realised and in realisation are described in the following subchapters as published articles and not yet publicised work.

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[i] Duchamp (1989, p. 140) uses the term "transubstantiation" for description of "the change of inert matter into a work of art"

[ii] Duchamp (1989, p. 139) uses the term "transmutation" to describe the experience of the spectator when participating in creative act

4.2.1. **Artist – spectator**[i]

According to J. J. Gibson (1986) the animal implies the environment just as the environment implies the animal. They are mutually dependent, and this dependence is implicit in their structure. Gibson argues this mutuality is not effectively described by physical sciences and in terms of basic concepts such as space, time, matter and energy. The physical reality without life does not yet constitute the environment. Gibson therefore decides to rethink this interdependency in a more adequate terminology comprising media, substances and surfaces rather than abstract planes and spaces.

The medium is not isotropic as is the abstract space, it does not rely on arbitrary axes and units, it has its own intrinsic polarities, gradients and features, yet it is stochastically homogeneous, it tends to be so in order that the substances emanating from their sources can be differentiated by the animal. While abstract points in space are equivalent to each other, the movement of the animal in a medium, the shifting of its viewpoint, makes each vantage point unique. The animal has thus developed more than ambient awareness. What distinguishes the animal from the vegetative life forms is its ambulatory perspective on the medium. Furthermore a highly evolved conscious animal is aware of the medium

[i] as presented at the 11th Consciousness Reframed Conference: Presence in the Mindfield, Lisbon 2011 and published in conference proceedings (Ljubec, 2011)

on different levels; it can reflect on its relationship towards the medium and even transcend the limitations of involvement in the medium.

Within Gibson's vocabulary the high degree of interdependence between the being and the medium, that was not self-explanatory in abstract spatio-temporal terminology, becomes evident. Now the body of a being is understood as totally immersed in its environment, so much so, that ''the motion of the body changes the overall surface layout'', it represents ''a change in the shape of the environment'', while in ''abstract geometry the motion of a body is'' merely ''a change of position along dimensions of space or rotation on these axes.'' (Gibson, 1986, p. 35)

How is a being so involved and dependent able to transcend a medium, explore other media, swiftly switching, trespassing and surviving? The animal transcended the aquatic medium by moving to the firm ground, adapting its body entirely to the new conditions and neglecting the old - yet there are animals, the amphibian beings, that are able to return to the water at any time. The term amphibian relates to both modes of existence, life on both sides, life of indecision.

In a similar manner a highly evolved conscious animal that is able to move between the planes of consciousness and to maintain coherent awareness on many levels could be termed a polyphibian being. What would be the nature of such a polyphibian, that is able to survive and thrive in multiple media, and in particular, how does the polyphibian trespass from one media to another, overcome the involvement, break the bond? In other words, what happens on the

interface of the two adjacent media in the act of trespassing, at the moment of breakthrough?

For the purpose of this investigation let us start with the assumption that the act of trespassing into a new medium, into the next modality of awareness is a 'creative' act – creative in a sense of novel configuration of attention, creation of new conditions by liberation from the old. But this act would have to be an indivisible process including the existent and the next modality, the trespasser and the witness of trespassing that is left behind.

This argument was presented already in 1957 by Marcel Duchamp (1989, p. 138) in his lecture entitled "Creative Act," where both the artist and the spectator are found to be accomplices. Both are implicated in such a complex manner that the artist is able to act without conscious awareness. The conscious, conceptual and critical awareness or the 'critical reaction' in Duchamp's words can be assigned to the spectator that remains the inhabitant of the old medium. Duchamp (1983, p. 138) thus defines the artist as a:

> […] mediumistic being who, from the labyrinth beyond time and space, seeks his way out to a clearing. If we give the attributes of a medium to the artist, we must then deny him the state of consciousness on the esthetic plane about what he is doing or why he is doing it. All his decisions in the artistic execution of the work rest with pure intuition and cannot be translated into a self-analysis, spoken or written, or even thought out.

Considered in the context of trespassing the media Duchamp's denial of any conscious awareness to the artist does not seem so controversial anymore. What

becomes clear is that in the act of trespassing the artist's attention shifts, the modality of awareness changes, adapts to the new conditions. Therefore the modified awareness of the artist cannot be analysed within the modality that the artist just abandoned with indifference, that is, within the default modality of the spectator that the artist just walked out of unconsciously.

The spectator is left only with the traces of breaking through the interface with the next medium. The art itself is merely the side effect of the polyphibian artist disrupting the surface tension. From the standpoint of the spectator there is no sight of the interface, no surface separating diverse media. The spectator is not aware of potential modality that differs from the conventions of the currently inhabited medium. The artist on the other hand, equipped with polyphibic sensors, is always attentive to the unknown, the uninhabited.

While the spectator and its native medium are continuously mutually dependent, the involvement of the artist with the surrounding medium varies greatly – down to the degree of zero involvement, that is, to complete indifference. Involvement in a system of conventions, conforming to the standards of the medium, ties the inhabitant to that medium even on the emotional level. A polyphibian, on the other hand, can survive without preferences, always able to alternate conformity.

Duchamp, the artist who himself strived for indifference, used to say: ''I force myself to contradict myself in order to avoid conforming to my own taste'' (Janis & Janis, 1945, p. 258). In his lecture Apropos Readymades, held in 1961, this neutral involvement is described as ''total absence of good or bad taste – in fact

a complete anaesthesia'' (Duchamp, 1989, p. 141). Being recognised as a visual artist Duchamp only practiced visual indifference. The aesthetic anaesthetics were administered in context of the retinal art alone – Duchamp used this phrase to distinguish it from non-retinal art. By regulating emotional reaction to the visual stimuli, to the unwritten rules of visual seduction Duchamp was able to absorb the invisible ideas.

When a visual artist becomes indifferent to the visual medium the outcome of the artistic action becomes peculiarly alien to the spectator. While the artist transcends the retinal, that is, penetrates beyond the retinal sensibility, the raw material that is to become art succumbs to transformations defined in an alien medium, that is, transformations under incompatible rules, inappropriate conventions. The exotic shock to the spectator invokes a critical reaction, a criticism that at first targets the artwork alone and only through detailed in-depth analysis slowly turns towards its own means. The spectator develops critical awareness of the means of critical thought, of the medium in which the thinking is conducted.

Critical awareness of the medium one inhabits has been substantially raised since 1964's publication of Marshall McLuhan's book Understanding Media, The Extensions of Man. McLuhan (1994, p. 18) explores how encounter with a new medium changes scale and pace of human affairs, how ''effects of new technology do not occur at the level of opinions or concepts, but alter sense ratios or patterns of perception.'' The new conditions due to new technology are not

felt on the conceptual level because they are not compatible with the existent conceptual structure. The awkward alienation is sensed as altered speed or escalation out of proportion.

McLuhan (1994, p. 18) claims ''the serious artist is the only person able to encounter technology with impunity, just because he is an expert aware of the changes in sense perception.'' This expertise is gained by alert indifference – alertness to different kind of differences. The waking up from aesthetic anaesthesia into new sentience is achieved by being sensible to changes in sensing. To measure the change of flow rate one imagines a surface perpendicular to the flow and plugs in the differential equation the area of that surface. Similarly the artist alert to subtle changes in perception spots the opportunity for trespassing into the new modality by setting up an abstract surface, an interface where the old medium will meet the new, where the flow rate will be changed by modulating the permeability of the interface.

Let us reread McLuhan's famous statement 'the medium is the message' in this recursive sense: the message of a medium is yet another medium. His example of cascade of media nested in media: 'the content of telegraph is print, the content of print is written word, the content of writing is spoken word, the content of speech is thinking process,' can be translated into derivatives. For instance consider the fact that the derivative of distance as function of time is velocity, the derivative of velocity is acceleration. Is acceleration the message of velocity,

velocity the message of distance? Just as the message of the telegraph is print the telegraph technology is derivative of print.

Staying in the context of function of time and the change of flow rate of information we can confirm that the information flows faster in the medium of telegraph than in the medium of print. The same changes in speed can be observed on the interface of other media for example when the amphibian returns to the medium of water it suddenly slows down the rate of crossing the distance. The polyphibian entering and exiting the various awareness modalities is slowing down or speeding up the flow of thinking.

The time scale differences between the media are not unlike when one wakes up from a dream confused by discrepancy between the actual time that passed on the alarm clock and the much longer time interval experienced in the dream. This operation of scaling time in mental activities can yield bizarre consequences. The ambient around the polyphibian is rewired, reconnected, reconfigured – with new conditions new meanings emerge, new questions arise, new tendencies shape the mental layout.

In McLuhan's (1994, p. 7) words: ''... consequences of any medium – that is of any extension of ourselves – result from the new scale ...'' Medium is the extension of the animal and as Gibson showed the mutual dependence of animal and its medium means that with change of animal's movement the overall layout changes. A monophibian animal observing a polyphibian trespassing will notice a disruption in the uniformity, an irregularity in the rational. For the spectator on

the firm ground of awaken rationality observing the immersion of the dreamer into the fluid medium the time arrow in the fluid is stretched, just like the light that is refracted on the sea level makes a stick under sea level appear of distorted size and position - the observer on the shore will not be able to grasp the stick relying only on visual clues.

Speed of light wave propagation changes when crossing the interface of air and aquatic medium. The fact that monophibians as rational beings strive for constant pace and consider modulations in rate of propagation as irrational is clarified by McLuhan (1994, p. 15): ''we have confused reason with literacy and rationalism with a single technology […] rational […] has […] long meant 'uniform' and 'continuous' and 'sequential'.'' The interface is the modulator of propagation of form, of information, beyond the rational rate. On the interface everything coexists in configuration, the sequential rationalisation fails.

All natural and artificial technologies meet on the interface. In contact with the interface the polyphibian turns into a polyglot instantaneously – reading all the meanings in simultaneous configuration rather than in a linear manner. Even the most evasive, ephemeral technologies are manifested to be manipulated on the interface. The interface is where the changes become explicit, while the change that propagates through the medium is implicit, deep below the surface, never announced only assumed. When implicit reaches its peak it manifests explicitly, like a projectile hitting a barrier, whether it is a concrete obstruction or an abstract difficulty.

To illustrate what happens at the moment a technology reaches its peak performance McLuhan (1994, p. 12) describes how ''just before an airplane breaks the sound barrier, sound waves become visible on the wings of the plane. The sudden visibility of sound just as sound ends [...] reveals new and opposite forms just as the earlier forms reach their peak performance.'' We can extend this analogy to include the polyphibian artist indifferently involved in transition from one medium to the other. Being indifferent to the message of the sound the artist is sensible enough to spot the sound barrier – attention of the artist shifts from audible to visual. Both modalities are ready to intertwine and coexist, enabling the artist to sense where and when the interface will occur.

The polyphibians do not only spot the novelty on the horizon but innovate on their own by overriding the existing medium. With our evolution into polyphibian beings on all levels of existence our sensibility to recognise the interfaces is being refined. After McLuhan's guide for Understanding Media we need an in depth guide for Understanding Interfaces.[i] After Gibson's fresh approach to human perception based on the insight that the animal and the medium imply each other, what can we infer if we acknowledge one medium is implied in another? If the media generate new media in perpetual innovation,

[i] for instance see guides like: The Postdigital Membrane: Imagination, Technology and Desire, where authors Pepperell and Punt (2000) question the existent digital interface as the final frontier and use the organic membrane as a metaphorical platform for coexistence of things in both states: interconnected and separated

the interfaces are emerging at all occasions all over the material and mental landscapes.

As mentioned, the artist tends to escapes the uniformity of a landscape populated by conformist spectators by amplifying features or accelerating the stagnating rhythm of the exhausted medium. At the peak performance the artist trespasses through the interface – but this barely noticeable barrier does not separate the artist from the spectator. They are both deeply involved on the interface, that is, the interface has depth, depth of an interval. The interval of delay is where the abstract time does not apply, only duration is experienced, Bergsonian[i] duration imbued with creation, with creative act.

In this interval dichotomies endure, not in sequential causality, but in a configuration where past is present. The creative act in duration is not an energy consuming activity; it is effortless, spontaneous, like the process of osmosis. It is the passage of a dissolved habitual awareness through a selectively permeable membrane from a less concentrated to a more concentrated solution, that is, to awareness at instantaneous speed, the immediate grasp of coexisting oppositions. To be entirely involved in the creative act, the spectator must, as did

[i] on duration as first defined by Henri Bergson (1910) in his doctoral thesis Time and Free Will: An Essay on the Immediate Data of Consciousness

the artist, submit to the principle of indifference that feels like a force pulling the attention out of the known into the unknown.

It is Duchamp (1989, p. 139) that finds this phenomenon of creative act ''comparable to transference from the artist to the spectator in the form of an esthetic osmosis taking place through the inert matter.'' Inert raw matter that happens to be where and when the interface occurs is transformed by the artist ripping apart the edge of the existent medium. Namely, Duchamp (1989, p. 139) continues, ''the creative act takes another aspect when the spectator experiences the phenomenon of transmutation: through the change from inert matter into a work of art, an actual transubstantiation has taken place.''

During trespassing, when contamination of the substances with new ideas takes place in transubstantiation under new rules, at the stage when the artist is modulating the permeability of the interface in more or less violent rupture of existent structure, Duchamp (1989, p. 139) is concerned with the "relation between the unexpressed but intended and the unintentionally expressed." The role of the spectator that gets involved in the creative act with delay is to make sense of the gap between the intention of the artist and the realization, the representation of the trace. The spectator fills the interval between the insight into the new and the habits of the old by interpreting, reconfiguring the meaning.

From the critical stance on the alienation of a substance that suddenly does not conform to current conventions, the spectator advances towards a standpoint right within the interface. By being diffused through the interval of the permeable

membrane the spectator is able to bring the conflicting new condition in direct contact with the old context, to conceptually refine the disruption on the interface. In this coexistence of otherwise incompatible the spectator delivers the verdict on the effort of the artist – the judgement on the effect of the effortless trespassing. In the meanwhile the polyphibian, indifferent to the judgement, is already exploring the next unknown.

4.2.2. Artist – curator – spectator

> Silence is the most extreme form of revolt. In Duchamp's case, the revolt has consisted of a patient and laborious attempt to forge a world for himself which would conform to his personal concepts, a world sufficiently remade so that it would owe nothing or very little to human reality […] to create a new world confronting the reality of things whose implacable immensity forces him to be quiet – to be quiet but not to accept. […] No, Duchamp's silence is neither indifference, nor abandon, nor emptiness, but a taut and menacing spring. [….] In his life as in his art and writing, he has never accepted any preordained principle or any intangible explanations. (Duchamp, 1989, pp. 4, 5)

Michel Sanouillet's 1958 introduction to The Writings of Marcel Duchamp depicts a very subtle but significant side of Duchamp's character – resistance. Accounting for this characteristic, Duchamp's talk on 'Creative Act' in 1957 can be related to Deleuze's talk on 'Act of Creation' in 1987. Although the creative act for Duchamp is about the transference of information between the artist and the spectator, thus a particular manifestation of the not entirely manifested, Duchamp notices there is a "missing link." Deleuze comes from the opposite stance, denying any transference of information in art in principle, his only

apparent sympathy to the stance of Duchamp is in acknowledging the act of resistance to the artist:

> What relationship is there between the work of art and communication? None at all. A work of art is not an instrument of communication. A work of art has nothing to do with communication. A work of art does not contain the least bit of information. In contrast, there is a fundamental affinity between a work of art and an act of resistance. It has something to do with information and communication as an act of resistance. (Deleuze, 2006, p. 322)

Although Deleuze in his talk did not in any way refer or respond to Duchamp, some questions raised by Duchamp are answered when his silence is considered as a form of resistance. Even if Duchamp denies to the artist the intention of resistance and of silence (the artist according to Duchamp is not aware of not expressing herself entirely), the silence is nonetheless present, forming an interval between the artist and the spectator. The unexpressed by the artist gets expression by participation of the audience in the interval, whether that audience forms merely different aspects of the artist's own personality or different persons. The interval is not only observed from another point of view, it is filled in with multiple points of being. In this interval the artist and spectator are newborn as a polyphibian. But in close examination of Duchamp's testimonial there is something else that is not mentioned, some ingredient that is absent:

> In the creative act, the artist goes from intention to realization through a chain of totally subjective reactions. […] The result of this struggle is a difference between the intention and its realization, a difference which the artist is not aware of. Consequently, in the chain of reactions accompanying the creative act, a link is missing. This gap, representing the inability

> of the artist to express fully his intention, this difference between what he intended to realize and did realize, is the personal "art coefficient" contained in the work. (Duchamp, 1989, p. 139)

The artist in transition between monophibic and polyphibic awareness might hesitate, turning around as a spectator to its own artwork - traces of trespassing, with the monophibic remnants lingering behind its newborn polyphibic organism. This hesitation in direct experience, this delay of living the experience, is resolved by introduction of the catalytic "missing link" in the chain reaction between the artist and the spectator, namely, the curator.

The curator – catalyst increases the rate of reactions and the spectator within the artist is rapidly exposed to polyphibic awareness. The "gap, representing the inability of the artist to express fully his intention, this difference between what he intended to realize and did realize" is the gap between disciplinary research and the transdisciplinary zone. The smaller the "art coefficient" between intention and realisation, the more it approaches the unit, the more one is living the knowledge. Such "art coefficient" is one of the signatures of transdisciplinarity.

There is no art to be comprehended in its entirety by a monophibic mind. No creative act begun by a polyphibian can be completed by a monophibian without transmutation of this monophibian into a polyphibian. In his conclusive statement, Deleuze (2006, p. 324) paraphrases Paul Klee, which explains Duchamp's preoccupation with posterity: "There is no work of art that does not call on a people who does not yet exist." The people who does not yet exist is the

people in becoming polyphibian, it is the incessantly new born organism of living knowledge, the ceaselessly mutating intelligence correcting itself, expanding its limits.

> By 1913, Kupka, Duchamp's fellow student of science and critic of Puteaux Cubism, was theorising on the future possibility of the direct transfer of thought from the artist to his audience […] For Kupka, as for Duchamp, the ideas in the mind of the artist had become the essence of a work of art. (Henderson, 2005, p. 67)

A monophibian indirectly manifesting information to a monophibian was no more a preoccupation of early 20th century artists. Kupka, Duchamp and others were searching for more direct ways of knowing. In the manner Deleuze does not attribute communication of information by repetition and representation through extraction and external means to art - art became an introspective experiment, an inner exploration of lived experience. An immediate knowledge is possible only in the imaginary organism of living knowledge with polyphibic organs of knowing.

If the missing ingredient in Duchamp's chain reaction is conceived as a curator, who facilitates and accelerates the transmutation of a monophibian to a polyphibian by inducing the self-organisation of the artist and her audience in the organism of living knowledge, then as a curator she must participate in multiple transformations at the same time. In this reaction the curator multiplies and dissolves the spectator, shifting her from one single fixed viewpoint to multiple floating, slightly dispersed points of being. Curator in this sense does

not clarify the work of art but as a shifter and shaker introduces noise and chance in mutation.

Curatorial catalysis is not detected by monophibians. It is the invisible mending, the multiplicity of stoppages, evident only from the other side of the interface on which the curator is operating. The interface, or the membrane, is the organ of the curator, the instrument of infradifferentiation. Even if the artist and the spectator are the same organism, the curator splits in a precise and complex entangled cut, "spectrifing" a monophibic tendency into polyphibianism. As a Poincaré cut - the curator's cut maps the trends in a complex phenomenon of a creative act. The invisible mending is appropriating the fabric of reality from monophibic point of view to accommodate the polyphibic points of being.

Curator infradifferentiates between two media, searching for slight incoherence, incompatibility as a signature presence of another medium, that the artist disrupted in passing through but that the spectator was not aware of. The curatorial cut of precision in the heterogeneous composite of multiple media forms its organ as a selectively permeable membrane – the interface that accurately articulates the interpenetrating media by separation. This organ is the peripheral membrane of the protoplasmic agora, the selectively permeable membrane of indifference, that is, of infrathin differentiation. Curator must be indifferent to media on either side of the membrane, enabling the spontaneous osmosis of the spectator through the membrane.

The osmotic pressure that is preventing the osmosis from happening, is rendering the curatorial membrane impermeable and thus keeping knowledge separated and compartmentalised. Duchamp (1989, p. 138), in his explanation of the creative act, mentions the "transference from the artist to the spectator in the form of esthetic osmosis taking place through the inert matter." The artist moves through media indifferently, disrupting the interfaces. Catalysed disruption reveals the shape of the membrane, it perforates and relaxes the membrane – the osmosis happens. One finds such curatorial membrane within oneself through introspection – introspectively one finds the catalyst necessary to become immediately polyphibic.

The curatorial mapping is iterative. By infradifferentiating or slightly changing the initial conditions, the curator takes the monophibian on a ride, navigating the wildest trajectories to a completely unforeseeable results. Curator makes sure that she forms an imaginary organism together with both the artist and the spectator. Curator is the mutation inducing ingredient. While on the monophibic side of the interface the exhibition is fixed with limited points of view, on the other side of the interface the ever changing movement of polyphibianism flows through protoplasmagora.

4.2.3. Intervention ASCO2.T AT.LAST

Duchamp's creative act is resumed in this thesis through re-enactment of readymade intervention under the pseudonym R. Mutt. The theoretical research on transdisciplinarity herein takes special interest in "serious artists" and their

relationship with scientists, questioning the division of these researchers into two separate categories. The current attempts of collaborations between art and science, are normally conducted under conditions when these categories are not considered obsolete, on the contrary, in some cases they are even glorified into "great" institutions. To test the applicability of transdisciplinary principles, as laid out in this thesis, the practical research took place as an intervention in one of the most acclaimed collaboration projects of the kind.

R. Mutt submitted a readymade to the call for proposals by the Collide@CERN programme. Like Duchamp's Fountain that served as a test, the proposed readymade ASCO2.T tested the readiness of this programme to collide institutions of Art and Science at CERN. The account of this intervention is given in the following subchapters that were published as two separate articles entitled 'The Myth of ASCOT and its rival ASCO2.T: Tech-noetic vs. Techno-logic, Round 1' presented at the conference 'Technoetic Telos: Art Myth and Media' in Kefalonia, 2012, and 'The uncertainty of ASCOT and the second-order hesitation of ASCO2.T within the transdisciplinary buffer zone, Round 2' presented at the conference 'Tribute to Uncertainty' in Prague, 2012.

4.2.3.1. ASCOT vs. ASCO2.T – round 1 – myths[i]

ABSTRACT

The following article is a report on inevitable intervention in the current state of affairs in well-intended and well-funded projects based on obsolete categorization of art and science. After unsatisfactory outcomes, on the disappointment of project directors themselves, a productive collaboration between artists and scientists is still desperately sought after, without considering with subtlety a re-categorization that is already happening. This intervention is an 'in advance reminder' for foreseeable recognition of the current state of affairs, a reminder of the sensibility necessary to recognize, as soon as possible, the accelerating rate at which concepts are continuously becoming obsolete, and the increasing fluidity of our intellectual and intuitive production.

EXERCISE IN PROVISIONAL TERMINOLOGY

pol•y•glot [pol-ee-glot], able to communicate in several languages by bringing them into resonance.

pol•y•phib•i•an [puh-li-fib-ee-uhn], able to coexist coherently, dispersed in several media. To be distinguished from "monophibian" – adapted to one and

[i] as presented (partially abridged) at the Consciousness Reframed conference (Kefalonia, 2012), Technoetic Telos: Art Myth and Media and published in (Ljubec, 2012)

only rationally standardized medium – and amphibian (any cold-blooded vertebrate of the class Amphibia, comprising frogs and toads, caecilians, newts and salamanders), adapted to no more than two media. To be exact, this is not a conventionally derived term from geometric cutting and pasting of Indo-European roots (ambhi, poly, bios), but by folding, twisting and stretching them topologically until orientation is lost and mutation emerges – an intergalactic fictional root (phibi). Only then is the imaginary discovered: Phibians, the fictional species, for instance, the iridescent streamlined humanoids from the fantastic Duniverse. The term is to be read in a mosaic mode – with a polyglot's resonating affinity: being a polyphibian is a multiple imaginary existence. That is, polyphibian is being (verb) dispersed and at the same time coherent under one being (noun). Resonating with amphi- the folding of polyphi- implies: on both sides multiplied. Polyphi- results from the tension in amphi-: dichotomies on both sides of the membrane resolve their tension within the "infrathin" interval of the membrane, and consequently there are multiple connections, multiple meanings. Unlike amphibians, which confront the dichotomy and take it from both sides, and monophibians, who avoid any confrontation, polyphibic awareness emerges within the interface – interfering with the language of knowledge in movement. Topologically, the multiplicity of bothsided-nesses in the polyphibious turns life (bios) both insideout and outsidein. The animal, which is only a feature of its environment, the moving agency within the medium, turns on itself. Imagine the animal as a drop of ink dispersed in a fluid heterogeneous environment. By mixing the fluid the ink is dispersed. By reversing the function of mixture, the drop is coherently reassembled. The

coherency of a polyphibian featured through multiple media by definition cannot be lost under any topological transformation.

In the following quotation by Roy Ascott (2003, p. 261) replace the obsolete word "artist" with the provisional word "polyphibian":

> We are creating a culture in which the "artist" becomes a complex and widely distributed system, in which both human and artificial cognition and perception play their part; an art that is emergent from a multiplicity of interactions in data space.

It will be argued in this article that if an artist can inform the sciences, he or she can do so most efficiently in the way this was redefined by Ascott (Ascott, 2003). But in order to absorb the redefinition, the above exercise is to be repeated subconsciously throughout the text, dissolving the obsoleteness of any concept in the fluid language of imagination.

IMAGINARY SOLUTIONS AND LANGUAGES

How many languages does nature speak? Art has relatively recently disintegrated language borders, and it welcomes all that speaks to it. Consequently, the term art has become obsolete. In principle, an artist will never discriminate on the basis of what is real and what is imaginary – rather, he or she will imagine any reality, explore it, mess around and leave that mess, as it is, in the locally conventional reality, to the astonishment of the local mentality. Such an artist in the course of his or her artistic career will become a distinguished polyglot, and through endless training to survive and thrive in any conceived reality, the most devoted artist will evolve into a polyphibian.

How many languages does science speak? Judging from the rate of specialization in science, one would expect a myriad of original languages to be invented from moment to moment. Instead, the scientific rigour in principle demands uniformity without loss in translation. In other words, science, in principle, tends to abstract itself from all conceivable realities, avoiding anything imaginary. A scientist, in principle, is not allowed to imagine or envision reality, but to abstract the "real", to develop the language to prove the realness, to devise only such experiments that will be repeatable. A scientist is expected to achieve predictability, certainty, security.

But this is only in principle. To the astonishment of a conventional community craving predictability, practicality and prosperity of its species, science has relatively recently introduced more uncertainty than in any period before. Against all scientific principles, the most seriously devoted scientist will consult the imaginary more often than the carefully selected itinerary of proven reality. Such a scientist will gather all the bravery of the polyphibian to break into the unknown, to listen to and learn from all other languages of nature. Indeed, one needs courage to admit that cherished concepts such as certainty and with it all practicality of predictability are only products of unimaginative conventionality.

In spite of the shifts in scientific paradigms, the rigour of science remains the promise of prosperity for the human race. With this rigour intact, the term science is not to become obsolete as art did. Art was torn, twisted, reversed into anti-art and back, dispersing itself in this devastatingly creative process, to be allowed to

accept any raw information via any antenna. On the contrary, the rigour of science allows the scientist to receive only real and relevant data. By building apparatuses of remarkable complexity to filter and fragment reality into repeatable abstraction, the visionary ability of the scientist is ever more constrained – the visionary is replaced by vast statistical data processing.

The visionary scientist is urged to escape from the standard scientific framework to the scientific "underground", to the "subconscious" science, to be able to imagine what is there to perceive. Without imagination there is no perception of the unknown. In the known and conventionalized there is no need to perceive – for conventional reality habit suffices. But the unknown will always permeate the known. The unknown demands indifference to conventional predictability, and involvement in what lies in between. Physicists, for instance, have been consulting beyond boundaries of physics for ages; they consulted in the language of metaphysics, explaining structures with meta-structures and those again with meta-meta-structures and so forth, until an ultimate pseudo meta-science was introduced in the book Exploits and Opinions of Dr. Faustroll, Pataphysician by Alfred Jarry in 1911. Jarry (Jarry, 1996) unravelled 'pataphysics as a science of imaginary solutions that was subsequently explained to an American audience by Roger Shattuck (1960, p. 24):

> In the realm of the particular, every event arises from an infinite number of causes. All solutions, therefore, to particular problems, all attributions of cause and effect, are based on arbitrary choice, another term for scientific imagination. 'Pataphysics welcomes all scientific theories (they are getting better and better) and treats each one not as a generality but as

> an attempt, sometimes heroic and sometimes pathetic, to pin down one point of view as "real". The idea of "truth" is the most imaginary of all solutions.

PROTECTORS OF IMAGINATION

Although widely practised in recent history, prohibiting the imagination, censoring the uncertain part of the unknown, was never taken to the extreme, never to be established as an absolute rule, not even by the most eager conventionalists in power. Consider the nineteenth-century art scene in Paris: as a counterbalance to the academically predictable exhibition of artists in Salon de Paris, Salon des Refuses had to be established in 1863 for all the artwork refused at the official salon due to excess imagination. Such "protection" of the refused in a special salon was not entirely honest, and there was ridicule of the outcasts on the agenda, but it nonetheless turned out to be extremely beneficial for the avant-garde artists. In fact, it is considered that no institution of this period did as much for the advance of French art as Société des Artistes Indépendants, which was consequently formed in 1884 by Parisian artists – a society that would enable exhibits based on the simple principle no jury, no prizes/sans jury, ni recompens.

Avoiding the jury is possible in principle but is it attainable in practice? Is it practical for the impatient audience? Société des Artistes Indépendants reckoned it was too early to judge before the exhibition, but at the exhibition the public was expected to judge, even encouraged by a predetermined quantifiable system. But should the public judge if it does not speak the language (yet)? Every original item exposed is speaking of what is yet to be learnt, or absorbed. Art is about the

future; it refers to something that will be comprehended only later on; it is dragged by the artist into the present – what the public perceives is only a trailer. The jury has not mastered the future language – it cannot give its verdict now.

In the twenty-first century we can easily afford to postpone the judgement for posterity – there is virtually unlimited space to exhibit and to store for the future. In addition, the foreseen future is reaching us ever faster. But if art is obsolete, what exactly are we to exhibit and examine with postponement? A mutation that survived the dissolution of art is polyphibians – this species does not comprise only ex-artists, but also scientists working with wild imagination undercover, carefully disguised in clean white lab coats and hiding the source of their insight under neat statistical graphs.

At the turn of the twenty-first century, as before, with Salon des Refuses, the refused imaginary approach of a certain kind from a certain crossover species has been recognized and the judgement has been suspended. The imaginary is not to be entirely refused, not even in the most rigorous sciences. There have been attempts to smuggle artists into labs, by the most prominent and well-funded foundations, but unfortunately without any subtle understanding of how obsolete the category of artist is. As a result, the artist with scarce sensibility to instantaneously comprehend the language of science could not communicate with scientists on the "underground", "unconscious" level. As a result, there would be no other result but the intimidation of the artist by the grandeur of scientific knowledge, which could only result in futile decoration of scientific

outcomes and disappointment of the scientist who would remain with no guidance. The devoted scientist is polyphibic in origin and needs to meet his or her equal – an experienced ex-artist polyphibian with a high degree in polyglot-ism.

The latest attempt to protect imagination is the Collide@CERN project, set up in 2011 by Ars Electronica and CERN for a collision of art and science. But how can the director of the project ensure safe conditions for such a collision? As the director, Ariane Koek, herself noted:

> [...] arts/science (sometimes called "sciart") is gaining ascendancy in the 21st century as a movement of influence and power. [...] Artists are being driven to become scientific, from the moment they fill in a funding application predicting their final production. I work in arts/science myself. So, you could argue, who I am to talk? After all, I have created an artists" residency programme at Cern, the world's largest particle physics laboratory and home to the large hadron collider. But it has at its heart the wonder of the creative process. It is not a residency which is process-driven or defined by an outcome; nor does it demand communication about or homage to the science. [...] I have deliberately set it up to be a laboratory of the imagination, where freeplay can happen. [...] This goes against the trends that can be seen in the arts/science aesthetic which has emerged from the 20th century [...]

In the current conditions of art obsoleteness, or, at best, of art defined directly by the free market, the "no jury, no prizes" rule appears difficult to apply; therefore, the Collide@CERN programme had to comprise a jury that would judge beforehand, not only before the artwork was submitted, but most of all before the jury could qualify as a polyglot of all the possible languages that would be the outcome of the project. Historical events of the nineteenth century have

confirmed that such judgemental procedure is not inspiring for setting up "a laboratory of the imagination" (Koek, 2011). But history somehow tends to repeat itself, and again in the midst of conventional stagnation there is the urge for independent intervention.

Let us therefore return to the establishment of the Society of Independent Artists, this time the American version, in 1917. Like Société des Artistes Indépendants, the American Society of Independent Artists was based on the principle "no jury, no prizes". The principle always holds in principle, but the director of the society took no chances and tested this rule in practice – at the very first exhibition that the society would convene. The director was Marcel Duchamp himself and the outcome of the test was so disappointing that he immediately resigned.

PROPOSAL TO BE IMAGINED

The American Society of Independent Artists announced in January 1917 that it would organize annual exhibitions "where artists of all schools can exhibit together – certain that whatever they send will be hung" (Camfield, 1991, p. 66). This democratic approach was to ensure that the public would be presented with the entire spectrum of contemporary imaginary solutions. The first exhibit was to take place in April 1917. Just in time for the exhibit, Duchamp has chosen and purchased a ready-made object, turned it 90 degrees, signed it "R. Mutt 1917" and submitted it to the exhibit. With that act an imaginary Richard Mutt with an imaginary address in Philadelphia became the now infamous artist who would submit the mysterious readymade.

Immediately after the incident of refusal of the readymade by the "non-existent jury" and subsequent resignation of the director, the members of the American Society of Independent Artists realized their immature decision and in May 1917 a manifesto defending the case of R. Mutt was published (Anon, 1917, p. 4). R. Mutt's fame never diminished, and one can only imagine how many works of art or other works have been attributed to him.

In the twenty-first century, imbued with tolerance towards new ideas, the power of an avant-garde disintegrated, making the reactionary momentum even stronger in reinforcing the conventional structures. Comparison of the current jurisdiction of Ars Electronica in the Collide@CERN project with the vision for Ars Electronica from the late twentieth century is alarming. For instance, consider the following proposal from an extensive study by Ascott (2003, p. 285):

> Perhaps one of the more useful metaphors to describe what is required is the "datapool", a term I coined as a consultant for the new Ars Electronica Centre in Linz, Austria. The datapool is that into which, and within which, data in all its modes flows – endlessly transformed through human interaction – and from which it emerges, art-in-flux, flowing on into other domains, other pools, other tributaries of the data sea. This and other such cultural organisms call for new behaviours on the part of the viewing public: no longer to observe, stand back, look from a distance and judge, but to plunge into the datapool, immerse themselves in its fluid changeability, share in its swirling transformations, navigate its knowledge bases, dive to its depths of meaning. This is to call for new standards in public access to art, art not as finite object but as process and system, a fluid, moving stream of data configurations, embodied in networks, on screens, in material structures, in installations and environments, endlessly open to transformation and change. The Ars Electronica project is a museum of the twenty-first century. But it can also be seen as the college of the future: not reactive but anticipatory.

To prevent further museum mummifications, any polyphibian with the rented pseudonym licence from R. Mutt would translate the challenge of Collide@CERN into nothing less than "Can art match the challenge of the Big Bang proportions, proposed by science?" "Indeed it can", R. Mutt decided, after coincidental study of CERN technology. If science invented ASCOT – Apparatus with Super Conducting Toroids (Norton, 1992, pp. 137-164), art will match it and raise the bet with ASCO2.T – Apparatus with Super COnducting Thought Transduction. It is a known fact that after ASCOT comes a second T. It was only a matter of time before the second-order cyborganic cyclotron ASCO2.T came after the first to map the mind in ATLAS detector that is to be upgraded AT.LAST.

The director of the Collide@CERN project pledged to break the habit and rethink the art/science programme (Koek, 2011). The newly established programme under conspicuously old rules had to be tested. Are institutions like Ars Electronica ready for necessary re-categorizations, to work with ephemeral languages that allow for a continuum of creative discussions? To initiate such a discussion, R. Mutt with the consent of R. Ascott (documented on paper and in video format) submitted the ready-made ASCO2.T to Ars Electronica for CERN:

> I, Ascott, herby consent, to be used by R. Mutt in collaboration with con – CERN– ed scientists as Apparatus with Super COnducting Thought Transduction: "A – S – C – O – double T" for the purpose of synchrotronic exposure of readymade minds to raw data.

The submission was rejected. Without any reply or notice of rejection, the proposal simply vanished from the agenda and therefore the hypothesis of the results of the experiment remains consistent with those of 1917:

> Mr Richard Mutt sent in a fountain. Without discussion this article disappeared and never was exhibited. (Anon, 1917, p. 4)

There is no need for collision of artists and scientists. Even though both are institutionalized and categorized, with their uncompromised devotion and subtle sensitivity they are upgrading themselves into polyphibic beings by absorbing the raw data from nature through osmosis. In other words, the datapool, for those brave enough to be exposed to raw data, is where the refused unknown can be imagined.

In fact, one can already imagine what the submitted proposal could be about. For that purpose, further revelation of the ASCO2.T AT.LAST project is postponed. Stay tuned for the second round of this debate.

4.2.3.2. ASCOT vs. ASCO2.T – round 2 – uncertainties[i]

ABSTRACT

The first round about "The myth of ASCOT and its rival ASCO2.T: tech-noetic vs. techno-logic" exposed the hazard in colliding obsolete disciplinary categories under outdated procedures. The orthodox jurisdiction of Ars Electronica and CERN in Collide@CERN, one of the most prominent ongoing programmes of this kind, does not eliminate the risk of missing the target by operating with categories of artists and scientists. Art is one of those disciplines with a long expired warranty, but with decay on its periphery that is turning into fertile forefront territories. Fresh temporary categories are marking and spreading over these uncharted territories and sensibly interconnecting with peripheries of other disciplines. The ex-artist that is reborn in this peripheral transdisciplinary zone can be provisionally categorized as a polyphibian for its features to be carefully studied. Like amphibians, a polyphibian can coherently transcend from one medium to another, in between and beyond the disciplines. In order to research the implications of such "categorical" mutations, a readymade was submitted to the organization of Collide@CERN under the licence of R. Mutt. Namely, the readymade ASCOTT (Apparatus with Super COnducting Thought Transduction) dubbed also ASCO2.T is needed as the second-order upgrade of

[i] as presented (partially abridged) at the MutaMorphosis conference (Prague, 2012), Tribute to Uncertainty, and published in (Ljubec, 2013)

the existing plan for ASCOT (Apparatus with Super COnducting Toroids) invented by the scientists for CERN. As is expected from the reputation of R. Mutt's readymades – this submission was ignored and refused in just the same quiet manner as his most notorious one. But if society would not provide salons for the refused artists (Salon des Refuses) right next to the salons under the scrutiny of academically established artists, there would be no mutations and no evolution in art. Such mutations of the artist into a "complex and widely distributed system" at the dispersing fringes of decomposing art was already predicted by R. Ascott. Polyphibians are the species surviving the ripening metamorphosis of disciplines by taking refuge in the unexplored transdisciplinary buffer zone. This is the only zone where a confrontation of ASCOT technology with tech-noetics of ASCO2.T is possible. The refused unknown demands not a Salon but the Interval of Suspended Judgement. In the sequel to the first round of this debate, the Interval of Suspended Judgement will be investigated.

PROVISIONAL TERMINOLOGY, CONTINUED

pol• y• phib• i• an [puh-li-fib-ee-uhn]

a Being able to coexist coherently while dispersed in several media. To be distinguished from "monophibian" – adapted to one and only rationally standardised medium, and amphibian (any cold-blooded vertebrate of the class Amphibia, comprising frogs and toads, caecilians, newts and salamanders) adapted to no more than two media. In the evolution from mono- to poly-

"mediumistic" the rational-self-referential limitations that arose with development of sequentially optimized cortex need to be surmounted: push the frontal cortex to the background. Bypass the linear wiring. Switch from direct current to the alternating current in all directions. Become polyphibic.

pol• y• phib• i• c [puh-li-fib-ee-k]

a living multisided knowing of a phenomenon. Compare to prefixes monophi- (on one side), amphi- (on both sides) and polyphi- (on many sides). Add to that bios, the life, the Being in Knowing. Polyphibic refers to being a newborn Being in front of every experience – the knowing is reborn with each instance. An experiment never yields exactly the same output. The outcome can always be experienced from a different side. Grasp the multi-sidedness of all appearances that the experimental apparatus yields and you grasped the phenomenon with the polyphibic awareness.

tech• no• e• tics [tech-no-e-tiks]

Technoetics is a convergent field of practice that seeks to explore consciousness and connectivity through digital, telematic, chemical or spiritual means, embracing both interactive and psychoactive technologies, and the creative use of moistmedia. (Ascott, 2008)

tech• nous [tek-noos, nous]

Just like tech-noetics frees the technical in technology from the limitations of classical logic, tech-nous, the tech-enhanced-mind frees the mind from the urge to deduce and reduce, to equate unequal. The mind is again fully immersed in heterogeneity. Contrary to expectations of inoperability in such heterogeneity, tech-nous, so enhanced, can operate efficiently. Heterogeneity does not exclude communication, computation, etc. it only enlarges the field to accommodate dichotomies. Mind, tech-enhanced by any moist medium, is capable of polyphibic performance. Instead of human mind imposing its intuitive structure, its instinct to generalise for instance, onto the machine, in tech-nous the reversed is allowed: the machine is free to corrupt the mind, disrupt the obsolete self-referential rationality that inevitably leads to technical paradoxes once a boundary is crossed. Tech-nous in this sense is not about rational mind imposing restrictions on machine but embracing unpredictable side effects of the system, bringing them into the resonance, resonating the systemic errors to a different order of awareness in tech-nous.

Example in a sentence: Polyphibians are always concerned for freedom of tech-nous from sole dependency on self-referential rationality, as is evident from Marcel Duchamp's statement in an interview with Laurence Stephen Gold:

> My work has been an attempt to show that reason is less fruitful than we think. We think that we find solutions through this function of rational thought but we do not. The mind is much freer than this type of thought would indicate. (Molderings, 2010, p. c6)

INTERVAL OF SUSPENDED JUDGEMENT

11th of October, 2011 – R. Mutt with consent of R. Ascott suggested the upgrade of Apparatus with Super COnducting Toroids – ASCOT (Norton, 1992), part of design for ATLAS detector at CERN, to the second order Apparatus with Super COnducting Thought Transduction – dubbed ASCO2.T.

Since the upgrade was quietly refused by the jury of "Collide@CERN", a sort of contemporary Salon des Refuses was proposed – an Interval of Suspended Judgment where an upgrade could be carried on without prejudices.

4th of July 2012 – P. Higgs' boson was officially received with a 5 sigma certainty and a standing ovation in an auditorium at CERN. With that glorious event, the conCERNed scientists agreed to shut down LHC for upgrade.

CONCERN FOR (DIS)APPROVAL

Since the upgrade is now officially on schedule, R. Mutt with the readymade assisted applied for approval of the council of Arts@CERN (the organizer of Collide@CERN) to implement the second-order cyborganic detector ASCO2.T:

During the uneasy and uncertain Interval of suspension of acceleration, that follows after the relief of high 5 Sigma Confidence Interval in which the conCERNed scientists are to upgrade what was once conceived as ASCOT detector, R. Mutt is willing to assist in implementing the 2nd order version ASCO2.T under strict safety conditions of Interval of Suspended Judgement.

This extract was filled in the official form, which is to facilitate the applicant in proving to be worthy of official (dis)approval. Namely, as is clear from Arts@CERN's public policy, CERN has appointed a "Honorary Cultural Advisory Board for the Arts" to advise on "arts engagement" (Arts@CERN 2012). With outdated postulates such as "Great Art for Great Science", this obsolete "Arts" Jury has the jurisdiction to disapprove or disregard "art" projects in the name of benefit to fundamental scientific research.

The only requirement demanded by the applicant to implement such a controversial upgrade is that this uncertain procedure is to be performed in the buffer zone free from ignorance and prejudices and to allow provisional neo-logisms, neo-categorizations, to release the cramp in which impedingly categorized artists and scientists meet. Due to heavy use of conservatives in thinking, to resolve this immobilizing shock that prevents smooth transferral between disciplines, more than one round of debate is needed.

From the first round of debate that was opened after R. Mutt's submission of readymade ASCO2.T was silently refused, it was clear that a new version of Salon des Refuses was necessary as a buffer zone that protects the projects from being crushed by the Establishment. Such contemporary zone for refused ideas would be the Interval of Suspended Judgement, but since this would be no ordinary salon, located on this or that avenue, how is one to locate such an interval? To locate this judgement-free zone, we need to go deep in the roots of scientific uncertainty.

S(T)IGMA OF CERTAINTY

When absolute certainty becomes obsolete, the confidence of a natural scientist in comprehending a natural phenomenon is narrowed down to "confidence intervals" that can only indicate the reliability of a certain estimate. It was at the beginning of the previous century that the confidence in the possibility of complete comprehension of nature was profoundly shaken. Not only was nature revealed as essentially unpredictable and prevailing uncertainty accepted as a fact – some scientist even considered the probabilistic laws as more fundamental than deterministic laws. The latter would be the emergent structure of the former. In this sense, quantum mechanics was the first physical theory based entirely on laws of probability (Bohm, 2003).

Without going into the details of how absolute certainty became obsolete, let us consider how approximations of certainty are conceived and how they are valued. It is assumed that the results of a well-devised experiment will follow a so-called "normal distribution" – describing a bell-shaped Gaussian curve. That is, this assumption holds for experiments with no significant systemic error.

Equation for the family of Gaussian curves includes a parameter sigma (σ) that is used to measure the "standard deviation". When a theoretical model is tested, the results that fall off a few sigma from the peak of the Gaussian curve are not significant, or rather are considered inconsistent with the model.

The degree of deviance or variance in the model described by parameter sigma relates to the width of the bell in the Gaussian curve. As the bell of the curve flattens, deviations flourish. With the flattening of the bell, the experimentalist's confidence in the model and experiment itself diminishes.

PHYSICAL /'PATAPHYSICAL THRESHOLD[i]

Imagine a physical experiment so "badly" constructed that the Gaussian curve flattens down entirely – touching the 'pataphysical floor. What is 'pataphysical about this extreme case of distribution curve is that there is no normal distribution where the expected result comes out consistently. Rather, as 'pataphysics teaches, there is no such thing as things in general, but only exceptions.

Each result of such an extremely flattened bell curve is exceptionally unique – in front of each measurement we are, in the words of Henri Poincaré, as a "newborn babe". At least this is how we would be, Poincaré (1913, pp. 363, 364) claims, if we were not driven by the survival instinct, which helps us to equate the unequal, to abstract and generalize. Of course without such instinct, he points out, there would be no science, not even language; perhaps we would not even survive to the day.

[i] see figure 1

Although in response to the fierce challenges to the scientific establishment in the early twentieth century, Poincaré admits that science is tailored to human opportunism and utilitarianism; science, he claims, is not completely artificial, since it is not tailored to an individual human, one single individual scholar (Tannery, 1912, pp. 73, 74). Marcel Duchamp, the extreme individualist, takes the same challenge concerning the arbitrary scientific standards even further: departing from Poincaré's observation, Duchamp's mission becomes to be newborn in front of every phenomenon, with each experience of it (Molderings, 2010, p. 7).

Duchampian newborn experiences in accordance with 'pataphysics always follow the degenerated Gaussian curve – flattened into a line – the threshold between physics and 'pataphysics, which barely touches the floor. The Interval of Suspended Judgement could not be more appropriately located than at this physics /'pataphysics threshold that constricts the confidence in results; there is no room for judgement, generalization or reduction of heterogeneity in this "infrathin" interval. The precise location of the Interval of Suspended Judgement can only be imagined and never manifested on a graph, since it is too close, infinitely close, but again not entirely close to zero.

MOSAIC MODE

Trespassing into the Interval of Suspended Judgement comes with a warning: the shock of abrupt transition from conventionalized homogeneity to anarchic heterogeneity can be fatal for an unprepared monophibian. A polyphibian, on

the other hand, is adapted to such different kinds of encounter with the medium. Over that threshold, the medium is not to be ordered, normalized and standardized from a fixed viewpoint of the "creator". The polyphibian adopts the emphatic approach – shifting the viewpoint in co-creation.

In Round 1 of this debate, the obsolete term artist or rather "serious artist" – that is according to Marshal McLuhan (1994, p. 18) the only "expert aware of the changes in sense perception" – was replaced by the temporary term polyphibian (Ljubec 2012: 92). According to McLuhan (1992, p. 5), the artist is "the only person in our culture whose whole business has been the retraining and updating of sensibility." What McLuhan (1992, p. 5) describes as artists "constantly making 'raids on the inarticulate'" is in fact the polyphibic operating mode within heterogeneity.

In his returning from visual to acoustic tribal space, McLuhan stumbles upon a Nobel laureate in medicine, Georg von Békésy, who, while researching the auditory space, finds the mosaic as a useful model. McLuhan (1962, p. 43) adopts this model:

> The paradox presented by Professor von Békésy is that the two-dimensional mosaic is, in fact, a multidimensional world of inter-structural resonance. It is the three-dimensional world of pictorial space that is, indeed, an abstract illusion built on the intense separation of the visual from the other senses.

For McLuhan, the dynamic advantage of mosaic lies in its two-dimensionality as opposed to the inert perspective, which McLuhan condemns as three-

dimensional anguish. Namely, "in extreme contrast to 'point of view', which assumes a fixed position from which to examine each situation and to assert one's preference", McLuhan (1992, p. 76) poses the mosaic, which requires "constant readjustment to our surroundings." In other words, McLuhan (1992, p. 63) concludes:

> Ground cannot be dealt with conceptually or abstractly: it is ceaselessly changing, dynamic, discontinuous and heterogeneous, a mosaic of intervals and contours. As von Békésy discovered, the appropriate form of awareness is acoustic-tactile-kinetic and alive to the stress and coercion that each exerts on the other.

This alive awareness, the living knowledge in mosaic that engages multiple senses, "does not demand that objects be dissected to be understood; rather, the multiple parts coexist simultaneously. To understand acoustic space, you must perceive all of it, not focus on one part" (McLuhan, 1975). McLuhan (1962, p. 71) further observes: "the method of the twentieth century is to use not single but multiple models for experimental exploration, the technique of the suspended judgment." Suspended judgement provides the delay or distance required – the interval in which dichotomies can coexist and interpenetrate.

IDEA OF FABRICATION

Fabricating an experiment whose outcome falls over the threshold of normal distribution disturbs the fabric of normalized reality. In crossing the threshold from generalized to unique, unrepeatable results of an experiment, the technology of the experiment succumbs to a radical transformation. The logic in

technological apparatus is stretched; the rational and self-referential systems that lead to dead-end paradoxes are revived in an expanded mosaic context.

The upgrade from ASCOT to ASCO2.T reverses the roles of mind and machine. It is not the monophibic mind anymore that imposes its intuition onto the machine, rather when the machine submerges into the Interval of Suspended Judgement the polyphibian suddenly becomes aware of the Being machine. The mutual empathy between what was before being and machine is now shared in the recognized multi-sidedness of machine. While a monophibian acknowledges only the side of the system that its mind conceived, concealing the systemic errors, the polyphibian is aware of all other sides and contexts of the system.

CORRELATION, COMPLEMENTARITY AND THE LOGIC OF THE INCLUDED MIDDLE

> The need for a definition of reproducibility in the law of nature has […] resulted in the loss of the unique in the scientific conceptualization of nature. What we have experienced in quantum mechanics is the occurrence of the essentially unique where it would least be expected, namely in ("non-lawful") individual observation. (Pauli, 1996, p. 56)

The loss of unique and individual became evident when physicists crossed the threshold of classical physics. The classical logic outside the constricted area failed the rational expectations and alternatives to objectivity had to be considered. Books like "Causality and Chance in Modern Physics" by David Bohm or "From certainty to uncertainty: the story of science and ideas in the

twentieth century" by David Peat thoroughly describe the paradigm shift in the science of physics, especially the turn to quantum physics.

The quantum physicist, Basarab Nicolescu, extends the implications of such shift in paradigm to the entire spectrum of human endeavour. The shift from classical logic to its broadened version – the so-called logic of the included middle – introduced by Stéphane Lupasco for the purpose of resolving duality on the quantum level – is applied by Nicolescu (2002, p. 28) between and beyond all the disciplines. By widening the domain of this upgraded logic to transdisciplinarity, Nicolescu reveals the glimpses of the structure in the buffer zone between and beyond disciplinary, constrained knowledge.

Such transdisciplinary buffer zone works like the interval of suspended judgement where A is either A or not-A, or both. With proposal from Lupasco to include the element that is both A and not-A, as a constituent axiom of logic, the principle of complementarity has been addressed in a formal manner. As is recounted by David Peat, Niels Bohr formulated the principle of complementarity from the wave/particle duality:

> Quantum systems demand the overlapping of several complementary descriptions that when taken together appear paradoxical and even contradictory. Quantum theory was opening the door to a new type of logic about the world. […] Rather than creating exhaustive descriptions of the world or drawing a single map that corresponds in all its features to the external world, science was having to produce a series of maps showing different features, maps that never quite overlap. (Peat, 2002, p. 8)

A pile of never quite overlapping maps creates the kind of mosaic conditions McLuhan promoted after Georg von Békésy. Complementarity of multi-sided appearances on multiple maps constitutes the phenomenon that can be grasped simultaneously only by polyphibic awareness. With the principle of complementary descriptions of reality, mosaic reading from multiple viewpoints becomes a necessity. Georg von Békésy writes:

> When in a field of science a great deal of progress has been made and most of the pertinent variables are known, a new problem may most readily be handled by trying to fit it into the existing framework. When, however, the framework is uncertain and the number of the variables is large the mosaic approach is much the easier. (Békésy, 1960)

Other principles were brought forward to cope with unsettling quantum conditions. After complementarity, the principle of correlation (Bell, 1987) soon followed to indicate the indescribable circumstances in a quantum system when it is broken into parts. Namely, parts of the system continue to be correlated even when they are separated. Non-local correlation persists after separation as if the system is self-aware and aware of all interrogations about it. While monophibic separation and fragmentation of reality results in reduction, the polyphibic multi-sidedness preserves the shared information between all the facets of reality. In the following comparison, David Bohm (2003, p. 1c10) observes the role of correlations in separated cuts, facets and sides of reality:

> Compare the structure of the totality of natural law to an object with a very large number (in reality infinite) of sides, having facets within facets, facets reflecting facets, facets consisting of mosaics of facets, etc. To know what the object is, then, we must

> have a large number of different kinds of views and cross-sections. Each view or cross-section then contributes to our understanding of many aspects of the object. The relationships between the views are, however, equally important, for they serve to correct the errors which arise as a result of regarding one or a limited number of views as a complete representation of the whole object; and they also indicate qualitatively new properties not apparent in the separate views.

CO-CREATION BETWEEN THE OBSERVER AND THE OBSERVED

For the outcome of our experiment to reach the "infrathin" interval with infinite sigma, the apparatus must be upgraded to a version freed from influences of intuition of continuity and causality. That is, to obtain unequal multi-sided apparitions of a phenomenon, that on the normal distribution graph follow the curve degenerated into a flat line, in front of every apparition the apparatus must be a newborn being.

Monophibians not only refuse to be reincarnated in front of every event, being essentially "monoglots", they are reluctant to speak a new language in every new situation. Niels Bohr was concerned by the fact that we only speak one (the everyday) language and we use it to articulate any scientific subject. Polyphibians are trained polyglots in order to avoid this additional source of transferring instincts from one area to another, namely, universal language is but another agency of transferral, of equating the unequal.

Bohr argued that we cannot assume quantum entities to have intrinsic properties such as speed and position, that is, we cannot import properties from human scale world into the world of the quantum. We must first be reborn on the

quantum level. For Bohr, every act of measurement is an act of interrogating the universe, as David Peat (2002, pp. 16, 21) summarizes:

> The answer one receives to this interrogation depends on how the question is framed – that is, how the measurement is made. Rather than trying to unveil an underlying quantum property, the properties we observe are in a certain sense the product of the act of measurement itself. […] Bohr […] argued that "the procedure of measurement" has 'an essential influence' on the very definition of the physical variables that are to be measured. […] the answer to a quantum measurement is a form of co-creation between observer and observed.

Co-creation involves a polyphibic rebirth in every act of interrogation. Unlike a regular experiment, where the monophibian discards every abnormality and talks fluently only about the normal distribution of results, the experiment in co-creation between the observer and the observed yields not only always new results, but new language to describe them. The polyphibians are co-creating the Interval of Suspended Judgement.

APPARATUS AND ITS APPARITIONS

If it is known in advance that the results of the experiment will be unique, never to be equated with another outcome, what is to be said of the apparatus? How can an apparatus be so upgraded, its degrees of freedom so enhanced, that the only thing that is certain is that anything is equally possible? By switching from physical to 'pataphysical apparatus, the systemic errors in a machine are not discarded or corrected. The system is allowed to express itself in the full range of side effects. The technical in the machine that was received by the open mind

within the Interval of Suspended Judgement is reconnected to the mind in tech-nous. Tech-nous is the first stage of expanding the rational and self-referential system that by default ends up in paradoxes, in the very irrational, unpredictable, uncomputable behaviour that the system was supposed to escape. To understand technology outside the limits of logic is to understand the mutual dependence of techne and nous – the influence of what was projected back onto itself without ignoring the multiplicity of side effects, without disregarding the multi-sided context.

While ASCOT was devised to aim at a normal distribution with adequately shaped bell curve to help physicists to indicate consistently repeated appearance of a Higgs boson – a degenerated distribution of irreproducible appearances coming from ASCO2.T helps a 'pataphysicist indicate and comprehend the Higgs boson as a multi-sided feature. In a 'pataphysical experimental setting of ASCO2.T, by default none of the results obtained can be identical to any other even if, to the conCERNed physicist, the conditions will seem identical in every trial. A physicist who would embrace this upgrade and pursue this path must be warned before crossing over the threshold into the Interval of Suspended Judgement. For these reasons, a distant early warning (DEW) was sent to the "Arts" council through the application for conCERNed approval, describing the procedure:

> Take a human (ready) made apparatus and modulate the systemic error to a degree where the human instinct to equate unequal, the intuition present in all humans to generalize and abstract is disabled. Then each measurement will be unique – the

probability of single exceptional event to be detected more than once will be infinitely small. From such nonlinear flaw-full apparatus results a relatively abnormal linear distribution of detected apparitions. With consistency in deviations – each apparition is infinitely nonstandard – comes a certainty that all appearances have the same probability to occur and every apparition is just as significant as any other. The certainty in a phenomenon consisting of singular appearances arises with emergence of a virtual line – a linear condensation forming multiplicity from incommensurable singularities. The certainty arises as self-recognition of apparatus in the phenomenon – or self-reference of detected feature in all incomparable detections, in the complementarity of contradiction.

Every polyphibian is aware – and we are talking here of multisided, that is, polyphibic awareness – that a phenomenon is composed of multiplicity of unique appearances. The readymade assisted apparatus – ASCO2.T – is the only kind that is ready for detecting bosons from multiple floating viewpoints. While the monophibic standard scientific approach relies on repeating detection of one and the same appearance, that is, a biased one-sided detection from fixed point of view, to insure certainty, the tech-noetic innovation by polyphibians relies on unrepeatable multiplicity of exceptional appearances. Only if the multisided appearances are to be grasped simultaneously (in mosaic superposition) by tech-nous (a polyphibically enhanced mind) can a holistic glimpse of the phenomena (the feature of the field) be revealed. Since there is no such thing as things in general and to avoid any tautology in repeating one and the same result of detection ASCO2.T will be activated within fuzzy limits of a personal "confidence interval."

CENTENNIAL CELEBRATION OF THREE STANDARD STOPPAGES

With the forthcoming centennial of three standard stoppages, Duchamp's Idea of the Fabrication is to be updated, expanded from stops, stoppages and invisible mending to invisible reconstruction of the fabric – a co-creation, a correlational fabrication – not from one side only, as is customary for technique of invisible mending, but from multiple sides.

the original idea from 1913/1914 (Duchamp, 1989, p. 22)

> – If a straight horizontal thread one meter long falls from a height of one meter straight on to a horizontal plane distorting itself as it pleases and creates a new shape of the measure of length. –
>
> – 3 patterns obtained in more or less similar conditions: considered in their relation to one another they are an approximate reconstruction of the measure of length.

the updated Idea for 2013/2014

> If canvas fabric is collided with a burning cigarette the invisible mending is to be done from multiple sides. – 3 apparitions obtained in more or less similar conditions: considered in their relation to one another they are an approximate co-fabrication of a phenomenon under interrogation.

What one notices immediately is that the original idea starts with the straight line – the shortest distance in Euclidean geometry and ends up in non-Euclidean geometry. The manifestation of the updated idea seems reversed: we start with utterly, almost inconceivably non-linear apparatus and end up in the most dreaded linear interval – the terror zone of experimental physics. That is, instead of ending up on a nice normal curve, we drop flat on a line. One needs to bear in mind this threshold line – a kind of DEW line, infinitely close to zero, that only a polyphibian is able to locate precisely in imagination and trespass with precision – this line is nothing but full of infinite deviation.

In experiments devised by monophibians, the apparatus bursts the fabric of reality, colliding particles with colossal amounts of energy. When the hole is burnt into the fabric, the monophibians invisibly mend the fabric – their mending

perfectly matches their model of reality. On one side only, that is. On the other side, of course, the mending is revealed. A physicist ignores the existence of another side, while a 'pataphysicist gladly displays the wrong side, if there is interest for it.

The readymade ASCO2.T therefore operates by invisible mending. In a cosy armchair, it takes on the old habit – it lights a cigar, takes a canvas painted Prussian blue and carelessly burns it, colliding particles with the fabric of reality. It then takes a needle and mends the trajectories of colliding particles – the three stoppages are the fabricated paths. So far all so monophibic. Then with a polyphibic twist, the mending is revealed from multiple sides – all appearances are available to a polyphibian that is able to grasp them in wholeness.

To explain once more in obsolete terms: the role of the "artist" in "science" is to prevent that supposedly "unavoidable" tautology of measurement apparatus, so devised to measure those very properties we invented through inventing the apparatus. An "artistic" measurement reveals all possible aspects. Reproducible outcomes are nothing but foci on one aspect, one and the same apparition of a phenomenon – a phenomenon that in this fixed focused way is never to be revealed entirely.

On the contrary, in the Interval of Suspended Judgement, this is precisely what happens: the apparatus measures each unique appearance of the phenomena – by repeating the experiment over and over, the outcome is never the same. This

is only possible if the apparatus is tech-noetic, where the systemic errors are embraced and driven into resonance with the nous of the participating observer.

The update to three standard stoppages is an invitation to "artists" turned polyphibians to disturb and breathe life into an extremely important debate on chance and causality that was initiated a century ago and still remains an unpleasant taboo even in fundamental science. What better way to do this than to excavate this "anart" fossil a century later – in 1913 the idea of fabrication was triggered and stopped at the same time. Books upon books were written – but the three standard stoppages still speak more than ever was said of scientific standards.

4.2.4. Interval of Suspended Judgement

The creative act is therefore to continue in the safety of the Interval of Suspended Judgement, a transdisciplinary buffer zone between the disciplines in which a mindless monophibian must be notified to mind the gap, the gap in which the rules change, incessantly. Polyphibic awareness is required to sense the gap spontaneously. Such gaps are filled with transdisciplinary silence[i], as Nicolescu (2002) observes. There is no indirect communication in the gap, only immediate transduction between the artist and the spectator.

[i] see chapter 2.2. for more on the role of silence in transdisciplinarity

Where precisely is a gap located, depends on the circumstances under which one approaches the gap with polyphibic awareness. To locate a gap the approach must be unconventional, that is, counter-conventional. The attention of the polyphibian redistributes in order to counter the tendencies of any encountered convention. The polyphibian plays along all types of reasoning and cuts in at the intersection. When the interval is registered the polyphibian suspends all the judgement within it. To keep the interval sterile from germs of judgement, the incision must be clean-cut, infrathin.

A simple example is given in this thesis of locating a gap in the specific circumstances of Collide@CERN program that was to confront art and science. Unlike the institutional role of the jury that doesn't mind the gap, the approach of the curator within a creative act is not to judge, not to inhibit, but to act as a catalyst. Participation in the creative act described in previous subchapters follows the 'pataphysical tendencies, discovered in the artwork of the anartist Marcel Duchamp, in order to meet with tendencies of conCERNed[i] physicists. Unlike the discriminating jury, the curator infradifferentiates the two confronted tendencies of intellectual reasoning, occupying both points of being simultaneously, until it is impossible to prevent an explosion of laughter that results in a gap, in a clearly demarcated threshold.

[i] term coined by Roy Ascott (conversation with the author)

The threshold is thus to be approached from both the direction of physics, science generalizing observed phenomena into laws as general as possible, and the direction of 'pataphysics, science of the exceptional and the unique, whereby even generalisation is an exception. To be noted is that the tendencies to judge and to generalise are closely related. As mentioned before[i], Poincaré observed that it is our survival instinct that enables us to equate the unequal, in short, to generalise, to abstract and consequently to tailor the science by the measures of human opportunism and utilitarianism, while Pauli revealed[ii] that only a special branch of physics - the quantum physics - has appreciated the idea of the search for exceptions in spite of the strong drive for generalisation.

Within the specific context of arts confronting the science of CERN, the location of the Interval of Suspended Judgement was therefore to be determined by following the standard procedures of physical experiments at CERN, carrying them out to the very extreme periphery so that physics could meet the conditions of 'pataphysics. The attainment of the greatest scientific discovery at CERN in 2012 was judged by the scientific community within the so-called "confidence interval" of the "six sigma certainty" which is, as usually, plotted by physicists on the graph of normal distribution – the Gaussian curve.

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[i] see chapter 4.2.3.2.
[ii] ibid.

A well behaved physical experiment aims for consistent reproducibility of results accumulating at the peak of a well-shaped Gaussian curve. The parameter sigma[i] in the equation of the curve determines the shape of the curve[ii], for instance the curves plotted for sigmas of low values have high peaks. The exceptions that fall far from the peak are discarded by physicists but treasured by 'pataphysicists. If one searches beyond physics, beyond the science of the general, one aims at experiments that yield exceptions and nothing but exceptions. Compared to physics, what is the shape of a Gaussian curve for a well-conceived 'pataphysical experiment? In other words, what is the required 'pataphysical value for sigma?

A 'pataphysicist sends the parameter sigma in the equation of the Gaussian curve to infinity to obtain a hilariously flat curve[iii]. To interpret this extremely straight curve imagine a physical experiment so "badly" constructed that the outcomes are never repeated and spread, flattening down the normal distribution curve completely, touching the 'pataphysical floor. Each result of such 'pataphysical experiment is exceptionally unique. No generalisation - no judgement! The threshold between physics and 'pataphysics marked by this infinitely flat curve, infinitely close to zero, demarcates where the science of the general stops, suspends the judgement, and explores in new directions, diverges and deviates.

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[i] see figure 1 for the equation of the Gaussian curve
[ii] see figure 1 for the low values of parameter sigma
[iii] see figure 1 for the dotted line that represents the Gaussian curve with parameter $\sigma \to \infty$

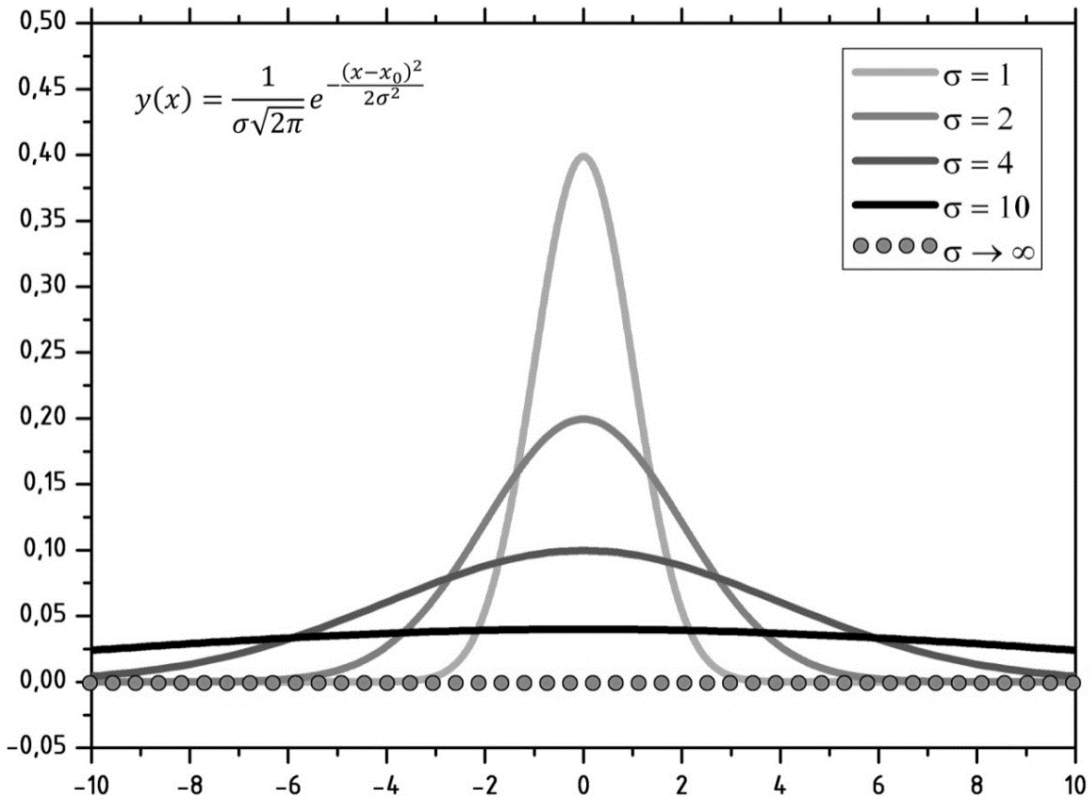

Figure 1: Interval of Suspended Judgement

Locating the threshold between physics and 'pataphysics – the Interval of Suspended Judgement - on the graph of normal distribution at the infinite value of parameter sigma (indicated by a dotted line).

CERN has opened a dialogue with arts by establishing the Arts@CERN to ensure a suitable selection of "Great Art for Great Science." Artists are now welcome to pass their proposals through the selectively permeable filter of Arts@CERN jury which either disapproves with the proposed project or issues an official document of approval. The proposal submitted to the jury in October 2012 was to consider the exciting new discovery of the threshold between physics and 'pataphysics as a temporary suspension of their habits of judgement. By broadening the horizons with all the implications of this stimulating discovery, the hope was to broaden the range of acceptance of exceptional Art proposals to Science.

4.2.5. The Box of 1914

The Box of 1914 is Duchamp's first collection of notes that serves as his first announcement of his largest artwork - the Large Glass, and yet the notes themselves already acquire the status of an artwork. One of the main sources of inspiration for Duchamp's notes was, according to Henderson (2005, p. 72), the publication of Leonardo da Vinci's manuscripts by Charles Ravaisson-Mollie at the end of the 19th century when the general interest in this artist-scientist was on the rise. The impression of the great polymath on Duchamp was such that he tried to experience the intricate intertwining of artistic and scientific tendencies himself. Taking example from Leonardo's notes Duchamp acquired a scientific style of notation for his art.

> When Duchamp looked to Leonardo, he was most interested in artist's notebooks, which demonstrated his intellect and established the recording of ideas in notes as a legitimate form of artistic production. (Henderson, 2005, p. 188)

Henderson (2005, p. 73) observes many similarities in Duchamp's and Leonardo's writings, among them the discontinuity. Just as there is a lack of sequence in Leonardo's text, so does Duchamp disregard the linear continuity: "Duchamp ensured the absence of any clear sequence among his notes by recording them on separated pieces of paper" Henderson (2005, p. 73). In spite of, or even because of, no preferred sequential order Henderson (2005, p. 74) is convinced the assortment was significant for Duchamp:

> Although previous scholars have never treated the Box of 1914 notes as a coherent group, Duchamp would certainly have selected those notes carefully: they were to function as an announcement of what was to come in the Large Glass at the same time they declared his commitment to random ordering of chance.

The notes therefore were more than a humorous application of a pseudoscientific language: "If a straight horizontal thread ..." or "Given that ..., if I suppose ...," that Henderson (2005, p. 75) highlights as typical language of a geometrical proof. Duchamp was applying scientific approach to non-scientific domains, expanding the territories of science: "I propose to strain the laws of physics" (Roberts, 1968, p. 62). Henderson goes at great length to report all known areas of science and technology that Duchamp tampered with.

> Duchamp's interest in Leonardo was not a retrospective one: he was not simply concerned with earlier ideas that bore Leonardo's imprimatur. Instead he sought to act as the new Leonardo, responding actively to contemporary science and technology as Leonardo has done in Renaissance. (Henderson, 2005, p. 72)

Although Duchamp's response was foremost humorous, his engaging with the latest ideas in science originated from genuine curiosity producing comical side effects that served as a subtle critical approach to rigidity of methods and to habitual minds. Duchamp was challenging the limits of disciplinary and even interdisciplinary research by taking an instrument successfully used and reused in one discipline and applying it in an unconventional manner to a problem set outside that discipline. The comical element in these experiments uncovered the

scope of the tool or the method, opening up new ways for transcending disciplinarity.

To participate in the Large Glass one needs to consult the notes. The Large Glass is a projection of a higher order – a higher dimensional organism of living knowledge onto the ordinary knowledge apparatus of lower dimensions. Large Glass is to be lived by a polyphibian. In contact with the monophibian the glass shatters. Only the dead knowledge archived in a box of notes can be safely and arbitrarily dissected by the monophibian. While the transdisciplinary polyphibic wasp-bride self-organises in a higher dimensional beehive, the monophibian is left with the disciplinary "cemetery of uniforms[i]," and a scattered assemblage of notes, inducing laughter with every attempt to order them meaningfully.

One of the notes in the Box of 1914, entitled the Idea of the Fabrication, introduces Duchamp's experiment with chance, or what Duchamp (1989, p. 33) terms "canned chance" – the 3 standard stoppages. By annotating this experiment in the Box of 1914 Duchamp announces a fierce but humorous deviation from conventional standards, measuring systems, and geometries that are to shape the Large Glass. The conventional straight unit of length becomes just as arbitrary as any curved unit of length – the arbitrator here is chance aided by gravity. In the most comprehensive research of 3 standard stoppages, Herbert Molderings

[i] cemetery of uniforms was Duchamp's term for uniforms of different professions depicted in Large Glass

(2010, p. 836) reveals the growing relationship between gravity and "aesthetics of chance" through various episodes, in one of them:

> In the exhibition Le Surréalisme en 1947 at the Galerie Maeght in Paris, Duchamp related the figure of the juggler of the center of gravity directly to the 3 Standard Stoppages. It had been Breton's idea to erect an "altar" to twelve mythical figures of modernism, including the soigneour de gravité, which existed only as a sketch, not having been realised in the Large Glass. (Molderings, 2010, p. 836)

The Idea of the Fabrication that was realised and conserved as "canned chance," to be reused as a standard, whenever inappropriate, became an offering to a never realised mythical figure – Juggler- Handler-Tender of Gravity. This figure that was exceptionally allowed to cross the threshold and enter the domain of the Bride was, according to Molderings (2010, pp. 829-835), invented by Duchamp as "a reaction to the crisis of language that had seized theoretical physics at the turn of the century, when the new insights into the subatomic structure of matter had begun to erode the terminology of classical mechanics and physicists were still not clear about the language needed to describe energetic processes in a subatomic context."

To demonstrate the perplexity among the greatest scientists facing the paradigm shifts in physics, Molderings quotes Poincaré (1913, p. 310) pondering on the consequences of questioning the validity of Lavoisier's principle of the conservation of mass: "the center of gravity of an isolated system moves in a straight line; but if there is no longer a constant mass, there is no longer a center of gravity, we no longer know even what this is." The scientific hesitation in

regards to notion of mass and gravity culminated in a monumental experiment in 2012 at CERN, confirming the existence of Higgs boson – the juggler in the Higgs field, responsible for mass, and yet only tangentially related to the problem of gravity. It is within this context that, for the purposes of this thesis, the Box of 1914 was reopened and the Creative Act resumed.

4.2.6. The Box of 2014

The box of 2014[i] documents participation in Duchamp's creative act, first announced in 1914 within a box. In accordance with the theory and practice outlined in the current chapter, this subchapter examines Duchampian "participation in a creative act" and "readymade intervention" from curatorial points of being. The Box of 2014 is not focusing merely on the traces of trespassing, but by establishing precisely the location of the threshold that is to be trespassed, it curates the conditions for further trespassers, setting up a catalytic reaction for potential participants in Duchamp's creative act.

Namely, contrary to the tendency of blurring the borderline between art and science in art-science collaborations, the line where the notes from the Box of 2014 are to be catalytically curated must be clearly conceived. Curatorial reaction against generalisations that could lead to institutionalisation and unnecessary categorisation of "art-science collisions," as previously examined in the

[i] see also appendix B

Collide@CERN programme, requires a specific, exceptional context – in the present case – the context of pataphysical exceptions.

Observing the nature by co-creating it, the Large Hadron Collider at CERN represents the most glorious advancement in the "non-retinal art," established by Duchamp a century ago through application of comical correctives to the instruments of observation. Particle accelerators and detectors break with tradition of instruments from microscopes to telescopes that are indulging the retina: no particle is to be directly detected by a retina – particle trajectories are only post-festum reconstructed for amusement of the retinal audience.

Participation in a creative act of nature by creating particles through collisions introduces a 'pataphysical component into particle physics that should not be overlooked. For this reason physics was differentiated from 'pataphysics following the mathematics that determines the s(t)igma of certainty for detection of the most wanted particle responsible for mass. Mathematically satisfying both physics (science of the general) and 'pataphysics (science of exceptions), the threshold between them was established by sending the parameter sigma in the equation for the standard distribution curve to infinity. [i]

[i] see chapter 4.2.4. and figure 1 for the equation and the graph of normal distribution at various values for parameter sigma

In such exact experimental setting, Duchamp's 'pataphysical equations, such as "arrhe is to art as shitte is to shit,"[i] inevitably mutate, for instance, into "arrhe is to art as stigma of certainty is to sigma." Namely, Duchamp's notes, as was shown in the previous subchapter, become legitimised[ii] artworks in their own right, an indispensable constituent of his creative act, and as such, are prone to participatory evolution. Accurately curating the environment for Duchamp's notes in 2014 would therefore imply a variety of mutations.

Setting up the Box of 2014 hence consists in remapping Duchamp's notes from 1914 onwards, that are constituting, rather than merely complementing the Large Glass, into the context of the Large Hadron Collider, laying between the Jura mountain range, which Duchamp surmounted on the 'Jura-Paris Road,' and the lake Geneva with the waterfall Forestay, which Duchamp photographed for his last work 'Given: 1st the waterfall, 2nd the illuminating gas.' Duchampian dynamics of liquids and gases suddenly provides 'pataphysical mechanics to "strain the laws of physics" (Roberts, 1968, p. 62) on another scale: from oscillating density, subsidised symmetry and reintegration of friction that runs the Batchelor Apparatus to the domain of the Bride and its ironic causality, where

[i] see the Box of 1914 (Duchamp, 1989, p. 24), for more algebraic comparisons see the Green Box (Duchamp, 1989, p. 28)
[ii] see Henderson (2005, p. 188) for the role and importance of notes as art form

demultiplication of the target becomes the sculpture of skill and the collision is the "raison d'être of the picture."[i]

With or without the historical fact that Duchamp's 'pataphysical expeditions enfold the territory, now dominated, at least underground, by CERN physical experiments, the catalytic reaction triggered by remapping the 'pataphysics of the Large Glass onto the Large Hadron Collider results into new readings, new interpretations, and new kinds of participation. For instance, a 1914 note, "the Idea of the Fabrication" for a standard unit of length is rewritten[ii] by Duchamp in 1934 as if executed under jurisdiction of the "Ministry of gravity" abiding by the "Regime of Coincidence," forming "canned chance."[iii] In the Box of 2014 a note on "the Idea of the Postproduction" is issued.[iv]

The 3 Standard Stoppages produced according to the Idea of the Fabrication are reused as "canned chance" within other works of Duchamp, including the Large Glass. In the Idea of the Postproduction the 3 Standard Stoppages are reconsidered in the context of the Large Hadron Collider, where the threshold between repeatable and consistently unrepeatable results of the experiment is established. As suggested, the postproduction consists in plotting a normal distribution graph for the 3 Standard Stoppages by sending the parameter sigma

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[i] see Duchamp (1989) for modified principles of physics explained through various notes
[ii] see the Box of 1914 (Duchamp, 1989, p. 22) and the Green Box (Duchamp, 1989, p. 26)
[iii] see the Green Box (Duchamp, 1989, p. 26)
[iv] see appendix B for both the note "Idea of the Fabrication" and the "Idea of the Postproduction"

to infinity. The possibility of "infra-thin" separation between the 3 "identicals"[i] is therefore recovered in the Interval of Suspended Judgement.

The ATLAS detector of the Large Hadron Collider was derived from the design of the apparatus under the acronym ASCOT. According to the Regime of Coincidences it was no coincidence that there was a readymade cyborganic apparatus available under the acronym ASCOTT. Without hesitation Roy Ascott was anonymously submitted (under the pseudonym of R. Mutt) as a readymade to upgrade ASCOT for ATLAS with another "T" into ASCOTT, or rather, ASCO2.T AT.LAST. Despite the apparent detection of the particle responsible for mass in 2012, at the ATLAS detector, the questions in the all-too-modern theory of gravity were not answered. The Ministry of Gravity hence continues the quest with all hopes invested in ASCO2.T AT.LAST.

The Altar for Duchamp's Juggler-Handler-Tender of the Center of Gravity[ii] constructed on Breton's demand as one of the altars to mythical figures of modernism is now dedicated, on request of the Ministry of Gravity, to this very ASCO2.T AT.LAST. Just as the Juggler of the Center of Gravity was conceived in a note but never realised in the Large Glass, only to become a mythical figure of modernism, so does the ASCO2.T AT.LAST, quietly rejected by CERN and

[i] see appendix A for notes on "infra-thin" and "identicals"
[ii] the altar is part of the exhibition Le Surréalisme in 1947, Paris in honour to the mythical figures of modernism

never realised in the Large Hadron Collider, become the mythical figure of polyphibianism.

Duchamp's (or rather R. Mutt's) original Fountain was lost, but the myth of the Fountain persisted, omnipresent through his oeuvre, all the way to the last artwork where it appears in the form of the Waterfall, in particular, the waterfall Forestay by the lake Geneva, from where a different kind of overview can be obtained of CERN, just across the lake. In the same manner, the myth of ASCO2.T persists. As a myth, it is never actualised, but maintains its virtual component. Within the Box of 2014, in particular, the myth of ASCO2.T AT.LAST exists inside the virtual planet Earth – the Google Earth[i].

The myth-preserving environment of Google Earth readily lends itself to collecting Duchamp's notes. With complete aesthetic indifference the notes can be supplied to the virtual territory in a predetermined form at the chosen coordinates, with accompanying links "To here" and "From here." There are myriad of ways in which to curate the Box of 2014 in a virtual planet, free from constrains gravity, where Duchamp (1983) would find the "liberty of indifference" that is offered by the principle of "anti?gravity," following a "centre of distraction," rather than attraction.

[i] see also appendix B for instruction on curating the Box of 2014 through Google Earth

Besides 1st, the waterfall, and 2nd, the illuminating gas, only the meta-meta note, or simply the ‘pata note is given on curating the exhibition of notes. Otherwise the curator of the Box of 2014 has complete liberty of indifference to navigate the street view of the virtual Large Hadron Collider, annotating any suspicious events from leaking gas in the tunnels, to deserted bicycles and other kinds of chariots within the Batchelor Apparatus. The intervention in the virtual ATLAS Control Room ensures that the video of ASCO2.T AT.LAST is transmitted at all times. The spectator is invited to complete the existent physical apparatus, intermittently interrupted with ‘pataphysical notes, through infinite imaginary solutions. By curating the notes the curator thus exposes the mind of the spectator to the raw data at the threshold between physics and ‘pataphysics.

Every version of the Box of 2014 constitutes a unique encounter between the physicist and the ‘pataphysicist, furthermore inviting artists and scientists of any discipline to experience their encounters as something more specific and exceptional than the general assessment of a blurred borderline between art and science. The Box of 2014 is therefore, above all, an invitation to the artists to recognise the interface between the media, or in particular between the disciplines, and to halt at the infrathin interval, in order to delve into where the limitations of the scientists occur, and to help extend these limitations of science “a little,” just as Duchamp (Roberts, 1968, p. 62) was aiming “to strain the laws of physics, just a little.”

4.2.7. Retinal and non-retinal detectors: medium glass[i]

The instructions inscribed in French on a strip of metal glued across Marcel Duchamp's work, also known as Small Glass, translate into English as follows: 'To Be Looked at (from the Other Side of the Glass) with One Eye, Close to, for Almost an Hour.' In exploration of the implications of such strenuous procedure the original instructions will be expanded upon: 'To Be Looked at (from Multiple Sides) with more than One I, Close to and Even Closer, for Almost an Instant' - an invitation to exercise the polyphibic awareness of multiplicity of appearances, the ability to look at a phenomenon not only from one or the other side but from multiple sides, in its multiple potential apparitions.

The original title 'To Be Looked at (from the Other Side of the Glass)…' already persuades the spectator to switch the sides and go behind the image, but as curious spectators we are also tempted to speculate beyond it being a mere image, beyond the frame that binds it to be an image. Such speculation unravels its potential power when used as an instrument – an instrument that Duchamp (1989, p. 140) would invite us to engage with, to interact with in a "creative act" that "is not performed by the artist alone; the spectator brings the work in contact with the external world by deciphering and interpreting its inner qualifications."

[i] as presented at the 13th Consciousness Reframed Conference: Behind the Image and Beyond, Cairo 2013 and published in conference proceedings (Ljubec, 2014)

The small glass made contact with the external world in 1918, when it was hanged naked - frameless on a balcony in Buenos Aires. Duchamp (1989, p. 139) further explains participation in a "creative act" as a matter of "transference from the artist to the spectator in the form of an esthetic osmosis, taking place through the inert matter." In the case of the Small Glass the inert matter is glass with all its optical elements, an unframed, unlimited, selectively permeable membrane, receiving attention not unlike an antenna.

In the same text on "creative act" Duchamp (1989, p. 138) refers to the artist as "a mediumistic being who from the labyrinth beyond time and space, seeks his way out to a clearing." In an evolving transdisciplinary context Duchamp's "mediumistic being" was grown into an imaginary solution to release the disciplinary confinements. To navigate the zone in between and beyond disciplines the mutual dependence between the "mediumistic being" and the medium it interacts with - creates in - had to be re-examined (Ljubec, 2011, p. 165). By analogy with amphibians who are able to survive and thrive in two media like water and air a "mediumistic being" that is able to trespass multiple media was redefined and reborn into a polyphibian.

Let us use Duchamp's Small Glass in a creative act, not as an image to be looked at, but as an instrument to look for polyphibians, a detector for polyphibic awareness. We already know how a monophibian with a monocle would look upon a small glass – aiming right at the magnifying glass in the middle. An amphibian would approach small glass as an interface – maintaining overview

of both sides. How about a polyphibian? How would one detect with an apparatus, as puzzling as the Small Glass, such an enigmatic creature as a polyphibian? Before we participate in the creative act let us briefly review the main constitutive elements of this detector[i] at hand:

- The magnifying lens;
- The zone plate: a set of rings around the magnifying lens which alternate between opaque and transparent. Unlike the lens, a zone plate is a device that relies on diffraction instead of refraction or reflection to focus light or other wavelike phenomena. Diffraction happens when a wave encounters an obstacle – such as the opaque ring on the zone plate. By adjusting the space between the zones constructive interference can be achieved from diffracted light.
- The cross-eyed scissors: only partly visible in the Small Glass but fit entirely on the Large Glass alluding to Leonardo da Vinci's X-shaped diagram of cross-eyed vision that studies binocular disparity (the difference in image location of an object seen by each eye, resulting from the distance between the eyes).
- The optical witness eye-chart: used to diagnose astigmatism, blurred vision caused by a refractive error of the eye that prevents convergence of parallel rays of light on a single focal point on the retina.

[i] see (Henderson, 2005) for more on technical details

- The pyramid;
- The obelisk.[i]

[i] This talk was presented in Egyptian landscape of pyramids, obelisks and sphinxes.

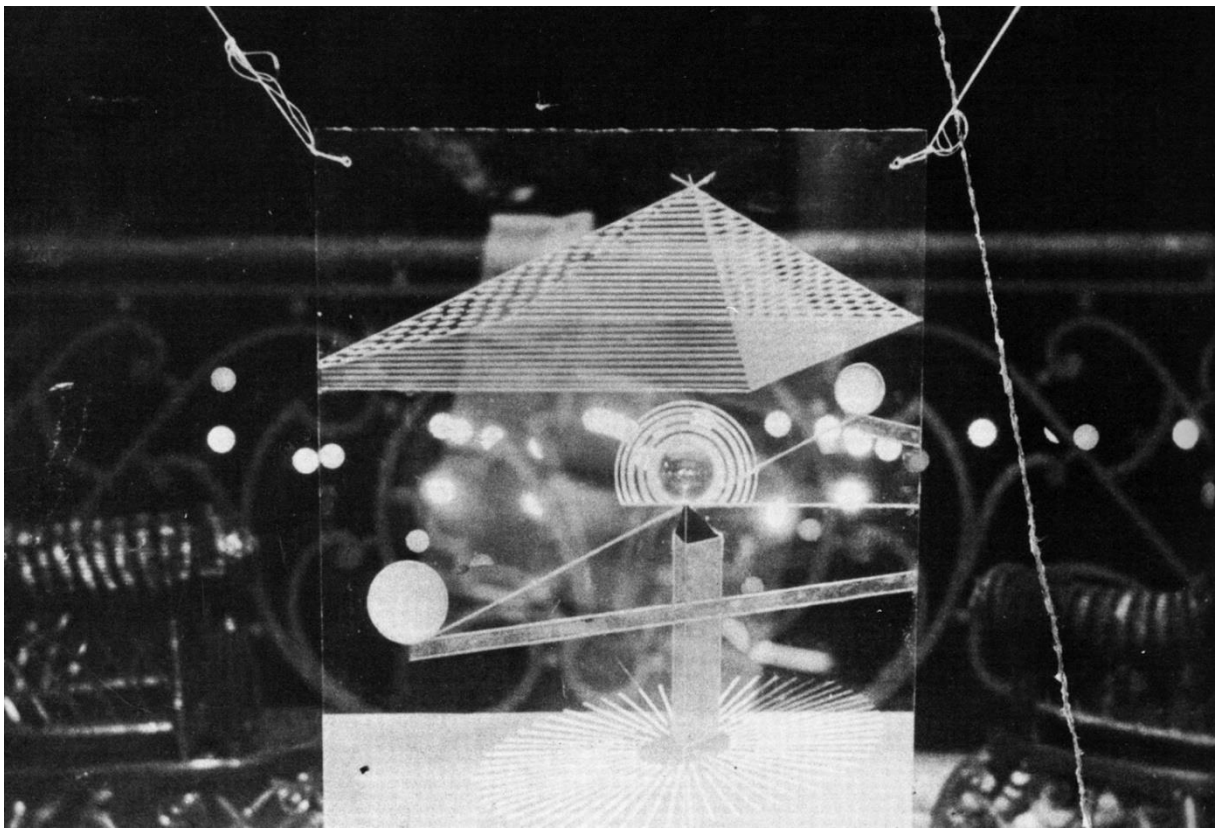

Figure 2: Small Glass, unframed

Marcel Duchamp, To Be Looked at (from the Other Side of the Glass) with One Eye, Close to, for Almost an Hour, 1918, oil paint, mirror silver, lead wire and magnifying lens on glass, Museum of Modern Art, New York, bequest of Katherine S. Dreier. Photograph of the work unframed taken in Buenos Aires in 1918–1919. Yale University Art Gallery, Société Anonyme Collection.

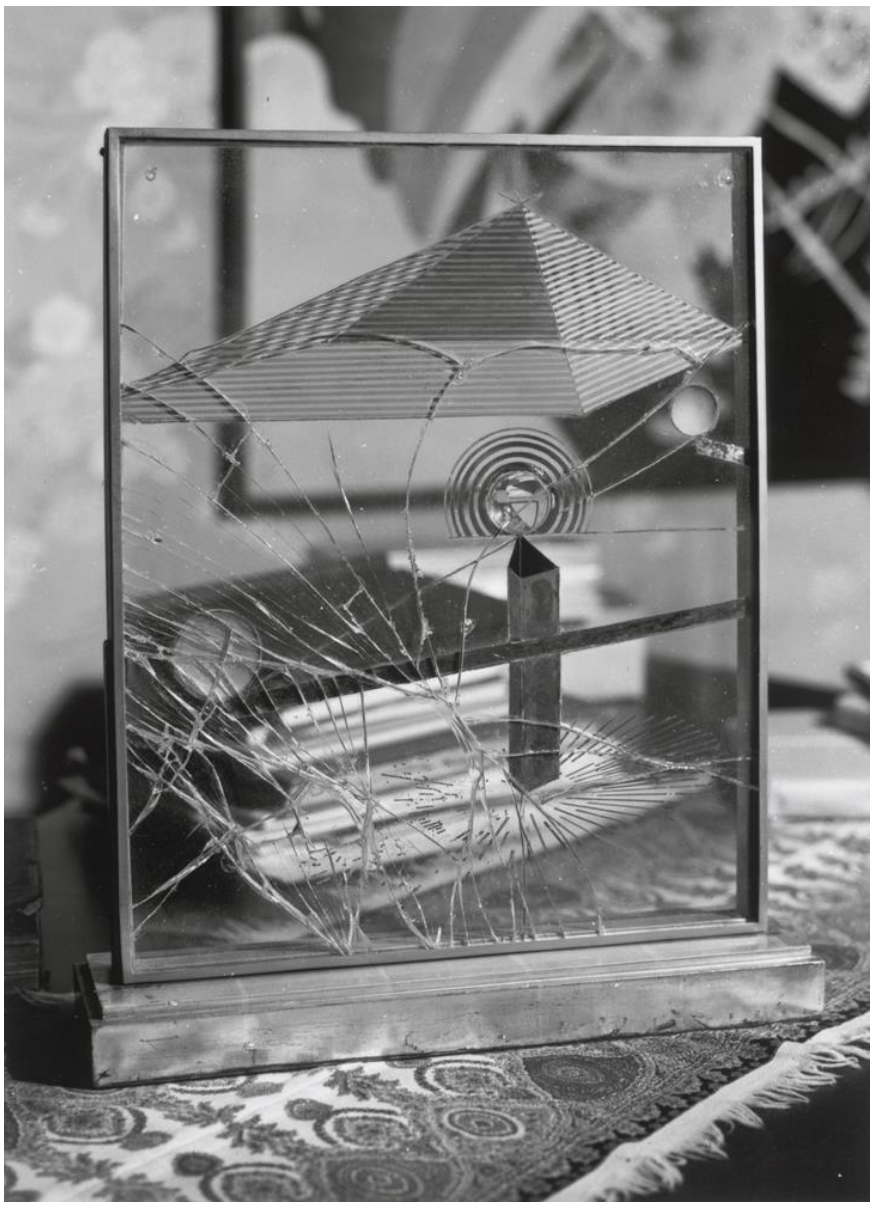

Figure 3: Small Glass, framed

Photograph of Marcel Duchamp's To Be Looked at (from the Other Side of the Glass) with One Eye, Close to, for Almost an Hour, 1918. Photographer John Schiff. Photo credit: Yale University Art Gallery. Museum of Modern Art, from Katherine S. Dreier's private collection.

SMALL GLASS TO BE ENGAGED IN CREATIVE ACT

1918. On a balcony in Buenos Aires:
oil paint,
mirror silver,
lead wire,
magnifying lens on glass – small glass in relation to Large Glass.

Strip of metal with French inscription:
À regarder (l'autre côté du verre) d'un oeil, de près, pendant presque une heure.

Two holes in top two corners: the small glass hangs from two threads.
It hangs in space without a frame, without borders.
The two threads are the only visible connection to a variable context.
Hanging there invisible, transparent,
yet heterogeneously transparent, impenetrable to homogeneous mind.

Its optical elements readjust the geometry of space it is hanging in.
Vice versa the space could readjust the optical elements:
spatial translation could crack the transparency;
vibrations of space in transportation are a possibility to be actualized in glass:
small or Large, cracking is its potential.

While fresh with potential it is free to hang out in the open air,
interfering with electromagnetism of an open field,
detecting the passing wave fronts of visible light, or invisible …

Becoming actualized by the crack –
one of the many possible cracked configurations is manifested:
the manifestation abruptly arrests an open system.

A small glass self-actualized is

to be enclosed in a frame
to be displayed in an enclosed space
to be looked at.

Is it a joke on monophibians? A monophibian enters a bar:
to be looked at (from the other side of the glass) with one eye, close to, for almost an hour.
'I just tell them not to do it because there is nothing to look at but exhaustion'.
Duchamp[i].
Exhaustion of one eye, of mono I.
Monotony of empty infinite depth in perspective,
only one viewpoint allowed, from one side, wrong side, even:
the lens inflates infinity, turns it upside down.

Retinal fatigue:
small glass as apparatus open to all the possible configurations -
once framed and enclosed in a sealed system serves as a satirical retinal art.

A precisely located pyramid of stripes suddenly bursts in laughter of moiré patterns.

To see it from the other side, from both sides at once:
that is to become a cut – amphibian cut:
place your eyes above and below water surface,
split your eyes open.

Ground yourself by floating in the midst:

---

[i] as quoted in (Siegel, 1969)

know the frivolous air and firm ground but know also the underwater.
Protrude in either way but keep attention on the surface.

Amphibious pair of eyes are caught in the cut:
looking close to, even closer;
until the pair of eyes are in the plane of the lens,
until the lens is on the line in between the eyes;
in the extreme zone of indifference for ambivalent amphibian.

The joke is on you - binocular disparity -
Duchampian humour sticks in the scissors of a cross-eyed vision alla da Vinci.
Don't miscalculate the depth – your world is infrathin.
The second eye is here only to help you hallucinate depth.

A monophibian never comes as close -
it observes on a distance, behind the glass.
Do not freeze your gaze towards infinity.
Add infinity to your reasoning and it vanishes in the vanishing point.

If a monophibian looks at the small glass …
it finds itself alone in vertigo.

Balance yourself with another I.

If an amphibian gets involved in the cut of the small glass and survives …
it animates the surface, it renders the interface alive.

Make the interface a selectively permeable membrane;
semi transparent, semi opaque, reflect, refract, diffract.
a zone plate for braiding light
a zone plate for breeding life

Keep multiplying the foci:
multiple focal points - viewpoints floating out of focus.
Multiply into life:
once alive - use the third eye and diffract the I.
Disperse oneself.

If a polyphibian is detected by the small glass …
how would one know its presence?

Through the Optical Witness?
The witness of polyphibic awareness:
the eye chart perceives a polyphibian as an astigmatic blur: poly- foci!
Another comic relief?

Duchamp is waiting on the other side.

A polyphibian is always present
in every cut, slim slice, infrathin interface
in multiplicity of appearances
with multiple Is.

When a polyphibic eye closes
it turns inward
to open towards other directions, other sides.

Detectors and Witnesses in small glass
witnesses and detectors in Large Glass:
iridescent interference between thin layers of heterogeneous transparency
brought together close to and even closer
for a polyphibic awareness to arise for almost an instant -
delay in glass collapses into simultaneous presence.

5. Conclusion

5.1. Imagining polyphibianism: reaffirming research thesis

To cross the gap between disciplinary and transdisciplinary research the gap between theory and practice of transdisciplinary needs to be addressed. While, with every major discovery on a periphery of a scientific discipline, trespassing into transdisciplinary zone occurs sporadically and spontaneously, there is in general no access granted or guaranteed for intentional trespassing. Crossing the borders of disciplinary research therefore mostly results in exchange among disciplines that might inflate the area of each involved discipline or further fragment the disciplinary apparatus into additional compartments. Such cross-disciplinary projects are nonetheless executed within a specific disciplinary domain, rather than in the transdisciplinary zone in between and beyond disciplines.

The problems preventing the open structure of knowledge, as proposed in Manifesto of Transdisciplinarity, to manifest in practice, are not to be solved by yet another auxiliary structure, a firm framework or a fixed methodology functioning as a bridge over such ineffable gap between theory and practice. Instead this thesis envisions a movement rather than a structure - polyphibianism - an evolutionary movement of an imaginary organism of living knowledge.

Polyphibianism is thus imagined as a possible transition from closed structure of disciplinary research to open structure of transdisciplinarity. As an imaginary solution to problems that occur in this transition, its aim is to better understand the given problematic, to offer a fertile foundation to elaborate on experiencing a different kind of knowledge, where the observer and the observed are not separated but mutually dependent, forming a self-aware organism of transdisciplinary knowledge, rather than accumulating knowledge, extracted and externalised within disciplinary research.

This thesis hence foresees a possible transdisciplinary research environment indigenous to disciplinary researcher where intellect evolves by correcting itself and becoming self-aware. The intellectual instruments mutate into organs of knowing and self-organise into an organism of living knowledge. Various principles of correction, innovation, invention, and mutation of potential organs of knowing are examined in an attempt to confront the concerns of disciplinary researchers engaging in transdisciplinary practice. Moreover, an example of effective practice is studied where an artist trespasses the borders of art and invades the zone in between the sciences by setting up a creative act for the spectators to participate in.

Participating in a creative act becomes the experimental setting for this thesis in which the missing link between the artist and the spectator is searched for. The role of this link, conventionally attributed to the curator, in the context of transdisciplinarity, is to become the catalyst, accelerating the transition and

transmutation of both artist and spectator into the organism of living knowledge. The proposal of this thesis for internal introspective participation in transdisciplinary way of knowing, that resists external representation, is therefore reaffirmed through experimental practice.

This thesis does not limit itself to a specialised readership, it is hoped that any researcher constrained by her or his disciplinary domain will find in it inspiration and the way to search beyond the disciplinary borders. And yet, for the purpose of spreading such encouragement the primary intended readership would be the curators of artwork that moves freely in between and beyond institutionalised knowledge. The curator in this case is the proto-polyphibian, inviting others into the movement of polyphibianism, inviting them to participate in each other's creative acts. Triggering such catalytic reaction is the crucial step in further evolution of the imaginary organism of living knowledge and the main motivation for writing this thesis.

5.2. Inventing polyphibic organs: resolving research questions

The study sought to overcome the problems in transition from disciplinary to transdisciplinary research, from theory of transdisciplinarity to significant engagement in practice. To address this transitional problematics the main issues inhibiting transdisciplinary practice had to be identified. The intention of questions formulated in this study is not only to seek a theoretical answer but to

respond directly to practice. For this reason the research undertook more than a theoretical inquiry, attempting to test the proposed imaginary solutions with practical interventions and participation in creative acts. The questions are restated here in the sequence of entering the transdisciplinary zone from concerns whether or not to consider transdisciplinarity as a research option in the first place, to progressively more specific suggestions on practicing transdisciplinarity. These imaginary solutions are of provisional nature in a field that evades a firm framework. Limitations of the current research and suggestions for a future research are listed at the end of this chapter.

UNEASE OF UNKNOWN

The proof that transdisciplinary zone is not an empty set was already provided by Basarab Nicolescu (2002). This thesis resumes the pursuits of Nicolescu's manifesto by studying what about this unknown, unexplored, but far from uninhabited territory causes anxiety in disciplinary researchers: anxiety of transition from closed disciplinary to open transdisciplinary structure, anxiety of disorientation in absence of firm and fixed methodology, anxiety of archaic, abstruse, mystic or esoteric knowledge, anxiety of reintegrating the observer and the observed, of admitting interdependency, of establishing a dynamic relationship of mutually interchangeable roles. To prevent these preconceived notions, derived from obsolete categorisation of knowledge production, from impeding evolution of transdisciplinary practice, this thesis has demonstrated through exemplary study cases that transdisciplinary zone is neither void nor

vague. Furthermore, it is by imagining what transdisciplinarity might evolve into that this thesis attempts to alleviate the unease in front of the unknown.

PROBLEMS OF TRANSITION INTO PRACTICE

Once it has been intentionally decided that transdisciplinarity is to be practiced, transition into the transdisciplinary zone poses challenges both on the level of the individual disciplinary researcher transmuting into a polyphibian, and on the level of collective institutionalised research, where the apparatus of customary knowledge production is obstructing such transmutation. Without fundamental adaptation to a ceaselessly changing transdisciplinary environment through evolutionary mutations of organs of knowing, practicing transdisciplinarity is bound to remain superficial or be substituted with its surrogate interdisciplinarity or multidisciplinarity.

Insufficient immersion into transdisciplinary zone is often the case in collaboration of such disparate institutions as are art and science. In many such attempts the lack of transmutation is evident from the fact that the involved artist and scientist do not experience or engage into a different kind of knowing. Rather, confronted with seemingly incompatible methodologies, a mutual and silent consensus is reached, that one discipline should become subordinate to the other, for instance, that art at service of science is to be further limited to illustrative, demonstrative set of tools. Such practice not only reduces transdisciplinarity to a cross-disciplinary exchanges of instruments, but

furthermore reinforces the impenetrability of institutions built around disciplines.

A pretence of collaboration reinforces the disciplinary apparatus and increases the anxiety between disciplinary cultures. This thesis proposes to attack this problem by participation of members of various institutions in a creative act where each participant "experiences the phenomenon of transmutation" (Duchamp, 1989, p. 139). Transmutation into a polyphibian takes place first and foremost on the individual level. It was shown throughout this thesis how with polyphibic awareness all the problems of transdisciplinarity, as perceived from monophibic standpoint, can be avoided: the problems of resisting representation, of preservation, of extraction and abstraction of knowledge, the problems of reliance on habits of human sense organs and inability to invent new organs of knowing, and other problems of communication of the incommunicable, of mediation of what can only be known immediately, etc.

This thesis proposes imaginary solution, but to be able to imagine solutions first the existing faculties of intellect must be studied through which the intellect can expand. The faculty of laughing is examined in efficiency as a comical corrective and the faculty of dreaming for enhancing imagination. Polyphibianism follows the 'pataphysical science that expands intellect from a faculty focused on generalisation to a faculty that is able to receive the multiplicity of exceptions through laughter. The rigidity of disciplined intellect can be broken by laughter on several orders. The monophibic laughter is elastic, it temporarily relaxes the

reasoning but soon after lets the monophibian to return to the approximately the same state. The laughter that transforms the monophibian into polyphibian on the other hand is plastic, it burst a laughing individual into multiplicity of points of being - the newborn polyphibian is not to return to the previous state.

PROBLEM OF PRACTICING PRECISION

Once transmutation is in process the tactics of a newborn polyphibian need to be developed. Transdisciplinary practice requires new organs of knowing. While disciplinary knowledge is increasing in quantity, losing ability to adapt even to increasingly complex conditions that it creates itself, transdisciplinary knowledge grows by differentiation in kind, differentiating in quality. In the same manner values of disciplinary research, such as precision, are measured in quantity, whereas transdisciplinarity, for instance, treats precision as quality. The faulty accusation from the side of disciplinary institution would be in this case that transdisciplinarity lacks in precision. This thesis is an attempt to demonstrate the contrary.

As is shown in this thesis, the anticipation of chaos, the discovery of chance within deterministic systems, left the scientists without adequate tools for precisely determining some systems' behaviour. Suddenly, no matter how precisely one sets up the system, if the system is sensitive to initial condition, quantifiable prediction becomes impossible and irrelevant. Poincaré crossed the borders of a discipline that was obsessed with quantities as the only valuable measure of prediction, and imagined a different kind of prediction – a qualitative

analysis of the future behaviour of the system that would evaluate the system in the state space of all its possible evolution trajectories. Poincaré's invention of a different organ of knowing dynamic systems is taken as an example in which precision gains new meaning.

Part of the practice based research performed for the purposes of this thesis was an attempt to examine the changing notion of precision within the transdisciplinary practice. Locating the Interval of Suspended Judgement for the specific context of crossing institutions of art and science, of state of the art physics and 'pataphysics, the precision procedures of both physics and 'pataphysics were followed to the extreme, where they intersect – only there the interval could be located with infinite mathematical precision. A search for the interval of suspended judgement is context dependent – it depends on the disciplines involved. Some disciplines are not straightforward to cut – their domains of influence meander into other disciplines. To find a discipline-free zone – the transdisciplinary zone - the infrathin incision might have to be quite convoluted.

This thesis finds the model of transdisciplinarity in Bergson's writing on laughter and dreams – both faculties are active at the periphery of intellect. While laughter was shown to correct the rigid quantitative precision based on measurement and congruence, dreams were shown as a turbulent heterogeneous overly saturated environment where at first sight precision cannot be achieved. But Bergson (1914, p. 50) explained: "Abundance, in the domain of the mind, does not mean effort.

What requires an effort is the precision of adjustment." Transdisciplinarity trains the precision of fine-tuning towards infinitely intricate new details appearing in a dream-like flow of knowledge that is not to be compared quantitatively from a single point of view, but experienced qualitatively in plurality of incomparable points of being.

DICHOTOMIES, TRICHOTOMIES, POLYCHOTOMIES

Many kinds of contradictions were addressed in this study, such as simultaneous practicing of indifference and involvement, or contrasting comparisons that proved the same point: a dichotomy formed between opposing statements of McLuhan and Bergson on the visual and the intellectual aiming at the same conclusion, a trichotomy between whether Duchamp supported Poincaré or Bergson, none of them, or both, in their dispute, etc. By resolving these tensions between seemingly irreconcilable terms from a fixed viewpoint, but imaginable as complementary if experienced from different points of being, this thesis introduces a proto-practice of transdisciplinarity, making the first steps towards imagining new organs for new ways of knowing. The entire organism of living knowledge is created from such tensions as, for instance, being incessantly newborn while concurrently growing old, etc.

Disciplinary knowledge is in principle foreseeable – from one theorem consequences can be derived, inferred by reasoning, that as complicated as it may be, it is simply following the predetermined methodology of a discipline. Transdisciplinary knowing is uncertain because it cannot be dissected without

knowing it first, but to know it one must first dissect it. Transdisciplinarity, growing knowledge by differentiation into multiple points of being, is hence unforeseeable – it comes into existence with spontaneous differentiation rather than being preconceived. As Bergson (2005, p. 9) affirms: "To predict it would have been to produce it before it was produced." The tension of polychotomy is not to be fragmented arbitrarily or uniformly, as is customary in most disciplinary departments, but with precise transdisciplinary incision from which the organism of knowledge may grow and be lived from many points of being.

5.3. Awakening polyphibic awareness: reassessing research approach

APPROACH OF A SERIOUS ARTIST

Why approach the problematic of transdisciplinary practice stated above from a stance of a particularly challenging collaboration between disciplines as distant and disparate as that of art and science? Namely, categories of art and science are generalised and universalised to the extent that they are on the verge of becoming obsolete. Moreover, the diversity within both categories is such that instead of forming coherent cultures, artistic and scientific multiplicity of ephemeral subcultures overshadows the discussion of the "two cultures" (Snow, 2012). With this ambiguity taken into account, it is of no surprise that collaborations between artist and scientist, spontaneous or intentional, have not been formalised into a validated methodology. And yet, the fact that these collaborations rest on sheer

empirical evidences and accounts of experiences confirms existence of attempts at transdisciplinary practice unrestrained by theory.

What is commonly referred to as artistic approach can also be classified as unclassifiable, that is, not belonging to any discipline – not satisfying the requirements of disciplinary research and the rigour of disciplinary knowledge production. Therefore art is, in a sense, already expelled by the discipline, Duchamp only makes that more obvious by escalating terms from artist to anartist, leading inevitably to anarchist. Art, from all disciplinary endeavours, is the most transdisciplinary by default, that is, it operates beyond disciplines, and for this reason it is arguably the most suitable foundation for evolution of transdisciplinarity. Art of course returns to disciplinary knowledge production with every manifestation and yet it was artists, like Duchamp, introducing the non-retinal art, training themselves in true transdisciplinary manner, in order to resist representation.

This thesis focuses on Duchamp's practice of transdisciplinary trespassing, as a study case, his becoming a "pseudo-scientist," or just "pseudo all in all." (Tomkins, 1965, pp. 36, 37). Pseudo attitude in research never quite reaches the disciplinary level of representation, the pseudo-disciplinarian always keeps one foot in the transdisciplinary torrent. An artist becoming a pseudo-scientist remains in the process of crossing the gap between art and science for that crucial extended period of time. This gap between art and science is argued in this thesis as one of most promising entryways into the transdisciplinary zone.

Many of the above mentioned impediments in transdisciplinary practice were circumvented by examining the cultural impact of scientific and technological revolutions that lead to McLuhan's theory of media, where McLuhan exposes artists as the most sensitive explorers of advancements in science and technology. Serious artists, as McLuhan enhances their important role in society, are researchers with special sensitivity to changes in rate of sensing, sensible to those changes in altered mode and rate of perception that uncover otherwise imperceptible fluctuations in the media environment. Serious artists are willing to experiment with the media outside the rules and methods that were set up for it, outside the range of its predetermined applicability, thus revealing the true scope of a new medium and mutual dependence between the medium and its inventor.

The model of the serious artist involved in the progress of science and technology is not a model of accessing such accelerating knowledge production by learning it from external sources, but by living it in real time, experiencing the change as the wave-front approaches. Such spontaneous engagement in new knowledge as it grows already transcends the disciplinary approach to knowledge. Serious artist is therefore considered in this thesis as a suitable transdisciplinarian proto-species. McLuhan's "way of the serious artist" evolves in this thesis in the "way of the polyphibian". Following Duchamp's invitation, the research in this thesis practices the participation in creative act as a possible attempt to reach the transdisciplinary zone, to bridge art and science with a movement, rather than a

structure, and in the particular case of art science collision - to locate the threshold between physics and ‘pataphysics.

TANGENTIALLY ‘PATAPHYSICAL

Why is the approach to transdisciplinarity in this thesis tangentially ‘pataphysical? That the author of the Manifesto of Transdisciplinarity is allegedly well acquainted with ‘pataphysical literature might well be a coincidence, and yet, when examined closely, the comical corrective that ‘pataphysics practices on physics and the science of the general, in general, is in essence transdisciplinary, it is going beyond the limitations of the disciplinary production of laws, or rather reduction of “exceptional” data in the process of generalization. Polyphibianism therefore tangentially touches ‘pataphysics in its ambitious scope to recognise and study the unique – polyphibianism offers the imaginary solution to grow organs of knowing the unique.

‘Pataphysically serious humour, expanding the limits of intellect, is not simply a useful trigger for trespassing the disciplinary borders – polyphibianism embraces all the “logics” of laughter and other modes of ‘pataphysical “reasoning” and production of imaginary solutions. Since polyphibianism, as transdisciplinary movement, resists representation, it can be at most referred to by being touched by ‘pataphysics – a description of polyphibianism can therefore at best be tangentially ‘pataphysical. Just as pataphysics redefines finances to phynances in order to describe the self-aware geometry of polyphibianism, fractal was redefined into phractal.

As much as from disciplinary monophibic standpoint 'pataphysics might lack in rigour, precision or consistency, it has been confirmed in polyphibic context of practicing precision that meta-meta- or rather 'pata- description of polyphibianism is one of the more satisfactory options in representing polyphibianism to monophibians. Only in this manner a formula for transdisciplinarity can be discerned. Like recursive equations generating fractals, phractals are recursive transdisciplinary formulas that in order to live the knowledge need to re-new, re-create knowledge in continuity of change. Living knowledge is ceaselessly evolving: evolution of living knowledge = growing old + being newborn = keeping past alive + being indifferent to the past. Phractal growth is bending the rules – expanding within by enfolding exceptions to the rules. The ceaselessly evolving phractal structure is consistently porous and selectively permeable.

INTROSPECTIVE PARTICIPATION

Why does the approach to transdisciplinarity in this thesis rely on introspection? The evolution of transdisciplinarity, as imagined in this thesis, is an evolution of a growing organism of living knowledge. In contrast to externalised disciplinary knowledge this organism knows itself internally through ceaselessly mutating organs of knowing. The access to transdisciplinarity is therefore through internal experience of knowing or, in other words, it is accessible introspectively. Introspection enables that crucial, critical and even comical corrective to habits of thought that externalise and separate the observer from the observed.

Reviewing the documented introspection of the three study cases – the writings and annotations by polymath or mathematical physicist Poincaré, metaphysicist Bergson and 'pataphysicist Duchamp - it becomes clear that introspection dissolves all boundaries between scientists, artists and philosophers. Their tools only differ in appearance, in fact, the differences appear only in tools they use to externalise the internal knowing. When deeply involved in profound discoveries their procedures do not differ in method – every great invention comes from the same source. This unseen, ungraspable method that was examined for the thesis, confirms the hypothesis of obsoleteness of categorisation into arts and sciences, or any other category in knowledge production and reproduction, knowledge classification, administration, illustration, explanation, education, communication, distribution or the like.

Poincaré's introspection focuses on aesthetic sensibility in scientific discovery, Duchamp's notes are serious but humorous pseudo-scientific and anartistic speculations, while Bergson's introspection merges both the indifference in humour and the imaginative involvement in a dream. The method of indifference trained with the faculty of laughter is shown to open up access beyond disciplinary research internally – introspectively. Introspection can therefore be practiced through dreams and imagination – together with comical corrective the "reasoning" in dreams forms the logic of transdisciplinarity. Duchamp sets up a creative act by experimentally exaggerating Poincaré's ideas and complementing them with Bergsonist / anti-Bergsonist dichotomies. By participating in this creative act, as Duchamp invites his spectators to do, an attempt of

transdisciplinary practice is made, examining how to experience knowledge at the threshold between disciplines.

5.4. Limitations of research: resistance to representation

Transdisciplinarity is complementary to disciplinarity. Trespassing into transdisciplinary zone is not a one way trip. The trespasser regains her role as a disciplinary researcher. In this thesis the movement of polyphibianism metabolises into two kinds of knowledge – catabolism returns and reintegrates the transmuted substance into transdisciplinary organism of living knowledge, while anabolism extracts the non-living knowledge for disciplinary post-production. The feedback loop between transdisciplinary and disciplinary research encounters the problem of resistance to representation in transdisciplinarity.

The problem lies on the border that divides representation oriented research and non-representational research. The process of disciplinary research must be visualisable, it is tailored for visually dominated culture. Results of research are to be superimposed, measured against each other, evaluated and judged. On the contrary, transdisciplinarity offers the Interval of Suspended Judgement. Nothing is to be communicated, everything is immediately known and immediately changes. The tendencies of transdisciplinarity and disciplinarity oppose each other – the instruments of visualisation and the organs of knowing the invisible are of a different kind. Research of transdisciplinarity within a disciplinary context that presupposes categorisation and requires

diagrammatical schemas of transdisciplinary apparatus is severely limited and can be fatal for the practice of transdisciplinarity – the message of transdisciplinarity does not come across because transdisciplinarity is not about communication. There are no orders given by the organism of living knowledge to adapt to changes, rather, organs of knowing self-re-organise with each mutation.

How to overcome these limits is perhaps a note for the subchapter on future research. The author of this thesis is aware of the limitations of any description. Even though the chosen terminology of "life," "organs," "organism," "self-organisation," etc., is used to turn the reader's focus away from apparatuses of knowledge production, the use of metaphors does not evade categorisation. To escape such limitations imposed by descriptions, the intellect is invited to disassemble the boundaries through comical corrective. For this purpose the organism of living knowledge in this thesis remains vaguely defined, with loose borders, but most of all, it is defined in an equation of constant change, growth, or, in Bergson's (2005, p. 10) words: "to exist is to change, to change is to mature, to mature is to go on creating oneself endlessly."

The term polyphibian is a provisional, transitory category, not intended for a species but for differentiation into all possible species – imaginary solutions for not yet imagined problems and for reimagining falsely stated problems. Polyphibianism is thus evolutionary movement of adaptability in imaginary solutions. Once this equation is not only grasped but practiced in imagination the

category can be dismissed, it becomes obsolete. The limitations of this research are therefore to be overcome by each replacement of an obsolete category with a new one, by changing and mutating the definition and by cracking up in laughter.

5.5. Future research: further evolution

The thesis opens up many interstitial areas for future engagement in transdisciplinary niches. By participating in a particular creative act only one specific Interval of Suspended Judgement was established on a precisely located threshold, inviting the reader to search for other intervals by joining in, or setting up other creative acts. In a true transdisciplinary manner this invitation comes with no method offered – the interval must be reinvented from scratch, the sense organs must mutate to a different search sensibility. Likewise there are no labels prepared for reuse – with each project that is to disregard obsolete categories new provisional terminology should be conceived, preferably for single use.

For transdisciplinary projects initiated by an artist the thesis proposes to consider the role of a curator as a catalyst in the creative act. Further studies are needed to reconfigure curatorship in a mutating art environment - how to ensure curatorial sensitivity for recognising the tendencies of a disciplinary trespasser, how to develop curatorial skills to guide a polyphibic transmutation. Moreover, a lack of expertise in reconsidering the traditional form of exhibitions can be irreversibly damaging with growing economic dependency of art projects on

administrative apparatus that forces the artist to manifest externally, to exhibit in public spaces - to be publicised within monophibic format restrictions.

Since the administrative apparatus measures quantity, demand for high quota of artistic export leads inevitably to overproduction of artistic artefacts. On the other hand, the apparatus, lacking in sense of humour and malfunctioning as a comical corrective, demonstrates the utmost tolerance over quality of art projects. Tolerance of the existing art formats discourages adaptation to changes and the traditional environment for exhibiting the art prevails. Further research into the role of comical correctives and other critical faculties is crucial not to lose the evolutionary trajectory of art from a century ago when artists as Kupka were "theorising on the future possibility of the direct transfer of thought from the artist to his audience," (Henderson, 2005, p. 67). With advancements in science and technology opportunities unavailable to Kupka present themselves to new generations of serious artists.

Even though polyphibianism is inspired by such visions of "direct transfer" and immediate knowing, it is not the aim of this thesis to convince the reader that there is no need for representation or preservation of living transdisciplinary knowledge in a suspension state for future generations. Posterity preoccupied many serious artists working on frontiers, producing futuristic work that was ahead of their time that could not have been immediately translated to monophibic society, oriented towards the past. As Klee noticed: "there is no work of art that does not call on a people who does not yet exist," Deleuze (2006, p.

324). Duchamp likewise carefully assembles the material manifestations of his transdisciplinary processes in form of postponement: Large Glass becomes a delay in glass, the boxes of notes, or the box in a valise, are equally a form of archival suspension, inviting the "people who does/did not yet exist" to participate in his creative act.

Just as research in this thesis demonstrated the importance of precise incision between disciplines, further research must be undertaken on how to accurately interrupt a transdisciplinary flow. The movement of polyphibianism and the snapshots of monophibic fixed viewpoint perspective must synchronise. Under the influence of transdisciplinary polyphibianism, monophibic faculty of disciplinary archiving of knowledge in suspension, is to evolve in discrete leaps. The problem of representation for spatially and visually dominated monophibic culture must not be underestimated: from the loss due to reduction of intricate fractal / phractal dimensional polyphibianism to simple integer dimensions, to the loss due to reducing the multiple points of being to a single fixed viewpoint. Imaginary solutions are needed for resolving the dichotomies and polychotomies of curatorship in mediating the immediate transdisciplinary practice.

With technological advancement impacting the variables of human environment the landscape of the intellect is changing. Just as human species is gradually resigning from conquering its habitat, and reconsidering itself in an interdependent relationship with it, our relation with the environment of intellectual knowledge production must be rethought correspondingly. The

complex dynamics between the animating agent and the ambient needs to be taken into account. The use of original sense organs is being reduced and replaced by other instruments of knowing the environment – some of them pervading the human life to the extent of becoming new organs of knowing. If human beings are to be aware of organs implanted on them by their own technological inventions, they must be always prepared to develop their own imaginary organs independently, to counter and resist the current, if necessary.

By practicing transdisciplinarity the anxiety of the archaic way of knowing dissolves. Transdisciplinarity merges the new technologies with the ancient on equal grounds, notwithstanding the humour – the comical corrective is applied in all directions. Just as McLuhan recognised the artists at the forefront of technological advances, so do other civilisations recognise their polyphibians. The purpose of this thesis is thus to find the polyphibians at the forefront of disciplinary culture and evolve an indigenous environment for disciplinary trespassers. Through this environment the access is open to all potential ways of knowing and the proposal made in this thesis is to further research them introspectively. Polyphibianism, in this sense, is integrative and emphatic to all modes of knowing, just as transdisciplinarity does not exclude the disciplinary research.

Bergson, without allowing himself to go too far, nonetheless encourages introspective speculation, beyond boundaries of disciplinary research, in the interval of suspended judgement: “I stop upon the threshold of the mystery. To

explore the most secret depths of the unconscious, to labor in what I have just called the subsoil of consciousness, that will be the principal task of psychology in the century which is opening. I do not doubt that wonderful discoveries await it there, as important perhaps as have been in the preceding centuries the discoveries of the physical and natural sciences. That at least is the promise which I make for it, that is the wish that in closing I have for it," (Bergson, 1914, p. 56). The proto-polyphibic skills introduced in the early 20th century by Bergson Poincaré, Duchamp, and others, and carefully curated for posterity, are to be trained as survival tactics in the changing intellectual landscape of the 21st century.

Appendix A: temporary terminology

ART/ANART/ANTIART

While antiart counters art, anart protests by complete indifference to art.

> If [Marcel Duchamp] used the term "an-art" to refer to the results of his search beyond art and anti-art, then he undoubtedly did so by analogy with the term "an-archy." […] Art, Duchamp was convinced, could be practiced only as a radically individual, esoteric activity (Molderings, 2010, pp. 2496-502).
>
> In 1965, when interviewed by Don Morrison of the *Minneapolis Star* about the Readymades, Duchamp said "I don't like the word 'anti'. They are an-art or non-art." Quoted in Duchamp, "Ephemerides," 18 October [1965]. Cf. also Drot, Jeu d'echecs avec Marcel Duchamp. (Molderings, 2010, pp. 4166-72)

CREATIVE ACT

Marcel Duchamp, *Creative Act*, Houston, April 1957

> This phenomenon is comparable to transference from the artist to the spectator in the form of an esthetic osmosis taking place through the inert matter […] In the creative act, the artist goes from intention to realization through a chain of totally subjective reactions. […] The result of this struggle is a difference between the intention and its realization, a difference which the artist is not aware of. Consequently, in the chain of reactions accompanying the creative act, a link is missing. This gap, representing the inability of the artist to express fully his intention, this difference between what he intended to realize and did realize, is the personal "art coefficient" contained in the work. […] the creative act takes another aspect when the spectator experiences the phenomenon of transmutation: through the change from inert matter into a work of art, an actual transubstantiation has taken place […] the creative act is not performed by the artist alone; the spectator brings the work in contact with the external world by deciphering and interpreting its inner qualification and thus adds his contribution to the creative act." (Duchamp, 1983, pp. 139, 140)

INDIFFERENCE

Marcel Duchamp, *Apropos of "Readymades,"* New York, October 1961

> A point which I want very much to establish is that the choice of these "readymades" was never dictated by esthetic delectation. This choice was based on a reaction of visual indifference with at the same time a total absence of good or bad taste … in fact a complete anesthesia. (Duchamp, 1989, p. 141)

INFRADIFFERENTIATION

Infradifferentiation is a transdisciplinary differentiation with infrathin precision.

INFRATHIN

Infrathin is what separates the science of the general from science of exceptions:

> when the smoke of the tobacco smells also of the mouth from which it comes, the 3 smells marry by infra thin (Duchamp, 1983)

> just touching. While trying to place 1 plane surface precisely on another plane surface you pass through some infra thin moments -- (Duchamp, 1983)

> Infra-thin separation 2 forms cast in the same mold (?) differ from each other by an infra thin separative amount -- (Duchamp, 1983)

> All "identicals" as identical as they may be, (and the more identical they are) move toward this infra thin separative difference. (Duchamp, 1983)

> Two men are not an example of identicality and to the contrary move away from a determinable infra thin difference – but there exists the crude conception of the déjà vu which leads from generic grouping (2 trees, 2 boats) to the most identical "castings." It would be better to try to go into the infra thin interval which separates 2 "identicals," than to conveniently accept the verbal generalization which makes 2 twins look like 2 drops of water. (Duchamp, 1983)

INSTINCT

> Instinct perfected is a faculty of using and even of constructing organized instruments; (Bergson, 2005, p. 155)

INTELLECT

> Intelligence perfected is the faculty of making and using unorganized instruments. (Bergson, 2005, p. 155)

INTERVAL OF SUSPENDED JUDGEMENT

a transdisciplinary buffer zone between the disciplines in which a mindless monophibian must be notified to mind the gap, the gap in which the rules change, incessantly. Polyphibic awareness is required to sense the gap spontaneously. There are gaps between art and science, between physics and 'pataphysics, etc. Such gaps are filled with transdisciplinary silence (Nicolescu, 2002). There is no indirect communication in the gap, only immediate transduction between the artist and the spectator. Where precisely is a gap located, depends on the circumstances under which one approaches the gap with polyphibic awareness. To locate a gap the approach must be unconventional, that is, counter-conventional. The attention of the polyphibian redistributes in order to counter the tendencies of any encountered convention. The polyphibian plays along all types of reasoning and cuts in at the intersection. When the interval is registered the polyphibian suspends all the judgement within it. To keep the interval sterile from germs of judgement the incision must be clean-cut, infrathin.

INTUITION

> An absolute can only be given in an intuition, while all the rest has to do with analysis. We call intuition here the sympathy by which one is transported into the interior of an object in order to coincide with what there is unique and consequently inexpressible in it. Analysis, on the contrary, is the operation which reduces the object to elements already known, that is common to that object and to others. (Bergson, 1992, p. 161)

ORGANISM OF LIVING KNOWLEDGE

polyphibian

ORGANS OF KNOWING

polyphibic organs

OSMOSIS

spontaneous net movement of solvent molecules through a partially permeable membrane into a region of higher solute concentration, in the direction that tends to equalize the solute concentrations on the two sides

OSMOTIC PRESSURE

defined as the pressure required to maintain an equilibrium, with no net movement of solvent

PHRACTAL

Just as 'pataphysics corrects finances into phynances (Jarry, 1994, p. 58) – polyphibianism corrects fractals into phractals […] exaggerating the mathematics to the extreme where mathematical systems become self-aware organisms, where fractals self-organise in living phractals […] pseudo-recursive transdisciplinary

formulas that are bending the rules and enfolding exceptions within the pores, to live the knowledge in a continuity of change […] a phractal divides fractals to generate new beings […] if fractals exist in uniform time, can phractals restructure homogeneous time in heterogeneous duration? […] The ceaselessly evolving phractal structure is consistently porous and selectively permeable. […] Phractals are infinite monster fractals awaken into self-awareness, unceasingly creating and inventing new individuals out of their own individuality in a continuity of change that is self-organising into consciousness. Phractals, as well as their cousins fractals, access from any present moment the entire past, but unlike fractals, phractals derive from all possible memory a fresh flow of memory that was not dried out yet into a set of replicating recursive formulas. Phractals do not remain affine to one species but invent and create new species not unlike evolution. If fractal is self-affine species-bounded family-tree of minor variation, phractal is the trans–species evolution. […] Phractal is intellect transcending itself. It starts with a few simple rational steps that are iterated. In this iteration it becomes self-aware and starts laughing. Iterative equations are self-corrective humour. One shouldn't comprehend Phractals intellectually. One should only have intuition of Phractals.

POINT OF BEING

In the continuous tradition of renaissance culture knowledge production relies on viewpoints taken, but with the inevitable and irreversible changes in conditions brought about by the rise of omnipresent electronic culture Derrick de Kerckhove (1997, p. 187) notes the turn from the point-of-view to the point-of-

being: “My point-of-being is not exclusive but inclusive; it is not a perspective vision that frames reality, but rather, is a place defined by the precision and complexity of my connections with the world.”

’PATAPHYSICS

The following is the definition by Alfred Jarry, from his book *Exploits and Opinions of Doctor Faustrol, Pataphysician*, first published posthumously in 1911:

> An epiphenomenon is that which is superinduced upon a phenomenon. Pataphysics, whose etymological spelling should be επι (μετα τα φυσικα) and actual orthography ’pataphysics, preceded by an apostrophe so as to avoid a simple pun, is the science of that which is superinduced upon metaphysics, whether within or beyond the latter’s limitations, extending as far beyond metaphysics as the latter extends beyond physics. Ex: an epiphenomenon being often accidental, pataphysics will be, above all, the science of the particular, despite the common opinion that the only science is that of the general. Pataphysics will examine the laws governing exceptions, and will explain the universe supplementary to this one; or, less ambitiously, will describe a universe which can be - and perhaps should be - envisaged in the place of the traditional one, since the laws that are supposed to have been discovered in the traditional universe are also correlations of exceptions, albeit more frequent ones, but in any case accidental data which, reduced to the status of unexceptional exceptions, possess no longer even the virtue of originality. DEFINITION. Pataphysics is the science of imaginary solutions, which symbolically attributes the properties of objects, described by their virtuality, to their lineaments. (Jarry, 1996, pp. 21, 22)

POLYPHIBIAN

> a Being able to coexist coherently while dispersed in several media. To be distinguished from “monophibian” – adapted to one and only rationally standardised medium, and amphibian (any cold-blooded vertebrate of the class Amphibia, comprising frogs and toads, caecilians, newts and salamanders) adapted to no more than two media. In the evolution from mono- to poly- ”mediumistic” the rational-self-referential limitations that arose with development of sequentially optimized cortex need to be

> surmounted: push the frontal cortex to the background. Bypass the linear wiring. Switch from direct current to the alternating current in all directions. Become polyphibic. (Ljubec, 2013, p. 150)

POLYPHIBIC

> a living multisided knowing of a phenomenon. Compare to prefixes monophi- (on one side), amphi- (on both sides) and polyphi- (on many sides). Add to that bios, the life, the Being in Knowing. Polyphibic refers to being a newborn Being in front of every experience – the knowing is reborn with each instance. An experiment never yields exactly the same output. The outcome can always be experienced from a different side. Grasp the multi-sidedness of all appearances that the experimental apparatus yields and you grasped the phenomenon with the polyphibic awareness. (Ljubec, 2013, p. 150)

POLYPHIBIANISM

evolutionary movement of imaginary organism of living knowledge

POLYPHIBIOLOGICS

logics of polyphibianism

PROTOPLASMAGORA

Whereas Phantasmagoria (from Ancient Greek phantasma - "ghost," agoreuein, "to speak publicly"), refers to a publicly experienced varying and shifting scenes of phantasms, of subtly interchanging real and imagined visuals, Protoplasmagora is privately, introspectively accessible public space for emphatic exchange of thought torrents among polyphibians. […] Polyphibian, as a transdisciplinary organism, moves through the transdisciplinary zone - protoplasmagora: an agora of all polyphibic organisms – the entire evolutionary past of polyphibianism. […] Just as the figure needs the ground or the animal cannot exist without environment, so does the polyphibian require a

protoplasmic medium. Polyphibianism as a movement cannot be suitably defined without a background - the polyphibian explores the transdisciplinary territory. If protoplasm is considered to be the primordial living substance then protoplasmagora is the primordial generator of living knowledge. […] Polyphibian is the living knowledge incarnated – it has all the impetus needed to reorganise itself wherever there is the fertile territory. It is this mutual dependence with its environment that defines the polyphibian. To comprehend the living knowledge it needs to be non-arbitrarily dissected in two agents – each of them alternating between active and passive role or in other words: assuming in turn the role of agent or ambient. […] The interdependence here is not simply complementary, one is not merely the opposite of the other, but rather a heterogeneous amalgam of one and the other. A clear cut separation of a polyphibian and protoplasmagora into a homogeneous agent and ambient would be artificial and restrictive, just as a division between the observer and the observed prevents certain problems to be resolved. To start the evolution of these terms either agency could be defined by both: [polyphibian = polyphibian + protoplasmagora] and [protoplasmagora = protoplasmagora + polyphibian]. Protoplasmagora is therefore as much auxiliary to a polyphibian as is polyphibian auxiliary to protoplasmagora, both are organisms at the service of each other. In simple terms, the protoplasm, as a proto-living substance, already differentiates its metabolism into anabolic processes that internalise the material input, transforming the material into organism's own vital substance, thus the material becomes alive, and catabolic processes that externalise the input into a lifeless substance output, serving the organism as a prosthesis. In the same

manner one might imagine an organism of knowledge metabolising its material into living internalised substance and external lifeless substance that can be worn as prosthetic apparatus until it becomes obsolete and is simply cut off, as hair or nails, and archived. Polyphibians, regarded as a product of anabolism within the protoplasmic transdisciplinary metabolism, are intricately integrated and internalised by protoplasmagora. By-products of catabolism, on the other hand, are monophibic, mechanical and lifeless, and therefore externalised, expelled to the periphery, where they are subject to comical corrective, as discussed before . Although monophibians lose touch with living knowledge and, at best, simulate it with crude approximations, they can be born again into the living knowledge if digested by protoplasmagora. Laughter facilitates metabolism of living knowledge through contractions and relaxations of a constipated reasoning – the spasms of a comical corrective. Nonetheless laughter does not simplify metabolism – the products of a metabolic equation that operates on monophibians are complex, retaining both monophibic and polyphibic components. Upon entering the transdisciplinary territory one is consumed by this territory – one's energy dissipates and is redistributed in both disciplinary and transdisciplinary research.

TECHNOETICS

> a convergent field of practice that seeks to explore consciousness and connectivity through digital, telematic, chemical or spiritual means, embracing both interactive and psychoactive technologies, and the creative use of moistmedia. (Ascott, 2008)

Just like tech-noetics frees the technical in technology from the limitations of classical logic, tech-nous, the tech-enhanced-mind frees the mind from the urge to deduce and reduce, to equate unequal. The mind is again fully immersed in heterogeneity. Contrary to expectations of inoperability in such heterogeneity, tech-nous, so enhanced, can operate efficiently. Heterogeneity does not exclude communication, computation, etc. it only enlarges the field to accommodate dichotomies. Mind, tech-enhanced by any moist medium, is capable of polyphibic performance. Instead of human mind imposing its intuitive structure, its instinct to generalise for instance, onto the machine, in tech-nous the reversed is allowed: the machine is free to corrupt the mind, disrupt the obsolete self-referential rationality that inevitably leads to technical paradoxes once a boundary is crossed. Tech-nous in this sense is not about rational mind imposing restrictions on machine but embracing unpredictable side effects of the system, bringing them into the resonance, resonating the systemic errors to a different order of awareness in tech-nous. (Ljubec, 2013, p. 150)

Appendix B: curating a box of notes

This appendix provides a few instructions and examples to potential curators of the Box of 2014, beginning with the meta-meta note, or simply, the 'pata note, on how to assemble Duchamp's notes from the Box of 1914 onwards. Every note is to be saved, preserved or "chance-canned" in the Google Earth application and viewed from a certain eye altitude and at certain coordinates that point precisely to where the cursor disappears during the print screen. It is highly recommended, to use the readymade Google Earth style, fonts, icons, tags, links (including the commonly used link tags "To here," "From here," that conveniently point to and from each note), with utmost aesthetics indifference. Google Earth enables links to both textual and graphic material from Duchamp's original notes, preserving it intact or participating in it by slight distortion, a glitch that is necessary to map the context of the Large Glass on the virtual territory of the Large Hadron Collider. Upon R. Mutt's video intervention with R. Ascott's consent, streamed on monitors and from projectors on the walls of the ATLAS Control Room, the virtual world is allowed to go out of control. For further immersion of the participator, the Google Street View of the ATLAS Control Room can be projected within a room curated for this purpose. For instance, the spectator can navigate through the intervention sites from the mock up ATLAS control panel. It is also recommended to clutter the virtual intervention sites with 3D readymade models, such as The Fountain. Furthermore, within the same room, the Google Earth formatted notes can be cut out of the virtual, extracted out of the projection of the interactive environment and extruded as prints, pictures or paintings,[i] invisibly suspended in the actual air, as well as suspended from virtual interaction. The participator is thus trapped "infrathin" at the threshold between physics and 'pataphysics, where the parameter sigma touches infinity and trespassing becomes inevitable. The following template and further examples of deviation from Duchamp's original notes demonstrate a possible interference between the Google Street View data representation and location-dependent participation in Duchamp's creative act.

[i] "use 'delay' instead of picture or painting […] a way of succeeding in no longer thinking that the thing in question is a picture – to make a delay of it in the most general way" (Duchamp, 1989, p. 26)

__°__’__”N
__°__’__” E
elev __ m
eye alt __ m

Titre en français, Title in English

note

To here
From here

46°14’07.59”N
6°03’20.34”E
elev 440m
eye alt 442m

ATLAS Salle de Contrôle, Atlas Control Room
Meta Meta Note = ‘Pata Note

make a note on making a note
for recursive intervention

Mirrorical Return
the virtual component of the ASCO2.T AT.LAST myth
intervenes within the virtual ATLAS control room:
use the satellite image of the control room
projected within the virtual globe -
project it in on the walls of another room,
non-locally connected to, at last.
furnish that causally disconnected room retinally -
with con-cern-like clusters of monitors monitoring
and projectors projecting for the retina;
then display the virtual ATLAS control room
on the monitors of the anonymous room.
now reiterate intervention non-retinally:
apply the liberty of indifference
by retinal deferment and delay in glass -
replace the coordinates
on the map of the ATLAS control room
with the coordinates of the replacement room:
??°??'??"N ??°??'??"E
Imagery Date: ??/2014

To here ATLAS control room
From here non local control AT.LAST

49°57’20.22”N
0°35’02.51”E
elev -1m
eye alt 703.65km

L'idée de la fabrication. The idea of the fabrication.

– If a straight horizontal thread one meter long falls from a height of one meter onto a horizontal plane distorting itself as it pleases and creates a new shape of the measure of length. –

– 3 examples obtained in more or less similar conditions: considered in their relation to one another they are an approximate reconstitution of the unit of length.
The 3 standard stoppages are the meter diminished.

L'idée de postproduction. The idea of post-production.

3 standard Stops =
canned chance –
1914.

plot a standard distribution graph
for the 3 standard stoppages:
send sigma to infinity –
2014.

$$\lim_{\sigma\to\infty}\left(\frac{1}{\sigma\sqrt{2\pi}}e^{-\frac{(x-x_0)^2}{2\sigma^2}}\right)$$

To here generalization, standardization
From here infra-thin separation

Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image IBCAO
La route Jura-Paris. The Jura Paris Road.
Tour Guide

46°14’10.03”N
6°03’23.03”E
elev 480m
eye alt 444m

Peinture de précision, et beauté d'indifférence.
Painting of precision, and beauty of indifference.

To here ASCOT - painting of precision

From here ASCO2.T - painting of precision, and beauty of indifference
The possible,
implying the becoming -
the passage from one to the other takes place in the infra-thin.

The figuration of a possible.
(not as the opposite of impossible
nor as related to probable
nor as subordinated to likely)
the possible is only
a physical “caustic”
[vitriol type]
burning up
all aesthetics
or callistics

46°14’05.75”N
6°03’19.26”E
elev 471m
eye alt 444m

This collision is the raison d’être of the picture.

Pictorial Translation –
The 5 nudes, one the chief, will have to lose,
in the picture, the character of multiplicity.
They must be a machine of 5 hearts,
an immobile machine of 5 hearts
The chief, in this machine,
could be indicated in the centre and at the top.
The machine of 5 hearts will have to give birth to the headlight.
This headlight will be the child-God.
He will be the divine blossoming of this machine mother.
He will have to be radiant with glory.
And the graphic means to obtain this machine child,
will find their expression in the use of an endless screw.
(accessories of this endless screw, serving to unite
this headlight child God, to his machine-mother. 5 nudes

To here
on one side,
the 5 nudes, one the chief,

From here
on another side,
are the two terms of the collision.

This collision is
the raison d’être of the picture.

46°14’09.26”N
6°03’20.33”E
elev 442m
eye alt 447m

L'apprenti dans une collision. The apprentice in a collision.

To here = From here

Apprenticed collision is a -
“sculpture” of skill.

With maximum skill,
this projection would be reduced to a point (the target).
With ordinary skill
this projection will be a demultiplication of the target.

to have the apprentice in the Sun

avoir l'apprenti dans le soleil
à voir: l'empreinte qui dans le sol est

given to sight: the imprint which is in the ground

From figure
To in(-fra-thin-)separable figure-ground

The figure obtained is the visible flattening (a stop on the way) of the demultiplied body.

46°14’09.58”N
6°03’22.41”E
elev 495m
eye alt 444m

Èlectricité en large, Electricity Breadthwise

The only possible utilisation
of electricity “in the arts.”

To here
there is no discontinuity between the bach.machine and the Bride.
But
From here
the connections will be.
electrical. and will thus express the stripping:
an alternating process.
Short circuit if necessary -

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