List of Todos

Institute of Creative Technologies
De Montfort University

Fania Raczinski

Algorithmic Meta-Creativity

Creative Computing for Computational Creativity

pata.physics.wtf

Supervisors:
Prof. Hongji Yang
Prof. Andrew Hugill
Dr. Sophy Smith
Prof. Jim Hendler

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

Created: 25th March 2015 — Last Saved: 8th December 2015
Wordcount: 4552

PRE☺

TL;DR

Algorithmic Meta-Creativity Fania Raczinski

ABSTRACT[1]

A pataphysical methodology for applying creativity to exploratory search

Creativity, Pataphysics and Computers

Absurd Obscure French Pseudo Philosophy

Creative Computing

Art

Practice-Based Research

Exploratory Search

pata.physics.wtf

Interpretation/Evaluation

[1] "Too long; didn't read"

Contents

List of Figures

List of Tables

List of Source Code

Acronyms

TMPR
Trajectory Model of Practice and Research. vi, 23, 24

double check hyperref links in pdf toc

Part I

H∑LL⊖ W⊖RLD

1 Introduction

This thesis describes 'Algorithmic Meta-Creativity'. More precisely it is about using creative computing to achieve computer creativity.

The project is transdisciplinary; it is heavily inspired by the absurd french pseudo-philosophy pataphysics and draws from a wide range of disciplines such as computer science, psychology, linguistics, literature, art and poetry, languages and mathematics.

The research involved includes exploring what it means to be creative as a human, how this translates to machines and how pataphysics relates to creativity.

The outcome is presented as a website -pata.physics.wtf- written in 5 differ-

ent programming languages[1], making calls to 6 external Web services[2], in a total of over 3000 lines of code[3]. It's main purpose is to demonstrate three creative 'patalgorithms' in action in the context of exploratory information retrieval. A browsing rather than a search engine, it presents results in various formats such as sonnetts. Immediate inspirations come from fictional character 'Doctor Faustroll' created by french absurdist Alfred Jarry, the 'Celestial Emporium of Benevolent Knowledge' by magical realist Jorge Luis Borges and 'A Hundred Thousand Billion Poems' by Pataphysician and Oulipian Raymond Queneau amongst others.

The system behind `pata.physics.wtf` partially automates the creative process (generating novel combinations, transforming conceptual spaces, etc).

Using pataphysics as a fuel for creativity through the medium of subjective pataphysical algorithms I fuse objective programming with creativity.

Current literature shows that creativity, specifically in regards to computers, is hard to measure objectively. I argue that the most appropriate way to approach this is by looking at five subjective constraints simultaneously (person, process, product, place, purpose) in a holistic manner.

automating creative process (randomising poems, writers go through drafts - i automate this process. poems = combinatorial creativity visualised. From calculated relevance to creative detour.

noise
basins of attraction
break symmetry
creativity is not linear
phase shift
(Everitt 2011)

---

original idea: build pataphysical web search tool using semantic web tech. create an ontology of creativity for Computers

why did i not use semantic web stuff? semantic web is about agreed ontologies which oppose surprises. a creative ontology would work around that but needs the structure of the semantic web in place (rdf etc) which is hypothetical atm and not realistically implementable. SW is about standards. pataphysics is about

[1] Python, HTML, CSS, Jinja, JavaScript
[2] Microsoft Translate, WordNet, Bing Image Search, Getty, Flickr, YouTube
[3] 2864 lines of code, 489 lines of comments - as of 08 Dec 2015

breaking standards (exceptions etc).

bridge: how do current search engines work? they prioritise revelvance using pagerank algorithms etc. happens at crawling time. pataphysics isnt about relevance. (index is ranked)

pataphysics cant be ranked. need for neutrality in index but creative ways to retrieve matches for query. but then changed to focus on the concept of searching/browsing (in itself, rather than part of a system architecture) and ranking as a creative process. pataphysicalisation happens at query time between query and index. (index is neutral)

project was to build a prototype that proves these ideas. my eventual approach was to take elemnts from both the ontology idea and the relevance ranking IR way and combine/redeploy them in a new way using pataphysics that would yield results designed to foster/inspire creativity.

finish introduction

1.1 Motivations

Assumptions: computers can be creative.

complete assumptions, do I have any? or is the point to answer those as research questions?

problem: can computers be considered creative? Can pataphysics facilitate creativity? Can computer creativity be objectively measured?

motivation: personal background? comp sci + arts and creativity

do I discuss personal interest in motivation?

context: creative computing is about a creative process (with a potential creative output) whereas comp creativity is about a creative product using traditional means. comp creativity is on the rise such as AI is 'emerging' still.

Why pataphysics? Pataphysics is highly subjective and particular and is as such very suitable for this kind of transformation from relevant to creative. Pataphysics can provide some useful techniques that are very suitable for creative computing.

Purposive without purpose (Kant)

"Fourth, through aesthetic judgments, beautiful objects appear to be 'purposive without purpose' (sometimes translated as 'final without end'). An object's purpose is the concept according to which it was made (the concept of a vegetable soup in the mind of the cook, for example); an object is purposive if it appears to have such a purpose; if, in other words, it appears to have been made or designed. But it is part of the experience of beautiful objects, Kant argues, that they should affect us as if they had a purpose, although no particular purpose can be found."[4]

WHY NOT JUST RANDOMNESS????? there has to be an injection of meaning at some point random results are easy. but they might not be focused enough.

1.2 Questions

closed

- Can a creative process be automated or emulated by a computer?
-
- inspirational rather than informational (procedural)?
- How can we get search results that are unexpected and yet make sense?
- How can we present search results in a creative and pataphysical way?
- How does Pataphysics relate to creative computing?
- How can we use Pataphysics as inspiration for search ranking?
- How can we write a specifically creative algorithm?

open

- How can we rank search results but still be true to Pataphysics philosophy?
- How can we represent and structure data to reflect its context, meaning and subjectivity?
- What does it mean for search results to be creative/relevant?
- Can computers be creative?
- What does it actually mean to be creative even for a human being, etc
- Is pataphysics creative?
- What is a relevant search result?
- Is creativity irrelevant?

answer research questions in conclusion

[4] Kant, chapter 2a: http://www.iep.utm.edu/kantaest/

1.3 Process-ions

This project combines research in science and art. It is an interdisciplinary research project.

computational linguistics (wordnet) natural language processing (index, dameraulevenshtein) creative computing literature (pataphysics, oulipo)

This project has roots in disciplines such as Computer Science and Humanities.

Information Retrieval
: Software Engineering, Semantic Web

Pataphysics
: Literature, Philosophy, Ontology

Creativity
: Cognitive Science, Artificial Intelligence

In regards to my project:

- A concept implementation method is used with a descriptive-other approach
- A qualitative investigation into if and why the proposed search results are useful will be done
- Following experimental methodologies, to evaluate the proposed new solution to the problem of creative search

Epistemology
: Subjective/Argumentative

Methodology
: Experimental, Interpretative, Qualitative

Methods
: Concept implementation, (Heuristic) Evaluation

1.4 Product-ions

- Design a tool for creative searching on the Web
- Design pataphysics inspired algorithms to model creativity in this tool
- Produce a proof-of-concept prototype
- Propose a framework for evaluating and interpreting creative search results

!!! http://pata.physics.wtf http://pata.fania.eu
!!!

1.5 Contributions

abusing tech in creative ways can yield useful results pataphysics = Creativity

combining the pseudo philosophy of pataphysics with sematically structured algorithms which use programming APIs and computational linguistics to produce original creative works.

patalgorithms

web presence

overturn expectations subvert browsing undermine relevance corrupt results

5 Ps

1.6 Publications

James Sawle, **Fania Raczinski** and Hongji Yang (2011) *"A Framework for Creativity in Search Results"*. The 3rd International Conference on Creative Content Technologies, CONTENT'11. Rome, Italy. Pages 54–57. (Sawle, Raczinski and Yang 2011)

Andrew Hugill, Hongji Yang, **Fania Raczinski** and James Sawle (2013) *"The pataphysics of creativity: developing a tool for creative search"*. Routledge: Digital Creativity, Volume 24, Issue 3. Pages 237–251. (Hugill et al. 2013)

Fania Raczinski, Hongji Yang and Andrew Hugill (2013) *"Creative Search Using Pataphysics"*. Proceedings of the 9th ACM Conference on Creativity and Cognition, CC'13. Sydney, Australia. Pages 274–280. (Raczinski, Yang and Hugill 2013)

Please note that a full list of talks, exhibitions and publications is available at appendix **??**.

1.7 The Hitchhiker's Guide to this Thesis

PREFACE

.

Part I

IN THE BEGINNING. . .

Chapter 1

Introduction

2 Inspirations

2.1 The Syzygy Surfer

The research presented here is based on the initial idea of Jim Hendler and Andrew Hugill's "Syzygy Surfer" (Hendler and Hugill 2011; Hendler and Hugill 2013). They suggest the use of three pataphysical principles, namely clinamen, syzygy and anomaly, to create a new type of Web search engine, reminiscent of the experience of "surfing the Web". This is in contrast to current Web search engines which value relevant results over creative ones.

is this my opinion or theirs?

"Surfing" used to be a creative interaction between a user and the web of information on the Internet, but the regular use of modern search engines has changed our expectations of this sort of knowledge acquisition. It has drifted

away from a learning process by exploring the Web to a straightforward process of information retrieval similar to looking up a word in a dictionary.

> "The ambiguity of experience is the hallmark of creativity, that is captured in the essence of pataphysics. Traversing the representations of this ambiguity using algorithms inspired by the syzygy, clinamen and anomaly of pataphysics, using a panalogical mechanism applied to metadata, should be able to humanize and even poeticize the experience of searching the Web."(Hendler and Hugill 2013)

Their inspirations come from Borges (Borges 2000) (for the underlying poetic sense of unity), Jarry's pataphysical principles (Jarry 1996) and Singh's panalogies (parallel analogies – to introduce ambiguity, since it allows various descriptions of the same object) (Singh 2005).

2.2 Faustroll's Library

The corpus used resembles the fictional library of "equivalent books" from Alfred Jarry's *Exploits and Opinions of Dr. Faustroll, 'Pataphysician* (1996, p.10-12)[1].

1. BAUDELAIRE, a volume of E.A. POE translations.
2. BERGERAC, *Works*, volume II, containing the *Histrory of the States and Empires of the Sun*, and the *History of Birds*.
3. *The Gospel according to* SAINT LUKE, in Greek.
4. BLOY, *The Ungrateful Beggar*.
5. COLERIDGE, *The Rime of the ancient Mariner*.
6. DARIEN, *The Thief*.
7. DESBORDES-VALMORE, *The Oath of the Little Men*.
8. ELSKAMP, *Illuminated Designs*.
9. An odd volume of the *Plays* of FLORIAN.
10. An odd volume of *The Thousand and One Nights*, in the GALLAND translation.
11. GRABBE, *Scherz, Satire, Ironie und tiefere Bedeutung*, comedy in three acts.
12. KAHN, *The Tale of Gold and of Silence*.
13. LAUTREAMONT, *The Lays of Maldoror*.
14. MAETERLINCK, *Aglavaine and Selysette*.

[1] "In addition, three prints hanging on the walls, a poster by TOULOUSE-LAUTREC, *Jane Avril*; one by BONNARD, advertising the *Revue Blanche*; a portrait of Doctor Faustroll, by AUBREY BEARDSLEY; and an old picture, which appeared to us to be valueless, *Saint Cado*, issued by the Oberthuer printing house of Rennes."(Jarry 1996, p.12)

15. MALLARME, *Verse and Prose*.
16. MENDES, *Gog*.
17. *The Odyssey*, Teubner's edition.
18. PELADAN, *Babylon*.
19. RABELAIS.
20. JEAN DE CHILRA, *The Sexual Hour*.
21. HENRI DE REGNIER, *The Jasper Cane*.
22. RIMBAUD, *The Illuminations*.
23. SCHWOB, *The Childrens' Crusade*.
24. Ubu Roi.
25. VERLAINE, *Wisdom*.
26. VERHAEREN, *The Hallucinated Landscapes*.
27. VERNE, *Voyage to the Center of the Earth*.

2.3 100.000.000.000.000 Poems

Raymond Queneau's 'Cent Mille Milliards de Poèmes' is a prime example of Oulipian art. The book is essentially made up of 10 pages containing one sonnet each. Each page however is split into 14 thin strips, one for each line. This means that mathematically there are 10^{14} possible poems to be read by combining different lines every time.

place footnote text on correct page on final runthrough

2.4 Chinese Encyclopaedia

Jorge Luis Borges 'Chinese Encyclopaedia' in the short story "The Language of John Wilkins" (Borges 2000) is a primary inspiration for this project. It lists the following results under the category of 'animal'.

check ref

1. those that belong to the Emperor,
2. embalmed ones,
3. those that are trained,
4. suckling pigs,
5. mermaids,
6. fabulous ones,

[2]Images by Martin Pyper http://www.mestudio.info/2010/02/28/one-hundred-thousand-billion-poems/

Figure 2.1: Toulouse-Lautrec's "Jane Avril"

Figure 2.2: Bonnard's "Revue Blanche"

Figure 2.3: Aubrey Beardsley's "Docteur Faustroll"

Figure 2.4: Oberthuer's "Saint Cado"

Figure 2.5: queneau1+2[2]

7. stray dogs,
8. those included in the present classification,
9. those that tremble as if they were mad,
10. innumerable ones,
11. those drawn with a very fine camelhair brush,
12. others,
13. those that have just broken a flower vase,
14. those that from a long way off look like flies.

Although these are all perfectly valid results, it is clear that they form a more creative, even poetic, view of what an animal might be than the Oxford English Dictionary's prosaic: "a living organism which feeds on organic matter".[3]

2.5 Yossarian Lives

YossarianLives is a creative search engine which claims to return "diverse and unexpected results".(Yossarian 2015)

"These types of results are incredably useful for any one who derives value from new ideas."(Yossarian 2015)

- Augmented creativity
- Lateral Discovery
- Metaphorical Search

[3]"animal, n.". OED Online. September 2015. Oxford University Press. http://www.oed.com/view/Entry/273779?rskey=qx2uxn&result=1&isAdvanced=false (accessed December 02, 2015).

- Creative Graph

[4]

2.6 The Library of Babel

The Library of Babel is a place for scholars to do research, for artists and writers to seek inspiration, for anyone with curiosity or a sense of humor to reflect on the weirdness of existence — in short, it's just like any other library. If completed, it would contain every possible combination of 1,312,000 characters, including lower case letters, space, comma, and period. Thus, it would contain every book that ever has been written, and every book that ever could be — including every play, every song, every scientific paper, every legal decision, every constitution, every piece of scripture, and so on. At present it contains all possible pages of 3200 characters, about 104677 books.

Since I imagine the question will present itself in some visitors' minds (a certain amount of distrust of the virtual is inevitable) I'll head off any doubts: any text you find in any location of the library will be in the same place in perpetuity. We do not simply generate and store books as they are requested — in fact, the storage demands would make that impossible. Every possible permutation of letters is accessible at this very moment in one of the library's books, only awaiting its discovery. We encourage those who find strange concatenations among the variations of letters to write about their discoveries in the forum, so future generations may benefit from their research.[5]

[4] http://about.yossarianlives.com/index.html

[5] https://libraryofbabel.info/

3 Methodology

Description and justification of methodology...

> "Only those who attempt the absurd achieve the impossible." (attributed to M.C. Escher)

Epistemology
: "A broad and high-level outline of the reasoning process by which a school of thought performs its empirical and logical work." Wikipedia

Methodology
: "Less high level than epistemology is methodology. It refers to a more specific manner in which to do empirical and logical work. The same epistemology can have several methodologies." Wikipedia

Method
: A methodology can consist of several methods. Wikipedia

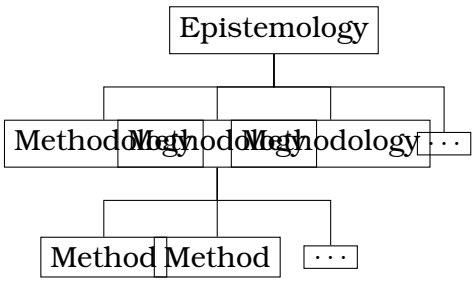

Figure 3.1: Epistemology breakdown chart

Epistemology

"is the branch of philosophy concerned with the nature and scope (limitations) of knowledge. It addresses mainly the following questions: What is knowledge? How is knowledge acquired? To what extent is it possible for a given subject or entity to be known?" [wikipedia]

"A broad and high-level outline of the reasoning process by which a school of thought performs its empirical and logical work." (Mingers and Willcocks 2004)

Methodology

"is usually a guideline system for solving a problem, with specific components such as phases, tasks, methods, techniques and tools. It can be defined also as follows: 1. 'the analysis of the principles of methods, rules, and postulates employed by a discipline' 2. 'the systematic study of methods that are, can be, or have been applied within a discipline' 3. 'the study or description of methods' " [wikipedia]

"Less high level than epistemology is methodology. It refers to a more specific manner in which to do empirical and logical work. The same epistemology can have several methodologies." (Mingers and Willcocks 2004)

Research Strategy is a procedure for achieving a particular intermediary research objective—such as sampling, data collection, or data analysis. We may therefore speak of sampling strategies or data analysis strategies. [wikipedia]

Research Approach refers to an integrated set of research principles and general procedural guidelines. Examples of research approaches include experiments, surveys, correlational studies, ethnographic research, and phenomenological inquiry. [wikipedia]

Qualitative researchers aim to gather an in-depth understanding of human behavior and the reasons that govern such behavior. The qualitative method in-

vestigates the why and how of decision making, not just what, where, when. Hence, smaller but focused samples are more often needed than large samples. [wikipedia]

Quantitative research refers to the systematic empirical investigation of social phenomena via statistical, mathematical or computational techniques. The objective of quantitative research is to develop and employ mathematical models, theories and/or hypotheses pertaining to phenomena. Quantitative data is any data that is in numerical form such as statistics, percentages, etc. [wikipedia]

3.1 Intradisciplinary Research

Different disciplines prefer different research methodologies. It makes sense that research in medicine, chemistry, literature or mathematics all use different methods. What could a mathematician achieve in a white laboratory coat and test tubes in his hand, and similarly, what could a chemist achieve with pen, paper and a calculator?

> "methodological pluralism is acceptable but what is not acceptable is philosophical pluralism"??

What would be traditional RM in those fields?
Why can I not mix and match them?
What do I do now/instead?
Can inter/multi/trans-disciplinary research be NOT collaborative but done by a single person?

> "When you describe your methods it is necessary to state how you have addressed the research questions and/or hypotheses. The methods should be described in enough detail for the study to be replicated, or at least repeated in a similar way in another situation. Every stage should be explained and justified with clear reasons for the choice of your particular methods and materials."[1]

3.1.1 Computer Science Research

In their rather old but still insightful analysis of over 600 papers, published between 1995 and 1999, Ramesh et al (Ramesh, Glass and Vessey 2004) have shown that -by far- the most common approach to research in computer science

[1] http://bit.ly/1Edj84y

was “formulative” (as opposed to “descriptive” and “evaluative”) in particular in regards to “processes, methods and algorithms”.

Research Approach in CS:

Descriptive: (9.88%)

- Descriptive-system (4.14%)
- Descriptive-other (5.10%)
- Review of literature (0.64%)

Evaluative: (10.98%)

- Evaluative-deductive (1.11%)
- Evaluative-interpretive (-)
- Evaluative-critical (-)
- Evaluative-other (9.87%)

Formulative: (79.15%)

- Formulative-framework (2.39%)
- Formulative-guidelines/standards (0.64%)
- Formulative-model (5.73%)
- Formulative-process, method, algorithm (52.55%)
- Formulative-classification/taxonomy (0.80%)
- Formulative-concept (17.04%)

Research Method in CS:

- Action research (-)
- Conceptual analysis (15.13%)
- Conceptual analysis/mathematical (73.41%)
- Concept implementation (2.87%)
- Case study (0.16%)
- Data analysis (0.16%)
- Discourse analysis (-)
- Ethnography (-)
- Field experiment (-)
- Field study (0.16%)
- Grounded theory (-)
- Hermeneutics (-)
- Instrument development (-)
- Laboratory experiment (human subjects) (1.75%)
- Literature review / analysis (0.32%)
- Laboratory experiment (software) (1.91%)
- Meta-analysis (-)
- Mathematical proof (2.39%)

- Protocol analysis (-)
- Phenomenology (-)
- Simulation (1.75%)
- Descriptive/exploratory survey (-)

(Ramesh, Glass and Vessey 2004)

Formal

Formal methodologies are mostly used to prove facts about algorithms and system. Formal specification of a software component in order to allow the automatic verification of an implementation of that component, the time or space complexity of an algorithm, or on the correctness or the quality of the solutions generated by the algorithm. (Amaral et al. n.d.)

Experimental

Experimental methodologies are broadly used in CS to evaluate new solutions for problems. Experimental evaluation is often divided into two phases. In an exploratory phase the researcher is taking measurements that will help identify what are the questions that should be asked about the system under evaluation. Then an evaluation phase will attempt to answer these questions. A well-designed experiment will start with a list of the questions that the experiment is expected to answer. (Amaral et al. n.d.)

Build

A "build" research methodology consists of building an artifact — either a physical artifact or a software system — to demonstrate that it is possible. To be considered research, the construction of the artifact must be new or it must include new features that have not been demonstrated before in other artifacts. (Amaral et al. n.d.)

Process

A process methodology is used to understand the processes used to accomplish tasks in Computing Science. This methodology is mostly used in the areas of Software Engineering and Man-Machine Interface which deal with the way humans build and use computer systems. The study of processes may also be used to understand cognition in the field of Artificial Intelligence. (Amaral et al. n.d.)

Model

The model methodology is centered on defining an abstract model for a real system. This model will be much less complex than the system that it models, and therefore will allow the researcher to better understand the system and to use the model to perform experiments that could not be performed in the system itself because of cost or accessibility. The model methodology is often used in combination with the other four methodologies. Experiments based on a model are called simulations. When a formal description of the model is created to verify the functionality or correctness of a system, the task is called model checking. (Amaral et al. n.d.)

(Holz et al. 2006): Four quadrant model: 1. What do we want to achieve? 2. Where does the data come from? 3. What do we do with the data? 4. Have we achieved our goal? Iterative process, can repeat etc.

3.1.2 Humanities Research

3.1.3 Arts Research

3.2 Transdisciplinary Research

Multidisciplinarity
: "concerns itself with studying a research topic in not just one discipline but in several simultaneously."

Interdisciplinarity
: "has a different goal than multidisciplinarity. It concerns the transfer of methods from one discipline to another."

Transdisciplinarity
: "concerns that which is at once between the disciplines, across the different disciplines, and beyond all disciplines."

(Nicolescu 2010)

Problem Focus: (solve complex, multi-dimensional, particular problems)

"TD research therefore starts with a problem that is 'in the world and actual' as opposed to 'in my head and conceptual'." "This inherent feature of 'creating change' highlights the relevance of using the term 'consequential' to characterise TD research approaches and problems." (Wickson, Carew and Russell 2006)

3.3 Practice Based Research

finish section on practice based research here

> "Art research is of necessity speculative research. It produces its own protocols; the artist as reseacher engages with knowledge in ways that involve the adoption of new frames of reference, the design of new systems and the aquisition of new behaviours. Outcomes will be generally non-linear, associative, connective, transformative and frequently challenging. Trans-disciplinary research in art generates discourse requiring new language."(Roy Ascott's preface in Linda Candy and Ernest Edmonds 2011, p. v)

> "In ways often disconcerting to its academic hosts, art research is prepared to look in all directions for inspiration, understanding and explication: to the East as well as the West, so to speak; following the left-hand path as well as the right; working with both reason and intuition, sense and nonsense, subtelty and sensibility. It is what can be called a trans-disciplinary syncretism that best informs artistic research, just as it is the integrative faculty of 'cyberception' that enables our focus on mutliple realities and a technoetic instrumentality that supports art strategies involving the evolution of mind, the networked distribution of presence and the re-configuration of personal identity. Art research is second-order research; the researcher is always a part of the system or subject of inquiery. Innovation in subjectivity prevails over odurate objectivity. (...) methodologies that can, whenever needed, put subject before object, process before system, behaviour before form, intuition before reason and mind before matter."(Roy Ascott's preface in Linda Candy and Ernest Edmonds 2011, p. vi)

Linda Candy - Practice Based Research: A Guide

> "Practice-based Research is an original investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice. Claims of originality and contribution to knowledge may be demonstrated through creative outcomes which may include artefacts such as images, music, designs, models, digital media or other outcomes such as performances and exhibitions Whilst the significance and context of the claims are described in words, a full understanding can only be obtained with direct reference to those outcomes. A practice-based PhD is distinguishable from a conventional PhD because creative outcomes from the research process may be included in the submission for examination and the claim for an original

contribution to the field are held to be demonstrated through the original creative work. Practice-based doctoral submissions must include a substantial contextualisation of the creative work. This critical appraisal or analysis not only clarifies the basis of the claim for the originality and location of the original work, it also provides the basis for a judgement as to whether general scholarly requirements are met. This could be defined as judgement of the submission as a contribution to knowledge in the field, showing doctoral level powers of analysis and mastery of existing contextual knowledge, in a form that is accessible to and auditable by knowledgeable peers." (Linda Candy 2006)

Edmonds and Candy's "TMPR" (E. Edmonds and L. Candy 2010).

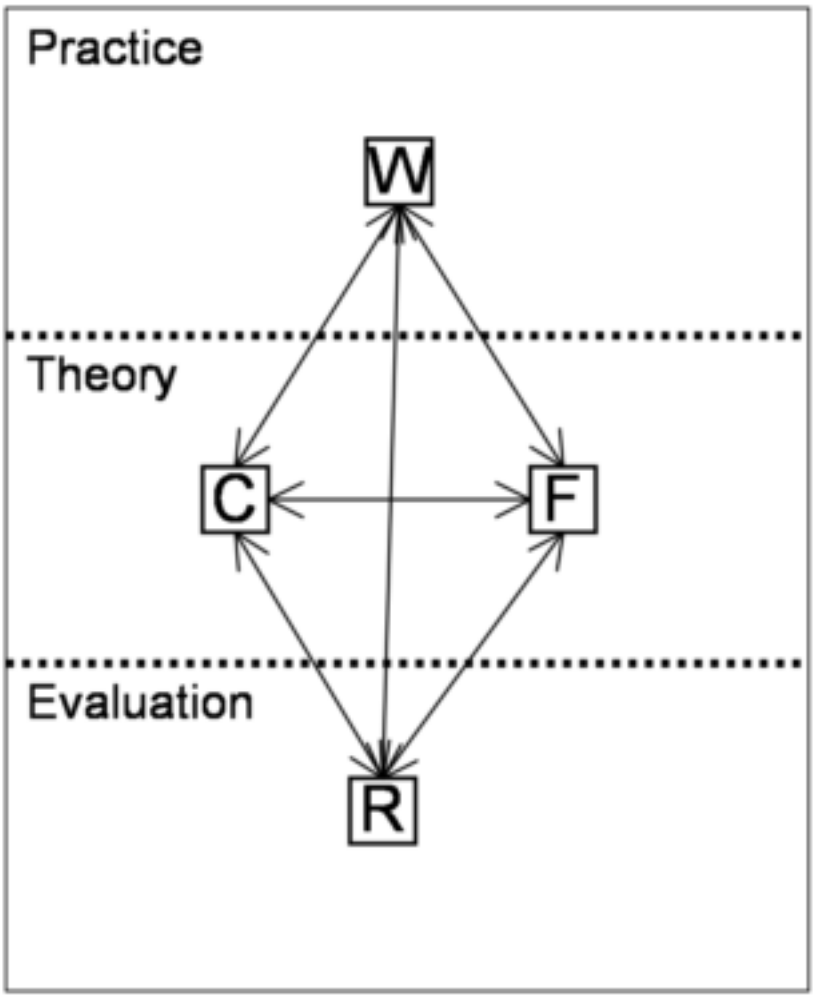

Figure 3.2: tmpr

Practice (works): website Theory (criteria, frameworks): algorithms and context Evaluation (results): interpretation

“A framework comprises a conceptual structure that is used to influence practice, inform theory and, in particular, shape evaluation.”

“Some examples of framework types are: • classifications for assessing the ways in which audiences respond to particular works. • criteria for guiding the design of a new artifact or installation, • questions, expressed as working hypotheses, to be explored using theoretical knowledge”

Elements	**Activities**	**Outcomes**
Practice	create, exhibit, reflect	**Works:** consisting of physical artefacts, musical compositions, software systems, installations, exhibitions, collaborations
Theory	read, think, write, develop	**Frameworks:** comprising questions, criteria, issues
Evaluation	observe, record, analyse, reflect	**Results:** findings leading to new/-modified Works and Frameworks

Table 3.1: Elements, Activities and Outcomes of each Trajectory in the TMPR

My project is using a practice based research methodology. A transdisciplinary epistemology. Method of constructing a prototype.

"Thomas Mann has been quoted as suggesting that “A great truth is a truth whose opposite is also a great truth” [23]." (Wickson, Carew and Russell 2006) "Objectivity, set up as the supreme criterion of Truth, has one inevitable consequence: the transformation of the Subject into an Object. The death of the Subject is the price we pay for objective knowledge." (Nicolescu 2010) ""The too strong insistence on the difference between scientific knowledge and artistic knowledge comes from the wrong idea that concepts describe perfectly the ‘real things.’ [. . .] All true philosophy is situated on the threshold between science and poetry."" [Heisenberg as cited in 11] Three axioms of the methodology of transdisciplinarity: 1. The ontological axiom: There are, in Nature and society and in our knowledge of Nature and society, different levels of Reality of the Object and, correspondingly, different levels of Reality of the Subject. 2. The logical axiom: The passage from one level of Reality to another is ensured by the logic of the included middle. 3. The complexity axiom: The structure of the totality of levels of Reality or perception is a complex structure: every level is what it is because all the levels exist at the same time. (Nicolescu 2010) “Our

ternary partition (Subject, Object, Hidden Third) is, of course, different from the binary partition (Subject vs. Object) of classical realism." (Nicolescu 2010) "The old principle 'unity in diversity and diversity from unity' is embodied in transdisciplinarity." (Nicolescu 2010) "Conducting scientific research means remaining open to surprise and being prepared to invent a new logic to explain experimental results that fall outside current theory." (Jarry 2006) "Heisenberg's Uncertainty Principle is merely an application, a demonstration of the Clinamen, subjective viewpoint and anthropocentrism all rolled into one." (Jarry 2006)

Part II

T⊖⊖LS ⊖F TH∑ TR∀D∑

Part III

THE CΘRE: TΣCHNΘ-LΘGIC

Part IV

M∑T∀-LΘGIC∀LYSIS

Part V

H∀PPILY ∑V∑R ∀FT∑R?

POST☹

Bibliography

Amaral, Jose Nelson et al. 'About Computing Science Research Methodology'. In: (cit. on pp. 20, 21).

Borges, Jorge Luis (2000). 'John Wilkins' Analytical Language'. In: *Selected Non-Fictions*. Ed. by Eliot Weinberger. London: Penguin Books, pp. 229–232 (cit. on pp. 11, 12).

Candy, Linda (2006). *Practice Based Research:A Guide*. Tech. rep. (cit. on p. 23).

Candy, Linda and Ernest Edmonds, eds. (2011). *Interacting: Art, Research and the Creative Practitioner*. Libri Publishing (cit. on p. 22).

Edmonds, E. and L. Candy (2010). 'Relating Theory, Practice and Evaluation in Practitioner Research'. In: *Leonardo* 43.5, pp. 470–476 (cit. on p. 23).

Everitt, Dave (2011). 'Is creativity a 'natural' process?' In: *Proceedings of the 12th International Research Conference Consciousness Reframed: art and consciousness in the post-biological era* 12 (cit. on p. 4).

Hendler, Jim and Andrew Hugill (2011). 'The Syzygy Surfer : Creative Technology for the World Wide Web'. In: *ACM WebSci 11* (cit. on p. 10).

– (2013). 'The syzygy surfer: (Ab)using the semantic web to inspire creativity'. In: *International journal of Creative Computing* 1.1, pp. 20–34 (cit. on pp. 10, 11).

Holz, Hilary J et al. (2006). 'Research Methods in Computing : What are they , and how should we teach them ?' In: *ITiCSE Innovation and technology in computer science education*, pp. 96–114 (cit. on p. 21).

Hugill, Andrew et al. (2013). 'The pataphysics of creativity: developing a tool for creative search'. In: *Digital Creativity* 24.3, pp. 237–251 (cit. on p. 8).

Jarry, Alfred (1996). *Exploits and Opinions of Dr Faustroll, Pataphysician*. Cambridge, MA: Exact Change (cit. on p. 11).

Jarry, Alfred (2006). *Collected Works II - Three Early Novels*. Ed. by Alastair Brotchie and Paul Edwards. London: Atlas Press (cit. on p. 25).

Mingers, John and Leslie Willcocks (2004). *Social theory and philosophy for information systems*. John Wiley and Sons, p. 455 (cit. on p. 17).

Nicolescu, Basarab (2010). 'Methodology of Transdisciplinarity - Levels of Reality, Logic of the Included'. In: *Transcdisciplinary journal of Engineering and Science* 1.1, pp. 19–38 (cit. on pp. 21, 24, 25).

Raczinski, Fania, Hongji Yang and Andrew Hugill (2013). 'Creative Search Using Pataphysics'. In: *Proceedings of the 9th International Conference on Creativity and Cognition*. Sydney, Australia: ACM New York, NY, USA, pp. 274–280 (cit. on p. 8).

Ramesh, V., Robert L. Glass and Iris Vessey (2004). 'Research in computer science: an empirical study'. In: *journaltitle of Systems and Software* 70.1-2, pp. 165–176 (cit. on pp. 18, 20).

Sawle, James, Fania Raczinski and Hongji Yang (2011). 'A Framework for Creativity in Search Results'. In: *The Third International Conference on Creative Content Technologies*. Rome, pp. 54–57 (cit. on p. 8).

Singh, Push (2005). 'EM-ONE: An Architecture for Reflective Commonsense Thinking'. PhD thesis. Massachusetts Institute of Technology (cit. on p. 11).

Wickson, F., A.L. Carew and A.W. Russell (2006). 'Transdisciplinary research: characteristics, quandaries and quality'. In: *Futures* 38.9, pp. 1046–1059 (cit. on pp. 21, 24).

Yossarian (2015). *Yossarian* (cit. on p. 14).