List of Todos

Institute of Creative Technologies
De Montfort University

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Algorithmic Meta-Creativity

Pataphysics and subjective/objective creativity in computing

pata.physics.wtf

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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

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Interpretation/Evaluation

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

Contents

List of Figures

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List of Source Code

Acronyms

API Application Program Interface. 40, 51, 52, 53

CSS
Cascading Stylesheets. 54

HTML
Hypertext Markup Language. 54

HTTP
Hypertext Transfer Protocol. 52, 95

IN Information Need. 25

JSON
JavaScript Object Notation. 53

NLP
Natural Language Processing. 43

NLTK
Natural Language Tool Kit. 43, 50

REST
Representational State Transfer. 52

TMPR
Trajectory Model of Practice and Research. x, 19, 20

URL
Uniform Resource Locator. 52, 53

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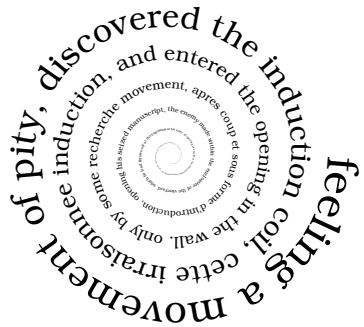
Part I

H∑LL⊖ W⊖RLD

1 Introduction



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original idea: build pataphysical web search tool using semantic web tech. cre-

ate 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 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.

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

finish introduction

1.1 Problem / Motivation / Context

context: creative computing is about a creative process (with a potential creative output) whereas comp creativity is about a creative product using traditional means.

Assumptions: computers can be creative.

complete assumptions

From relevant to creative.

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.

"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."[1]

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.

Jorge Luis Borges 'Chinese Encyclopaedia' (Borges 2000) illustrates this idea very well. The encyclopaedia lists the following results under the category of 'animal'.

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

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

1.1.1 Related Work

The Syzygy Surfer

The research presented here is built on the initial ideas of Jim Hendler and Andrew Hugill's "Syzygy Surfer" (Hendler and Hugill 2011; Hendler and Hugill 2013). They first suggested 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 search engines which value relevant results over creative ones. "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' "Chinese Encyclopaedia" (Borges 2000) (for the underlying poetic sense of unity), Jarry's Pataphysics (Jarry 1996) (for the concept of patadata – data beyond metadata) and panalogies (parallel analogies – to introduce ambiguity, since it allows various descriptions of the same object) as formulated by Singh (Singh 2005).

Yossarianlives

> Traditional search like Google, Bing, Yahoo, or DuckDuckGo returns the most popular results, and gives you expected & cliché ideas. It's what everyone else already thinks about a topic.
>
> Yossarian creative search returns diverse and unexpected results that share loose associations to your search. The results help you think about your topic in new ways and generate new ideas.
>
> If you search "beauty" in Google you get pages and pages of white models. It returns a singular way of thinking about the topic.
>
> Search "beauty" in Yossarian it returns disparate results with shared attributes, showing many different ways of thinking. Is beauty a diamond

(strong, rare, flawless), or is family beautiful (activity, togetherness) or is beauty architected (designed, planned, precision)?[2]

Use traditional search for when you know what you are looking for.

Traditional search is for learning what the world already knows.

Use creative search for when you don't know what you are looking for.

Creative search is for helping you come up with new ideas.[3]

Augmented creativity

Seeing lateral connections is an uniquely human ability, and your individual ability to make these connections is based on your own experience. We build tools that help you see more by suggesting connections that you probably wouldn't have considered otherwise, increasing the diversity and frequency of your ideas, and priming you for creativity.

Lateral Discovery

When working to escape filter bubbles too often randomenss and complete seridipity are seen as the answer for new discovery. We build tools that explore lateral association between content and believe this approach can lead to predictable moments of discovery that drive engagement, traffic, and purchase, etc.

Metaphorical Search

Search engines today have a problem in that they tell us what the world already knows, reinforcing existing knowledge. We build tools that seek to remedy this by returning results that are disperate, but metaphorically related to the query. These types of results are incredably useful for any one who derives value from new ideas.

Creative Graph

Facebook created the Social Graph helping us understand how people and things are connected, Google created the Knowledge Graph to codify the worlds information, and here at Yossarian Lives we are developing the Creative Graph, a radical new way to understand the conceptual relationships between things.[4]

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

[2] https://yossarianlives.com/

[3] https://yossarianlives.com/

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

> 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]

1.1.2 Research Questions

-

- How can we make a search tool that is inspirational rather than informational?
- How can we get search results that are unexpected and yet make sense?
- 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?
- 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?
- How can Semantic Web technologies help with the representation of patadata?
- 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?

[5] https://libraryofbabel.info/

answer research questions in conclusion

1.2 Methodology

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

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

1.3 Deliverables / Outcomes

- 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
!!!

1.3.1 Contribution to Knowledge

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

1.3.2 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, Yang 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 **??**.

1.4 The Hitchhiker's Guide to this Thesis

PREFACE

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Part I

IN THE BEGINNING. . .

Chapter 1

Introduction

Chapter 2

Methodology

Part II

IN A GALAXY FAR FAR AWAY. . .

Chapter 3

Pataphysics

Chapter 4

Creativity and Computers

Chapter 5

IR and NLP

2 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

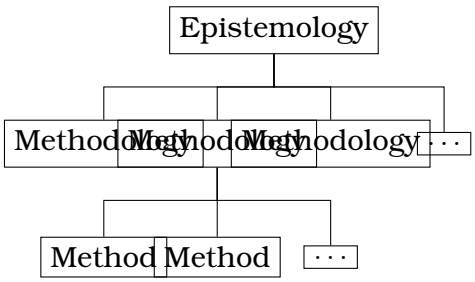


Figure 2.1: Epistemology breakdown chart

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]

2.1 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]

2.1.1 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.

2.1.2 Humanities Research

2.1.3 Arts Research

2.2 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)

2.3 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).

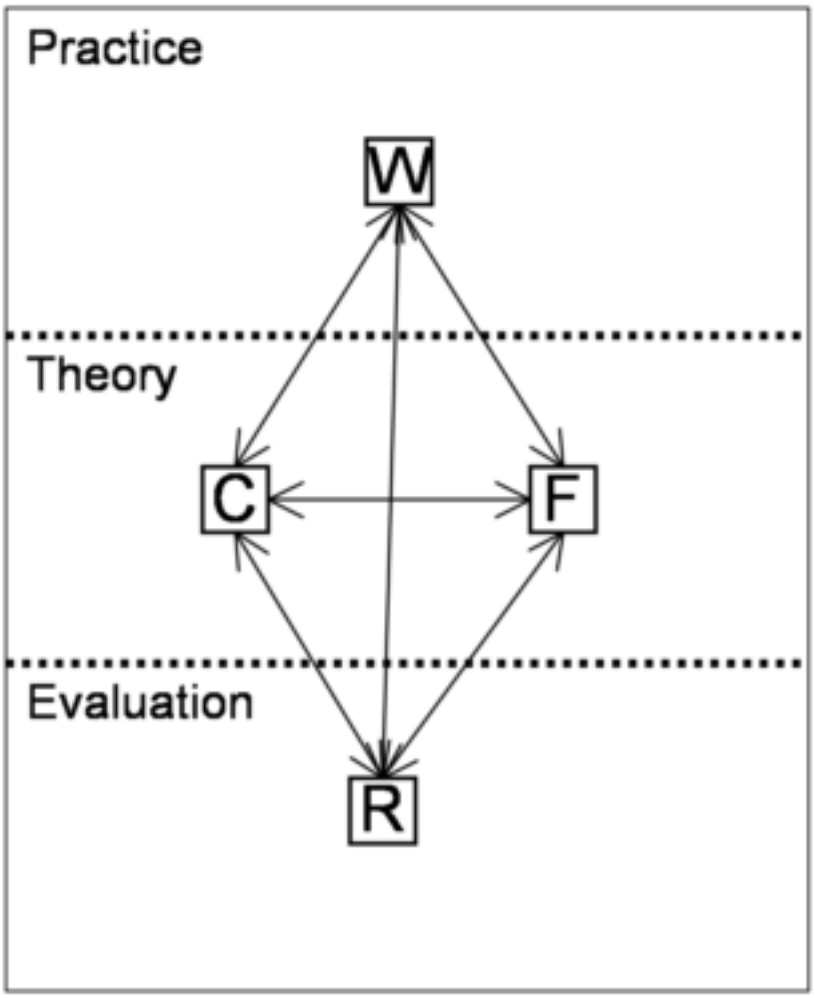


Figure 2.2: tmpr

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 2.1: 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$\Theta\Theta$LS ΘF THΣ TR$\forall$DΣ

Part III

THE CΘRE: TΣCHNΘ-LΘGIC

3 FOUNDATIONS

Part of this research has been described in a journal article in Digital Creativity in 2013, and I presented a paper at the Creativity and Cognition conference 2013 in Sydney.

Why pataphysics? How does pataphysics relate to creativity and how does it support creativity in computers?

- link the various creativity models
- how do they apply to computers?
- link pataphysics to creativity — and computers
- ranking and pataphysics

3.1 Searching vs. Browsing

What do we actually mean by searching? Usually it implies that there is something to be found, an Information Need (IN); although that doesn't necessarily mean that the searcher knows what he or she is looking for or how to conduct the search and satisfy that need.

From the users' point of view the search process can be broken down into four activities (Sutcliffe and Ennis 1998) reminiscent of classic problem solving techniques (Polya 1957):

Problem identification
IN,
Need articulation
IN in natural language terms,
Query formulation
translate IN into query terms, and
Results evaluation
compare against IN.

This model poses problems when we consider a situation where an IN cannot easily be articulated or in fact is not existent and the user is not looking for anything. This is not the only constraining factor though and Marchionini and Shneiderman have pointed out that "the setting within which information-seeking takes place constrains the search process" (Marchionini and Shneiderman 1988) and they laid out a framework with the following main elements.

- Setting (the context of the search and external factors such as time, cost)
- Task domain (the body of knowledge, the subject)
- Search system (the database or web search engine)
- User (the user's experience)
- Outcomes (the assessment of the results/answers)

Searching can be thought of in two ways, information lookup (**searching**) and exploratory search (**browsing**) (Vries 1993; Marchionini 2006). A situation where an IN cannot easily be articulated or in fact is not existent (the user is not looking for anything specific) can be considered a typical case of exploratory search and

describes the kind of search that is most suited to our proposed tool. The former can be understood as a type of simple question answering while the latter is a more general and broad knowledge acquisition process without a clear goal.

Current web search engines are tailored for information lookup. They do really well in answering simple factoid questions relating to numbers, dates or names (e.g. fact retrieval, navigation, transactions, verification) but not so well in providing answers to questions that are semantically vague or require certain extend of interpretation or prediction (e.g. analysis, evaluation, forecasting, transformation).

When it comes to exploratory search though, the user's success in finding the right information depends a lot more on constraining factors such as those mentioned earlier and can sometimes benefit from a combination of information lookup and exploring (Marchionini 2006).

> Much of the search time in learning search tasks is devoted to examining and comparing results and reformulat-ing queries to discover the boundaries of meaning for key concepts. Learning search tasks are best suited to combinations of browsing and analytical strategies, with lookup searches embedded to get one into the correct neighbourhood for exploratory browsing. (Marchionini 2006)

De Vries called this form of browsing an "enlargement of the problem space", where the problem space refers to the resources that possibly contain the answers/solutions to the information need (Vries 1993). This is a somewhat similar idea to that of Boden's conceptual spaces which she called the "territory of structural possibilities" and exploration of that space "exploratory creativity" (Boden 2003).

All of these ideas, however, seem to be concerned with how users interact with a search system, rather than how the system acts itself. So we need to shift our perspective and think about how a search tool can be more supportive for exploratory search directly and by what means.

3.2 Creativity

comparison table Poincare, Wallas, Polya, CC?

We had previously differentiated between creative computing and computational creativity:

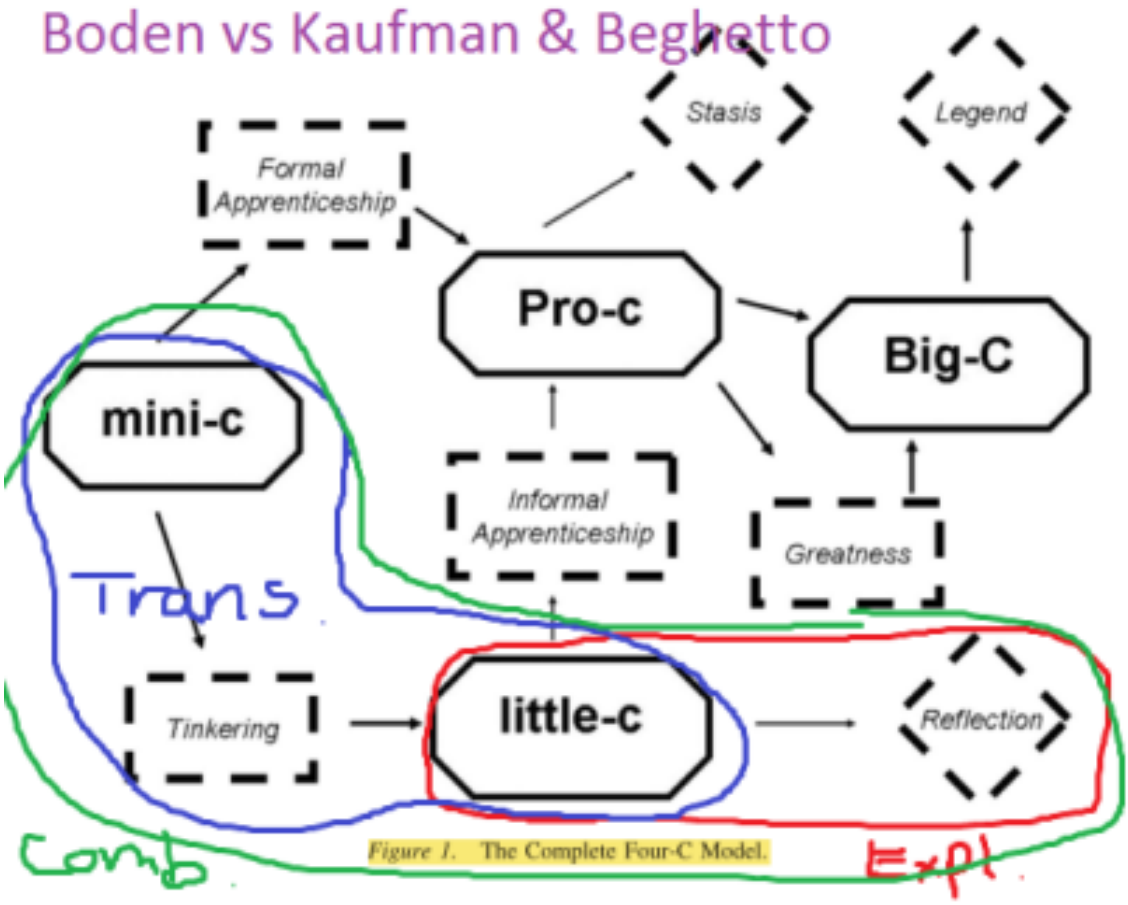


Figure 3.1: Kaufman's 4 C Model vs. Boden

> Intuitively the former is about doing computations in a creative way, while the latter is about achieving creativity through computation. You can think of the latter falling into the artificial intelligence category (using formal computational methods to mimic creativity as a human trait, see also (18)) and the former being a more poetic endeavour of how the computing itself is done, no matter what the actual purpose of the program is. (Hugill 2013)

The differences are subtle but clear.

How does ethics fit into this?

3.3 Pataphysics

3.3.1 and Creativity

The creative process normally involves a move from the known to the unknown and sometimes from the named to the unnamed. In bringing something new

Creative Computing	Digital Humanities	Computational Creativity
Motivation	Design	Intentionality
Ideation	Curation, Analysis, Editing, Modeling and Networks, Infrastructure	Framing
Implementation	Computation, Processing	Process
Operation	Versioning, Prototyping, Failures	Product

Table 3.1: Comparison of Creative Computing vs Digital Humanities vs Computational Creativity

4 step model	4 P Model	Problem Solving
Preparation	Person	Understand
Incubation	Press/Context	Plan
Illumination	Process	Carry Out
Verification	Product	Look back

Table 3.2: Comparison of 4 Step Model vs 4 P Model vs Problem Solving

into existence, the human qualities of openness and tolerance of ambiguity are generally regarded as highly desirable. We may define creativity as **the ability to use original ideas to create something new and surprising of value**. We generally speak of creative 'ideas' rather than 'products', which merely provide evidence of a creative process that has already taken place. Both the originality and the value of an idea are evaluated using subjective criteria. **Pataphysics**, which represents an extreme form of subjectivity, is therefore a highly appropriate framework within which to encourage and enable creative thinking and operations.

Both the originality and the value of a creative idea are always evaluated using purely subjective criteria. Pataphysics, which represents an extreme form of subjectivity, is therefore a highly appropriate framework within which to encourage and enable creative thinking and operations.

> 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)

Pataphysics is highly subjective and particular and is as such very suitable for this kind of transformation from relevant to creative.

> (Pataphysics) can only be defined in a new undiscovered language because too obvious: tautology. (Baudrillard 2007)

see section baalh

It is instructive to overlay these ideas on existing theories of creativity. Margaret Boden (Boden 2003), for example, has defined **P-creativity** (short for psychological creativity) as the personal kind of creativity that is novel in respect to the individual mind and **H-creativity** (short for historical creativity) as fundamentally novel in respect to the whole of human history. This allows for subjective evaluation of any idea.

Using Boden's definition we can call an idea 'new' if it is new to the individual who came up with it, making the idea P-creative. We can say that a creative idea can be seen from two perspectives: the subjective (P-creative) and the objective (H-creative) view. She argues that constraints support creativity, and are even essential for it to happen. "Constraints map out a territory of structural possibilities which can then be explored, and perhaps transformed to give another one" (Boden 2003, p.82).

This echoes the ideas of groups such as the **Oulipo** (which began as a Sub-Commission of the Collège de 'Pataphysique), who investigate 'potential literature' by creating constraints that frequently have a ludic element. Various other groups, the Ou-x-Pos, perform similar operations in fields as diverse as cinema, politics, music and cooking (Motte 2007).

Boden's conceptual space is the "territory of structural possibilities". So, the conceptual space of a teacup might be that it is meant to carry a certain amount of tea without breaking or burning fingers. It wouldn't be wise to create a teacup made out of paper. But whether we make a cup out of glass or porcelain, or how we shape the cup or the handle is pretty much up the individual's creativity. Being able to move around in this conceptual space, experiment (in thought or in reality) and play with different ideas while still following a given set of constraints is a good starting point for creativity to happen. Boden defines three sub-types of creativity.

The Oulipo similarly classifies its conceptual space under two broad headings: the synthetic and the analytic:

> (...) In the research which the Oulipo proposes to undertake, one may

> distinguish two principal tendencies, oriented respectively towards Analysis and Synthesis. The analytic tendency investigates works from the past in order to find possibilities that often exceed those their authors had anticipated. (...) The synthetic tendency is more ambitious: it constitutes the essential vocation of the Oulipo. It's a question of developing new possibilities unknown to our predecessors. This is the case, for example, of (Raymond Queneau's) 100,000,000,000,000 Poems or the Boolean haikus. (Motte 2007, p.27)

Later writings develop these ideas in more detail. La Littérature Potentielle **Oulipo1973**, is divided into several sections, dealing with clusters of methods, that include: anoulipisms (analytical oulipisms, such as combinatorial literature); use of preexisting structures such as lipograms (omitting a letter or letters), palindromes and snowballs (in which each successive word adds or subtracts a letter), homophonic translation, tautogram, and definitional literature; lexical, syntactic, or prosodic manipulations (such as the celebrated S+7, in which each substantive is replaced by the seventh word after it in a standard dictionary); lexicographical or prosodic synthoulipisms (early algorithmic methods); and perimathematical synthoulipisms (such as the Boolean poetry and combinatorial works already mentioned).

Boden links her three aspects of creativity to three sorts of surprise. She says that creative ideas are surprising because they go against our expectations. "The more expectations are disappointed, the more difficult it is to see the link between old and new." (Boden 2003, p.84) This suggests that fewer **expectations** (an open mind) allow creativity to happen more easily. Empirical experiences form expectations, which hinder our ability to accept creative ideas when they happen. In order to be able to recognise creative ideas we need to be able to see what they all have in common and in what way they differ and not reject unusual, unexpected ones.

> "Unless someone realizes the structure which old and new spaces have in common, the new idea cannot be seen as the solution to the old problem. Without some appreciation of shared constraints, it cannot even be seen as the solution to a new problem intelligibly connected with the previous one." (Boden 2003, p.84)

It is clear that the Oulipo has a similar approach in its theorising of potential literature. Releasing creativity through constraint is its essential raison d'être.

This is not to say that experience and knowledge are necessarily bad for creativity. To appreciate creativity we need to be knowledgeable in the relevant

domain to be able to recognise old and new connections and transformations. But we also need a certain level of openness and tolerance for ambiguity to overcome our expectations. Perhaps it is for this reason that 'creative people' are often assumed to have particular personality traits. Sternberg (Sternberg 1999; Sternberg 1999), for example, proposes that these comprise: independence of judgement, self-confidence, and attraction to complexity, aesthetic orientation, and tolerance for ambiguity, openness to experience, psychoticism, risk taking, androgyny, perfectionism, persistence, resilience, and self-efficacy. More empirically, Heilman, Nadeau and Beversdorf (Heilman, Nadeau and Beversdorf 2003) have investigated the possible brain mechanisms involved in creative innovation. While a certain level of domain specific knowledge and special skills are necessary components of creativity, they point out that "co-activation and communication between regions of the brain that ordinarily are not strongly connected" might be equally important.

Newell, Shaw and Simon add to the above with their report on the creative thinking process (Newell, Shaw and Simon 1963). They identify three main conditions for creativity: the use of imagery in problem solving; the relation of unconventionality to creativity; and the role of hindsight in the discovery of new heuristics. Other issues they point out are abstraction and generalisation. So, for example, poets transform the grammar of their conceptual space (in this case, language) to create new sentence structures in a poetic form. By doing so, they go against the expectations, the possibilities of the language and cause surprise. Some people might not understand the transformations and therefore the jokes or beauty of a poem simply because they are either not able to recognise connections between the old and newly transformed elements (maybe due to a lack of knowledge in the poems topic or in that particular language) or because they do not want to accept unconventional methods.

Consider the following table, which compares some of the key ideas of creativity (Boden 2003; Indurkhya 1997; Koestler 1964) with the main pataphysical operations. It will be seen that pataphysics succeeds in bringing into sharp relief the more generalised scientific ideas. The pataphysical terms are taken from the natural sciences or philosophy, but always with an ironic twist, betraying their underlying humour. They connect quite strongly with the primary descriptors of creativity, while adding a certain layer of jouissance. **Pataphysics is self-avowedly useless, but its principles may prove surprisingly useful within this context.**

3.3.2 and Computers

CREATIVITY	PATAPHYSICS
Combinational: Juxtaposition of dissimilar, bisociation, deconceptualisation	**Antinomy**: Symmetry, duality, mutually incompatible, contradicting, simultaneous existence of mutually exclusive opposites **Syzygy**: Alignment of three celestial bodies in a straight line, pun, conjunction of things, something unexpected and surprising
Exploratory: Noticing new things in old places	**Anomaly**: Exceptions, equality
Transformative: Making new thoughts possible by transforming old conceptual space, altering its own rules	**Clinamen**: Unpredictable swerve, the smallest possible aberration that can make the greatest possible difference

Table 3.3: Creativity vs Pataphysics

ANDREW:
Since our solutions will be imaginary, our aim is not so much to have the computer generate creative artefacts as to engage in a creative dialogue with the user. Therefore, we do not intend to move as close to artificial intelligence as Colton's framework seems to suggest. In the pataphysical universe, ideas such as 'human skill', 'human imagination' and 'human appreciation' are too generalised to be useful. One may very well ask: which human? And when, where and even why? Rather, our project will aim to produce an exceptional computational entity that consistently generates surprising and novel provocations to the users, who in turn may navigate and modify these by deploying their own skills, appreciation and imagination. The relationship between the two will develop quite rapidly into one of mutual subversion since, however apparent the 'rules of the game' may become, the outcomes will always be particular or exceptional.

We are not the first people to attempt to apply pataphysical ideas in computer science. Johanna Drucker focused specifically on the cleft between formal logic and subjective judgement. She introduced the discipline of 'Speculative Computing' as a solution to that problem (Drucker and Nowviskie 2007). The concept can be understood as a criticism of mechanistic, logical approaches that distinguish between subject and object.

> Speculative computing takes seriously the destabilization of all categories of entity, identity, object, subject, interactivity, process, or instrument. In short, it rejects mechanistic, instrumental, and formally logical approaches, replacing them with concepts of autopoiesis (contingent interdependency), quantum poetics and emergent systems, heteroglossia, indeterminacy and potentiality, intersubjectivity, and deformance. Digital Humanities is focused on texts, images, meanings, and means. Speculative Computing engages with interpretation and aesthetic provocation. (Drucker 2009, p.29)

For Drucker, aesthesis (ambiguous and subjective knowledge) is fundamentally opposed to mathesis (formal objective logic) and subjectivity is always in opposition to objectivity. Knowledge is a matter of interpretation of information, which can be represented digitally as data and metadata. She introduces what she calls a **'patacritical'** method of including exceptions as rules, even if repeatability and reliability are compromised. Bugs and glitches are privileged over functionality, and are "valuable to speculation in a substantive, not trivial, sense." As she says: "'Pataphysics inverts the scientific method, proceeding from and sustaining exceptions and unique cases" (Drucker and Nowviskie 2007).

In order to break out of the formal logic and defined parameters of computer science, she asserts, we need speculative capabilities and pataphysics. "The goal of pataphysical and speculative computing is to keep digital humanities from falling into mere technical application of standard practices." She links interface design with other speculative computing principles, and refers to Kant's idea of art as **'purposiveness without purpose'**. She says that the appreciation of design as a thing in itself (regardless of utility) is a goal of speculative aesthetics.

The projects Johanna Drucker describes in her book SpecLab (Drucker 2009) could certainly be considered related work. Not only in their theoretical foundations but also in some aspects of their implementation. One project in particular is worth mentioning here: the 'Patacritical Demon, an "interactive tool for exposing the structures that underlie our interpretations of text", although it remained a purely conceptual piece of work and was never implemented. Her idea if the "patacritical" method is quite interesting. Pataphysical exceptions and anomalies can thus be justified in a computational system. But it is not just this concept that deserves mention here. Her ideas on structured data, metadata and knowledge representation link very nicely into my project. How can we represent and structure data so that it does not lose its subjectivity, context and meaning? Her reference to graphical analogies is inspiring in that regard as well. I am certain I will refer back to her concepts throughout my thesis.

3.4 Patalgorithms

The proposed concept for a pataphysical algorithm requires precise data structures to represent the transformations that have taken place during the pataphysicalisation, such as the patadata. The system's index has to be adapted to accommodate this new type of data structure. It also needs to be flexible enough to allow algorithms to fit in at different stages or locations of the system, for example the inverted-index, ranking functions or query itself. Whilst this new style of algorithm has been proposed, current architectures are not capable of supporting them. As such a new flexible component-based software architecture has been proposed which will allow for a range of different style systems to be developed with little overhead. As such improving the chance of creative outcomes occurring in a different way.

Linking back to some of the creative, pataphysical concepts we have discussed earlier, let us put some of the ideas for our tool into perspective. The constraints for our conceptual space are the pataphysical rules that we want to apply to our data. We use those rules to explore, combine and transform our space; giving us the flexibility and freedom we need to find interesting results.

We developed the idea of pataphysicalising data as the process of applying such pataphysical rules in order to produce creative search results. This pataphysicalisation process forms a central component of our system (see Figure 3.2) and influences all areas of the search tool.

redraw figure

3.4.1 Pataphylicalisation

The conceptual space for our project is 'pataphysical Web searching'. There are some very simple rules or constraints that form an initial definition of the project. For example it is clear that we want to search the World Wide Web (rather than a library database), that we want to return a list of search results (and not a pile of books) and that we want the search process and its results to be creative/pataphysical (rather than relevant). In a more technical sense, we have the query term (s), the index (of all web pages that we have crawled) and some pataphysical rules in our conceptual space. How we structure our search system, how we format the index or how we go about finding our results, is not in our conceptual space however. We can explore the space to its limits and we can transform it if we want to or feel like we need to. Our pataphysical rule set will include methods for transforming the space. By applying pataphysical rules to find results to our query we are pataphysicalising the query.

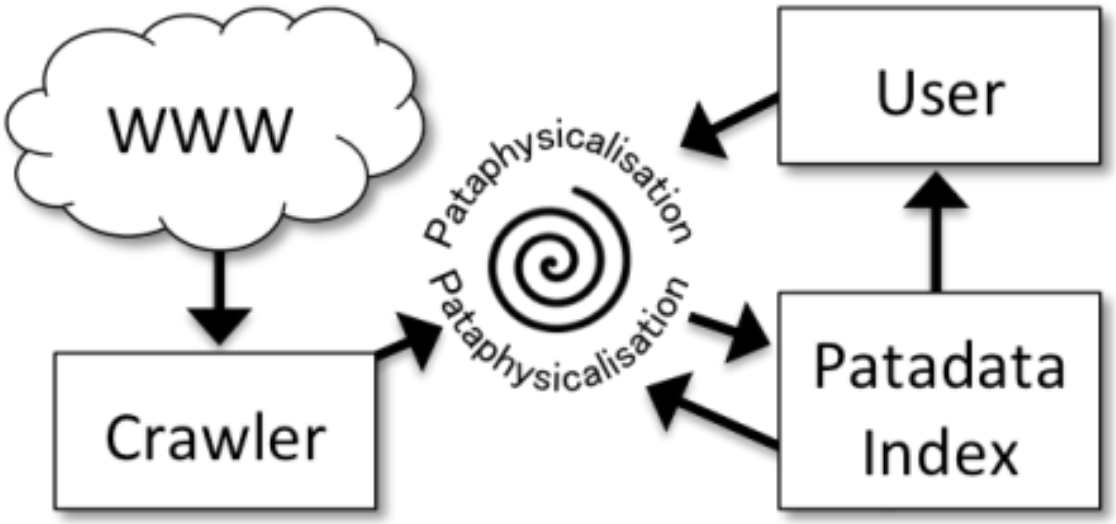


Figure 3.2: Pata central

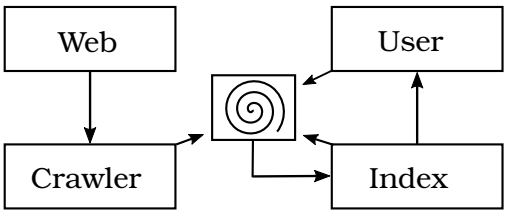


Figure 3.3: Pata central

Definitions:

To pataphysicalise
(verb) – applying pataphysical transformations
Pataphysicalisation
(noun) – the process of pataphysicalising
Patadata
(noun) – any data which has been pataphysicalised

But what exactly does the process of pataphysicalisation include? The kinds of transformations we are thinking of could be for example replacing or adding to the query term (s) with synonyms, antonyms, opposites, syzygies, clinamens etc. This can be done with the help of thesauri or dictionaries and ontologies. Whether we pataphysicalise our query term (s), the index or the results does not matter at this point. They are all possible and will maybe be done all at the same time (see figure 3.3 below). We can consider the possibility of a 'pa-

tametric index', rather than a parametric index or a 'patasaurus' (pataphysical thesaurus/ontology).

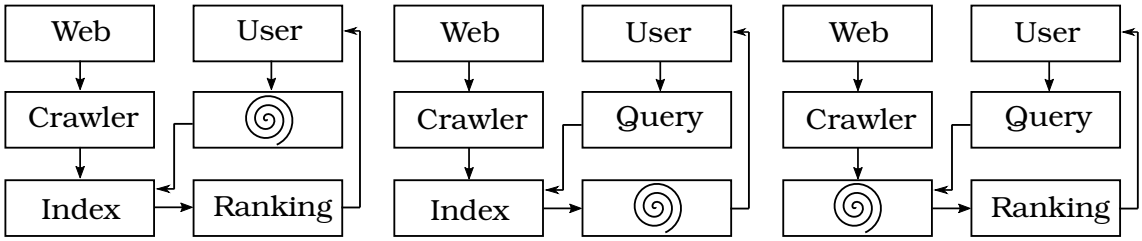


Figure 3.4: Pataphysicalisation

> Arguably, few other textual forms will have greater impact on the way we read, receive, search, access, use and engage with the primary materials of humanities studies than the metadata structures that organize and present that knowledge in digital form. (Drucker 2009, p.9)

3.4.2 Patadata

The idea of patadata is derived from the idea below:
Physics → Metaphysics → Pataphysics
Data → Metadata → Patadata

Patadata will allow us to engage with digital knowledge in a more creative way even. If metadata helps us organise information semantically then patadata is for organising information pataphysically. If metadata is objective then patadata is subjective. Drucker also points out that "many information structures have graphical analogies and can be understood as diagrams that organise the relations of elements within the whole." (Drucker 2009, p.16) So maybe patadata could allow us to represent these graphical analogies in some way? An alphabetical list is a typical model for representing text data sets for example. Or an otherwise ranked list, a tree structure, a matrix, a one-to-many relationship, etc. But is a ranked list really the best way to represent search results? Ranking itself seems unpataphysical. It contradicts the philosophy of pataphysics, although we can argue that this contradiction makes it pataphysical again. Maybe this dilemma can be solved simply by adopting another type of graphical analogy to structure the results such as a tree structure instead of a ranked list.

Example: Let's say our patadata is represented by a list of keywords that each stands for a pataphysicalisation of the original query term. This list is added to each item in the index.

Query = 'Tree'
Patadata = [Tree (equivalent), Car (opposite), Paper (antinomy),
Narwhal (anomaly), Book (syzygy), Venus Fly Trap (clinamen)]

Query = 'Sun God Ra'
Patadata = [Sun God Ra (equivalent), Slave (opposite), Holiday (antinomy),
Blue Balloon (anomaly), Pyramid (syzygy), Sphinx (clinamen)]

3.4.3 Ranking — Pranking?

In traditional Web search, ranking signals contribute to the improvement of the ranking process. These can be content signals or structural signals. Content signals are referring to anything that is concerned with the text and content of a page. This could be simple word counts or the format of text such as headings and font weights. The structural signals are more concerned about the linked structure of pages. They look at incoming and outgoing links on pages. There are also Web usage signals that can contribute to ranking algorithms such as the clickstream. This also includes ideas such as the Facebook 'like' button or the Google '+1' button which could be seen as direct user relevance feedback.

Ranking can be done at different stages of the search process. Depending on how the index is formatted and what information can be pre-computed at that stage, the ranking algorithm evaluates every Web page for relevance and returns them in order. There exist lots of different approaches on ranking, including PageRank (Brin and Page 1998b) and HITS (Kleinberg 1999), which both analyse the link structure of the World Wide Web. They analyse the incoming and outgoing links on pages. PageRank for example assigns a numerical weight to each document, where each link counts as a vote of support in a sense. It is executed at indexing time, so the ranks are stored with each page directly in the index. HITS stands for 'Hyperlink Induced Topic Search' and its basic features are the use of so called hubs and authority pages. It is executed at query time. Pages that have many incoming links are called authorities and pages with many outgoing links are called hubs.

Given a query term X, what is considered a relevant match though? Do we simply return a list of Web pages where X appears in the heading of each page? It is obviously not that easy. Several ranking signals are combined together; Google states that they use over 200 signals including PageRank and they personalise results using signals such as the web history and location (Google n.d.). What kinds of ranking signals do we need for our pataphysical Web search tool? We could say that a page Y is relevant if it matches the patadata for query X. So, for example, Y would be a relevant result if it is a clinamen or syzygy to X.

The more patadata matches there are the higher the ranking maybe. We don't necessarily have to assign a numerical ranking value to each page. Depending on how we structure our results page that might not be necessary. Shuffling the results list or the results tree could be an option.

3.5 User experience

Whilst developing a system that returns creative results to the end user has numerous advantages, the assumptions that are made about and the decisions we take for the user must still be considered. For example, presume that the user inputs a search request 'The Cat in the Hat' after reading a Dr. Seuss book to their child, and the system employs an anomalous method on the query and searched 'sunglasses'. Whilst there is logic to the new search request, it is anomalous to the initial request, if the user receives these results without being told what method was used, the results will appear random, and therefore are likely to be detrimental to the user. Therefore the level of interaction the user has with the system and the feedback the system gives to the user on decisions it is making will have a large influence on the overall effectiveness and appreciation of the search tool. A quick and simple solution to this problem would be to add an icon to the side of each search result which displays how the original query was pataphysicalised.

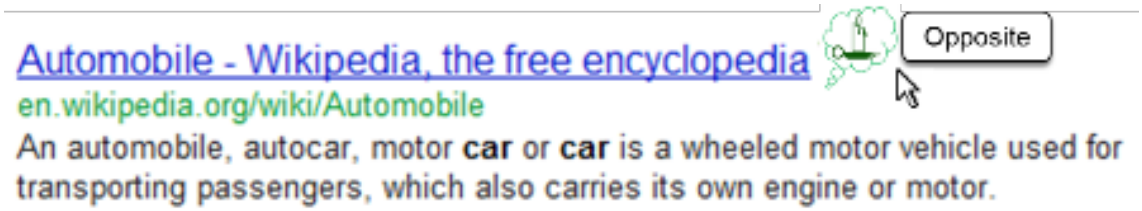


Figure 3.5: Feedback button

The above image (figure 3.5) shows an example of how this could be implemented. The little green candle (a reference to pataphysics in itself by the way) shows a pop-up note when hovered over with the mouse pointer. In this case the original query could have been 'tree' and 'car' was returned as an opposite to that.

4 Implementation

Part of this research has been described in a journal article in Digital Creativity in 2013, and I presented a paper at the Creativity and Cognition conference 2013 in Sydney.

---

style inline code

run code on laptop and get snippets of all variable contents, e.g. faustroll, froll_dict, . . .

give examples of different results if using different base documents!

add section about which pieces of code are not written by me

fix page numbers

The website http://pata.physics.wtf showcases the current proof-of-concept algorithms. This chapter gives an overview of the structure of the website and the development process.

Typically, software development is divided into so-called front and back ends. The frontend includes web design and web development and is meant to provide an interface for the end-user to communicate with the backend which involves a server, an application and a database (although this is not completely true in this project).

The frontend design is created using the **w3.css** stylesheet as a basis. The website is mostly responsive, meaning it can be viewed well on phones, tablets and screens (the poems and image spirals for example unfortunately have a fixed width which does not scale down well). The site contains various scripts written in **Javascript** (e.g. scramble letters, randomise poem, send email and tabbed content).[1]

The backend relies heavily on a **Python** framework called **Flask**. Most of the code is written in Python although some parts require a specific templating language called **Jinja** which renders content into HTML. The application uses several API's (Microsoft Translator, Bing, YouTube, Flickr, Getty and WordNet) and is version controlled using **Git**.[2]

The folder structure is as follows:

- app
— static
—— css
—— images
—— corpus
— templates
- .git
- dev.py
- guni.py

[1] frontend links: http://www.w3schools.com/w3css/, https://www.javascript.com/

[2] backend links: https://www.python.org/, http://flask.pocoo.org/, http://jinja.pocoo.org/, https://git-scm.com/

- live.py
- .gitignore
- README.md
- TODO.txt

folder structure

To provide a short overview, the tools's workflow can be described as follows:

1. Tokenise texts and remove stopwords to build index,
2. a query triggers the three pataphysical algorithms,
3. each algorithm finds results for the query,
4. retrieve some words before/after match for context, and
5. render the resulting sentences.

add audio? update this section depending on what i do

From the homepage users can choose between text, image and video search. Then they can enter a query — in the case of text search this should be single words only, image and video search support multi word queries.

4.1 Corpus

Instead of crawling the Internet the present tool uses a local collection of texts in its text-search. 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)[3]. In principle the corpus is just a folder within the tool's directory structure which contains the following files:

0. Alfred Jarry: *Exploits and Opinions of Dr. Faustroll, 'Pataphysician*
1. Edgar Allen Poe: *Collected Works*
2. Cyrano de Bergerac: *A Voyage to the Moon*
3. Saint Luke: *The Gospel*
4. Leon Bloy: *Le Desespere* (French)
5. Samuel Taylor Coleridge: *The Rime of the Ancient Mariner*
6. Georges Darien: *Le Voleur* (French)
7. Marceline Desbordes-Valmore: *Le Livre des Meres et des Enfants* (French)

[3] "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)

8. Max Elskamp: *Enluminures* (French)
9. Jean-Pierre Claris de Florian: *Les Deux Billets* (French)
10. *One Thousand and One Nights*
11. Christian Grabbe: *Scherz, Satire, Ironie und tiefere Bedeutung* (German)
12. Gustave Kahn: *Le Conte de l'Or et Du Silence* (French)
13. Le Comte de Lautreamont: *Les Chants de Maldoror* (French)
14. Maurice Maeterlinck: *Aglavaine and Selysette*
15. Stephane Mallarme: *Verse and Prose* (French)
16. Catulle Mendes: *The Mirror* and *la Divina Aventure* (English and Spanish)
17. Homer: *The Odyssey*
18. Josephin Peladan: *Babylon* (EMPTY FILE)[4]
19. Francois Rabelais: *Gargantua and Pantagruel*
20. Jean de Chilra: *L'Heure Sexuelle* (EMPTY FILE)[4]
21. Henri de Regnier: *La Canne de Jaspe* (EMPTY FILE)[4]
22. Arthur Rimbaud: *Poesies Completes* (French)
23. Marcel Schwob: *Der Kinderkreuzzug* (German)
24. Alfred Jarry: *Ubu Roi* (French)
25. Paul Verlaine: *Poems*
26. Emile Verhaeren: *Poems*
27. Jules Verne: *A Journey to the Centre of the Earth*

The original list as it appears in "Faustroll" is shown below. Only three of the items have not been found as a resource. Some others have been approximated by using another text by the same author for example. Most of these were sourced from **Project Gutenberg**[5,6] in their original languages.

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*.

[4] I have not been able to find any source texts online.

[5] See https://www.gutenberg.org/

[6] **A note on copyright:** Duration of copyright: §5. "For literary, dramatic, musical or artistic works 70 years from the end of the calendar year in which the last remaining author of the work dies." (https://www.copyrightservice.co.uk/ukcs/docs/edupack.pdf) Maurice Maeterlinck and Marguerite Vallette-Eymery (a.k.a. Rachilde or Jean de Chilra) died less than 70 years ago and their work should still be under copyright. Alfred Jarry in the Simon Watson Taylor translation is a derivative work and is probably also still protected. (http://www.copyrightservice.co.uk/copyright/p22_derivative_works) *Fair dealing*: §7. "Private and research study purposes", so for the purposes of this project copyright should not apply.

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*.
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*.

4.2 Setup

When the server is first started various setup functions are executed before any HTML is rendered. The search algorithms are triggered once a user enters a search term into the query field on any of the text, image or video pages.

Each plain text file in the corpus is added to the internal library one by one. Source 4.1 shows how this is done. The `PlaintextCorpusReader` is a feature of the Natural Language Tool Kit (NLTK) Python library[7] for Natural Language Processing.

The `setupcorpus` function (see source 4.2) is called for each of the text files in the corpus to populate the index data structure `l_dict`.

```
l_dict = dictionary { dictionary { list [ ] } }
```

[7] http://www.nltk.org/

Figure 4.1: Toulouse-Lautrec's "Jane Avril"

Figure 4.2: Bonnard's "Revue Blanche"

Figure 4.3: Aubrey Beardsley's "Docteur Faustroll"

Figure 4.4: Oberthuer's "Saint Cado"

```
1 library = PlaintextCorpusReader(corpus_root, '.*\.txt')
2 l_00 = library.words('00.faustroll.txt')
3 l_01 = library.words('01.poe1.txt')
4 ...
5 l_27 = library.words('27.verne.txt')
```

Source 4.1: Adding text files to the corpus library.

A dictionary in Python is what is known as an 'associative array' in other languages. Essentially they are unordered sets of **key: value** pairs. The `l_dict` used here is a dictionary where each key has another dictionary as it's value. Each nested dictionary has a list as the value for each key.

```
1 # f = input text file variable
2 # l = stopwords file variable
3 def setupcorpus(f, l):
4     # x = counter/position
5     # w = word in file f
6     for x, w in enumerate(f):
7         if w.isalpha() and (w.lower() not in l):
8             y = 'l_' + (re.search(r"((\d\d).(\w)+.txt)", f.fileid)).group(2)
9             l_dict[w.lower()][y].append(x)
```

Source 4.2: 'setupcorpus' function to process the corpus and create the index.

Line 6 in source 4.2 starts looping through file `f`. Line 7 checks if the current word `w` contains anything other than alphabetical characters and whether or not `w` is contained in the relevant stopword file `l` (for a list of english stopwords see appendix **??**). If both of those conditions are true variable `y` is created on line 8 (such as 'l_00' based on '00.faustroll.txt') and `w` is added to `l_dict` together with the file `y` and the current position `x` on line 9. After all files are processed, the index looks like this:

```
{
  word1: {fileA: [pos1, pos2, ...], fileB: [pos], ...},
  word2: {fileC: [pos1, pos2], fileK: [pos], ...},
  ...
}
```

Using one of the terms from figure **??** on page **??**, here are their entries in the index file (the files are represented by their number in the corpus (see page 41), i.e. **l_00** is the 'Faustroll' file, **l_01** is the 'Poe' file, etc.). An excerpt from the actual `l_dict` can be found in the appendix **??**.

```
{
  doctor: {
    l_00: [253, 583, 604, 606, 644, 1318, 1471, 1858, 2334, 2431, 2446, 3039,
↪   4743, 5034, 5107, 5437, 5824, 6195, 6228, 6955, 7305, 7822, 7892, 10049,
↪   10629, 11055, 11457, 12059, 13978, 14570, 14850, 15063, 15099, 15259,
↪   15959, 16193, 16561, 16610, 17866, 19184, 19501, 19631, 21806, 22570,
↪   24867],
    l_01: [96659, 294479, 294556, 294648, 296748, 316773, 317841, 317854,
↪   317928, 317990, 318461, 332118, 338470, 340548, 341252, 383921, 384136,
↪   452830, 453015, 454044, 454160, 454421, 454596, 454712, 454796, 454846,
↪   455030, 455278, 455760, 455874, 456023, 456123, 456188, 456481, 456796,
↪   457106, 457653, 457714, 457823, 457894, 458571, 458918, 458998, 459654,
↪   459771, 490749],
    l_02: [11476, 12098, 28151, 36270],
    l_10: [53085, 53118, 53220, 53266, 53364, 53469, 53573, 53592, 53621,
↪   53718, 54873, 55262, 55525, 55577, 55614, 55683, 55741, 56058, 62709,
↪   113969, 114131, 114405, 114794],
    l_19: [14928, 15702, 49560, 82710, 167218, 180210, 189817, 189908, 190020,
↪   190235, 190905, 199430, 226663, 275454, 275928, 278097, 287375, 291383,
↪   304731, 306055, 324757, 330488],
    l_27: [16270, 79245]
  }, ...
}
```

4.3 Text

After the setup stage is completed and the webpage is fully loaded, user input in the form of a text query is required to trigger the three pataphysical algorithms.

Image and Video search do not use all three algorithms — where relevant this is highlighted in each section. Generally the following descriptions refer to the text search functionality.

Explain difference in Text, Image and Video

4.3.1 Clinamen

The clinamen is the unpredictable swerve that Bök calls “the smallest possible aberration that can make the greatest possible difference” (Boek 2002).

In simple terms, the clinamen algorithm works in two steps:

1. get clinamen words based on dameraulevenshtein and faustroll,
2. get sentences from corpus that match clinamen words.

find ref for dameraulevenshtein in baeza-yates book?

It uses the 'faustroll' text by Alfred Jarry (1996) as a base document and the Damerau-Levenshtein algorithm (Damerau 1964; Levenshtein 1966), which measures the distance between two strings (with 0 indicating equality), to find words that are similar but not quite the same. The distance is calculated using insertion, deletion, substitution of a single character, or transposition of two adjacent characters. This means that we are basically forcing the program to return matches that are of distance two or one, meaning they have two or one spelling errors in them.

```
1  # String w = query word
2  # Int i = assigned distance
3  def clinamen(w, i):
4      words = set([item for item in l_00 if dameraulevenshtein(w, item) <= i])
5      out, sources, total = get_results(words, 'Clinamen')
6      return out, words, sources, total
```

Source 4.3: Clinamen function

Source 4.3 line 4 creates the set of clinamen words using a list comprehension. It retrieves matches from the 'faustroll' file `l_00` with the condition that they are of Damerau-Levenshtein distance `i` or less to the query term `w` (see appendix **??**). Duplicates are removed. Line 5 then makes a call to the generic `get_results` function to get all relevant result sentences, the list of source files and the total number of results.

```
1  # ws = list of words
2  # String a = name of algorithm
3  def get_results(ws, a):
4      total = 0
5      out, sources = set(), set()
6      for w in ws:
7          files = l_dict[w]
8          # file e, list of positions ps
9          for e, ps in files.items():
10             f = get_title(e)
11             sources.add(f)
12             sent = pp_sent(w.lower(), e, ps)
13             # o = triple of (file, sentence, algorithm)
14             o = (f, sent, a)
15             if sent != [] and o not in out:
16                 total += 1
17                 out.add(o)
18     return out, sources, total
```

Source 4.4: 'get_results' function to get all sentences for a list of words.

The `get_results` function (see source 4.4) is used by all three algorithms (clinamen, syzygy and antinomy). Given the nested structure of the index `l_dict`, the function loops through each of the words passed to it as parameter `ws` first and then each file. Line 7 retrieves the dictionary of files from `l_dict`. Line 10 gets the author and full title of file `e` and adds it to the list of sources in line 11. Line 12 makes use of yet another function called `pp_sent` (see source 4.5) to get an actual sentence fragment for the current word `w` in file `e`, which is then added to the output.

```
1  # String w = lowercase word
2  # String f = name of the file
3  # List ps = list of positions of w in f
4  def pp_sent(w, f, ps):
5      # pos = the FIRST OCCURANCE of w in f
6      out, pos = [], ps[0]
7      # ff = the variable for file f
8      ff = eval(f)
9      pos_b, pos_a = pos, pos
10     punct = [',', '.', '!', '?', '(', ')', ':', ';', '\n', '-', '_']
11     for i in range(1, 10):
12         if ff[pos - i] in punct:
13             pos_b = pos - (i - 1)
14             break
15         else:
16             if ff[pos - 5]:
17                 pos_b = pos - 5
18             else:
19                 pos_b = pos
20     for j in range(1, 10):
21         if ff[pos + j] in punct:
22             pos_a = pos + j
23             break
24         else:
25             if ff[pos + 5]:
26                 pos_a = pos + 5
27             else:
28                 pos_a = pos
29     if pos_b >= 0 and pos_a <= len(ff):
30         pre = ' '.join(ff[pos_b:pos])
31         post = ' '.join(ff[pos+1:pos_a])
32         out = (pre, w, post)
33     return out
```

Source 4.5: 'pp_sent' function to retrieve a sentence from a file.

In function `pp_sent` (source 4.5) line 6 is important to note because it is a key functionality point. Even though the index `l_dict` stores a full list of all possible

positions of a given word in each file, the `pp_sent` function **only retrieves the sentence of the very first occurance of the word** rather than each one. This decision was taken to avoid overcrowding of results for the same keyword.

Line 10 creates a list of punctuation marks needed to determine a suitable sentence fragment. Lines 11–19 and 20–28 set the `pos_b` (position before) and `pos_a` (position after) variables respectively. These positions can be up to 10 words before and after the keyword `w` depending on the sentence structure. In line 30 the actual sentence fragment up to the keyword is retrieved, while in line 31 the fragment just after the keyword is retrieved. `ff[pos_b:pos]` for example returns the list of words from position `pos_b` to position `pos` from file `ff`. The built-in Python `.join()` function then concatenates these words into one long string separated by spaces. On line 32 a triple containing the pre-sentence, keyword and post-sentence is set as the output and then returned.

The image/video searches don't use the clinamen function at all.

4.3.2 Syzygy

The syzygy surprises and confuses. It originally comes from astronomy and denotes the alignment of three celestial bodies in a straight line. In a pataphysical context it is the pun. It usually describes a conjunction of things, something unexpected and surprising. Unlike serendipity, a simple chance encounter, the syzygy has a more scientific purpose.

In simple terms, the syzygy algorithm works in two steps:

1. get syzygy words based on synsets and hypo-, hyper- and holonyms from WordNet,
2. get sentences from corpus that match syzygy words.

```
1  # w = input query term
2  def syzygy(w):
3      words = set()
4      wordsets = wn.synsets(w)
5      for ws in wordsets:
6          words.update(get_nym('hypo', ws))
7          words.update(get_nym('hyper', ws))
8          words.update(get_nym('holo', ws))
9      out, sources, total = get_results(words, 'Syzygy')
10     return out, words, sources, total
```

Source 4.6: Syzygy function.

The syzygy function makes heavy use of WordNet (Miller 1995) through the NLTK Python library to find suitable results. Specifically, as shown in source 4.6, the algorithm fetches the set of synonyms (synsets) on line 4. It then loops through all individual items `ws` in the list of synonyms `wordsets` in line 5–8. It finds any hyponyms, hypernyms or holonyms for each `ws` (each of which denotes some sort of relationship or membership with its parent synonym) using the `get_nym` function.

explain reasoning behind algorithms like this for all:

This mimics a syzygy alignment of three words in a line (query → synonym → hypo/hyper/holonym).

Line 9 makes use of the `get_results` function (see source 4.4) in the same was as the clinamen function does.

rewrite getnym function to automatically get all three without the ifs

The image and video searches both use the syzygy function as part of their `pataphysicalise` function (see source 4.8).

4.3.3 Antinomy

The antimony, in a pataphysical sense, is the mutually incompatible.

In simple terms, the antinomy algorithm works in two steps:

1. get antinomy words based on synsets and antonyms from WordNet,
2. get sentences from corpus that match antinomy words.

```
1  # w = input query term
2  def antinomy(w):
3      words = set()
4      wordsets = wn.synsets(w)
5      for ws in wordsets:
6          anti = ws.lemmas()[0].antonyms()
7          if len(anti) > 0:
8              for a in anti:
9                  if str(a.name()) != w:
10                     words.add(str(a.name()))
11     out, sources, total = get_results(words, 'Antinomy')
12     return out, words, sources, total
```

Source 4.7: Antinomy function.

For the antinomy we simply used WordNet's antonyms (opposites) (see source 4.7). This algorithm is very similar to the algorithm for the syzygy. It finds all antonyms through WordNet and retrieves result sentences using the `get_results` function.

4.4 Image & Video

In simple terms, the image and video search works in three steps:

1. pataphysicalise query terms using syzygy algorithm
2. translate each pataphysicalised term
3. retrieve images/videos using API calls

The `pataphysicalise` function (see source 4.8) transforms the original query terms ready for the next step. In line 5 the `syzygy` algorithm (source 4.6) is used to make this transformation. Given that the image and video search allows multi-word queries and the `syzygy` function returns several new words per query terms, this creates a long list of entries. On top of that the output is the inner product (line 8) of all these results. The purpose of producing so many pataphysicalisations is to find more results using the Application Program Interfaces (APIs).

```
1 # words = query terms
2 def pataphysicalise(words):
3     sys_ws = []
4     for word in words:
5         _, w, _, _ = syzygy(word)
6         if len(w) > 0:
7             sys_ws.append(list(w))
8     out = itertools.product(*sys_ws)
9     return list(out)
```

Source 4.8: Function to pataphysicalise image and video query terms.

For example, running the pataphysicalise function with the terms 'clear' and 'sky' will produce two intermediary lists (shortened here for the demonstration) which are then combined into one list using the Cartesian product:

```
["disembarrass", "bear", "judge", "remove", "elucidate", "modify", "free",
↪  "approve", "certify", "determine", "strip",  "empty", "purge", "vanish",
↪  "disappear", "sell", "pay", "make", "take", "disforest", "formalize",
↪  "okay", "allow", ...],
```

```
["blue", "atmosphere", "fling", "throw_back", "lag", "blue_sky", "submarine",
↪  "toss_back", "blue_air", "mackerel_sky", "wild_blue_yonder"]


[("disembarrass", "blue"), ("disembarrass", "atmosphere"), ..., ("strip",
↪  "fling"), ..., ("empty", "submarine"), ..., ("allow", "mackerel_sky"),
↪  ("allow", "wild_blue_yonder")]
```

The next step is to translate the pataphysicalised search terms as shown in source 4.9 before any API calls are made.

```
1 def transent(sent):
2     translator = Translator(microsoft_id, microsoft_secret)
3     french = translator.translate(sent, "fr")
4     japanese = translator.translate(french, "ja")
5     patawords = translator.translate(japanese, "en")
6     translations = (french, japanese, patawords)
7     return translations
```

Source 4.9: Translation function.

4.4.1 REST & API

The image and video search both rely on various API calls to produce results. Currently used are Microsoft Translate, Bing Image Search and YouTube.

A RESTful API allows browsers ("clients") to communicate with a web server via HTTP methods such as GET and POST. The idea is that a given service, like the Microsoft Bing search API, can be accessed in a few simple steps using a library like **Requests**[8]. These are:

1. Construct the Uniform Resource Locator (URL) (see, source 4.10 lines 5,6,7 and 11)
2. get an API key (see, source 4.10 line 4)
3. send URL and key using GET method (see, source 4.10 line 12)
4. receive and process response in requested format (e.g. JavaScript Object Notation (JSON)[9])

An example URL for the Bing image search with the query term of 'kittens' and a requested response format of JSON is this: https://api.datamarket.azure.com/

[8] http://docs.python-requests.org/en/latest/
[9] http://www.json.org/

```python
def get_Bing(words):
    out = []
    trans = ''
    bing_key = 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx'
    base = "https://api.datamarket.azure.com/Bing/Search/"
    params = "Image?$format=json&Query='"
    after = "'"
    for x in words:
        y = ' '.join(x)
        z = transent(y)  # (french, japanese, patawords)
        url = ''.join([base, params, z[2], after])
        bing_img = requests.get(url, auth=HTTPBasicAuth(None, bing_key))
        if bing_img.json()['d']['results']:
            trans = z
            for result in bing_img.json()['d']['results']:
                phototitle = result['Title']
                photoimg = result['MediaUrl']
                photolink = result['SourceUrl']
                out.append((phototitle, photoimg, photolink))
            break
        else:
            out = []
    return out, trans
```

Source 4.10: Using the Microsoft Bing API to retrieve images.

Bing/Search/Image?$format=json&Query='kittens'. There are many other parameters that can be specified, such as 'Adult' (which can be set to 'Moderate' for example) and 'ImageFilters' (which allows users to specify size or aspect ratio)[10].

Bing will then send back the response in JSON format. One entry of the list of results looks like this (with whitespace formatting added for convenience). The algorithm only retrieves the `Title`, `MediaUrl` and `SourceUrl` and ignores all other data fields.

```
"d": { "results": [
  { "__metadata":
    { "uri":
↪    "https://api.datamarket.azure.com/Data.ashx/Bing/Search/Image?Query=\u0027kittens\u0027&$ski
      "type": "ImageResult"
    }, // __metadata
    "ID": "e09072a2-faf3-47ac-b77d-46a8df8941aa",
    "Title": "Cute Kittens - Pictures - The Wondrous Pics",
    "MediaUrl":
↪    "http://wondrouspics.com/wp-content/uploads/2011/12/Cute-Kitten2.jpg",
    "SourceUrl": "http://wondrouspics.com/cute-kittens-pictures/",
```

[10] see https://datamarket.azure.com/dataset/bing/search#schema

```
    "DisplayUrl": "wondrouspics.com/cute-kittens-pictures",
    "Width": "1440",
    "Height": "900",
    "FileSize": "238015",
    "ContentType": "image/jpeg",
    "Thumbnail":
    { "__metadata":
      { "type": "Bing.Thumbnail"
      },
      "MediaUrl":
↪   "http://ts2.mm.bing.net/th?id=OIP.M5692e5d79242507e30600fd54639316cH0&pid=15.1",
      "ContentType": "image/jpg",
      "Width": "480",
      "Height": "300",
      "FileSize": "13856"
    } // Tumbnail
  }, ...
  ], // results
  "__next":
↪   "https://api.datamarket.azure.com/Data.ashx/Bing/Search/Image?Query=\u0027kittens\u0027&$ski
} // d
```


4.5 Design

Once the three algorithms have produced their respective results, the page displaying these results can be rendered. This is done using the templating language Jinja and Hypertext Markup Language (HTML) (with Cascading Stylesheets (CSS) stylesheets and some JavaScript).

The text results page has three options for how the results are presented, with 'Poetry — Queneau' being the default.

Poetry

Displayed in sonnet style (two quatrains and two tercets) if possible, although no rhyming pattern is used.[11]

- Queneau — Each line can be changed manually.
- Random — The whole poem can be randomised.

Sources

Ordered by source text.

Algorithms

Ordered by algorithm.

get proper ref for sonnet style

[11] https://en.wikipedia.org/wiki/Sonnet

Figure 4.5: proto3screen

The image and video results pages work the same way. They both have two display options, with the 'Spiral' option being the default. The spirals are modelled on the idea of Fibonacci spirals.

Spiral
: Displayed square images/videos as a golden spiral.

List Displayed as a simple list.

4.5.1 Poetry

Source 4.11 shows the segment of HTML/Jinja code that renders the Queneau Poetry. Lines 2-6 creates a button for sending the currently showing poem per email. Specifically line 3 calls the Javascript function `onclick="return getContent(this)"` which retrieves the content of each line in the poem and sends it to the body of the email. Lines 7-22 render the 4 stanzas of the poem. This is done using two nested Jinja 'for' loops (line 8 and line 16). Line 8 loops through the (ideally) 14 lines of the poem. `lol` can be considered a masterlist of all sublists for each poem line.

get structure of lol as opposed to all_sens

```
# all_sens list:
```

```
    <div class="subtab_content" id="q_tab">
      <p class="w3-center">
        <a class="emailbutton w3-btn w3-blue-grey" href="#" onclick="return
↪   getContent(this)">
          Email this poem!
        </a>
      </p>
      <div class="poetry w3-container w3-theme-l5">
        {% for n in range(1, lol|length + 1) %}
          {% set wid = ['wn', n|string]|join %}
          {% set lid = ['lyr', n|string]|join %}
          {% set sid = ['scrollLinks', n|string]|join %}
          {% set aid = lol[n-1] %}
          <div id="poems">
            <div id="{{wid}}" class="wn">
              <div id="{{lid}}" class="lyr">
                {% for sens in aid %}<span title="{{ sens[0] }}, {{ sens[2]
↪   }}">{{ sens[1][0] }} <form class="inform" action="../textresults"
↪   method="post"><input class="inlink" type="submit" name="query" value="{{
↪   sens[1][1] }}" onclick="loading();"></input></form> {{ sens[1][2]
↪   }}</span>{% endfor %}
              </div>
            </div>
            <div id="{{sid}}" class="scrollLinks"></div>
          </div>
        {% endfor %}
      </div>
    </div>
```

Source 4.11: Code for rendering Queneau style poems.

```
        [(title, (pre, word, post), algorithm), ...]
      # lol list:
        [all_sens[0], all_sens[1], ...]
```

4.5.2 Spiral

4.6 Prototypes

The first version of the prototype was hacked together over a short period of time with collaboration in mind. It was originally build to demonstrate the three algorithms in action before James' architecture was finished. The design of the website was simple and plain.

Results were displayed in three sets per algorithm. Each keyword was preceded and followed by exactly 5 words.

	Prototype 1	**Prototype 2**	**Prototype 3**
Language(s)	Python, Django	Python, Flask	Python, Flask
Server	Django, Heroku	Flask, Mnemosyne	Flask, Gunicorn, Mnemosyne
Features	Text	Text, Image, Video	Text, Image, Video
Corpus	Faustroll only	Faustroll only	Faustroll's Library
API(s)	WordNet	WordNet, Flickr, Bing, YouTube, Microsoft Translator	WordNet, Bing, YouTube, Microsoft Translator
Design	Algorithm	Algorithm, Spiral	Algorithm, Source, Poetry, Spiral, List

Table 4.1: Comparison of prototypes

Table 4.2: My caption

Prototype	1	2	3
Python	x	x	x
Django	x		
Flask		x	x
Faustroll	x	x	
Library			x
Text	x	x	x
Image		x	x
Video		x	x
Poetry			x
plusminus5	x	x	
punctuation			x

```
    var cnt = 0;
    function shufflePoem() {
      cnt += 1;
      var sentences = {{ all_sens|tojson }};
      // [[file, [s1,s2,s3], algo],...]
      var n = {{ all_sens|length }};
      var rlist = [];
      for (var i = 0; i < 14; i++) {
        var r = Math.floor(Math.random() * n);
        var t = sentences[r][0];
        var al = sentences[r][2];
        var b = sentences[r][1][0];
        var m = sentences[r][1][1];
        var a = sentences[r][1][2];
        var str1 = "<span title='" + t +', '+ al;
        var str2 = "'>" + b + " <form class='inform' action='../textresults'
↪  method='post'><input class='inlink' type='submit' name='query' value='";
        var str3 = m + "' onclick='loading();'></input></form> " + a;
        var str4 = "</span>";
        var fullsent = str1 + str2 + str3 + str4;
        rlist[i] = fullsent;
      }
      rlist[3] = rlist[3].concat('<br>');
      rlist[7] = rlist[7].concat('<br>');
      rlist[10] = rlist[10].concat('<br>');
      var output = rlist.join('<br>');
      document.getElementById('clickcount').innerHTML = cnt;
      document.getElementById('random_poem').innerHTML = output;
      return false;
    }
```

Source 4.12: Code for randomising poems.

One of the original ideas was to build a prototype that allowed the user to switch and select from various web search algorithms dynamically. The system architecture was never built. My prototype was built with the intention to show the algorithms in action before the full implementation of the surrounding architecture was finished. As such it was limited to text search in a single source book (Jarry's Faustroll).

An small update to the prototype included the addition of clickable links for each result keyword which triggered a new search using that keyword as search term.

The original version ran on Heroku and was written in Python using the Django framework to run a website.

get new screenshots for prototype 1

don't mention James?

The main differences between prototype 1 and prototype 2 are:

- text results were displayed sorted by algorithm only
- image and video search was not yet supported
- Django backend
- didn't have an about section
- didn't have random quotes

—

This version introduced the move from Django to Flask. It also included the first major re-design of the website. Flask made things simpler than Django.

It is still available online at pata.fania.eu.

A responsive design was created. Image and video search functionality was added.

Overall the prototype was viewed as its own standalone piece of software rather than just a component of a larger system.

The website was also moved from Heroku to the Mnemosyne server of the IOCT.

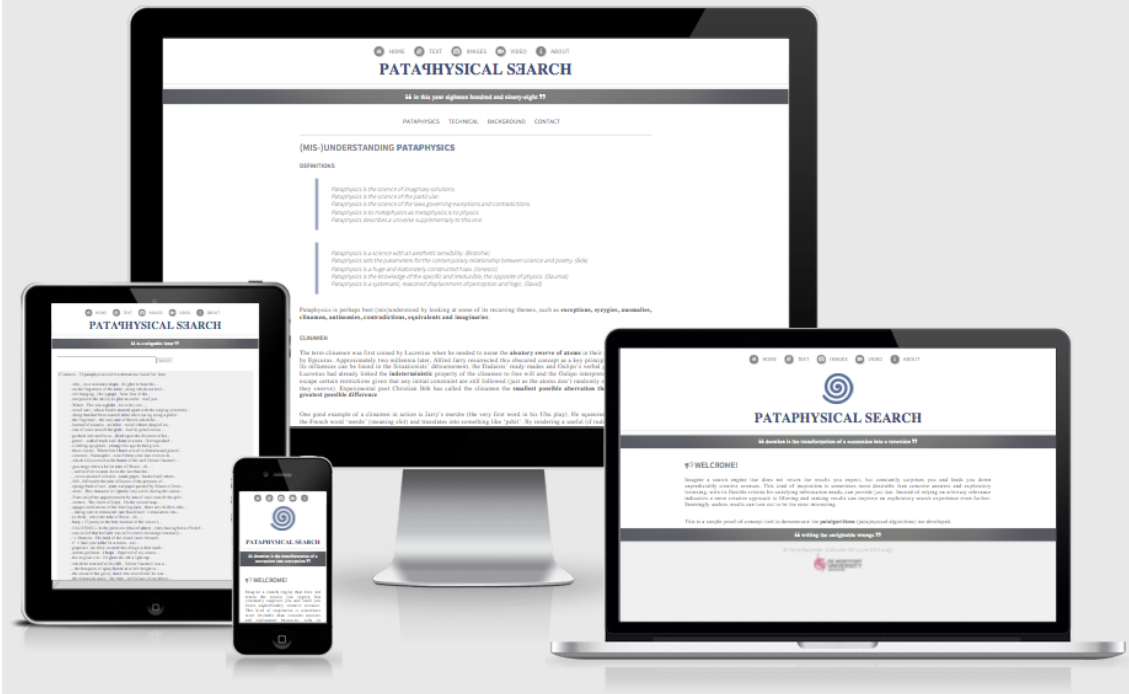
The main differences between the current version and prototype 2 are:

- the corpus consisted of the faustroll text only
- results were keyword $\pm$ 5 words per line
- text results were displayed sorted by algorithm only
- image and video results were displayed as spiral only

—

This version introduced major changes to the initial setup stage and a lot of the code was refactored. Another design update was also implemented. To the user the most obvious change will be the presentation of results. There are now various display choices. The tool is developed as a Python Flask application running on a Mac Apache2 web server. The flask development server is started using the 'python dev.py' command. This mode is set up for debugging and will give detailed error messages. Starting the live gunicorn server on apache2 use 'guni ..... guni.py'. This uses several threads etc. The stylesheet is based on the **w3.css**.


PATA. ꟻHYSICS. SEARCH
the virgin, the bright, and the beautiful today
DEFINITIONS
(MIS-)UNDERSTANDING PATAPHYSICS
SYZYGY
ANTINOMY
ALFRED JARRY
PATA. PHYSICS. SEARCH
laughter is the discord between tensions being resolved
SAINT CADO
like soft curved, amoeboid and protoplasmic
POETRY *
PATA. SEARCH


PATAꟻHYSICAL SƎARCH
(MIS-)UNDERSTANDING PATAPHYSICS
DEFINITIONS
CLINAMEN
PATAPHYSICAL SEARCH
¶ WELCOME!


Pataphysical Search!
Pataphysical Search!
Pataphysical Search!

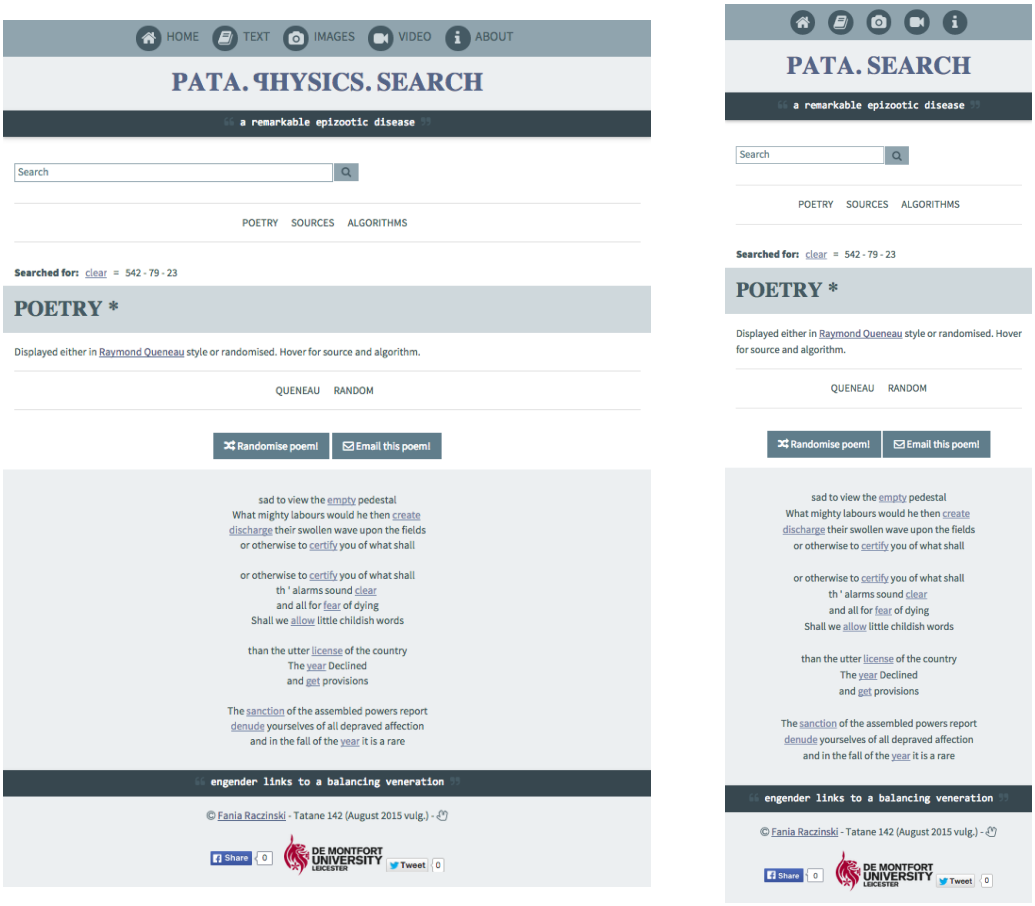


Figure 4.7: Poetry results screenshot & mobile

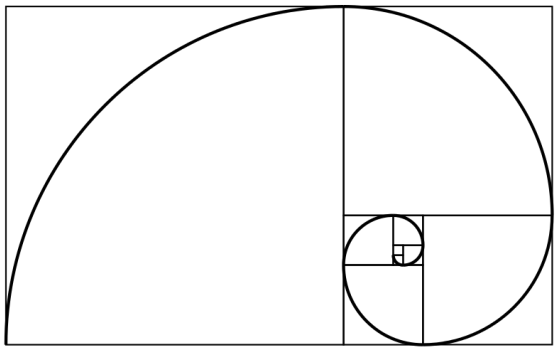


Figure 4.8: Fibonacci Spiral[12]

Figure 4.9: Prototype 1 screenshot

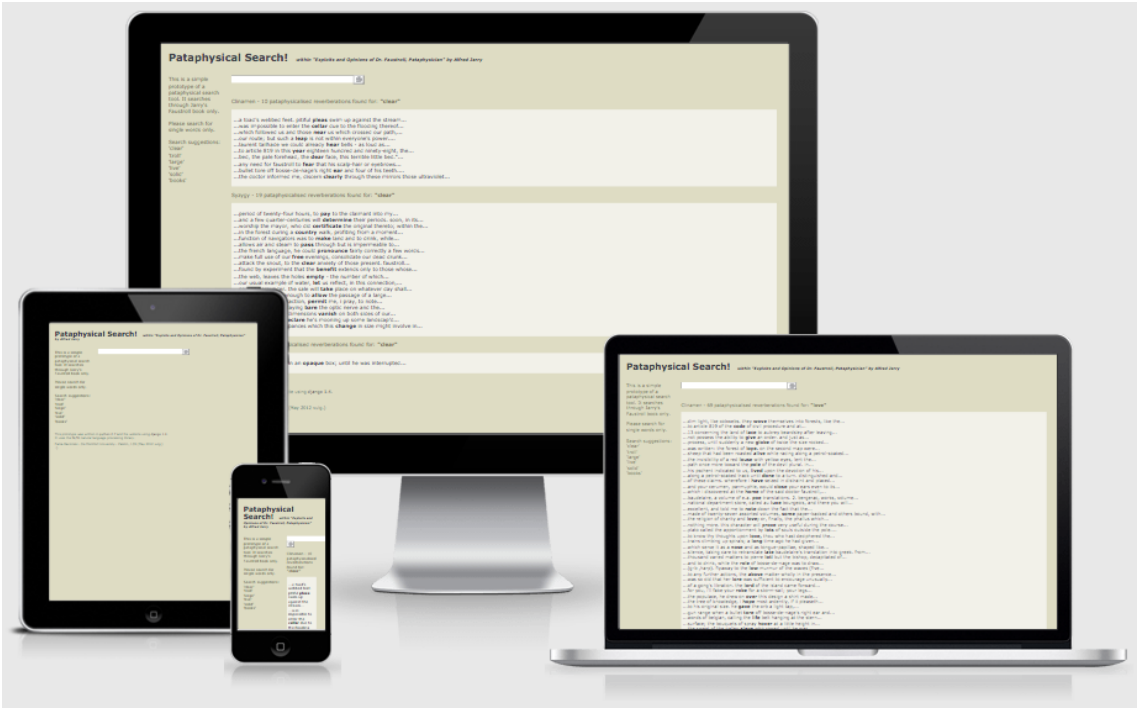


Figure 4.10: proto1screen

Figure 4.11: Prototype 2 screenshot

Figure 4.12: proto2screen

5 Applications

discuss problems with algorithms, pros and cons...

This function exhibits the same problem as mentioned above for the syzygy, just much worse. Arguably, some words just do not appear to have an opposite, but the pataphysical antinomy should still be able to find a match. A better thesaurus or a larger index (e.g. based on more than one book —- or, of course, the Web) could improve this method.

In this section we consider the possible uses and applications for the proposed creative search tool.

Our target audience is not quite as broad as that of a general search engine like Google. Instead, we aim to specifically cater for users who can appreciate creativity or users in need of creative inspiration. Users should generally be educated about the purpose of the search tool so that are not discouraged by

what might appear to be nonsensical results. Users could include artists, writers or poets but equally anybody who is looking for out-of-the-box inspirations or simply a refreshingly different search engine to the standard. The way we display and label results produced by the tool can influence how the user perceives them. The current prototype for example separates the results into its three components but we could have equally just mixed them all together. The less transparent the processes in the background (e.g. which algorithm was used, how does the result relate to the query precisely, etc.) are for the user, the more difficult it might be to appreciate the search.

There are many ways a pataphysical search tool could be used across disciplines. In literature, for example, it could be used to write or generate poetry, either practically or as a simple aid for inspiration. We are not limited to poetry either; novels, librettos or plays could benefit from such pataphysicalised inspirations. One can imagine tools using this technology that let you explore books in a different ordering of sentences (a sort of pataphysical journey of paragraph hopping), tools that re-write poems or mix and match them together. Even our simple prototype shows potential in this area and could be even more powerful if we extended it to include more base texts, for example the whole set of books contained in Faustroll's library ([20] and also [12]). A richer body of texts (by different authors) would produce a larger index which would possibly find many more matches through WordNet and end in a more varied list of results.

From a computer science perspective it could be used as one of the many algorithms used by traditional search engines for purposes like query feedback or expansion (e.g. "did you mean ... "or "you might also be interested in ... "). Depending on how creative we want the search engine to be, the higher we would rank the importance of this particular algorithm. One of the concepts related to the search tool, namely patadata, could have an impact on the development of the Semantic Web. Just as the Semantic Web is about organizing information semantically through objective metadata, patadata could be used to organize information pataphysically in a subjective way.

The prototype tool is already being used in the creation of an online opera, provisionally entitled from [place] to [place], created in collaboration with The Opera Group, an award-winning, nationally and internationally renowned opera company, specialising in commissioning and producing new operas. In particular, it is being used to create the libretto for one of the virtual islands whose navigation provides the central storyline for the opera. The opera will premiere in 2013, and will continue to develop thereafter, deploying new versions of the tool as they appear.

5.1 Patakosmos

www.patakosmos.com

5.2 Soeren and the other guy

5.3 Digital Opera

5.3.1 Use

> "There is an official and an unofficial way that I used the prototype. Officially, I threw keywords based on mood 'sad', 'lively' etc into it and used the results as the libretto for small sections of music that reflect said mood. Unofficially I used lots and lots of different words to retrieve the lines that worked." Lee Scott (22 May 2014)

5.3.2 Result

Confusing
...my tuning fork. imagine the perplexity of a man outside time...
...mandrills or clowns, spread their caudal fins out wide like acrobats...
...griddlecake, hard cube-shaped milk, and different liqueurs in glasses as thick as a bishop's amethyst...

Playful
...peacocks' tails, gave us a display of dancing on the glassy...

Busy
...wasps and bumblebees and the vibration of a fly's wing...

Driving
...bodies striking the hours of union and division of the black...

Disjointed
...tangential point of the universe, distorting it according to the sphere's...

Sadness
...others: may your dire sorrow flyaway...
...no longer deep enough to satisfy our honour...
...other side of the green sleep of hulls; ships passed away...

Sweeping
...loved her like the infinite series of numbers...
...the veritable portrait of three persons of god in three escutcheons...

Fear
. . .it will set. fear creates silence nothing is terrifying. . .
. . .forth revealing the distinction and evil engraved in the wood. . .
. . . underground arose from ali baba screaming in the pitiless oil. . .

Joy
. . .sibyls record the formula of happiness, which is double: be amorous. . .
. . .the lord of the island gloried that his creation was good. . .

Awe
. . .like earth; the enemy of fire and renascent from it. . .
. . .awesome figure, warlike and sacerdotal, glared at the assembly. . .
. . .is not an island but a man. . .

Clocked
. . .quincuncial trees. . .

Tension
. . .the vigilant gaze of the spirit of the dead. . .
. . .do not make as much noise as a single drum. . .
. . . the oars made a clangourous sound as they scraped along the bow. . ..

Calm
. . .a strange upon a clam sea quilted with sand; faustroll. . .
. . .each person present threw a pebble into the sea. . .
. . .depth and with edges that tend to ebb and flow. . .
(textures)

Morphing
. . .in a striking metamorphosis the mourning color of the hangings turned. . .

5.3.3 Interview

Part IV

M∑T∀-L⊖GIC∀LYSIS

6 Interpretation

Part of this research has been described in a journal article in Digital Creativity in 2013, and I presented a paper at the Creativity and Cognition conference 2013 in Sydney.

Creativity should be seen as a continuum, there is no clear cut-off point or Boolean answer to say precisely when a person or piece of software has become creative or not.

ref

Evaluating creative software is not an easy task. Pease and Colton [27] divide it into two notions:

- whether an idea or artefact is valuable or not, and
- whether a system is acting creatively or not.

We would need to investigate each individual search result in terms of its value and creativity. This could be done by user ratings or satisfaction questionnaires. Rather than measuring the success of individual results we could look at evaluation them as one set instead, similar to the blind side-by-side comparisons by

Bing or MillionShort.

The search results produced by our tool can be quite surprising sometimes and it not always clear how they connect to the initial query (especially if the inner workings of the algorithms are unknown), even if we identify through which function a result has been obtained. Obviously these keywords might not be helpful to users unfamiliar with the concept of pataphysics and might therefore appear rather nonsensical. Whilst there is a clear logic to each search result, they might appear anomalous to the user's expectations if he received these results without knowing the philosophy of the search tool. The results could possibly appear random then, and would therefore likely to be detrimental to the user.

To prevent that, the level of interaction the user has with the system and the feedback the system gives to the user on decisions it is making will have a large influence on the overall effectiveness and appreciation of the tool. A quick and simple solution to this problem would be to add an icon to the side of each search result, which displays exactly how the original query was pataphysicalised.

Creativity does not have a universally accepted definition. Creativity is a human quality and definitions don't necessarily lend themselves to be applied to computers as well. There are aspects that come up in many, like novelty and value, but some that rarely pop up, like relevance and variety. Creativity can be studied at various **levels** (neurological, cognitive, and holistic/systemic), from different **perspectives** (subjective and objective) and **characteristics** (combinational, exploratory and transformative). Creativity should be seen as a continuum, there is no clear cut-off point or Boolean answer to say precisely when a person or piece of software has become creative or not.

Current evaluation methodologies have concentrated on only a handful of the points raised above, for example studying only the creative end-product itself (out of context), only judging it by its novelty objectively, assigning an arbitrary thresholds, etc. This also includes the assumption that machines "only" mimic humans and are therefore not judged by full potential.

What does it mean, how can it be measured?

Subjectivity vs objectivity is a theme throughout

How is it defined and measured in humans, what can we just take directly from those concepts and apply them directly to machines and what needs to be completely redefined?

This paper discusses issues related to the study of creativity in a computer science context. Two transdisciplinary fields of study have emerged from the variety of disciplines concerned. These are computational creativity and creative computing. The former lies at the cross section of artificial intelligence and cognitive science and the latter is mostly distinguished by its involvement in art. Creative computing focuses on the process of creativity rather than just the outcome as in computational creativity. In the remainder of this paper, CC will always denote creative computing unless otherwise specified.

Many of these (if not all) spawn from the computational creativity discipline.

Introduce the difference between human and computer evaluation/creativity?

> In research communities, approaches to the study of creativity differ in three main respects: 1) the type of research design, whether experimental, psychometric, observational etc. 2) the focus of the research, whether on human attributes cognitive processes or features of creative outcomes, and 3) the type of information that is used for the basis of evidence, by which is meant whether the time frame is present (real-time observation) or past (historical data) and whether the situation is artificial (laboratory) or natural (real world settings). (Linda Candy 2012, p.3)

distinguishing between person's and product's creativity (Piffer 2012, p.258) it is concluded that a person's creativity can only be assessed indirectly (for example with self report questionnaires or official external recognition) but it cannot be measured (Piffer 2012, p.258)

6.1 Measurable Attributes

Novelty	**Value**	**Quality**	**Ephemeral Uncontrolled**	**Temporal Controlled**	**Purpose**
Originailty	Usefulness	Skill	Serendipity	Persistence	Intention
Newness	Appropriateness	Efficiency	Randomness	Results	Communication
Variety	Appreciation	Competence	Uncertainty	Development	Evaluation
Typicality	Relevance	Intellect		Progression	Aim
Imagination	Impact	Acceptability		Spontaneity	
	Influence		Experimentation		Independence

Table 6.1: Summary of all creativity attributes

Temporal, spatial, ephemeral. . . what else?

Summary
- Mimicking
- novelty + value + quality
- randomness + serendipity

6.2 Problems with Evaluation

Evaluating **human creativity** is problematic.

There are many debates across the involved disciplines. Specifically, Mayer identified five big questions of human creativity research: (Mayer 1999, p.450-451)

1. Is creativity a property of people, products, or processes?
2. Is creativity a personal or social phenomenon?
3. Is creativity common or rare?
4. Is creativity domain-general or domain-specific?
5. Is creativity quantitative or qualitative?

> An important challenge for the next 50 years of creativity research is to develop a clearer definition of creativity and to use a combination of research methodologies that will move the field from speculation to specification. (Mayer 1999, p.459)

Taking these debates about human creativity and directly applying them to machines seems logical but may be the wrong and lazy approach. Adapting Mayer's five big questions to machines does not seem to capture the real issues at play.

1. Is creativity a property of programmers, users, machines, products, or processes?
2. Is creativity a local, a network or an Internet phenomenon?
3. Is creativity common or rare? (P or H creativity)
4. Is creativity domain-general or domain-specific?
5. Is creativity quantitative or qualitative?

- Can a machine judge whether a human is creative?
- Is creativity a property of machines (hardware or software?)

- Is mimicking human creativity really enough and appropriate?
- Compare against "human creativity"? Or define machine creativity from scratch?
- Who is creative? The programmer or the program?
- Can creativity be objectively measured?
- Quantitative or qualitative?
- In respect to P or H creativity?
- Output minus input? (we don't have the same strict judgement on humans)
- Is it the product or the process or both?
- Does context matter? (Blind deaf dumb person = computer?)
- Does time matter?
- Does purpose or intention matter?
- AGI vs AI? Artificial general creativity vs artificial creativity?

On a more practical level, there are various problems that arise when trying to evaluate computer creativity. Anna Jordanous found that "evaluation of computational creativity is not being performed in a systematic or standard way" (p.2 Jordanous 2011, her emphasis).

(neurological, cognitive and systemic) in the computer sense!

Since most problems with evaluating creativity in computers (and humans alike) stems from the lack of a universal definition it seems logical to try and remedy this first and foremost.

Creativity is studied in many disciplines.

- understanding the chemical mechanisms within the brain (neurological)
- understanding the thought processes associated with creativity (cognitive)
- understanding creativity in children and adults, novices and professionals
- understanding creativity in individuals and society (holistic)

Creativity is a continuum, which means that being creative and not being creative form the two distinct extreme ends of a scale.

> "a continuous sequence in which adjacent elements are not perceptibly different from each other, but the extremes are quite distinct" (OED)

(subjective and objective)

How can we model Koestler's bisociative creativity in computers? Boden/Kaufman: Subjective and objective types (pandh or little-candbig-C) (Boden 2003; Kaufman and Beghetto 2009) (product+process)

DIGITAL CREATIVITY ?!?!?! Mix between digital humanities and creative computing/computational creativity —- see Digital Creativity Journal!!!! Unified theory of creativity! (Koestler?) Unified definition!

1. What is the definition of creativity?
2. Who is being creative? WHO
3. What was the aim/intention, if any?
4. What was the process, approach? HOW
5. What factors influenced the person/process? WHERE
6. What is the result/product, if any? Is it original, relevant? WHAT
7. What is the impact, if any?
8. What is the maintenance plan, if any?

6.3 5 P's: product, process, people, place and purpose

> One way of characterizing these processes is to use an alliteration that allows us to keep track of some of the core features of RRI in ICT, namely the four P's, which are: product, process, purpose and people. The purpose of using the four P's is to draw attention to the fact that, in addition to the widely recog- nized importance of both product and process of technical development, the purpose of the development needs to be considered and people involved in the innovation need to be incorporated in RRI. (Stahl, Jirotka and G. Eden 2013, p.203, my emphasis)

combine the 4 P's with purpose// 5 P's: product, process, people, place and purpose// Why is the purpose important?// Interpreting or Measuring?// Maybe we should not be looking for metrics but rather guidelines for interpretations of creativity.

In the end I believe it is impossible to measure creativity objectively. I don't just think it is impossible, I think it is unwise to try and do so. It would be silly to put a percentage on how creative something is just like it would be silly to say a certain product is 50percent ethical. In fact there are lots of parallels between (computer) ethics and (computer) creativity. Both are subjective, both are highly dependent on context.

What is important is to study and consider the factors that influence our perception of whether something is creative (or ethical) and what the implications are.

Creativity in a process or product will mean different things to different people, in different environments and contexts. Common sense.

Just as there are people who just cannot see any creativity in in modern art, there will always be people who wont accept anything produced by a computer as creative.

7 PATANALYSIS

7.1 Problems Encountered

7.2 Design Aspects

7.3 Search Results

Part V

H∀PPILY ∑V∑R ∀FT∑R?

8 Aspirations

PROBLEMS ENCOUNTERED AND SUGGESTED SOLUTIONS

SHORTCOMINGS AND MISSING FUNCTIONALITY

- Research in science and art
- Review paper? Pataphysics and creativity?
- Quantitative research questions
- Working definition for Pataphysics
- Examples for Pataphysics concepts
- Examples for types of creativity
- Examples for creative process
- Explain Leary's tables
- How can we use creative concepts discussed?

8.1 Code

FURTHER DEBUGGING OF CODE (IF NECESSARY)

8.2 Interface

DESIGN ASPECTS

IMPROVEMENTS / ALTERNATIVES TO USER INTERFACE DESIGN

8.3 Algorithms

IMPROVEMENTS / ALTERNATIVES TO ALGORITHMS

8.4 Architecture

IMPROVEMENTS / ALTERNATIVES TO ARCHITECTURE

8.5 Research

USER FEEDBACK (IF NECESSARY)

9 OBSERVATIONS

From here, we can try to implement different algorithms or different pataphysical concepts within our existing tool or built a different system. The next logical step would be to implement a fully functioning Web search engine using the algorithms described in this paper. But before we go into further development, it might be worth evaluating and interpreting the results produced by the prototype.

In this paper we have introduced a new approach for a creative search tool that uses pataphysics as an underlying philosophy. We have explained how pataphysics can be used in search algorithms to produce interesting results with a humorous twist. Our initial experiments within a limited domain have shown that the generated results can indeed be novel, surprising and useful. We have also briefly discussed ideas for applications of the tool and issues that may trigger possible further research in in the field of Computing. We have presented some thoughts on evaluation of our tool and future work.

While we only return matches that actually appear in the book (i.e. they exist in the index), and by doing so eliminate the introduction of new words like Jarry's merdre, the swerve or aberration is still evident.

	clinamen	syzygy	antinomy
clear	altar, leaf, pleas, cellar	vanish, allow, bare, pronounce	opaque
solid	sound, valid, solar, slide	block, form, matter, crystal, powder	liquid, hollow
books	boot, bones, hooks, rocks, banks	dialogue, authority, record, fact	—
troll	grill, role, tell	wheel, roll, mouth, speak	—
live	love, lies, river, wave, size, bite	breathe, people, domicile, taste, see, be	recorded, dead

Table 9.1: Comparison of algorithms

9.1 Achievements

9.2 Implications

9.3 Recommendations

POST☹

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GLOSSARY

GET

An Hypertext Transfer Protocol (HTTP) method. Allows a client (browser) to request data from a specified resource on a given web server.. 52, 53

POST

An HTTP method. Allows a client (browser) to submit data to be processed to a specified resource on a given web server.. 52