Laidlaw Undergraduate Scholarship Programme in Research and Leadership

Poster Brochure
2018
Introducing the programme

The Laidlaw Undergraduate Scholarship Programme in Research and Leadership is an exciting opportunity that aims to equip students with the skills and values to become leaders in their chosen occupations beyond university.

The programme integrates two five-week summer research projects, undertaken during consecutive summers. Scholars pursue and report on a research question of their choosing, working with an academic supervisor from their chosen School. Scholars are required to complete a research poster at the end of their first summer project and a written research report upon the completion of the second summer project period.

In addition, a comprehensive leadership programme runs across the academic year, including intensive leadership weekends. In the second year of the programme, each scholar creates a short video reflecting upon their experience of leadership development throughout the scholarship. Scholars are also awarded a six-month student membership of the Institute of Leadership and Management.

The scholarship encourages students to travel within the UK and overseas if it is relevant to their research project. This may be to study primary sources at a specific location, to make use of other facilities such as laboratories or specific equipment, to meet with academics at other institutions to discuss their research, or to take part in on-site research such as archaeological excavations.

The programme is generously sponsored by Lord Laidlaw of Rothiemay.
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Throughout the summer, the Laidlaw scholars have blogged about their research projects. To read more about the scholars’ projects and their thoughts as they develop their research and leadership skills, visit http://laidlawscholarships.wp.st-andrews.ac.uk
Leadership

A key part of the programme are the comprehensive leadership development activities that take place throughout the academic year. Through participation in online learning, bespoke leadership weekends and presentations from guest speakers, the scholars are provided with opportunities to develop their skills and network.

One of the principal aims of the leadership programme is to help scholars prepare for their future careers and become leaders in their chosen fields. The programme allows the scholars to:

- Better understand their own leadership style.
- Develop their ability to reflect, and derive learning from this.
- Lead a small team and receive feedback on their performance.
- Hear from experienced leaders.
- Understand the importance of research methods and ethics.
- Develop a sense of team amongst the Laidlaw scholars.

The leadership programme is delivered by staff from the Centre for Academic, Professional and Organisational Development (CAPOD) and comprises of a mixture of input, discussion, guest speakers, practical activities and individual reflection.

Earlier in their first year of the programme, scholars were matched with a Laidlaw mentor (a previous St Andrews Laidlaw Scholar) before the 2018 cohort attended a leadership weekend to welcome them to the programme. They were introduced to leadership theory, and participated in activities designed to develop key leadership skills and reflective abilities in preparation for their summer research.

During their research period the scholars participated in a summer programme of events which involved scholars working together in Action Learning Sets to review their research experience and provide support to each other. Guest speakers also shared their experiences and presented on a variety of topics centred on leadership, introducing the scholars to a range of methodologies and encouraging them to reflect on how these can impact them as a leader. After the first summer research projects have been completed, there is a further day of leadership training in the form of a ‘development centre’ which focuses on the scholars’ ability to communicate and present. Feedback on each scholar’s performance, collected at the development centre, is disseminated to students via a one-to-one development interview with a member of the CAPOD team.

In the second year of the scholarship, the scholars will attend a leadership development day which includes a focus on leadership in teams, before a second summer development programme. Following completion of the research projects, there is a final residential leadership weekend to review the leadership development of the scholars and allow them to practise the skills they have established through participating in an applied project.

As they enter the final year of their degree studies, each scholar will be given the opportunity to be partnered with an external coach who can provide ongoing support with their leadership development over the year.
The content of the combined leadership weekends and summer programme is based around the identified Laidlaw leadership attributes:

| Leadership abilities | • Able to lead without authority  
|                      | • Able to convey purpose and build coalitions  
|                      | • Cultural intelligence and capacity for empathy  
| Self-knowledge and awareness | • Honestly assesses own knowledge and leadership style/preferences  
|                      | • Knows own limitations and acts accordingly  
|                      | • Learns continually  
| Effective communicator | • Including an ability to listen with understanding  
|                      | • Uses digital connectivity  
| Problem-solver and critical thinker | • Able to make effective decisions in complex environments  
|                      | • Seeks out and fosters innovation and creativity  
|                      | • Strong intellectual ability  
| Collaboration and team working | • Builds relationships and networks  
|                      | • Works collaboratively and across boundaries  
|                      | • Uses emotional intelligence to achieve this  
|                      | • Capitalises on the power of diversity  
| Social and cultural intelligence and awareness | • Able to navigate new and foreign situations  
|                      | • Uses this to build relationships and networks  
| Resilience and determination to achieve | • Has energy and impact  
|                      | • Makes things happen  

Scholars benefit from access to an international network of researchers, support staff and fellow scholars as well as intensive training and development including:

- Introduction to leadership – examining and understanding what leadership is
- Self-leadership – setting personal development goals
- How others see you – receiving feedback on your leadership style
- Leadership and followership – how scholars work within teams
- Leadership in the wider context
- Leadership in academia, including research methods and ethics
Leadership values session: Scholars collectively create a word cloud of their leadership values.

Scholars reflect on their behavioural preferences through completing a DiSC profile.

Scholars receive input on some key leadership theories.
Learning about the importance of communication in leadership during the Leadership Development Day.

Scholars deconstruct what leadership is at the first residential leadership weekend.
Learning about communication and collaboration during the Leadership Development Day.

Presentation of results from one of the Leadership Day exercises.

Towards the future

Lord Laidlaw has generously continued to fund the Laidlaw Undergraduate Scholarship Programme in Research and Leadership. Applications open Monday 5 November 2018 for students who wish to apply for the scholarship starting in 2019.

For more information, visit www.st-andrews.ac.uk/students/involve/laidlaw
Finding Footprints on Mars: What lessons can we learn from Earth?

Lot Koopmans, supervised by Prof. Tony Prave – University of St Andrews School of Earth and Environmental Sciences

Introduction

In 2020 the European Space Agency (ESA) will send the ExoMars rover to the Martian surface. This rover will be equipped with a suite of instruments with the aim of finding life on Mars. Mars’ early geological history is similar to what has been found on Earth, marked with volatile life on Earth has been suggested to appear. By looking at Earth’s rock record, lessons can be learned on what we might find on Mars.

Life on Earth manages to exist in remarkably diverse environments. Much of this life is microbial. Microbial activity has been shown to imprint itself into the rock record through microbially induced sedimentary structures (MISS). This project looks at some of the processes by which these forms, and whether they are feasible on Mars.

Field Methods

Fieldwork in Stoor consisted of collecting a selection of photographic sequences taken of microbial structures found in the region. At each locality, geological context was noted, and images were captured from a 10 cm, 2 meters and 10 meters. The aim of these images was to emulate the CLUES (Close-up Imaging System) found aboard the ExoMars mission.

Preliminary Findings

The exposure around Stoor consists of a sequence of lacustrine bed sediments, overlain by periods of higher sedimentation. Within these layers, some microbial mat structures were found. The detection of these beds is difficult from further than 5 meters away. They appeared in both continuous and discontinuous beds, and were repeating.

One locality in Iceland had living microbial mats on the shoreline of a small lake. These chain-like microbial mats were found within a muscovite-like gel, existing both above and within the sediments.

Around geochemical areas, possible microbial structures were found in bank sediments of springs. These are abundant around geochemically active areas.

Next Steps

Isotopic Analysis

Raindrop clasts were found within a stream in Iceland. A suggestion is that microbes are acting as a birding gel to keep the clasts intact. Initial runs of the isotopic analysis support this (fig 6). More is to be done to support this theory.

TerraSpec Analysis

Hard samples will be shot at with light with different wavelength, which determines the minerals present within the rock. Some microbes leave distinctive mineral traces in rocks.

Further Fieldwork

More work is to be done on understanding the microbes which develop MISS. Do these exist in basaltic sands? Could I survive on Mars?

Summary

The ExoMars Mission is equipped with a suite of equipment to search for life on Mars. It is most likely that any life, past or present, will be microbial in nature. I travelled to Iceland to understand the processes by which microbes interact with sediments, and now this can be traced in the rock record. I discovered that from imagery alone, it appears exceptionally difficult to identify life on Mars. Further work is needed to identify definitive features that would lead to a clear discovery of life on Mars.

Acknowledgements: I would like to thank the Laidlaw Scholarship Programme in Research and Leadership for their generous funding of this project. I would also like to thank Pory Chang, Dr. Xi Li and Prof. Tony Prave for their continuous support.

References:
Aims:
The purpose of this project was to research and compile various anecdotes of 19th century Scots who worked and travelled in the Brazilian Amazon, within the bigger picture of the Amazon as a location of wealth and cultural mixing.

Methods:
Throughout the five weeks of the project, I visited the National Archives in London, the National Archives of Scotland, in Edinburgh and Glasgow City Archive.

Background:
Belém is the capital of the state of Pará, a gateway to Brazil’s lower Amazon region. It was founded in 1610 and was the last province to declare its independence from the Portuguese Empire, attaining its independence in 1822. It was a key port for the export of rubber, Brazilian wood, timber, cocoa, coffee and sugar.

British influence in Brazil had strengthened since 1808, when the Portuguese royal family, escaping from the Napoleonic threat to Lisbon, moved to Rio aided by the British Royal Navy. By 1819 Britain was leading the trade of imports and exports to the colony, and by 1819 the first British consul, Henry Dickenson was established in Belém. At the time of independence around 100 British commercial agents were based in Belém as well as a handful of correspondents placed upriver.

Results: Scots and the Amazon

During this project, I focused on the cases of James Henderson and Archibald Cumming, who had had different experiences of Pará and had also led somewhat different lives while there. For example, James appears to have integrated far less fully into the British and Brazilian communities in Pará than Archibald, who is demonstrated by James’ frequent trips back to Scotland and England. Despite this, James did, over time, integrate somewhat into the local communities. For example, in one of his letters, OS76/004 (National Records of Scotland in Edinburgh), James uses the phrase “as we say in Paris”, which shows that he does feel, to some extent part of the community.

With regard to Archibald, he seems to have integrated into the local communities more fully than James, coming across as well-known character in Pará, with many respecting him and many others differing in his face. Furthermore, Archibald was a key financial contributor to the creation of a British cemetery in Pará, showing his integration and involvement in the community (shown in document F074/12, in the National Archives).

Next summer, I hope to investigate more fully the lives of both these men by accessing local archives to build a clearer picture of their lives and opinions to see how they evolved over the time they spent in Pará. This is a work in progress which I will continue next year as I have planned to go to Belém and Rio de Janeiro to consult archives there.

Conclusions and Further Thoughts:

- The post independence treaty of 1826 protected British trade and interests, but the abolition of slavery and the boarding of suspected slave traders came to be seen by the Brazilians as the British building their national interests abroad.
- The records show that British Foreign Policy on abolishing the slave trade was paradoxical, as British families such as the Heskeths, Campbells and Dickensons still had slaves even after slavery was banned. Their involvement in slave transportation, gave tacit acceptance to the inhume conditions under which slaves were treated. UK law only prohibited its own citizens from possessing slaves in 1838 though, slavery itself' had been officially abolished in 1833.
- The result of UK intervention in Brazilian affairs had implications for diplomats, consuls and British residents in Pará that affected their lives and safety, eventually diminishing their presence.
- Colonists in the 19th century tended to portray the Amazon as a place of natural richness in their narratives, glorifying its natural beauty as a place of tremendous potential wealth.
IDENTIFYING THE ENIGMATIC EDIACARAN FAUNA USING THEIR GEOCHEMICAL FINGERPRINT

Katie Delahooke supervised by Dr Catherine Ross
Department of Earth and Environmental Sciences, St Andrews

The Fossils...

Cumbelina

One fossil species having Cumbelina morphologies from Torraces. These impressions are around 1 cm long and supply trace fossils. Cumbelina is generally inferred to be a colonel metani, composed of an oval, oval-sided tubular structures. These cases with the narrow constriction are attached to the substrate. Some of the imprints appear to potentially contain carbonaceous material.

Palaeoaspischnus

A yellow rock sample, c. 144 fragments, currently 0 cm to 50 cm, from unit 8 of 114 of the Victoria formation, Australia. Four distinct fossil morphologies. The imprints are thin, thus essentially carbonaceous and test material on the lower right hand corner. The fossils are composed of mass-occurrences with a matterlike structure. The identity of these fossils is quite controversial. Although resembling Palaeoaspischnus, the specimen (consistently carbonaceous impressions on carbonate) is unlike most other examples. Other microfossiles was in turn even more controversial. Affinities to xenophyophores, strange ancellar protists on the sea floor have been suggested or it could have been an ansage such as homps.

Methods

Piecing together the puzzle!

Before any of the geochemical data could be collected, the Victoria samples had to be carefully cleaned, examined, photographed and studied, in order to determine the location of the fossil beds in relation to other bedded units. The Victoria is 1 km thick and contains additional fossil impressions.

The bedded sediment emerged to be rather chaotic. At one end there were vertical beds, presumed to be a tabular sedimentation in hard mudstone structure, under and overlayer by placer horizontal laminations. The beds containing the fossil beds were at a distance range of beds, and disappeared as horizontal laminae through the whole sample, where high-energy features emerged.

Microscopy

Four specimens thin sections (3cmx3cm) of the Victoria were used to analyze with a petrology microscope. This allowed determination of the composition and origin of the fossil beds. The thin sections were impregnated and exposed to be used for micro-analysis, using a X-ray diffraction micro-Rover and reflected images were taken on the thin sections and fossil impressions.

Despite these difficulties, the fossils were measured for size criteria such as length, width and number of segments.

Raman Spectroscopy

The Cumbelina specimens (52-53) was one of 14 rocks from the Victoria, some 20 (of 52) were analyzed by the University of Toronto. These samples were analyzed by the University of Toronto, using a Raman Spectrometer. The technique measures the shift in the peak to a certain wavelength at the stone is analyzed, to determine the chemical composition.

Due to the high resolution, the composition of the fossil impressions can be compared to the matrix. This could potentially show carbonaceous signals, or at other minerals, giving clues as to the identity of the fossil. For example, amorphous carbon is often associated with fossil impressions containing carbonaceous, thus a relative signal in the fossil impression would suggest a xenophyophores affinity.

RMS for 691 C and 698 O

50 locations across the sample were analyzed on a total of seven scans. These locations took in-response of the different bedding units as well as a transect along the vertical beds to the basaltic composition of the matrix.

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Results so far....

5C and 5H O

If the 5C signal at 5H for each of the units indications, there appears to be a different background difference of each of the different bedding units. The fossil beds are very similar to that of the m臺灣, while the basal and top level beds have a number and range of 5C values.

The Late Ediacaran Shurong-Panina isotopic excursion records a 5C increase from -11.35% to 9.5%, a 5H from -1.5% to -35.0%. The mean 5C and 5H were +1.86% and 0.67%, respectively. This fits with this excursion. However, if consumed to the Victoria record (5C) H, the 5C is higher than expected, and most typical of 5C and 5H values.

The samples from Cumbelina do not contain enough calcite to give meaningful results.

The Future

The results from the Raman analysis are yet to come back at the time of production of this paper, though on-site analysis was that there was a suppression of a carbonaceous signal.

Weber et al. (2021) have recently discovered new microfossils (AM-317-34) that had been originally placed for this season, but due to machine breakdowns, these plans had to be put on hold. However, both carbonaceous and xenophyophores will be sent to Trinity College Dublin this year, which hopefully will yield exciting elemental distributions.

Summary

The Ediacaran bios are strange, fascinating and mysterious. Although the geochemical results are yet to be come back, preliminary findings indicate that there are carbonaceous impressions (which had been dispersed) which likely suggest further analysis. As the fossil preservation, the differentiation of the fossils in the Victoria sample is enigmatic, and study light on a turbulent microbial mat dominated world, in which these creatures existed.
Highly Commended:
Laura Nebout – Department of Social Anthropology
Highly Commended:
Simona Mezzina – School of Art History

The vanishing of an artist: exploring the career of Giuseppe De Nittis

Aim: to expand the information available on the artist’s career and life, and make it accessible in English to a wider audience.

The man, the artist

- "I was born in 1846 in Barletta, in the Pugliese, in this little town, in this small town, where I..."
- This is the first line of Italian painter Giuseppe De Nittis’ memoirs, "Notes et Souvenirs du Peintre Joseph De Nittis." A key work for understanding the life of the artist, it was first published in 1894, and probably written by his wife, Léontine Graville, who published many novels under the pseudonym of Olivier Chartal. Since 1913, the journal and the artist’s correspondence are held in the archives of the Pinacoteca De Nittis, in Barletta, along with 146 paintings, 65 etchings and 150 books. This comprehensive collection is where I conducted my research.

- The choice of naming everything Léontine possessed by her husband to his native town shows the strong connection between the painter and his family. This, along with his Apulian landscape work, is why he is considered a pioneer of a regional landscape art school, along with another Apulian painter, Francesco Netti from Sant’Agata in Colle, a school that flourished in the 1920s and survived until the end of the 1950s.

- De Nittis studied for less than two years, from 1861 to 1863, at the Istituto di Belle Arti in Naples. The turbulent relation with his professor and his strong and rebellious personality caused him to leave the school and spend some months in Capodimonte. There, he had the chance to study nature and colors up close and improve his drawing.

- In 1864, he exposed two works, both titled l’Ursuline delle Terme, at the Il Mostra della Società promotrice di Napoli. There he met the sculptor Adolfo Cecioni, a lifelong friend, who described the painter as ‘a short, young man, smartly dressed, with quite a ugly face, but refined manners and look.’

The Parisian sociétés

- In 1867 he travelled for the first time to Paris, where he stayed during August and September. He was immediately captured by the charm of the city, its richness and society. Thanks to his wit and charisma, De Nittis promptly managed to establish relationships with the most fashionable artists and art dealers, like Messiers, Rocherler and Goupil. The writer and author of the famous Journal, Édouard de Goncourt, also became a fundamental figure in the artist’s life.

- In 1868, De Nittis established himself permanently in the world of the art dealer, a painter who found his fortune as an official artist of the Second Empire. Cecioni strongly criticized this decision, but it was not meant to last. It mainly seemed a way to introduce himself in the Parisian sociétés, where De Nittis and his wife ultimately became prominent figures, as "l’invitato del sabato" show.

- The ‘inviti del sabato,’ or Saturday guests, saw some of the most illustrious personalities of the time. Dumas son, Zola, de Maupassant, Manet, Tissot, Degas, princess Mathilde Bonaparte, they all sat at the table of the Apulian artist, who loved to cook for his guests typical Italian dishes. De Goncourt writes that some collectors were willing to pay over fifty thousand francs for one of his works, not so much for the inner pleasure of owning a painting, but to be able to own the privilege of being admitted to his house.

The loved ones

- De Nittis married Léontine on 29 April 1869. In 1995, Vittorio Pica, De Nittis main biographer, reported Léontine’s words about her first meeting with the painter. She said: ‘One day, in 1868, I met the Newрис, he had some trouble being understood. I could speak Italian, although not so perfectly, however, it was enough to understand each other with joy…’. When they went back to […] Bougval, he said: today I met a young lady and, if I don’t marry her, I will not marry at all.’

- Reading De Nittis’ journals in the archives of the Pinacoteca De Nittis it becomes apparent that the relationship between the two was intense and lively at the same time. In fact, he described it with the following words: ‘We were two kids without any experience. We understood each other immediately. […] I kept her all to myself, my love is jealous. But I also managed to be all to her. […] She has been my companion, friend, model and wife. […] I think she was entirely satisfied of her place in my life. And if I demanded that for her nothing could exist apart from me, I believe I made her happy anyway… and that’s all that matters.’

- On the 19th of July 1927, Léontine gave birth to Jacques, their only child, in the house of Vincenzo De Nittis’ eldest brother, in Naples. At his christening Gustave Callebotte became Jacques’ godfather. He would be the one to introduce the artist into the Impressionist circle, allowing him to show five of his works in the famous 1874 Nadar exhibition at Boulevard de Capucines.

Conclusion: the private aspect of De Nittis’ life was strongly intertwined with his career. The artist, an especially clever and charismatic man, managed to find success everywhere along his path. His personality certainly facilitated the process, and it often got more recognition than his art. Nevertheless, the great esteem his colleagues had for him and the appreciation of the audience earned him a place in history.

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1. Giuseppe De Nittis, Notes et Souvenirs du Peintre Joseph De Nittis, p. 1
2. Christine Farese Sperken, Giuseppe De Nittis, De Barletta a Parigi, p. 14
3. Farese Sperken, p. 21
4. Pierre Gris, Giuseppe L. Morelli, De Nittis, le navi, i documenti, la nave aperta, p. 23R
5. De Nittis, p. 30
6. Vittorio Pica, Giuseppe De Nittis, l’uomo e l’arte.
7. De Nittis, pp. 32-33
8. Michele Cristallo, Giuseppe De Nittis, dall’ontano alla senza, p. 45.
9. Cristallo, pp. 49-50

(All translations are my own)
Water Management in Armenia: A Medieval Mystery
Valuation of 10th c. Resources in a Changing Climate

BACKGROUND

Through investigating a 10th century document recording the purchase and diversion of a water course, a fascinating story of adaptation to a drying climate in Medieval Armenia was uncovered.

QUESTIONS:
1. Which parts of the document are literal vs formulaic?
2. Can we locate the Vararaman waterway and the lost Gardens of Varduts?
3. Why was the watercourse bought and diverted?

METHODS

Historical Research: Documented locations were searched for historical and anecdotal maps.
GIS Analysis: A comparison between literature and geomorphology/hydrology was conducted.
Archaeological Investigation: Excavations, radiocarbon, and geophysical surveys were performed.

RESULTS

ANSWERS:
1. Because an escarpment pinch points the Vordan Gorge between the medieval village of Tal'ev and Varduts to the east, the legal threats to the settlements were symbolic curses, which reveals aspects of the legal textual structure and economic system of Medieval Syunik.
2. Varduts probably was a Rose Garden located on a landslide-modified terrace at the bottom of the Vordan Gorge beneath Tal'ev, just above the "Devil's Bridge," a natural hot springs. Xanayik, Shiner, and Halcas are medieval ruins located halfway down the Vordan canyon wall, beneath the modern towns of Khat, Shinaur and Halcas.
3. The Bishop of Syunik brought water from a mountain-west spring to Tal'ev in a cistern, then built conduit constructed a set of pipes, laid in concrete and buried beneath the ground surface, descending 250m from Tal'ev in order to continuously irrigate the Varduts Gardens, located at the only place they would not freeze over winter.

FUTURE WORK

Next summer I will continue to investigate the wider topic of Armenian climate during the medieval period by working with different climate proxies to build a database of drying events and compare these to literature sources.

Acknowledgments: I would like to thank Dr. Tim Reeves, Dr. Tim Brownlee, Laura Nicholson, Dr. Howie Aghababyan and Dr. Aghababyan for their help in my research, access to the GAPDS and water sources, for their continued support and Laura Laidlaw for providing such a wonderful opportunity to conduct research.

References:
THE SCHOOL OF MODERN LANGUAGES PRESENTS

LITTLE QUEER DOT:
The Performativity of the State and LGBT Theatre in Singapore

ABSTRACT

With the recent emergence of LGBT theatre productions and popular entertainment in the Singaporean arena, issues such as the staging of Neil Simon's Arabesque, Vol. One and the previously banned hit Butterfly by David Hwang, it seems apt that Singapore has been heralded as one of the new emerging gay capitals of Asia. Paradoxically, the conservative Singaporean government promotes traditional family values within a Confucian framework, privileging heteronormative social units, and punishing homosexual acts, with the anti-gay legislation of Penal Code 377A. Hence, my research explores the contradictory relationship between our conservative government and liberal theatre scene.

"GAY RIGHTS MAKE ECONOMIC SENSE"
- Far Eastern Economic Review

MONDAY, 29 OCT 2018
11AM – 4PM
ST SALVATOR’S QUAD

"I CAN SCREAM 'GAY', I WORK IN THEATRE!"
- Faith, Mardi Gras

Illicit pragmatism: framework of the government

- Pragmatism:
  - Focus on economic development, such as attracting foreign investments

- Liberalism:
  - Policy implementations and interventions are often contradictory, navigating spaces between liberal and repressive modalities

Examples of Illicit pragmatism:

1. Recent permits of same-sex couples over 35 to co-habitate

2. Production of homosexuality in heteronormative space

3. Queer public spaces and the 2013 National Gay Parade party

Illicit pragmatism: Queer infrastructure (gay, drug, and bars) driven by market demand of affluent gay entrepreneurs, 2013 NDP parade parade brought in thousands of peak-dollar tourists

Illicit pragmatism: Confusion values of the family unit still privileged, with the state's attitude being the tolerance of homosexuality as long as it stays within the boundaries of a marketable commodity

Written by: ADA QUEK
Supervised by: DR. DEREK DUNCAN
School of MODERN LANGUAGES

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**ParaHox Gene Regulation**

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**Background information:**

The ParaHox cluster contains three genes (Gsx, Xiox and Cdx) which are involved in the development of the Central Nervous System (CNS) and the gut. This cluster displays collinearity - where the order of the genes along the chromosome is the same as their expression pattern in embryogenesis.

Wnt signalling pathways are widely found in the animal kingdom and the final step in the pathway involves TCF/LEF transcription factors which control expression of target genes. Previous work shows TCF/LEF sites controlling the ParaHox Gsx gene. This study aims to find out if it plays a role in the two other ParaHox genes (Xiox and Cdx).

**Aims:**

- To assess the activity of gene regulatory elements in DNA constructs (a.k.a reporter constructs) where the regulatory element drives expression of a gene that can be detected via an enzyme reaction producing a blue substrate. Reporter constructs are easily put into *Ciona intestinalis* by a electroporation technique. The variety of reporter constructs will be particularly focused on sites in the ParaHox cluster that are rich in TCF/LEF binding sites.
- Treating *Ciona* embryos with a pharmacological agent (iCRT-14) which disrupts the Wnt-TCF/LEF signaling pathway (See Fig. 2) and observing its effects on development.

**Methods:**

**Ciona collection:**

Wild *Ciona intestinalis* were collected from pontoon at Arbroath Harbour, Arbroath, Scotland, and kept in an open circulation aquarium system in the Gatty building. Eggs and sperm were collected via dissection of the adults to perform in vitro fertilisation.

**Creation of reporter constructs for electroporation:**

Firstly the ParaHox regulatory regions were isolated from genomic clones and inserted into a pCES plasmid to make the reporter constructs. These reporter constructs were checked by DNA sequencing to confirm appropriate arrangements. The final pCES reporter plasmids were then introduced by electroporation in *Ciona intestinalis* embryos.

**Development of Ciona embryos**

Embryos were grown at 18°C and were fixed and stained at different developmental stages. See Fig. 1 for photos of developmental stages.

**Future research:**

Electroporating further pCES constructs to assess activity of TCF/LEF binding sites through ParaHox cluster. Looking at activity of ParaHox genes in iCRT-14 treated embryos.

**References:**


**Acknowledgements:** I wish to express sincere gratitude to Dr. DEK Ferrer, Dr. S. Sagabe, The Laidlaw Team and Lord Laidlaw
A- Context

We live in a world surrounded by paradox and contradictions. These come in many shapes and forms, whether it is an image or a short expression like “this statement is false”, mathematicians, philosophers, artists and people from all professions alike have been both annoyed and perplexed by their existence. Logic is the formal foundation of reasoning and for hundreds of years contradictions have been treated like the devil’s work, something we must aim to avoid. This has now changed radically with new logics in which contradictions do not break the system but rather become part of it. Paraconsistent logic (PL) is a non-classical logic system that allows contradictions. In it we can say things are true, false or both true and false. Changing our traditional logic in mathematics to paraconsistent logic produces remarkable results and allows the existence of inconsistent numbers, axioms and shapes, among others. This project was about understanding some of these objects and exploring the motivations, applications and impact of inconsistent mathematics.

B- Paradox

A revolution occurred when mathematics, humanity’s exact science that studies the purest truths, was challenged in its very core by Gödel and those who followed. Gödel’s paradox that stems from ‘this sentence is (informally) provable’ has sparked a lot of debate since its conception. One of these debates is whether mathematics is simply inherently inconsistent (which could greatly tilt the scale in favour of PL logic as the main logical basis). Those who motivate PL and support mathematics being inherently inconsistent, like Graham Priest [1], suggest that the fact that the sentence above is part of the informal mathematical body is enough to render mathematics as inconsistent (and that any attempt to solve this has the problem of semantical incompleteness). Tanswell avoids this conclusion by asserting that Gödel’s sentence is meta-mathematical, that is, about and not part of mathematics [2]. He claims that Gödel’s work only exposes the limits of formal systems which meet certain conditions and is not generalisable to conclude a general inconsistency of all of mathematics. Moreover, Tanswell claims that arguments for a generalisable inconsistency constantly misrepresent the different formalisation processes and the actual mathematical practice.

C- Inconsistent Images

Escher, Penrose, Magritte, Möbius are all examples of people that have played with the idea of visual impossibility. Mortensen [3] has endeavoured in the project of structuring inconsistent geometry with PL tools to draw and classify these figures in what would otherwise take many pages of obscure classical mathematics. On top of this, research suggests [3] that only an inconsistent theory can capture the perceptual experience of seeing an impossible thing, which also motivates the existence of paraconsistent systems. The history of mathematics has been shocked by paradox. PL has been motivated because it has firm solutions to semantic and set theoretic paradoxes (e.g. liar’s and Russell’s) among others. The lesson to be learnt is that the inconsistent has importance in its own right and, like with infinity during the 20th C., we must attempt to explore its structure further. According to Priest [1]: ‘The discovery of inconsistent objects [...] is the most recent, and perhaps the most contentious episode [...] and we are still in the process of thinking through its ramifications for mathematical reasoning’. The debate remains as to whether contradictions, widely considered an anathema, are actually a quality inseparable of any larger mathematical system.

References


Summer 2018

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Who is eligible for colon capsule endoscopy?

Calum McCutcheon, Professor Frank Sullivan, Caroline Paterson, Vicki Cormie
School of Medicine

1. Colon Capsule Endoscopy (CCE)
- Visualisation of the colon by a swallowed, disposable endoscope (usually PillCam COLON 2), 3.23cm long with a diameter of 1.16cm (1.2)
- Two cameras record nearly 360° of video of the colon that is transmitted to recorder device worn by patient
- Alternative to colonoscopy or CT colonography that does not require advanced facilities, sedation, or exposure to ionising radiation
- However, unlike colonoscopy it cannot remove & biopsy any growths (e.g. polype) identified
- Used to investigate potential colonic disease such as colorectal cancer (CRC) or inflammatory bowel disease (2-4):
  - In those with symptoms such as rectal bleeding, weight loss, diarrhoea, & constipation
  - In at-risk individuals, such as relatives of a CRC patient or those identified by screening programmes

Key Points & Preliminary Results
- Colon capsule endoscopy (CCE) is a non-invasive way of visualising the colon
- Contraindications include difficulty swallowing, GI obstruction, & inability to take bowel preparation
- Preliminary results (after reading 28/74 texts) suggest between 78% to 97% of adults investigated for colorectal cancer are eligible for CCE (5–10), but the real-world accuracy of these findings is uncertain

2. Contraindications to CCE
- Swallowing disorders (dysphagia, deglutition disorders & dysphagia) (1–3,12)
- Gastrointestinal (GI) stenosis/stricture/obstruction
- GI motility disorders
- Age of less than 2 years
- Implantable medical devices
- Contraindications to bowel preparation or boosters
- Pregnancy
- Dysphagia prevalence, for example, is estimated to be between 2.3% to 16%

3. Reason for study
As CCE & colonoscopy differ in their contraindications, it may be beneficial to health service planners to know what proportion of colonoscopy patients could safely undergo CCE instead.

4. Review Questions
Primary objective – in adults referred (from primary care or screening programmes) to secondary care for visualisation of the large intestine, what proportion:
- Are eligible (i.e. are not contraindicated) for CCE? (Primary objective)
- Consent to CCE? (Secondary objective)
- Complete CCE? (Secondary objective)

Records identified through searching Medline, Embase, & Web of Science for studies related to primary care/screening AND capsule endoscopy
(n = 3,160)

Records after duplicates removed
(n = 2,146)

Records screened
(n = 2,146)

Records excluded
(n = 2,072)

Full-text articles to be assessed for eligibility
(n = 74)

Overview of systematic review method & progress. Diagram adapted from Michal et al. (11)

Acknowledgments
This work was funded by & conducted as part of Calum's Laidlaw Scholarship Programme in Research & Leadership. Calum is immensely grateful for this opportunity.

Calum would also like to thank his Supervisors Professor Sullivan, as well as Caroline Paterson, Vicki Cormie, & CAPDI for their continued support.

References
From Folktales to Fiction: Investigating the Story-telling tradition of the Comoros

INTRODUCTION
The Comorian archipelago is composed of four islands, Grande-Comore, Mammel, Anjouan and Mayotte (the latter is now an overseas department of France). The archipelago has a strong Islamic tradition and is a melting pot of cultures from all around the Indian Ocean. This diversity is reflected in its rich oral literature. The first part of my research, mostly spent in the Comoros, focused on folktales, while the second part will explore how the recently-born Comorian written literature relates to codes of the oral storytelling tradition.

AIMS
- To establish a full bibliography of works on Comorian oral literature.
- To investigate how story-telling perpetuates and challenges Comorian traditions.
- To identify some of the foreign influences that shaped the tales.

THE STORY-TELLING RITUAL
- 2 types of tales: *haie* (fictional) and *hadisti* (historical).
- Story-telling is almost exclusively female and happens at night within the family circle.
- Tales belong to the world of *djinn* (supernatural creatures in early Arab/Islamic mythology and theology). The story-teller acts as a mediator between both worlds and follows the ritual:
  1. *Sama* in the *djinn language*, made up of words from neighboring languages (Arabic, Swahili, Malagasy).
  2. Introductory sentence 1: 'Haie Halaie' (Tale of old times')
  3. Introductory sentence 2, which can be participative.
  4. Tale.
  5. Closing sentence.

THE DJINN HUSBAND
A girl is seduced by a good-looking man and follows him to another island.

/\ Threat to the matrilineal organisation of society
The man is in fact a djinn and he wants to give her to his friends for his *shungo* (a donation that every man needs to provide once to his friends). Social obligations are even stronger than supernatural beings. Here is a common plot:

THE DJINN
- Very hairy, has horns and claws.
- Good and bad *djinn* (*xeras*).
- Far from being within society, has the same concerns and obligations.

THE OLD WOMAN
- Ambivalent function, can be helpful or harmful.
- The good one helps Muslims while the bad one challenges the unity of families. They are usually represented together.

IBOUNASSIA
- Trickster character who ridicules petty rulers.
- Name derived from Arab poet Abu Nawaz.
- Hala trick: takes flour for precious bone powder and becomes rich.

COMORIAN CHARACTERS

FOREIGN INFLUENCES
- WESTERN
  - Famous piettiness: a 'Little Thumb' throwing bits of cake in the djinn forest, a 'Blue Beard' *djinn* hiding his wife's corpse in a special chamber.
  - Universal stock characters: the king, the old woman.
- ISLAMIC
  - The first attempts at writing Comorian tales used the Arabic script.
  - The didactic function of the tales is very religious.
  - Arabic echoes the Islamic *hadisti* tradition (faithful account of the reported sayings of the Prophet).
  - The turning point of most tales happen at sea when meeting Arab sailors who are common characters, just like Allah (?).
- EAST AFRICAN
  - Denial of the African story-telling heritage.
  - Yet, the trickster character *Ibounassa* seems to be derived from the African character *Sungurwa* (here).
- MALAGASY
  - Belief in marine animal deities.
  - Malagasy-speaking communities in Mayotte.
- INDIAN
  - Influence of *Panchatantra* tales which presumably came through their Arabic version, *Kalila wa Dimna*.
A potential supergene? – Investigating hybridisation and the fitness of the *Lygaeus simulans* pale mutant in a hybrid background

Daniella Black* and David M Shuker

**Background**

Supergenes are adaptive clusters of genes inherited as a single unit. Recent research has identified many traits controlled by supergenes, for instance the wing pattern of *Popilio* butterflies (Ujima et al., 2013) and alternative mating strategies in the ruff *Philomachus pugnax* (Küpper et al., 2015).

In 2012, a pale mutant arose in a laboratory population of *Lygaeus simulans* (Figure 1). However, this mutant also influences a range of other life history traits, suggesting a possible supergene (Balfour et al., in press). Here we attempt to consider fitness effects of the mutant in a hybrid background, using the sister-species *L. equestris*.

![Figure 1: Mutant (A) and wild-type (B) *Lygaeus simulans* adults and 5th instar nymphs. Adults have fully developed wings. Photographs by Vicki Balfour.](image)

**Method**

- Using a fully factorial design *L. equestris*, pale and wild type *L. simulans* were crossed. Pairs were scored Y/N for mating.
- After removal of the male, females oviposited for one week, before the number of eggs laid were counted.
- After removal of the female, eggs were allowed to develop and hatch for one week, then the number of nymphs was counted.

**Results**

Pale mutant *L. simulans* males were less likely than the WT to hybridize with *L. equestris* females (difference represented by the arrow in figure 2A). Pre-copulatory reproductive isolation was asymmetric: mating in inter-species crosses was influenced by which species contributed which sex. The mean number of eggs and nymphs produced by WT female/pale male crosses was higher than all within-population crosses. *L. equestris x L. simulans* crosses did not produce nymphs (figure 2B).

![Figure 2: Mating and offspring production in the experimental crosses. E: *L. equestris*, W: wild-type *L. simulans* and P: pale mutant. The female is written first (e.g. EW – *L. equestris* female and wild-type *L. simulans* male cross). (A) Proportion of pairs mating once or more during trials. (B) Average number of eggs (green) and nymph (grey) produced per pair. Error bars represent standard errors.](image)

**Conclusions**

- WT female × pale male crosses produced more eggs and nymphs than all within-population crosses, suggesting heterozygous advantage.
- Male *L. simulans* mutants were less able to hybridize with *L. equestris* females than their wild-type counterparts: this suggests a further pleiotropic effect of the mutation.
- The lack of nymph production in any inter species cross constrained hybrid analysis and further hybrid crosses will be completed before considering genetic analysis of the mutant and possible supergene.

**References:** Küpper et al. (2015) Nature Genetics, Vol48(1)
Ujima et al. (2018), Science Advances, Vol4(4)

**Acknowledgments:** I would like to thank Dr David Shuker and Vicki Balfour for their guidance and expertise throughout this project.

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WHAT IS LAW?

AN INQUIRY INTO THE LEGAL WORLD OF EDWIN CHADWICK: HOW DO LEGAL REFORMERS CONCEIVE OF THE LAW IN ABSTRACT?

INTRODUCTION AND AIMS

My project aimed to understand how Sir Edwin Chadwick, a Victorian civil servant influential in public health reform and sanitation legislation, conceived of the law. Through focusing on Chadwick’s personal writings, reports, and letters, I aimed to build an idea of how this prominent public health and social reformer understood the law, its utility, and its ideal relationship with the government and with the public.

WHO WAS EDWIN CHADWICK?

Edwin Chadwick was born in 1800 and died in 1890. His professional career spanned journalism, the English Bar, and the civil service. Yes, it is for his work in the latter for which he is most known and esteemed as an important public health and social reformer. He lived in London for most of his adult life, during a time when the negative effects of the Industrial Revolution, such as urban overcrowding, poor living conditions, and outbreaks of disease, were rife and directly palpable. In his career in the civil service, Chadwick contributed to factory reform laws, led the investigation that led to the passing of the Public Health Act of 1848, and was an advocate for a centralized system of public health run by the government in matters of public health and social prosperity.

“WHAT IS LAW?”: VIGNETTES FROM A SNAPSHOT OF TODAY’S PUBLIC

“Corruption is unreasonable, and expensive. The law is simple and deliberately obfuscated by lawyers”

“Law is reward and punishment. Rules and decisions”

FINDINGS

“WHAT IS LAW?”: EDWIN CHADWICK’S CONCEPTION OF THE LAW IN ABSTRACT

1) LAW AS PARLIAMENTARY STATUTE

A relatively recent idea in legal thinking, Chadwick viewed the law primarily as being the formal state legislation passed by parliament.

2) LEGISLATION AS SOLUTION

Chadwick conceived of legislation as a tool through which to begin to solve the pressing social and health-related issues of his day. For Chadwick, the government therefore had a chief role in tackling such issues by initiating legislation that acknowledged the government’s responsibility to find solutions to these issues.

3) LAW AS A TOOL TO PROMOTE THE PUBLIC GOOD

Chadwick’s work on social reform legislation was influenced by contemporary utilitarian intellectuals, such as his friend the philosopher Jeremy Bentham. Bentham was an advocate of utilitarianism, whereby one should measure the majority’s happiness and minimize unhappiness when considering moral decisions. In this context, Chadwick appears to have conceived of the law as a way to achieve the better ordering of society, in order to end the collective well-being by using the law as a way to initiate the remodeling of public and local administration. He sought to improve the public’s welfare in order to promote a more efficient and less wasteful society.

4) LAW AS PREVENTATIVE

Chadwick viewed the law as a tool through which preventative measures could be put in place to promote long-term efficiency and health of society. For example, Chadwick helped to secure measures related to improving public sanitation in order to prevent the outbreak of disease in urban areas in the long term.

ACKNOWLEDGEMENTS

With many thanks to my supervisors for their advice and support, to CAP for coordinating the Laidlaw Scholarship, and to the Laidlaw Scholarship Programme in Research and Leadership for funding this research project.
WOMEN IN MATHEMATICS: AN UNSOLVED PROBLEM

OVERVIEW AND RESEARCH AIMS

The aims of the project are as follows:

- To design and create an open-source graph database, populated with records of women's experiences of Mathematics in Britain during the period 1795-1885.
- To explore the motivations surrounding the challenges facing Mathematics today, with a particular focus on the gender balance.
- To drive towards a Scottish Qualifications Authority policy change which currently fails to treat all students equally when pursuing a marks review.

Through analysis of the database, I will gain a view of the perception of Mathematics during this period. This will play a part in helping us to understand the sources of the current shortage of people in Mathematics-related careers (which the SCQF will also investigate) in the context of the current gender imbalance, and question whether a complete bridging of the gender gap is a necessary and effective way of resolving this.

THE DATABASE

INTRODUCTION

The period 1795-1885 saw a considerable change in attitudes towards Mathematics. At the beginning of the period, Mathematics was accessible to all levels, and enjoyed by men and women alike. The presence of popular periodicals such as The Ladies' Diary suggests that no gender stereotype had yet established itself. However, this changed significantly, and by 1835, despite advances in the education system, the pursuit of the subject by women was largely prohibited.

In populating the database, evidence will be taken from a wide range of sources, from diaries and novels to academic texts.

METHODS: DATABASE DESIGN

Many people are familiar with existent database management systems, such as MySQL. These are practical if the aim is to store data containing a moderate number of relationships in a tabular structure. However, if there are many relationships between the data, this design becomes inefficient and data is stored in rows and columns, which results in row-level storage.

I have chosen to create a graph database, a far more complex structure which is emerging as an effective way of storing linked data. This design is particularly useful for data containing many relationships, and can be visualised as a web (Fig 1). This allows complex relationships to be captured as connections between “nodes” of information. Relationships are physically stored within the database, and accessing them becomes easier – indeed, querying the database simply becomes a matter of ‘traversing’ the graph.

Each record containing an ‘experience’ is marked using XML. Every record mentioned in the text is assigned a unique identifier (UUID) from Levoy’s Web of Science. It connects throughout the web, and thus allows the network of relationships to be explored in a more comprehensive manner than a relational database. All materials are stored in a single XML document – a set of attributes which allow the extraction of RDF (Resource Description Framework) ‘subject-observer-object’ triples. The resulting RDF document is saved in a pristine form, which can be queried using SPARQL, and the results transformed into HTML to be displayed on a webpage.

PRELIMINARY FINDINGS AND FURTHER WORK

The creation of the database forms part of a pilot study to draw evidence from Britain 1795-1885. My research will focus on the design and implementation of the database, which will be extended in the future to include sources from abroad, and from a wider time period. The database will continue to be populated and refined, by increasing the complexity and range of possible queries. Ultimately, the database will go live on the internet, where it will be available to the public to explore and use.

I will use the database to look closely at the development of attitudes towards Mathematics over time. I hope that this may provide clues as to the reasons behind today’s gender gap, as well as indicate the course of the skills shortage experienced in the UK today.

ACKNOWLEDGEMENTS

I would like to thank Dr. Dr. Mark. This email address is incorrect. Alex, who was able to provide me with initial insights into the topic of gender imbalance.

REFERENCES

CONTACT

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Theatre and Ritual at the Edinburgh Fringe Festival

Summary

If theatre is understood as a kind of ritual, then each performance embodies a sociocultural system. Theatre can thus either reinforce the worldview it is produced by or effect social change by re-negotiating the norms and values it rehearses.

While the dramatic machinery elicits the audience’s stereotypical thinking, the audience project on the performance the expectations which originate from their sociocultural background. If these are met, then theatre reinforces the sociocultural values it represents. If, however, the audience’s expectations and the worldview represented on the stage do not match, then theatre can challenge the social order it is produced by and propose an alternative set of norms and values.

Methodology: I have written and directed a contemporary and meta-theatrical adaption of Euripides’ The Bacchae at the Edinburgh Fringe Festival. I have first explored the anthropological literature on ritual, focusing on its performative dimension. I have then shaped my directing style on Self’s notion of ritualization, and I have had conversations with my cast and crew about how performance can be meaningfully rehearsed and interpreted.

Theatre and Ritualization

Using Bell’s notion of ritualization (1992), I have identified dramatic performance and ritual action. If this identity holds, then theatre can be described as a kind of practice which represents itself as meaningful on the grounds of its being different from other practices. Based on my experience at the Fringe, I believe theatre rehearses sociocultural values and norms shared by the larger society which produces and consumes performances. At the same time, however, theatre is exposed in its nature of sociocultural construction, as its existence on stage ultimately relies on the performances of suspension of disbelief by the audience. Through performance, then, theatre represents the system of world-order proposed by the social group to which it belongs, by elevating it to a sacred, symbolic level, independent of everyday experience. Performance can thus either reinforce society’s norms and values or re-structure them at the symbolic level.

Self, Society and Performance

The way a performance is produced relies on the same theatrical machinery Goffman (1971) attributes to the production of the self. In theatre, the relationship between the audience and the actors is one of interdependence: together, they define the situation that is being established on stage. Starting from the set of social cues Goffman calls the front (i.e. setting, appearance, manner) presented in the dramatic action, the audience will draw on their sociocultural knowledge and, through stereotypical thinking, they will then project on the performance the expectations of what the norms and values rehearsed on stage may be. In this sense, a theatrical performance (including the audience’s response to it) can be understood as the ritual production of the entirety of a sociocultural system on a symbolic (i.e. representative) level.

FORMAL AND INFORMAL PROOF

George Tillisch
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Laidlaw Scholarship Programme in Research and Leadership

CONTEXT

Open up any textbook or journal of mathematics and you will soon find a proof. Despite the ubiquity of proofs in mathematics, it is rather difficult to say what a proof is and to explain the various characteristic features that proofs possess. This poster outlines some of the recent research in philosophy related to the problems of mathematical proof. In particular, we survey some of the attempts to understand how ordinary proofs, the kind found in textbooks and journals, relate to formal proofs in systems of logic.

Does the diagram opposite (adapted from [1], p.71) prove that the sum of the first n odd numbers is n²? This is one of the oldest examples of a ‘proof without words’. It is attributed to Nicholas of Gerasa and dated to around 100 AD.

These types of proofs can be used in almost all areas of mathematics. Consider a slightly more complex example (adapted from [1], p.109), does the diagram below prove that the sum of the first n ‘centred hexagonal numbers’ is n²?

A common view regarding these types of proofs is that, if they are proofs at all, they are certainly not mathematically rigorous proofs. Would these proofs be more rigorous if we ‘translated’ them into, for example, the language of first order logic?

A formal proof, or derivation, is a proof constructed in a formal system where each proposition is either an axiom or derived from an axiom via specified rules of inference. In contrast, informal proofs are proofs which are not constructed in a formal system. Nearly all proofs arising from the practice of mathematics are informal. The key question is, how do informal proofs relate to formal proofs?

KEY IDEAS

An ongoing task for philosophers concerned with these issues is to give an account of informal proofs which explains how they relate to formal proofs. More generally, any account must be able to explain the various data of mathematical practice.

The illustration on the right shows the path to an account of proof. If an account of informal proof can satisfy these explicanda (originally presented in [2]), then we should consider it successful.

Most accounts proposed so far fall into two broad sets. Derivationists try to explain the relevant features of informal proofs in terms of their having some relation to formal proofs. Whereas anti-derivationists reject any attempt to explain the relevant features of informal proofs in terms of derivations.

Most derivationists maintain that an informal proof is merely a sketch or a recipe for a formal proof. This idea is shown below using the proof of the mutilated chessboard problem and one of its formalisations (the formal proof is presented in [3]):

There is now much literature opposing the once standard derivationist views. This has led to the emergence of the philosophy of mathematical practice, along with anti-derivationist accounts claiming to be more faithful to mathematical practice.

CODA

This debate is still very much in progress. It is likely that further empirical studies of mathematical practice will be helpful in clearing up these issues. Recent work such as the univalent foundations programme has aimed to make the formalisation of mathematics practical for working mathematicians. The success or failure of such projects is likely to provide insight into the claims made on both sides of the debate.

References:
Reclassifying the eleventh cranial nerve: is the accessory nerve a single entity?

Henry Marles
School of Medicine, University of St. Andrews

INTRODUCTION

The eleventh cranial nerve, or accessory nerve, has been a subject of controversy in the anatomical world due to its unusual structure. It consists of a spinal root that originates from the cervical spinal cord and a cranial root that originates from the brainstem (as a conventional cranial nerve does). The roots are currently reported to unite to form the accessory nerve. As more modern experimental techniques have emerged, anatomical, embryological and physiological evidence has been found that suggests the two roots of the nerve may be separate entities. It is therefore necessary to analyse this new evidence to accurately classify the accessory nerve.

METHOD

A literature review was carried out using the PRISMA outline. The aim was to gather around 20 studies to include in the review due to the limited timeframe for the project.

The review structure was based on:
1. Development - Embryology
2. Structure - Gross anatomy and histology
3. Function - Physiology

FINDINGS

The accessory nerve currently has a classification that is based off antiquated methods due to its origins in the 2nd century AD. This has caused ambiguity in the understanding of the nerve due to discrepancies between its classification and what is currently known about it. Below are the main findings of the literature review.

Development:
- The development of the accessory nerve is mediated by both somites and neural crest cells
- There is molecular evidence for different mechanisms of development for the cranial and spinal roots

Structure:
- There is conflicting data as to whether the cranial and spinal roots exchange fibres
- The cranial root of the accessory nerve may, in fact, be a component of the vagus nerve
- There is significant variation in the morphology of the accessory nerve

Function:
- The innervation of the cranial and spinal root of the accessory nerve seem to be mutually exclusive
- Sensory fibres have been found in the accessory nerve, suggesting a nociceptive function

CONCLUSIONS

Due to the variation in the morphology of the accessory nerve, larger sample sizes are required to properly identify normal structure. That said, there appears to be more evidence supporting the hypothesis that the cranial and spinal roots are separate entities than a single nerve.
Changes in Late Roman Fortification Design: The decline of Roman order or a shift to local innovation?

Department: Classics
Researcher: Hugh Franklin
Supervisor: Dr Carlos Machado
Funding: Laidlaw Scholarship Programme in Research and Leadership

Year 1 aim: To begin to assess the creation and alterations to fortifications on the Late Roman Lower Danube and Rome

Background
- As the ancient world enters the Late Roman period (c. post 3rd Century ACE), there is a significant rise in the number and prominence of fortifications.
- Defence is therefore of evident importance, but how does this interact with both the local and wider cultural view?

Alterations/updates to design
- The fortifications on the lines (frontiers) are initially a military construction, but as both those defending and the areas defended change, so do those involved in the fortification maintenance and repair. This creates a wide variety of fortification styles in a relatively small area, a theme which is very typical of the Late Roman period.
- This variation may also be seen with Rome, but due to the gradual contraction of the city within the late 3rd Century Aurelian walls, we see an increased fortification of private houses and sections within the city. This may therefore show the potential downside to in-mural housing in Late Antiquity and the unmanageable cost of maintaining such a sizeable wall circuit.

Purpose of the fortifications
- Depends on location: There is a trend along the Lower Danube of a reduction in intra-mural private dwellings (within walls) towards having a central administrative hub with extra-mural housing.
- This may have increased reliance on the immediate vicinity rather than external influence from a central provincial power as in previous phases, yet the construction of new identical town walls within the province still suggests some form of external oversight.
- This may not have been an empire-wide phenomenon, as the city of Rome differs by seemingly combining sections of military planning and imperial authority with civilian construction. As such, there may be elements of displaying defensive capability yet having a reduced military presence, as can be seen to varying extents in the east of the empire.

Conclusion
- The increase in fortification of settlements seems to coincide with a shift in imperial priority towards the south and central eastern areas of the empire, causing an increased level of maintenance and external addition to eastern provincial fortification.
- This however does not necessarily mean demolition and abandonment of fortification for lower priority areas, but instead a greater reuse and alteration of building style and form more associated with the medieval period.
Aims: To find out why a terrorism discourse is being adopted against indigenous groups in Ecuador, and how peaceful protest against extractivism gets justified as acts of Terrorism. In particular, what I wanted to centre on was understanding the power of language and the opportunities for it to be manipulated and produce constructed identities.

Extractivism and Conflict: Figure one illustrates the scale of the oil reserves possessed by Ecuador, divided up into blocks. Most of these blocks are found in the Amazon in the country’s east-an area with over 250,000 indigenous people. The rainforest is their home, and many are both physically and spiritually dependent on it. This has led to a constant tension between the Government, keen to capitalise on this resource wealth, and the indigenous people who live there, fearing the damage extractivism will cause to their livelihoods. To make their voices heard, they are often left with no choice but to peacefully protest-an act which in the last 10 years has been transformed into terrorism offences.

Methodology: NGO and media reports, speeches, ethnographies and academic articles.

Why: The Connotations of the Word

“Everyone who opposes the development of the country is a Terrorist”

Labelling someone a terrorist is a powerful act; by making this allegation, it has the following effects:
1) Violating the ‘Principle of the Presumption of Innocence’.
2) Transforms the case from a ‘Private Land issue’ to a ‘Public Security’ one.
3) Allows the government to give an impression of national unity in response to the threat- demonstrated in quotes from the President as above. The effect is to grant the Government legitimacy.
4) Brings in an association of warfare and subsequently hypermasculinisation, allowing acts of sexual assault against women to happen more freely than would be the case in a normal criminal law situation.

How: A Colonisation of Words

<table>
<thead>
<tr>
<th>Sumak Kawsay</th>
<th>Meaning</th>
<th>Manipulated Meaning</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Good Living’- An indigenous concept of a high quality of life to strive for. It’s achieved through appreciation of a spiritual tie to the land.</td>
<td>An alternative word for economic development in the 2008 constitution, ignoring the key spiritual aspect.</td>
<td>Supressing the grounds for conflict; if indigenous people protest about mining when it’s been masked as an issue for Sumak Kawsay (as mining advances economic empowerment) its magnifies their crisis. Thus extreme labels such as ‘terrorists’ are justified as they seem wedged protesting against their own concept.</td>
<td></td>
</tr>
<tr>
<td>Pochomama</td>
<td>The Mother Earth Goddess; the Divine feminine tie to the land.</td>
<td>A derogatory phrase aimed at ‘backwards’ and ‘natively folkloric’ female anti-mining activists.</td>
<td>It lenses aside their demands as childish and ridiculous, demonising them and delegitimising their protest. This allows allegations of terrorism and disincentivising to penetrate deep into indigenous communities and be taken seriously.</td>
</tr>
<tr>
<td>Nanki</td>
<td>A positive feeling of energy and bravery.</td>
<td>In other contexts however it can mean a spear.</td>
<td>Fape’ Uneche (Photo Tree) crops in Nanki prior to a mining protest in 2009. His intention was for the protesters to bring this positive energy, however it was interpreted (probably deliberately), as bringing spears. This justified claims he incited violence, leading to him being sentenced to 12 years of prison for terrorism.</td>
</tr>
</tbody>
</table>

Conclusions, Leadership, and Moving Forwards

In summary, I researched why indigenous people are being labelled terrorists, firstly exploring the power of the word’s connotations. I also researched how such seemingly far-fetched accusations are justified, finding that the Government has in effect colonised indigenous language to delegitimise their protests and frame them as radicals. Through this way I have tried to demonstrated the power of words and voice as a tool of subordination.

I plan to continue my research next summer in a way that puts into practice the type of leadership advocated by the Laidlaw Scholarship, involving giving a voice to those who have had it taken from them and had their own language used to suppress them. I plan to go to Ecuador, and explore indigenous narratives on the impact of mining on their livelihoods, their experiences in having these allegations against them and the opportunities for resistance.
The Pill in East and West Germany: Comparing Policy, Uptake and Women’s Responses

Lorna McCarron, supervised by Dr Tom Smith
University of St Andrews School of Modern Languages

Background

- Socialist East Germany claimed to have achieved complete equality of the sexes.
- West German family policy was centred around enforcing traditional, Christian family values.
- Public discourse about women was polarised in the two states, meaning that the introduction of the contraceptive pill (the Pill) differed dramatically between them.
- The response of doctors, pharmaceutical companies and politicians to the Pill shaped how women perceived and interacted with the drug, whether it created a sense of empowerment or was perceived as a form of control.
- This study focuses on women’s voices of the 1960s and early 1970s responding to the Pill and detailing its effect on their personal lives.

Significance

- Within the given time period the ‘sexual revolution’ took place, second wave feminism developed and Cold War tensions grew. Women’s roles were changing rapidly, which affected how women perceived the influence of the Pill in their lives.
- This study is vital in order to further our understanding of the social significance of the Pill.
- My analysis forms a comparison between political ideologies, thus allowing us to see how reproductive rights flourish, or are commodified, under different political systems.
- My research informs academic discussion surrounding East Germany’s role in transnational history.
- I will also be contributing to academic debate within the field of medical humanities surrounding women’s health, through studying the individual experiences of women.

Initial Findings

<table>
<thead>
<tr>
<th>Federal Republic of Germany (West Germany)</th>
<th>German Democratic Republic (East Germany)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961: Die Antibabypille—the anti-baby pill</td>
<td>1965: Der Wunschkindspille—the planned child pill</td>
</tr>
<tr>
<td>Family policy: traditional, Christian values</td>
<td>Demographic policy: increase birth rate</td>
</tr>
<tr>
<td>Establish Christian conservatism to move on from Nazi past</td>
<td>Establish women as equal to men under socialism</td>
</tr>
<tr>
<td>Strict regulation for prescriptions of the Pill</td>
<td>Easier access to and positive marketing of the Pill</td>
</tr>
<tr>
<td>The student revolution of 1968 initiates public discourse about sexuality</td>
<td>East-West competition looses further relaxation of GDR policy on reproductive rights</td>
</tr>
<tr>
<td>Feminist concerns regarding consent and male control over the female body</td>
<td>Control of public opinion – positive response</td>
</tr>
</tbody>
</table>

My Research Questions for 2019

- How can literary writing by women contribute to our understanding of the social significance of the Pill?
- How did East German women use literature to discuss the impact of the Pill on their lives?
- How is the female experience of the Pill presented differently in the political and reflective writing of West Germany?
- Can parallels be seen in the writing styles of women from the East and West on the Pill? What does their use of literary techniques suggest about their feelings towards the topic?
- How do the women of the two states present the relationship between the Pill and procreation?
- Are feminist concerns towards the Pill reflected differently in the writing of East and West German women?
- To what extent do similarities between women’s responses contradict the rigid opposition between the two German states that emerges from the historical and political records?

Acknowledgements

I wish to express my sincere gratitude to the Laidlaw Scholarship Programme in Research and Leadership and to Lord Laidlaw himself for the generous funding of this programme.
Policies to encourage pro-social contributions

Laidlaw Scholar: Nathan Jones (nj2@st-andrews.ac.uk)
Supervisor: Dr Luc Bridet (lb22@st-andrews.ac.uk)
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Introduction

Why do people give money to those poorer than them? Perhaps this is a question that only economists would need to ask. Nonetheless, it is an important one for public policy and economics more generally.

A very basic economic model would simply assume that individuals seek only to maximise their own consumption, and are indifferent to that of others. This idea of the ‘homo economicus’ has been broadly ridiculed for good reason. It is not very useful for thinking about how people behave in the real world.

Giving to charity is very common in wealthy countries like the UK. For simplicity’s sake this research begins with the assumption that charitable giving is a desirable phenomenon. Suppose the government wants to encourage this ‘prosocial’ spending. What is the best way for it to do this? One way is to provide tax deductions for charitable donation, as the UK does through Gift Aid. This project compares two hypothetical schemes, and compares their different impacts on donors and recipients alike.

Methodology

Utility functions

- A fundamental tool of economics is the utility function. It is a mathematical function that takes variables like ‘income’ or ‘consumption’, and produces an output. This output is called ‘utility’, and is an arbitrary measure of a consumer’s satisfaction.
- The economy being modelled in this project has two consumers, but its characteristics hold for larger economies. One consumer is a recipient, whose utility function depends only on her own consumption. The other is a donor, whose utility function takes both her own consumption and her donation to the recipient.

Subsidies vs quotas (price vs quantity)

- The first scheme being analysed is a subsidy to donation. For every pound that the donor transfers to the recipient, the government pays her some amount of money. The government tries to set the subsidy to achieve a desired income for the recipient.
- Under the second scheme, the government auctions off a number of donation ‘obligations’, which are contracts requiring the donor to give money. The government charges a negative price, which means it ends up paying the donor to take the obligations. It auctions off the right number of obligations to achieve the same desired income for the recipient.

Uncertainty

- The final outcome will vary greatly if the policymaker doesn’t know the preferences of the donor, and if these preferences are subject to change (which is almost certainly the case).
- To model this uncertainty, a normal random variable is introduced in the donor’s utility function.

Optimisation

- The final step is using mathematical techniques to determine the equilibrium distribution of income corresponding to each option: no policy, policies with no uncertainty, and policies with uncertainty.

Step 1: define notation

- $u$ = utility
- $x$ = consumption
- $g$ = donation
- $w$ = endowment
- $s$ = price per unit donated
- $\theta$ = normal random variable $\sim N(1,1)$
- $x_1$ and $x_2$ refer to consumers 1 and 2. A macron refers to a fixed value.

Step 2: utility functions

- $u_1(x_1, g)$ and $u_2(x_2)$, which are strictly convex and continuously differentiable

Step 3: budget constraints

- $x_1 + g = w_1$ and $x_2 + g = x_2$

Step 4: modify the donor’s constraint to reflect policy

- $x_1 + (1 - \delta)g = w_1$
- $w_2 + g = x_2$

Step 5: introduce uncertainty about preferences

- $u_1(x_1, \theta + g)$

Step 6: compute the equilibrium and compare policies

![Figure 1](https://via.placeholder.com/150)

Illustration of the donor’s equilibrium contribution before and after the policy shifts her budget constraint. The horizontal axis is measures donation, while the vertical axis measures personal consumption.

Results so far/hoped for

- Under no uncertainty about the donor’s preferences, both schemes have the same result. However, this is not a useful approximation of reality. Policymakers are not able to fully predict how much people will donate when financially incentivised.
- The final distribution of wealth under the different policies will be an expectation and have a standard deviation, since a normal random variable is involved in the donor’s utility function.
- The aim is to take these final expected distributions of wealth and arrive at a set of broad stylised facts which relate simple conditions about people’s preferences, and the comparative efficacy of price and quantity regulation in this context.
- It is less about making concrete policy recommendations, and more about illustrating theoretical trade-offs in welfare economics.

I would like to thank the Laidlaw Scholarship Programme in Research and Leadership for funding this work, and for providing co-ordination with CAPOD and the School of Economics and Finance. I would also like to thank Dr Luc Bridet for his immensely useful guidance during the project.
EXPLORING MACHINE LEARNING IN CHEMISTRY

Oskar Leimkuhler, supervised by Dr. John Mitchell
University of St Andrews - School of Chemistry
Laadlaw Scholarship Programme in Research and Leadership

Neural networks: thinking machines?
The first artificial neuron was built by McCulloch and Pitts in 1943. Their aim was to help explain how the brain works by mimicking it electronically.

75 years later interest in artificial neural networks (ANNs) is at an all-time high, for their ability to be trained to perform a wide range of complex tasks using real-world data.

The aim of this project has been to implement three common applications of neural networks: modelling, prediction and categorisation, and to gauge their suitability for chemistry in each case.

Applications in chemistry
Potential energy surfaces for molecules can be calculated from quantum mechanics, but they often have no simple analytical form. A model has been developed here using a neural network with Gaussian functions in the last layer. Predicting the solubility of small molecules in water has been attempted before with a variety of machine-learning techniques. A neural network using dropout was tested against some of these earlier methods.

Neural networks require large datasets in order to learn effectively. Thus crystallography was an obvious choice to explore their possible uses due to the large volume of crystallographic data available.

Techniques
The ANNs used in this project were built in Python and trained using a backpropagation algorithm, in which the network parameters are adjusted incrementally in order to minimise the error on a set of training examples.

This method is highly versatile but comes with issues that must be overcome or worked around. To build a robust and efficient training method several modern techniques were implemented (see Table 1).

<table>
<thead>
<tr>
<th>Problem</th>
<th>Techniques Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too long to converge</td>
<td>Input scaling, weight initialisation, matched with activation function</td>
</tr>
<tr>
<td>Too slow</td>
<td>Stochastic gradient descent</td>
</tr>
<tr>
<td>Gets stuck in local minima</td>
<td>Stochastic gradient descent, Nesterov momentum</td>
</tr>
<tr>
<td>Convergence is unstable</td>
<td>RMSprop, Nesterov momentum</td>
</tr>
<tr>
<td>Overfitting</td>
<td>Dropout, L2 regularisation</td>
</tr>
</tbody>
</table>

[Table 1: Summary of techniques]

Of these the most novel is dropout, it was found to be very effective at preventing overfitting, where the network starts to learn specific features of the training set that do not generalise beyond it (see Fig. 2).

PES modelling
During development each new technique was tried against a test problem: learning the dihedral potential for a nitrogen molecule from quantum simulation data (B3LYP DFT). Gaussian functions were found to improve model quality and speed. Typically, a dihedral potential is used as an approximation for diatomics, but in other cases the functional form may not be known.

2D potentials were also handled well.

Solubility prediction
An ANN was used to predict the solubility in water (log5) of small molecules. It was trained on a set of 75 molecules with data for 123 of their chemical properties.

The network scored an RMSE of 1.183 log5 units, which beat some other methods but is still far from idealised accuracy. Dataset size and quality are both limiting factors on the network performance.

This can hinder this type of approach for real chemical systems, though there has been recent attempts to model protein-ligand binding affinity with ANNs using data from structure databases such as the Protein Data Bank.

Space group categorisation
A crystal in nature can be distinguished by its symmetry properties, like rotation or reflection, which is summarised in its space group symbol.

The space group can be determined from systematic absences in its X-ray diffraction pattern. A neural network was trained to recognise the ten of the most common space groups using X-ray diffraction data from the Crystallography Open Database.

The method achieved a prediction accuracy of 82% averaged over three runs. There was a failure to distinguish between two space groups which were extremely similar. Ignoring the distinction between these two space groups, the prediction accuracy rose to 97%.

Space groups are usually found using simple rules, but this might not be possible if the data is a lot of random noise. Experimenting with this data would be a good continuation to this project.

Summary
An algorithm was built to train ANNs for three different applications in chemistry. The algorithm performed well for modelling tasks when Gaussian functions were used in the final layer of neurons. Solubility prediction was achieved but limited due to small datasets. Space group categorisation worked well, but further research is needed to outperform current methods.

References

Acknowledgements
This project was funded by the Laadlaw Scholarship Programme in Research and Leadership by St Andrews University. Further funding was received from the SFN and the EPSRC.
A Stranger to Myself and to the World
Existentialism in Postmodern East Asian Literature

1. What is Existentialism?
Existentialism is a chiefly 20th-century philosophical movement that originated in Europe. The fundamental concept is that existence precedes essence – we are free to choose. With such freedom comes responsibility for our decisions in this irrational universe, followed by angst and a quest to define our own purpose in life.

The most common form of despair is not being who you are.
—Søren Kierkegaard

2. Background
World War II left the streets bombed and families torn apart. Traumatized by violence and turbulence in the aftermath, people questioned the purpose of the merciless war. In fact, what is the point in anything we do? What is there to look forward to?

Having witnessed and experienced the plight brought by war, the disillusioned and disillusioned intellectuals, under heavy influence of the translated works of Sartre and Camus, produced fiction permeated with existential motifs. This research studies the work of:

- Yukio Mishima (Japan)
- Kenzaburo Oe (Japan)
- Qidongsheng (Taiwan)
- Wang Shangyi (Taiwan)
- Liu Yichang (Hong Kong)
- Xi Xi (Hong Kong)

It was time to abandon the dream he had cherished too long. Time to realize that no specially tailored glory was waiting for him.
—A Sailor who fell from the Grace with the Sea, p. 125, Mishima

3. Themes
Angst, despair, and emptiness
There are overwhelming profusion of death and visceral imagery in Oe’s The Buddha, Shoot the Kids, among which the concentration of a pile of rotting animal carcasses with stiff legs and sticky mucus in a plague stands out as the utmost physicalization of hopelessness. In a less ominous but no less depressing manner, Liu effectively depicts the ubiquitous anguish and lack of salvation through the recurring imagery of stubs and bangs in The Drunkard.

Imprisonment
All the works examined involve imprisonment of some sort. While NB, the Buddha, Shoot the Kids presents the reader with a group of boys from a reformatory confined in a village and watched like caged animals, incarceration appears in the form of a remote island, an animal rescue centre, a claustrophobic apartment and an immobilising flood, all of which are symbolic of how man is thrown into the world and is powerless against the meaninglessness that he is trapped in.

Authenticity
Liu’s The Drunkard follows the stream of consciousness of an once respectable writer. Starting his career with passion for literature, he is constantly torn between producing work of high quality that lacks appreciation and selling cheap entertainment that appeals to the society. He eventually gives up on his ideal, turning to writing martial arts and pornographic novels, which is considered a disgrace to intellectuals. Although he calls such actions involuntary given that he has no other means of making money, he is painfully aware of his freedom to choose otherwise – a deprived but nobler life. It is this awareness of not being true to himself that haunts him day and night. In contrast, the protagonist of I Love Back Eyes by Qidongsheng, a man in his thirties, is portrayed as a sober outsider of the society defyng all conventions. Unemployed and supported by his wife, he spends his days strolling around Idly. When an unexpected flood leaves his wife and him stranded and separated, he chooses to save a prostitute, giving her everything that belongs to his wife and refusing to acknowledge his wife’s cry from another rooftop. In Liu Qidongsheng’s words, “Man’s existence is in the immediate relationship between oneself and the environment.” One must choose who he wants to be.

4. Paths to go down
Drunkeness
In face of the unresolved conflict between his ideals and reality, and the knowledge that he is held accountable for his own inauthenticity, the protagonist in Liu’s The Drunkard perpetually amnesthesizes himself with alcohol, spiraling down a road of self-destruction and self-abdication.

Suicide
In Xi Xi’s Elephant is an idiot, a perfectly healthy girl asks for euthanasia. She begs to be thrown away the way one would throw away a twigg for it has no purpose. In exercising her freedom to die, she has found and achieved a goal.

Insanity or amnesia
The rich protagonist in Xi Xi’s The Story of the Eastern City abandons a materialistic life and lives instead in a shabby garage. At first, with attachments to neither objects nor men, she lives a carefree life. However, when she becomes restrained by love, she tries to escape by drowning herself. The unsuccessful suicide attempt leaves her with partial memory loss and an opportunity to be “carefree again.”

Perhaps... rebel against society?
In Mishima’s The Sailor Who Fell from Grace with the Sea, a group of boys practices absolute disobedience. Believing that killing can fill the hollows in the world and enable them to achieve real power over existence, they brutally and gruesomely murder sisters and ultimately an adult whose cowardice they find unforgivably disgraceful, as a means of restoring the order in the world.

Or perhaps... to live humbly?
The protagonist in Xi Xi’s Elephant is an idiot, despite being in jail after helping a girl分娩, is just as contented as he used to be, finding companionship in arts, cockroaches and a frog which he keeps in his pocket.

5. Summary
The distress and terror evoked by the war, as well as the miserable living condition and coping with losses added an aura of pessimism and futility to the contemporary literature, but the existential themes accenteduated are timeless. There seems to be no escape from existential considerations; one may surrender to the apparent meaninglessness and drag out an ignoble existence, but sooner or later there is an inevitable confrontation of the internal conflicts. Among the different faces of the characters, being true to oneself and setting out one’s own mission — even if it is something incomprehensible to the society — might be the best, albeit difficult, way to live.

I always tell myself: learn not to be sad — look, a tree never cries.
—Elephant is stupid, p. 81, Xi
Attention in 3 dimensions

Valeriya Ryabchina, supervised by Prof. Julie Harris.
School of Psychology & Neuroscience, University of St Andrews

BACKGROUND
The capacity of our visual system to selectively attend to certain stimuli and ignore others, or selective visual attention, is an important aspect of visual processing. It is needed both for the 2D environment (the world of the display screen) as well as the 3D environment that we locate objects in on an everyday basis. There has been significantly less research on the mechanisms underlying selective visual attention in the 3D than in the 2D world and the role of depth in the attentional framework is not fully known.

Attributes of selective attention:
1) Space (spotlight) – depth allows the visual system to focus on a particular area of visual space. Stereuli within this area receive full perceptual analysis.
2) Object – depth segments scene into various objects (elements in a visual field organised into a coherent unit). Specific objects receive full perceptual analysis.

OVERVIEW OF THE PROJECT

Aim of the project:
Fit depth into the framework of selective attention described by the 2 attributes.

Binocular disparity (a depth cue obtained from the small differences between right and left eye’s views of the world) was artificially induced with a stereoscope.

Visual search efficiency (how quickly & accurately one responds to the target) was measured.

Main research question:
How does binocular disparity (distance between 2 planes) affect efficacy of visual search?

METHODS: MEASUREMENTS & HYPOTHESES

Measures of efficiency of visual search:
1) Reaction times (RT)
2) Search slopes reflecting search efficiency (rate at which the target is selected) (Fig. 3)

Hypotheses using attention’s attributes:
1) Space theory: visual efficiency decreases = RTs and search slopes increase
2) Object theory: efficiency increases = RTs and search slopes decrease

METHODS: RESEARCH PARADIGM

18 participants completed a visual search task – finding a target (the only white square on a plane) as quickly and accurately as possible.

RESULTS

Data from the ‘target on the back plane’ condition supports the Object-based attention hypothesis.
‘Target on the front plane’ condition Reaction time data supports the Space-based hypothesis; search slope data provides evidence for both hypotheses.

CONCLUSIONS

This project attempted to fit depth into the attentional framework. Binocular disparity was artificially created using a stereoscope and participants’ RTs in visual search tasks were measured. Findings suggest the integration of object and space-based attentional mechanisms in depth perception.

REFERENCES


ACKNOWLEDGEMENTS

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I would like to thank all my colleagues and students who participated in this project’s experiment.
Reclaiming space: How Scandinavian female artists remodelled the domestic sphere 1880-1910

Zoe Voice | School of Art History | Supervised by Dr. Kallistrup

The Male Gaze

Theorist Laura Mulvey argues that the male creator or viewer of visual art sees the female subject with a lens of difference, of ‘other’. This can be insidious, or merely the implicit curiosity of viewing that is assumed to be ‘opposite’ to the male experience. Either way, it established the act of viewing as a projection of the male fantasy onto the subject.

"Women then stand in patriarchal culture as a signifier for the male other, bound by a symbolic order in which men can live out his fantasies and obsessions through linguistic comedy by imposing them on the silent image of women, still tied to her place as house, not maker, of meaning" - Laura Mulvey

The Female Gaze

I propose that female artists studying female subjects employ a ‘female gaze’. This is not a penetrative curiosity in depicting female forms as Mulvey perceives the ‘male gaze’, instead we see a more implicit understanding or familiarity. This tends to result in the subject being disinterested in the viewer and absorbed in her own task, instead of being engaged with the viewer as we see in Ingres’s Odalysque above. There is, however, significant evidence that these artists still project a fantasy onto the subject, one of an idealisation of “womanliness”, showing the viewer what they believe to be the ideal embodiment of contemporaneous femininity, tied up with maternity and domestic skill.

Liminality

The most common subject depicted by these artists is the home or the painter’s close relations. While this could reveal their affection for these subjects, it is also symptomatic of the social restrictions imposed on women at this time; domestic interiors were the most accessible and appropriate subject. Yet rooms often appear as claustrophobic or lifeless, often with a door or window providing a threshold to the modern world outside - tantalisingly within view yet tantalisingly limited for women. Some artists, such as Ellen Danielson-Gambogi below, are even more overt in depicting their frustration.

Domestic Labour

At the turn of the century, theories such as Ellen Key advocated change in the perceived importance of mothering and childhood, in Scandinavia especially, the environment in which children were raised was thought of as correlating to that child’s success and happiness. In turn, means that the work of women was similarly weighted. We see in these paintings women active and occupied with caring for the home, and are virtuous for doing so. This also coincides with the bourgeois fascination with rural life - a lifestyle that is inherently labour-intensive.

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Images Clockwise from top-right:

With thanks to Lord Lidstone and the CANOD team

Project funded by the Lidstone leadership scholarship 2016.
“Laidlaw has truly been an incredible experience so far. I have grown and developed as a leader and person much more than I had expected. The leadership component has been incredibly valuable and has actually had an impact on the success of my research. The research has been a fantastic experience to get a feel what academia is about, and is a great way to test the waters.”

Lot Koopmans,
2018 Laidlaw Scholar