THE BOOLEAN

Snapshots of Doctoral Research at University College Cork 2012

2012

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Introduction

The Boolean was introduced in 2010 as a novel approach to making the wide diversity of research being undertaken by UCC's doctoral students known to as wide an audience as possible, in a style with which those without any expertise in the relevant fields could engage. The first two volumes have been very successful and, following their online publications in October 2010 and 2011 respectively, have been accessed and read widely all over the world, with many articles been downloaded hundreds of times.

We are delighted to present here Volume 3 of The Boolean, which again presents a wide range of articles about the research some of our doctoral students are undertaking today. By writing these articles in such a way that those outside the particular field of the student can easily understand the research the author is undertaking, these authors seek to take their research beyond the realm of the academic and into the wider public domain in a user-friendly way.

There are articles of interest to a very wide audience of stakeholders or those interested in a wide range of areas, ranging from medicine, and superheroes to high-speed communication.

This is one of the few opportunities for those outside the particular disciplines to learn about the work of these students, which is at the cutting edge of their fields, but yet is normally presented in scholarly language which often would not be readily understood by the interested non-expert. With The Boolean, we seek to bridge this gap.

The authors whose work is described in the pages of this volume were challenged to learn a new language of communication, to present their findings in a very new style. They then took feedback both from staff and student reviewers, to give the final versions published here. All authors are to be congratulated for rising to this challenge so well, and for bringing to life both the breadth of research ongoing in UCC and their passion for their work.

We hope all readers will find these articles stimulating, interesting and informative, and thank all those who have contributed to this volume.

'The Boolean' team
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Precise evaluation of Building Performance through the availability of dynamic building data and a Building Information Model (BIM)

Brian Cahill

Informatics Research Unit for Sustainable Engineering (IRUSE), School of Engineering, UCC

Introduction

All Buildings need to provide and maintain consistent user comfort while at the same time be efficient in their use of energy with a focus on reducing operation costs and CO2 footprint. It is a natural business need to have our building stock operating efficiently. A building that operates efficiently is one where most characteristics of the building can be monitored and evaluated while responding with essential actuation. Facility Management companies enter into service level agreements with building owners where they must provide a quality of service to all occupants and building stakeholders. It is currently impossible to precisely document how a specific zone in a building is performing, or will perform, in relation to user comfort, energy usage and cost (maintenance, running costs) if no sub-metering or accurate systemic details are present for that zone. This PhD research proposes a solution to this problem by integrating a Dynamic Building Information Model with current Building Performance Data Monitoring resources.

What is BIM?

A Building Information Model (BIM) is a useful tool in a facility management company's ability to store data concerning a specific building. When one reads the word model immediate images of building drawings and 3-dimensional miniature structures made from card-board come to mind. Figure 1 illustrates BIM as a software facility that allows users to store all digital aspects of a building in a number of supported formats, analyse building geometry, plan and manage projects, further amend drawings , visualise buildings and use data for manufacturing building components. BIM has proved over time to be a valuable asset in contributing to the management of relevant building data. The function, general usage and opinion of BIM in industry are reminiscent of a repository for static digital building data Figure 1.
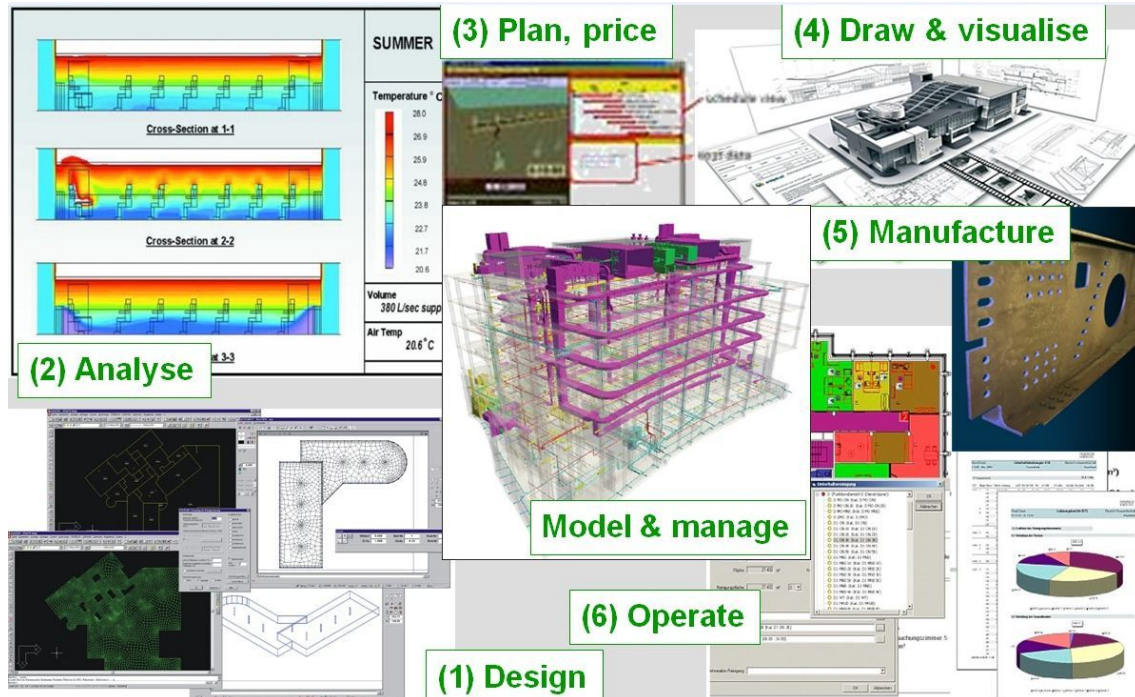
Figure 1: Building Information Model (BIM)

BIM and the Building Lifecycle

It is also worth mentioning that a BIM performs a different role depending on what stage the building is at in its lifetime. A BIM has a role to play at the concept and design stage. Efficient use of BIM at the design stage has seen a huge reduction in building costs. During construction, a BIM is useful for progress monitoring, managing costs and project plans. When the building becomes occupied with tenants, a BIM is useful for tracking energy usage, occupant and maintenance history. Finally, a building will at some stage need to be demolished and recycled. A BIM has a role to play here too in preserving all the history concerning the building's structure during its lifetime while also recording where building material were disposed of and recycled. It cannot be overstated enough how important the BIM is with reference to building data during a building's lifecycle.

Making BIM Dynamic

While BIM offers the potential of hosting all data associated with the building lifecycle, there is evidence to suggest that some phases of building lifecycle data are represented in a much more diluted fashion in a typical BIM. To date, a BIM relies heavily on manual updates from engineering staff. BIM's effectiveness becomes stronger with less manual interaction. Depending on human interaction to amend BIM based material can result in missing and duplicate data. Slow interaction with BIM based building models may

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possibly embed inaccurate and obsolete information.

A BIM can become more efficient in the way it stores and retrieves data while also giving the geometrical data more meaning. This research examines how a dynamic BIM can be supported by integrating wired and wireless sensed building data sources, such as a Data Warehouse, and, as such, provides a solid platform to perform precise evaluations of relevant building performance, at any stage of the building's lifecycle. This research will primarily focus on the operation phase of a building lifecycle where occupant energy usage, occupant comfort and building zone performance take priority.

Proving the concept of Dynamic BIM

As a proof of concept, this research focuses on using a BIM tool supporting a web browser based client with the following features:

☐ Industry Foundation Class building drawing file formats

☐ Industry Foundation Class versioning, Geographic Information System

☐ Building Drawing Data Filtering

☐ Web-browser Interface

In addition, current "Living Laboratories" have provided this research with more that 100 million datasets containing humidity, CO_2, radiant temperature, weather data, occupancy data, HVAC performance data, and overall building performance data. Current "Living Laboratories" include the Environmental Research Institute (ERI), UCC and the HSG zander Hotel and Training Centre, Neu Isenburg, Frankfurt, Germany. Figure 2 illustrates a current supported web-based application that displays building performance data from the ERI. The user simply clicks a relevant icon in the building floor schematic and a resultant two weeks period of specific building data is displayed. An enhancement of this application would be to integrate a similar tool that references the BIM and displays specific detail concerning building zones such as window type, door type, occupant levels, and history of energy usage.

Proposed Software Architecture

Current academic literature on the subject of BIM is preoccupied with how BIMs can be supported and how they can reproduce and exchange geometric data between numerous Computer Aided Design (CAD) drawing tools. This research pulls the topic of BIM in a different direction. Referring to figure 3, a BIM contains predominantly descriptive and static data. A Data Warehouse, on the other hand, supports data which is largely dynamic.
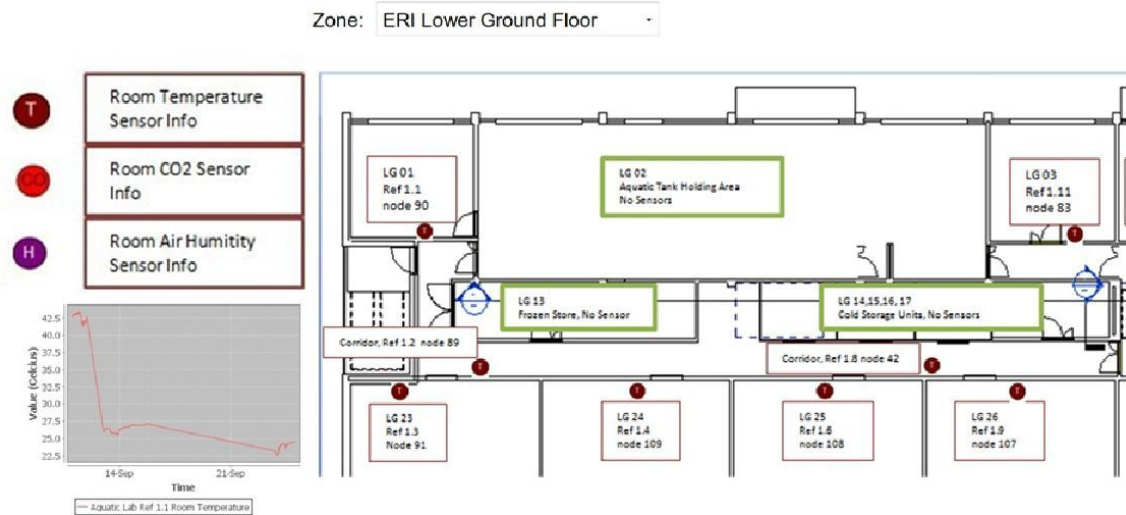
Figure 2: Building Performance Monitoring of the ERI

Data is sourced from wired and wireless meters deployed in buildings. In addition the architecture illustrated in figure 3 also supports data sources from RFID equipment used to detect occupants and track equipment. The sensor and actuation network involves, as mentioned, wired and wireless sensors coupled with actuation devices such as actuating windows, blinds, and under floor heating valves. The top layer of this architecture supports simulation activities where simulated output can be stored at the BIM. Maintenance tools incorporate how maintenance tasks are detected, scheduled, resolved and resourced. Monitoring Tools focus on retrieving data from both the BIM and the Data Warehouse where user interfaces/dash boards are designed to support stakeholder information requirements. The Intelligent Control supports the analysis of incoming sensed data.

Research Outcome

This research will focus on merging the abilities of the BIM and the Data Warehouse to produce a total Dynamic BIM solution where static data from the BIM will be enriched with dynamic data from the Data Warehouse such as room temperature, room occupancy levels, CO2 levels and much more. We are talking about capturing dynamic building performance data at a particular point in time and storing this data in a version of a BIM server based building model.

In addition to the above task, this research will examine how to further enrich dynamic BIM data by applying simulated data, and data produced through a Data Warehouse's data analysis techniques. The real goal in this research is to prove how such a dynamic BIM can precisely evaluate building performance and facilitate prognosis of building inspection,

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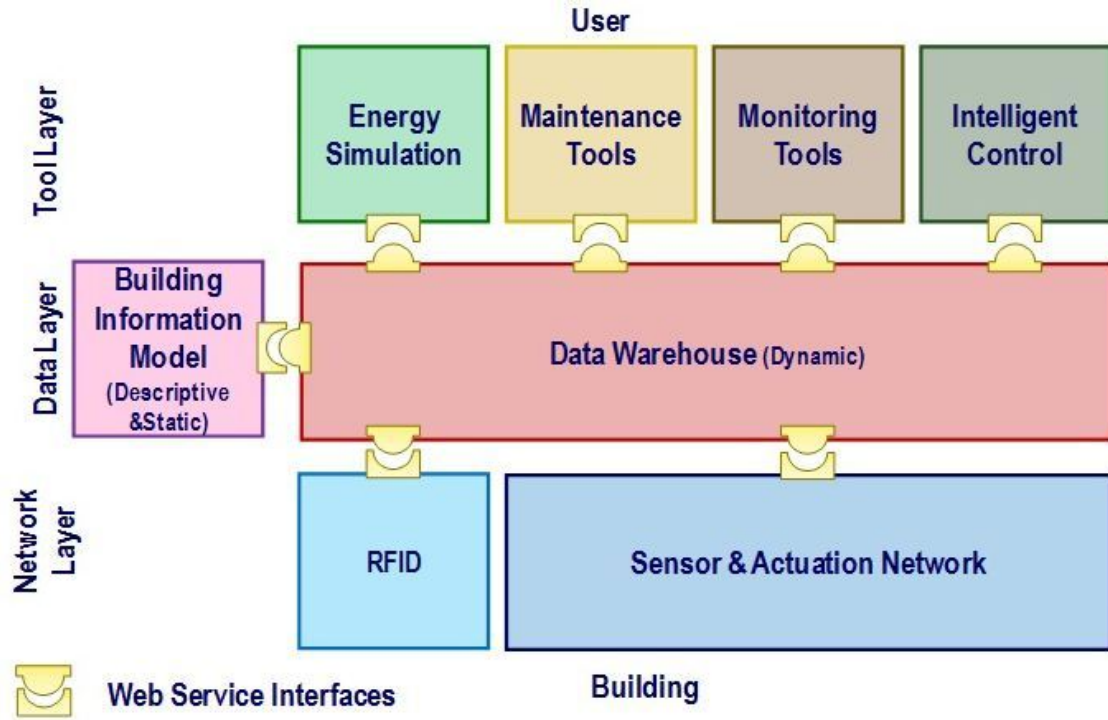
Figure 3: Dynamic Building Information Model Architecture

maintenance, actuation and renovation.

'Superheroes know where they are going': views from children's cultural worlds

Frances Clerkin

School of Education, UCC

> Imagination is more important than knowledge. For knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand. (Albert Einstein)

A 'world' of difference

Eileen asks 'why does Liam need a compass?', an item which Liam proudly produces from his backpack and displays at morning 'show and tell'. Liam often leads play episodes and is frequently an instigator of 'superhero' type play in pre-school. My response is 'he probably needs it for his superhero game'. Eileen's exasperated reply is 'superheroes know where they are going'. On quick reflection I agree that 'yes, that sounds likely.' In her initial statement, Eileen reveals not only that she knows the purpose of a compass but also that she expects a more considered and believable answer from a 'knowing other.' In Eileen's social and cultural experiences, my being adult confers just such a status. Clearly disappointed with my response she herself assumes an 'expert' role. Eileen reflects a shared understanding of culturally embedded assumptions associated with fictional Superhero characters. She also conveys a sophisticated awareness of the 'rules' of pretend worlds, an awareness that suggests that, even where disbelief is suspended, such 'realities' infer rules of engagement, perhaps open to negotiation but rules nonetheless.

The above scenario highlights that children come to pre-school having already absorbed a multitude of messages from the outside world out of which they try to make and share sense. Children's play realities arguably represent cultural 'worlds' within 'worlds', where they interpret, share and negotiate understandings, reflecting influences from media, computer technology, books, toys, pre-school and other social and cultural sources on their lives. It transpires that, on this occasion, Liam's intended use of the compass is as an explorer, replete with handmade map and compass to pursue hidden treasure, at a leisurely as opposed to "superhero in pursuit of 'bad guys'" pace.

Socio-culturalism, a multi-lensed camera

This socio-cultural take on children and childhood highlights relational and situated aspects of learning and development. In this qualitative research approach, I enter a pre-school community as a volunteer, seeking an increasing participation level in a situated community of practices. Through my participative role/s I seek to observe and record insider child and adult perspectives. Every participant, including myself as 'participant observer', brings their own historic, social and cultural experiences and agendas to bear on the research context, the inference being that any single context represents multiple realities or 'worlds' within 'worlds' which are constantly evolving. This approach challenges assumptions of objectivity which privilege researchers as 'experts' separated from the context of the research. It also acknowledges the imbalance of power between adults and children and pays particular attention to accessing and reflecting children's cultural perspectives.

This study reflects new sociological views on 'children' and 'childhood' that deny the notion of 'universal childhood' or a 'universal child'. Childhood 'culture' is viewed contextually within communities of practice. This research process explores what possible ways of being, seeing and doing are available and appropriated by children within everyday situated pre-school contexts. It also considers associated concepts of children as experts in their own cultural worlds, particularly in relation to their interactions in self initiated play experiences. Such times, often at the interstices of adult control are viewed as significant because of their potential for children to be self-directed and autonomous. This line of research recognises childhood as a valuable time in its own right and runs counter to perspectives that define children as 'incomplete' future adults, with adulthood viewed as the pinnacle of development. It has been argued that such views foreground children as primarily powerless and in need of protection. The counter-argument recognises childhood as a time in life that can never be repeated (OECD 2006). Out of this view of early learning and development are theorised opportunities for reciprocity and co- construction of meaning and shared learning in adult-child interactions

Methodology

The method adopted seeks invitations from children to participate, to in a sense go *through the looking glass'* and experience what these 'worlds' within 'worlds' might look and feel like from the perspectives of the child participants. Physical body positioning is important in this respect. When seated on the floor or a low chair, there is direct eye contact with children and a potential to engage invitations to participate. Unlike Alice's experiences of being lost in 'wonderland', it is proposed that a 'doorway' with the possibility to enter on invitation but also exit when met with the demands of other roles may be possible.

As well as this participatory approach, children's language and tool usage is explored and interpreted.

The scarlet cape is one such cultural tool in this setting that evokes many possible functions in the children's play roles from 'Kings' and 'Queens' to 'Superheroes'. The predominantly male perception of the superhero type role as reproduced by the children seems to limit its attractiveness as a play role for girls in the setting. However, this is not always the case. Marian creatively combines two roles and wears the cape over a Disney princess gown to transform herself into a 'Superhero Princess'. She further challenges gender boundaries by transforming herself into a 'Superhero King' when she adds a handmade crown to her ensemble and leads play episodes in new directions. As the transition from indoors to outdoors occurs, Rory picks up the sides of his raincoat, thunders past me saying 'don't close it... I must fly'. I am struck by the fluidity of identity in children's play interactions. They try on identities and explore new ways to be, see and do. Through these interactions they develop cognitive, social and emotional shared understandings that serve to extend and sustain their play themes.

During outdoor play, a doorway into the superhero world opens as Liam offers me a 'magic crystal' (a stone) to help me 'fly'. This exciting opportunity is pursued for several minutes as the more experienced superheroes fly with capes (hoods on head and the body of the coats held out to enable 'flight'). Children's imaginative use of symbols in play, supported by the tools of language, helped them to transcend the limits of their material resources. Suddenly, a heated physical battle erupts between two superheroes and I morph back into my adult role to mediate the dispute. A limitation of this approach means that for now the participatory 'door' into children's play cultures has closed. As in other research studies, some children persistently resist adult efforts at play entry and this is respected. However, many children seem to enjoy guiding my participation in their unfolding play themes and I continue to avail of such invitations.

Creators and meaning makers

The big underlying concept of this study is the notion of children as active agents, constantly interpreting, making meaning, improvising, being creative, constructing, deconstructing and reconstructing their worlds and making their culture in the moment. The exploratory nature of the study seeks new means to enter or be invited into what is perceived as children's play and learning worlds. It aims to envisage what matters to children, as well as what learning they are reflecting back, interpreting or transforming in play and what emergent themes motivate their dispositional interests that may develop along life-long learning trajectories. Adopting a least-adult/novice as opposed to adult/expert role requires the researcher to follow where the child's play intentions may lead. This is not to say that there is ever direct access into children's minds. Rather, the hope is that children

might invite us to momentarily shed the power within adult roles. This opens the possibility of better understanding and co-constructing understandings on what motivates, interests, constrains or enables children within the situated contexts of their unfolding learner identities.

This study links to growing understandings from neuroscience, psychology and sociology on the dynamics of early learning and development. These new understandings suggest the human capacity from infancy to develop creative, cognitive and emotional intelligence through playful social interactions in stimulating environments. My findings affirm the special mediating role of informed and reflective professionals in preserving and extending children's play and learning worlds. My study builds on socio-cultural theory and indicates that such professional practice may usefully incorporate both novice/learner and adult/expert roles. The associated practice-based research approach can inform and enhance generative curricular practices, bridging new connections between home and school and adult and child cultures. Accordingly, I argue for policy and practices that raise the professional status of early years educators. This implies supporting their ongoing training in and development of such practice-based research to be shared within and across early learning communities. Acknowledging children as holders of rights and experts in their own cultures implies accessing and supporting their ongoing input and influence. Such influences can and in notable instances (such as Reggio Emilia Schools in Italy) have been applied to the emergent curricula, architecture, layout, design and resourcing of adaptable and sustainable early learning environments.

The themes of flight and fluid learner identities emerging from this research context are representative of the creative, joyful 'what if?' possibilities within children's play and learning experiences. My own guided 'flights' into children's cultural worlds meant unshackling (at least for a while) the acquired layers of adult power and control, to follow and better understand where children's imaginative potential may lead.

"All the time, somebody listens in": mirror images of social paranoia in twentieth-century American and Soviet literature

Miranda Corcoran

School of English, UCC

Introduction

Emphasising the manner in which literary texts often serve to express the collective hopes and fears of their respective cultures or communities, my research explores the representation of social paranoia in a selection of Cold War American and Soviet Russian novels. Although the antagonism between these two opposing superpowers, and their struggle for ideological supremacy, shaped the course of twentieth- century international relations, my research proposes that an examination of the literary and cultural output of these two apparently irreconcilable socio-political systems reveals a parallel preoccupation with a number of typically paranoid concerns. These shared anxieties include the unsettling reality of state surveillance and similar methods of social control, the ever-present threat of enemy infiltration, and the politicisation of science which resulted in the terror of the Nuclear Age.

Indeed, much of the fiction produced in Russia from the Stalinist era onwards and in the U.S. during the Cold War period highlights the manner in which these two seemingly incompatible cultures were consumed by similar fears and gripped by an equally pervasive paranoia. The central thesis of my research maintains that these parallel conditions of anxiety and mistrust led to surprisingly similar literary responses, which transcended the ideological divide between capitalism and Communism and, as such, highlighted the uniformity of fear which lay beneath the façade of largely constructed difference.

For the purposes of this article, I will examine two novels whose analysis forms an integral part of my PhD thesis, Mikhail Bulgakov's *The Master and Margarita* (completed 1940) and Thomas Pynchon's *The Crying of Lot 49* (1966). In particular, this article will discuss how these texts engage with themes of observation and surveillance, and, in doing so, will attempt to highlight the manner in which these novels depict two seemingly divergent cultures as mirror images of paranoia and suspicion. Although this article will focus only on the manner in which key scenes from both texts demonstrate aesthetic parallels in their respective representations of paranoia, my research ultimately maintains that texts such

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as *The Master and Margarita* and *The Crying of Lot 49* fit into a much broader discourse of fear and anxiety. Approaching these works from a historical as well as a psychoanalytic perspective, my research explores how these two novels, along with numerous other texts, both Soviet and American, succeeded in countering rigid notions of Cold War Otherness by revealing two nations possessed by a similar sense of vulnerability and insecurity.

The Narrative of Otherness

Central to my research is an in-depth analysis of the cultural and ideological context from which these texts emerged, as my thesis maintains that the continued momentum of the Cold War conflict depended largely upon the manner in which both the Soviet Union and the United States constructed their respective adversaries as utterly alien and inherently threatening. Indeed, the Cold War conflict was framed in the political rhetoric of both sides as a conflict between diametrically-opposed adversaries, an unending battle between capitalism and Communism, theism and atheism, freedom and oppression. As such, the continuance of the Cold War as an ideological conflict hinged upon a psycho-social process known as "Othering". A pervasive psychological and cultural practice, "Othering" is the process by which both individuals and groups construct and solidify their identities by investing the self with all that is moral/right and the Other or enemy with all that is abhorrent and repulsive. In the context of the Cold War, this "Othering" process assumed the form of a deep-seated political and ideological animosity which fixated on the notion of the perceived enemy as a sinister, destructive force. Thus, while American propaganda of this period conceived of its Soviet adversary as the monstrous "hydra-headed super-enemy" of Communist encroachment, a seemingly omnipresent foe whose shadowy agents operated not on the global stage of international conflict, but in the covert realm of espionage and infiltration, the Soviet popular imagination viewed its capitalist enemy as an equally malevolent threat. In this way, the primary cultural narrative which sustained the political tension of the Cold War period was one of radical difference and irreconcilable animosity.

Comparative Literature and Dispelling the Narrative of Otherness

My research seeks to move beyond such rigid paradigms, suggesting instead that, despite the vast cultural and ideological chasm separating them, these cultures shared similar fears and, consequently, the narrative of "Otherness" and radical difference that defined Cold War political discourse existed as little more than a constructed mythology. Thus, while a more than cursory glance at the histories of these cultures exposes a whole series of similar political anxieties and paranoiac fears, it is within the fictive realm of literature and

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fantasy that the true extent of such parallels becomes apparent. The two texts I will discuss in this article, although drawn from ostensibly diverse socio-cultural contexts, display similar preoccupations with such characteristically paranoid themes as hidden conspiracies, spying and surveillance. In comparing the manner in which these two literary works represent such anxieties, my research attempts to prove that while the Soviet Union and the America of the Cold War period initially appear as fundamentally irreconcilable adversaries, both cultures were consumed by similar fears and gripped by an equally pervasive paranoia, a paranoia whose origin was rooted more in the dark reality of internal political oppression and a pervasive sense of deep-seated suspicion than in the largely constructed narrative of an utterly demonised external foe.

Representing Surveillance

Reflecting the contemporary fascination with spying and espionage, a preoccupation born out of the precarious political situation that defined both the fledgling Soviet state and the anxiety-ridden America of the Cold War period, both *The Master and Margarita* and *The Crying of Lot 49* construct vision and observation as central components of population monitoring and social control.

Composed during the height of the Stalinist purges of the 1930s, Bulgakov's vision of Soviet society is, as one historian writes, a vision of a social arena in which "the flywheel of repression [had] slipped out of the hands of those who were turning it" and, in doing so, had transformed the socio-cultural landscape into a terrifying realm of fear and suspicion. Depicting the numerous cruelties and abuses carried out by the Soviet Secret Police, Bulgakov's novel portrays Stalinist-era Moscow as an horrifically repressive society in which even the most mundane activities had become irrevocably intertwined with a "complicated process of surveillance and control". Thus, the world Bulgakov evokes is one in which a mixture of terror and anxiety surrounded the seemingly inescapable presence of the dreaded Secret Police, who appear throughout the novel as sinister, indistinct forms that spy on their fellow citizens and work to glean incriminating information by insinuating themselves into such seemingly innocent situations as "standing in a queue outside a store, frequenting the . . . market, [or] listening to workers' complaints in the factory cafeteria. . . " (Fitzpatrick 164).

This vision of members of the sinister Secret Police engaged in a ceaseless process of spying on a terrified Soviet populace is a recurring image throughout *The Master and Margarita*, and succinctly encapsulates the pervasive paranoia of a culture in which the possibility of arrest and incarceration remained a constant threat. This sense of a culture dominated by the fear of falling under the scope of state surveillance manifests in the form of a recurring plot point whereby most of the novel's characters find themselves pursued by menacing, shadowy members of the Soviet Secret Police. In one such scene, two of the novel's central

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characters are followed by a series of sinister observing agents:

> Although the footsteps of Azazello and Margarita fell lightly, a lone man heard them and began to shake restlessly... A second man, surprisingly like the first met them by the sixth entrance... The restless man looked around and frowned. When the door opened and closed, he left following the invisible enterers, looking into the passage, he, of course, saw no one. The third man, an exact copy of the other two, was on duty on the landing of the third floor. (*MM* 220)

Within this representative scene, Bulgakov conveys the profound anxiety of a society in which innumerable observing agents, primarily members of the Secret Police, pervaded the cultural landscape. Presenting such figures as an ever-present threat, Bulgakov succeeds in capturing the pervasive sense of fear and suspicion that thrived within the brutally oppressive climate of Soviet Moscow.

Resounding through decades of socio-political upheaval, a similar preoccupation with surveillance and observation can be seen in Thomas Pynchon's evocation of Cold War paranoia as depicted in *The Crying of Lot 49*. Set amidst the affluent suburbs of 1960s California, Pynchon portrays mid-twentieth century America as a society gripped by Cold War anxiety. The short, satirical novel is set amidst the hysteria and widespread suspicion of a culture in which the Cold War struggle against Communism played out as a covert battle in which, as one commentator notes, "the war was in all the world's filing cabinets... [and] the weapon was information". As such, Pynchon evokes the pervasive anxieties of a culture in which the preservation of democracy and freedom was viewed as dependent upon a complex system of surveillance and information-gathering. However, as such fears began to manifest in the repressive policies of America's post-war anti-communist witch hunts, a period commonly referred to as the McCarthy era after one of the driving forces behind this spate of political repression, an anxious American populace had begun to fear that their own body politic might shelter not only enemy infiltrators, but the sinister face of America's own oppressive political structures. Thus, while *The Crying of Lot 49* is a novel concerned with portraying the unique socio-historical circumstances of the 1960s, it presents the American socio-political landscape of this period as a deeply suspicious, deeply paranoid society. In this way, Pynchon's novel adopts a profoundly unsettling series of visual motifs whereby he populates the novel with a seemingly endless stream of sinister figures, who, in their invariably shadowy appearances, appear to embody contemporary Cold War fears surrounding the almost unprecedented scope of state surveillance. By presenting these figures as an omnipresent, malevolent force, *The Crying of Lot 49* mirrors the sinister aesthetic of *The Master and Margarita*. Echoing the profound sense of unease that pervades Bulgakov's novel, *The Crying of Lot 49* thus creates a deeply unsettling vision of a culture in which a profound anxiety surrounded the presence of observing agents and surveillance systems. The similarities between these texts can be seen in the numerous scenes and images from *The Crying of Lot 49* which recall events from Bulgakov's novel. One such example of the aesthetic and thematic parallels between the

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two novels occurs when Pynchon's inquisitive heroine, Oedipa Maas, finds herself plagued by the uncanny sensation that she is under some form of observation: "looking back, [she] could see their pursuer had been joined by another man about the same build. Both wore grey suits" . In scenes such as this, one can observe a profoundly paranoid social landscape, pervaded by the uneasy sense that the actions of its inhabitants are constantly under some sort of surveillance. Moreover, it is in this representation of a culture preoccupied by the presence of mysterious, observing figures that Pynchon's portrayal of America's Cold War paranoia most clearly echoes Bulgakov's exploration of the cultural anxieties of Stalinist-era Moscow. Indeed, by depicting the sinister figures that plague the heroine of his novel as shadowy, unnamed beings, Pynchon demonstrates a profound affinity with the sinister aesthetic found in Bulgakov's work and hints at the existence of shared fears so alike that they transcend ideological divides.

Conclusion

Early in *The Crying of Lot 49*, one character notes that falling under the gaze of surveillance structures is an inescapable part of the contemporary American condition, claiming that, "All the time, somebody listens in, snoops; they bug your apartment, they tap your phone". Due to the broad familiarity with American popular culture amongst most Western readers, such images of the deeply-ingrained social paranoia that plagued the American popular imagination during the Cold War period remain forever embedded within our general understanding of twentieth-century American history and culture. However, by exploring the manner in which Soviet literature of the Stalinist era expressed a similar fascination with images of surveillance, observation, and paranoia, my thesis maintains that, although both nations expended a great deal of energy convincing their citizens of the ethical, cultural and ideological Otherness of the rival superpower, a similar atmosphere of fear and mistrust thrived under both regimes. By exploring these texts from a historical, as well as from a psychoanalytic, prospective, my research attempts to highlight the fact that, despite the vast cultural and ideological differences separating these seemingly diverse socio-political systems, they shared a series of deeply-engrained anxieties which transcended rigid Cold War conceptions of Otherness.

Self-Neglect: A Hidden Killer

Mary Rose Day

School of Nursing and Midwifery, UCC

Introduction

Self-Neglect (SN) can be defined as:

"The inability (intentional or non-intentional) to maintain socially and culturally accepted standard of self-care with the potential for serious consequences to the health and well-being of the self-neglecters and perhaps even to their community" (Gibbons et al. 2006 p.16).

This definition is holistic and captures the intentional and choice factors as well as socio-cultural influence of the behaviour and the potential negative impact of SN for the individual, their family and community. A key component of assessment by professionals is the individual's decision making capacity and ability to understand the consequences of their actions. Occasionally, distorted images and headlines appear in the media such as "A Systems Failure: Pensioner found dead due to Self-Neglect". There is a general outcry of public rage but the media are not interested in understanding why the vulnerable but competent adult who was self-neglecting is not rescued. A social media heading like this is a nightmare for professionals and services.

A range of interrelated factors contribute to health inequalities of older people such as socio-economic and material factors, psychosocial factors and lifestyle factors. Many of these are risk or contributory factors for SN in community-dwelling older adults. SN is associated with ageing, and the growth in people living to aged 80 years and over has the potential to increase the prevalence and incidence of SN. SN is a serious public health issue and it can occur along a continuum of severity and is frequently described as an older person's inability to provide for oneself the goods or services to meet basic needs. SN is poorly conceptualised and there is no universally accepted definition. Most states in the United States categorise SN as elder abuse and include it within conceptualisation of neglect and vulnerability. SN accounts for the majority of Adult Protective Services (APS) cases in the United States. Conversely, SN is not included in the definition of elder abuse in Ireland, UK, Europe and Australia as it does not occur within a relationship of trust. However procedural documents for referral to Elder Abuse Services (EAS) in Ireland have included those 'at risk of extreme self-neglect' and 18- 20% of the referrals received are categorised as SN. Collectively, over the last 4 years, 1,739 SN referrals were made to services across the four Health Service Executive (HSE) areas in Ireland with under half

coming from the South, the area the researcher is based. SN is difficult to detect and estimates may present only the tip of the "iceberg" as many cases go unreported or are unknown to services until they are chronic or life threatening.

Physical, Psychosocial & Environmental Dimensions: Hidden Factors in Self-Neglect

A typical picture of people who severely self-neglect is one of very poor personal hygiene, malnourishment, living conditions of extreme squalor, vermin infested, with no running water or electricity and presence of a number of pets. Outsiders label such individuals as 'victims', 'reclusive' or 'eccentric' and many live alone and often refuse services.

Skills that enable individuals to live independently in the community are self-care tasks, activities of daily living (ADLs) (feeding, bathing, dressing, grooming, work, homemaking and leisure) and instrumental activities of daily living (IADLs) (doing housework, shopping, taking prescribed medication, managing finances, using telephone/technology or transport). Difficulties with handling finances, managing medication and using the telephone are more suggestive of problems in cognitive function, whereas difficulties with shopping, cooking, housework, laundry and transportation are more indicative of problems in physical function.

SN is associated with cognitive impairment, poor self-care, reduced physical function and is coupled with poor social support and poor income; self-neglecters are at serious risk for safe independent community living. Multiple psychosocial factors have been linked to self-neglect, such as alcohol/substance abuse, poor health, altered nutrition, dementia, depression, incontinence, pressure sores, impaired fragile skin, non-adherence to health advice or not taking prescribed medications or therapies. Alcohol/substance abuse in people who self-neglect is significantly associated with referral to APS services and more severe self-neglect. SN has been linked to poor social networks, poor family support, disconnectivity, service refusal and perceptions of poorer social resources were significantly related to increased risk for harm and reduced cognitive performance (Day *et al.* 2012). Individuals who SN are at higher risk for depression, isolation and abuse. SN is associated with higher rates of hospitalization, hospice care, nursing home placement, numerous physical health outcomes, early death and lower health status, including increased cardiovascular related mortality.

Higher SN prevalence is significantly linked to lower income. Many self-neglecters experience financial difficulties, suffer undue hardship and have annual incomes which are below the poverty line. Others appear to lack insight into how to manage their resources. Inadequate healthcare cover and inability to pay for needed formal support services can relate to eligibility and financial criteria. The current economic challenges and reductions

in community resources could put older people at risk for SN.

According to Iris *et al.* (2010) environmental decline is a key factor in SN development more than personal decline related to health conditions. This argument challenges the conceptualization of SN as a medical syndrome. To date, no validated measures of SN have been embraced. Individuals that SN create many challenges for multidisciplinary teams in relation to choice, autonomy, self-determination and health and safety. Public health nurses are the main referrers of SN cases to EAS and have been identified by geriatricians as one of the most helpful services. A shared multidisciplinary team (MDT) approach to SN is very important. Understanding professional's perspectives of SN is very important. A dearth of research has explored the perspectives and experiences of those working with self-neglect cases in the community such as mental health workers, social workers, public health nurses and community nurses. No research so far has examined SN from a MDT perspective and in the Irish context; there has been little published research on SN. Thus the aim of this study is to investigate the physical, psychosocial and environmental dimensions of SN as perceived by multidisciplinary team members.

Methodology

A descriptive cross-sectional study will be conducted. The dimensions being reviewed are Physical and Psychosocial Aspects of SN (Physical Health Risks, SN and Mental Health and Social Networks and SN) and Environmental Aspects of SN (Physical and Personal Living Conditions, Pets, Social and Economic Issues). The review will inform the development of the questionnaire and will include a socio-demographic research developed tool. The survey questionnaire will be distributed online using survey monkey to a large national sample of multidisciplinary team members (public health nurses, community registered general nurses, community mental health nurses, practice nurses, senior social workers, elder abuse services, general practitioners, voluntary care workers) who are in contact with self-neglecting individuals. This will strengthen its potential for subsequent use in developing a risk assessment tool for self-neglect.

Conclusion

Ageing demographic changes means SN is a critical issue for society and policy makers. It is a complex multidimensional phenomenon, a hidden killer, a tragedy that occurs along a continuum of severity, and can be intentional or non-intentional. SN presents many challenges for professionals, services and society as a whole. It is poorly defined and conceptualised. Identifying multidisciplinary team members perspectives on the physical, social and environmental domains of self-neglect will provide information to advance risk

assessment, decision-making, clinical guidelines and SN policy to better manage people who SN into the future. My research will inform interdisciplinary education and training on self-neglect.

Antibiotics and baby's bugs — what effects have antibiotics on the bacteria present in the infant gut?

Fiona Fouhy

Teagasc Food Research Centre, Moorepark and Department of Microbiology , UCC

Introduction

Take a moment to consider that there are ten times more bacteria present in the human gut than there are human cells in the body. Surprising and shocking as this may be, it should also occur to you that such vast numbers of bacteria are not there just by chance. In fact, these populations play numerous vital roles in our health and daily functioning. There are at least 100 trillion bacterial cells in the human gut, comprising over 500 different types, and these bacteria are involved in diverse and vital roles such as the digestion of foods, including foods which we would otherwise be unable to metabolise due to a lack of appropriate enzymes. These gut bacteria also contribute to the development of the gut-associated lymphoid tissue (GALT; part of the immune system located in the gut which is vital for developing tolerance to beneficial bacteria). Additionally, these gut bacteria synthesize vitamins (B and K) and aid in the elimination of harmful toxins.

So where do all of these bacteria come from? The process of acquiring these bacteria begins immediately at birth. During delivery, the infant gut is rapidly colonised with bacteria from their mother (if birth is by vaginal delivery) or from hospital staff and the surrounding environment (when birth is by Caesarean delivery). From birth through to 2 years of age, the infant gut undergoes dramatic acquisition, development and shifts in gut bacterial populations. By 2 years of age, the infant's gut bacterial composition resembles that of an adult, and as such becomes less dynamic, more complex and more stable.

During infancy, many factors other than mode of delivery also affect the bacteria that the infant acquires and develops. These include:

- ☐ Feeding choice (breast vs. formula feeding)

- ☐ Number of siblings and home environment (e.g. farm vs. urban setting)

- ☐ Time of weaning and choice of foods

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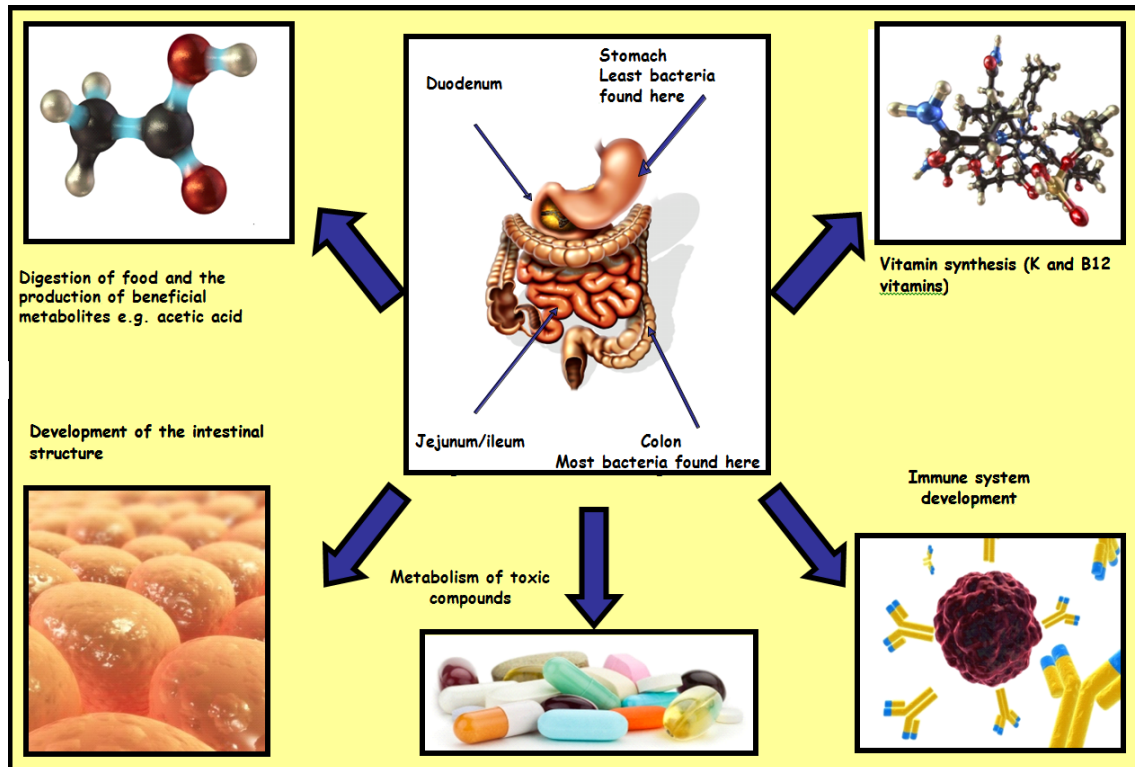
Figure 1: : Functions of human gut bacteria

☐ Exposure to probiotics (i.e. bacteria which when consumed in foods as part of a healthy diet could help to beneficially colonise the gut conveying measurable health effects)

☐ Exposure to prebiotics (types of carbohydrates added to foods which act as a nutrient source for beneficial bacteria in the gut, thus increasing their populations)

However, the infant gut bacteria populations can also be negatively affected by exposure to antibiotics in early life. While antibiotics have been pivotal in the prolongation of life, the use of broad spectrum antibiotics (those which kill a wide range of different bacteria) can also cause collateral damage and thus can kill beneficial bacteria such as bifidobacteria and lactobacilli (i.e. those most commonly studied for their health promoting properties). This could potentially increase the risk of the infant developing both short-term and long-term health effects, including antibiotic-associated diarrhoea or, more worryingly, having an increased risk of developing atopic diseases (e.g. eczema or asthma). Antibiotic-treated infants may also be at an increased risk of becoming overweight or obese, an issue causing concern in the current climate. Therefore understanding the exact effects of different antibiotics on both the potentially harmful, as well as the beneficial bacteria in the gut is vital to allow us to fight infections effectively while also minimising the harmful effects on beneficial bacteria.

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Study Aims

To date research on the affects of early life exposure to antibiotics on the infant gut bacteria populations has been extremely limited, with much of the research having used culture (or growth)-based approaches. Furthermore, to date, no study has used the new and sophisticated sequencing techniques available to investigate the effects of antibiotics on the gut microbiota of infants.

Thus, the aim of our study was to investigate the effects of treatment with a combination of 2 broad spectrum antibiotics (ampicillin and gentamycin) within 48 hours of birth (for a variety of different reasons) on the gut microbiota of 9 infants compared to 9 healthy controls. Controls are infants who are similar, in all respects, to the antibiotic-treated infants, except they were not exposed to antibiotics in early life. They therefore represent the gut bacteria populations you expect to see in a healthy infant who has not received antibiotics.

Approach Taken

One challenge that exists when studying the gut bacteria populations is accessing a representative sample to study. Most often, a faecal sample is collected. However, this is not ideal, in that, although it is an accurate representative of the bacteria present in the colon (the portion of the gut most densely populated with bacteria), it does not reflect the composition of the bacteria in the upper gastrointestinal tract. Nevertheless, faecal samples are a useful means of studying the gut bacteria populations, are provided in a non-invasive manner and thus continue to be frequently used in the majority of studies, including this present study.

In the past the most common approach was to dilute the faecal samples and grow the bacteria on agar, a jelly like material, and study the resulting growth. However, such approaches are extremely limited as 70-90% of bacteria in the gut do not grow well (or at all) on agar or other laboratory growth media. Moving away from growth (or culture)-based approaches, more recently, scientists began to employ molecular DNA-based approaches (so-called culture-independent approaches) to study all of the bacteria present in specific environments (such as the gut) and not just the populations that can be grown in the laboratory. For this approach, total bacterial DNA is extracted from an environment (e.g. faeces) and studied. In the past decade advances in DNA technology (and the development of next generation DNA sequencing technologies) and computing power have resulted in culture-independent approaches becoming even more powerful. Furthermore, these sequencing technologies allow you to not only identify the bacteria present, but also allow you to determine the relative proportions in which they are present also. Such technologies have significantly improved our understanding of complex microbial environments,

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including the human gut, and thus the interest in this field of science has increased greatly. However, to date these approaches have been relatively under-utilized in studying the bacteria present in the infant gut. Therefore, my study aimed to use these new technologies to provide detailed insights into the affects of antibiotics in early life on the bacteria present in the gut of infants.

For my study, faecal samples were taken 4 and 8 weeks after antibiotic treatment had ceased. DNA was extracted from these samples and prepared for sequencing. Results were then analysed using bioinformatics, which combines sophisticated computer science with statistical analysis. This approach allowed us to gain a comprehensive insight into the effects of antibiotics on bacterial populations in the infant gut.

Results

When the results from the treated infants were compared to those of the controls, 4 weeks after treatment had ceased, the results were striking.

The results indicated that the predominant bacteria present in the antibiotic-treated infants at week 4 were members of the *Enterobacteriaceae* family e.g. *E. coli* and *Klebsiella* (Figure 1). These bacteria dominated the gut of the treated infants, accounting for 75% of all bacteria detected. In contrast, the healthy controls had much lower levels of these potentially harmful bacteria (*E. coli* and *Klebsiella*) (38% combined), as well as much higher levels of beneficial bifidobacteria (25%) compared to the treated samples (5%). *Lactobacillus* levels were also higher in the controls (4%) compared to the treated infants (<1%). The total number of bacteria species detected in the controls was higher than those of the antibiotic-treated samples, who had much less diverse gut bacteria populations, as the majority of gut bacteria were reduced or removed following treatment.

Interestingly, 8 weeks after antibiotic treatment had ceased, there were still significant differences in the gut microbial populations of the treated infants compared to the controls, despite some signs of a recovery. *Klebsiella* and *E. coli*, as well as other members of the *Enterobacteriaceae* family remained dominant, accounting for half of all bacteria detected in the treated samples. These bacteria have the ability to cause ill-health if they increase to significantly high enough levels and out number the beneficial bacteria in the gut. Therefore, even 8 weeks after antibiotic treatment finished, the infant may still be at risk of adverse side effects because of these changes to the gut bacteria.

Levels of beneficial bifidobacteria had recovered so that, 2 months after treatment with antibiotics had ceased, the levels seen in the treated infants were no longer significantly different compared to the controls. This means that despite the infant's gut being immature, the beneficial bacteria present still have the ability to recover after antibiotic treatment, albeit a somewhat slow recovery of up to 8 weeks. In the controls at week 8,

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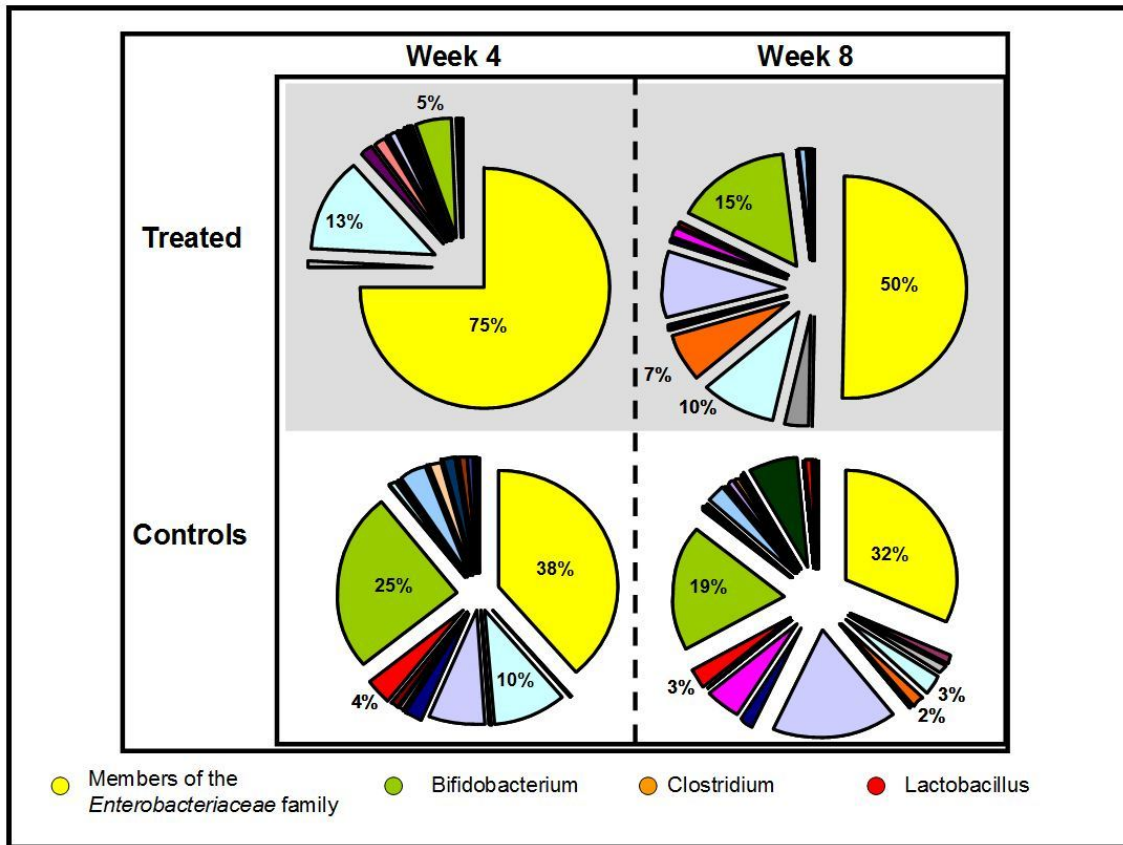
Figure 2: Bacteria present in the gut of antibiotic-treated infants compared to control infants

a much more diverse and varied gut microbial population was still evident compared to the treated infants, with no one bacteria being dominant. This showed that not all bacteria could recover over the study period of 8 weeks, and thus even short-term (2-9 days) antibiotic exposure had significant effects on the gut bacteria present.

Bifidobacteria have received significant attention as potential beneficial bacteria, which when consumed in foods e.g. yoghurts may have beneficial effects on health. Therefore, it is believed that maintaining good levels of bifidobacteria in the gut is important for health. Given that they have been seen to decrease in the gut following antibiotic treatment, we decided to specifically examine the effects of antibiotic treatment on beneficial bifidobacteria in the infant gut. This study found that only one type of bifidobacteria, *B. longum,* was dominant following treatment, showing that even within a group of bacteria, not all members will behave in a similar manner following antibiotic treatment (Figure 2).

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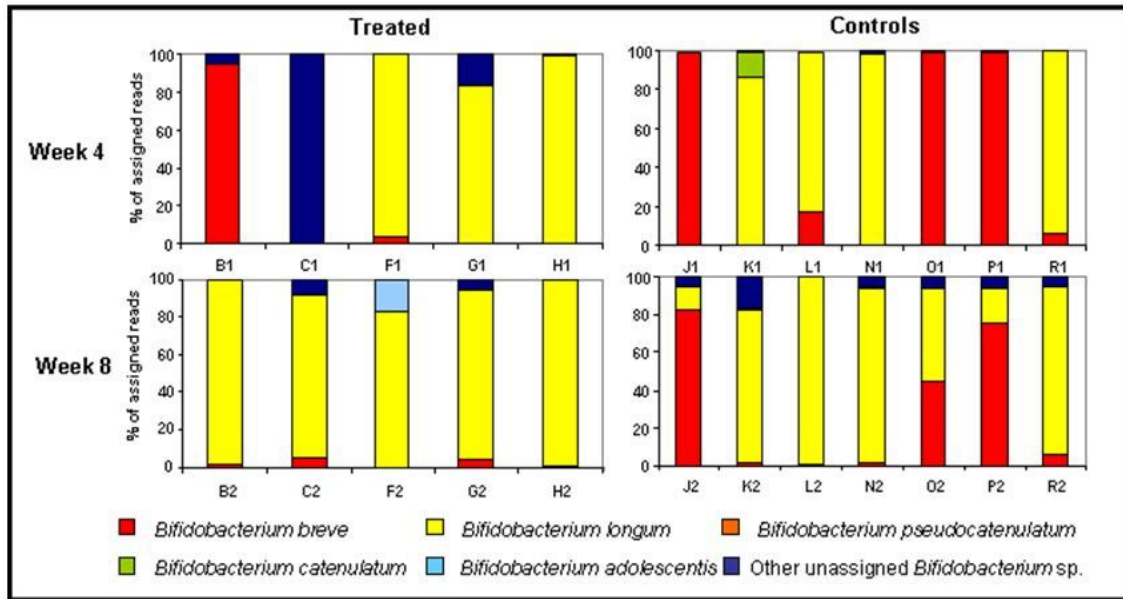bacteria present in the infant gut?

Figure 3: Bifidobacteria detected in the treated and control infants

Conclusions

Although the infant gut is immature until the age of 2 years, it is still a complex and highly dynamic microbial ecosystem. In fact, some have described the gut bacteria populations as a super organ within us, such is the complexity and importance of these bacteria. These gut bacteria are vital to infant health, and changes in levels of beneficial bacteria could have implications on both short-term and long-term health outcomes. Recent research suggests that an altered gut microbiota in early life could predispose the infant to allergic diseases or becoming overweight, obese or developing diabetes in later life.

Our study is the first to demonstrate, using state of the art sequencing technology, the devastating short-term effects of antibiotic therapy on the infant gut microbiota.

The results demonstrate the ability of certain potentially harmful bacteria e.*g*. *E. coli* to withstand certain antibiotic treatment and to become the dominant bacteria present. Moreover, the results showed the detrimental effects of antibiotics on levels of beneficial bifidobacteria and lactobacilli and that recovery was slow, with effects still being measureable 8 weeks after treatment had ceased.

Knowing the role of these gut bacteria in the immune system's development, such dramatic shifts in composition in early life could alter the immune development and potentially predispose the antibiotic treated infant to allergic diseases or even obesity in later life. With such diseases on the increase, understanding the multiple factors involved is essential to help us tackle these diseases effectively. Given the results of our study and that of others previously, it appears that antibiotics are a considerable factor in the development of the

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gut bacteria populations in infants and that the disturbances they cause could have the potential to cause serious health effects.

So what can be done? Do we continue to prescribe antibiotics to infants and let the beneficial bugs fight for their lives? Based on my findings it may be beneficial to prescribe the use of probiotics (beneficial bacteria in a tablet form or in foods) during antibiotic therapy and also continued use for a period after antibiotic therapy ceases. These bacteria may help to repopulate the infant's gut with beneficial bacteria populations and thus limit short-term health effects such as gastrointestinal (digestive system) upset and antibiotic-associated diarrhoea and also the long-term effects previously outlined. Additionally, where possible the use of narrow spectrum antibiotics should be used to minimise the collateral damage associated with broad spectrum antibiotic usage, as highlighted in this present study. Thus, while antibiotic use is vital, a targeted approach may be most beneficial to the gut bacterial populations.

The results of this study are important, as using new sophisticated technologies we have shown the significant effects that antibiotics can have on the gut bacteria present in the infant gut. Our approach of sequencing techniques, allowed us to get much more detailed results than if we had used the older growth-based approaches. The results highlight the need to use antibiotics which have a narrow spectrum of activity (i.e. they kill specific bacteria) where possible and the potential benefits of using probiotics to replenish beneficial gut bacteria populations.

This study adds substantially to our understanding of the effects that external factors such as antibiotics can have on the complex gut microbiota environment. Undoubtedly, the insights that are possible through the application of next generation sequencing to studying the gut microbiota, will fuel both scientists' and the publics' interest in the marvellous microbial world within us.

'It's a Part of Me' — The evocative potential of our possessions and surroundings

Mary Galvin

School of Applied Psychology, UCC

The Move

You are moving house. With dread you line up the cardboard boxes that you've salvaged from the nearest grocery store, trying to will all of your possessions in to them in the hope that you will be spared the time, effort and pain of having to physically pack up everything yourself.

Inevitably, with resignation you begin packing, finding that the further you delve into your wardrobe and bookshelves the more objects you find that you had forgotten you had. Pieces that you haven't used or even seen in years. The little bits of paper with scribbles on them, the shells you picked up on that walk on the beach, the random box that you 'might use in the future' and of course the favourites — the pieces that you could simply not leave behind you, the favourite mug, photo, pen, scarf... the list continues.

But ask yourself why, why are these objects so important? Why when one of your friends who sympathetically offered to help you pack asks, albeit with some annoyance, 'why are you keeping that?' do we reply with 'It's a part of me! I couldn't throw it out!'.

Evocative Objects, Personalisation and Me

Daniel Miller, a London based anthropologist, researched how new tenants of identical apartments decorated their homes over a period of ten years and he surmised that what we are exists not through consciousness or body but as a material environment that habituates and prompts us. Essentially what this means is that all of the possessions we use to personalise our space are a means of expressing who we are. The physical space of a house becomes the stage and the objects we decorate that space with are the props that allow us to perform our memories and identity to our audience, that is, the people in our lives, and indeed ourselves. Sherry Turkle called these items evocative objects and my own research set out to find exactly what these objects are evoking within us.

Having completed numerous tours of dwellings and lengthy interviews with their respective dwellers, I discovered that our identity was indeed a performance and that this was

supported by three main themes generated by the discussions around these objects; Memory and Experience, Part of me, and Transcience. Below are some of the direct quotations from adults aged between 25 and 35 five that I interviewed, all were living in rented accomodation.

Memory and Experience

'It's someplace that is very important to me so having those shells.....Probably two or three of the most important things that ever happened to me in my life have happened to me in the village where that beach is... so it's very important.'

'It's memories I suppose, it's people that are important to you and the majority of the photos are like good times in your life or like times that you want to remember and that's why you put them up because you want to remember, it kind of brings you back to that place and that time...'

Part of Me

'. . . they'd be representing different people in my life like and I suppose... a large part of them would be kind of the essence of me too. . .'

Transience

'.. After that everything serves a function and if you lose it or break it sure what harm... what I have wouldn't be the measure of me.... I would've been very materialistic like but....if you can get over that you can get over anything. You realise that everything is replaceable like'.

So what became apparent was that our life stories are being expressed through how we personalise our space. Our material environment plays a large role in who we are but, at the same time, as we see from the above quotes, sometimes we lose and break our possessions and sometimes they just come to a natural end themselves, for example, the ink fading of a personal note on the back of a photograph. This doesn't mean that we have lost the memory; it just means that we have lost the ephemeral container that we asigned it to. However, what happens if we lose the memory also? If the evocative object is gone and what it evokes is gone, where do we go from here?

Digital Design

So far we have seen how our possessions can enable and maintain our sense of self and how we can turn an empty house into a home through personalisation, but how does someone losing their memory maintain their sense of self through the aid of their material environment?

I am hoping to answer this question by researching the evocative potential of digital media in the context of Dementia, those suffering from Dementia, as well as their carers and loved ones. An interesting point from my previous research was that items falling under the title of technological or digital were not mentioned. They were seen as functional objects, almost as containers for our evocative objects; for example, the camera is where our photos are — losing the photos matter, not losing the camera. So how can we capture this evocative quality in order to design digital pieces that are as richly valued in our experience as our corporeal possessions?

An example of this is a piece by Jayne Wallace, a digital jewellery designer who has worked closed with an elderly husband and wife, the wife suffering from mild dementia. Jayne designed a jewellery box which houses dress broaches made from pieces of fabric cut from clothes that were meaningful to the elderly woman. These pieces of fabric were from dresses that she used to wear in her younger years, in particular when she attended dances with her husband. Each piece has a simple technology attached to it (a Radio-frequency identification ampoule) and once placed inside the jewellery box it plays different recordings of memories, stories, or even music that is associated with each piece of fabric. The box facilitates the recording of these pieces so her loved ones can record whatever snippets they wish. This piece is highly material, the digital component embedded within. However, this piece would not have the same evocative potential, or indeed be of any use, without this digital component. This is a perfect example of interaction design that supports the psychological processes of memory and identity and the evocative nature of our cherished objects from my previous research.

What is important is capturing the materiality of our favourite possessions and what they evoke within us and using this to design pieces that can aid those trying to hold on to their sense of self, and indeed encourage communication between them and their loved ones.

So, at last you seal up the final box of your possessions with the battered sellotape and now begins the loading up of the car with this cardboard cargo. What you are leaving behind has become an empty space and what you are about to walk into is equally empty, but you are armed with all you need to make it your new home. Now you face unpacking it all again, but perhaps this time you may look at how you do this and reflect upon why these 'little bits of worthless pieces' hold so much worth to you.

Possibly "the Truth, the Whole Truth and Nothing But the Truth": Attempting to Define Creative Nonfiction

Ross Griffin

School of English, UCC

"The world is so taken up with Novels and romances, that it will be hard for a private history to be taken for genuine, where the names and other circumstances of the person are concealed, and on this account we must be content to leave the reader to pass his own opinion upon the ensuing sheets, and take it just as he pleases." (Daniel Defoe, *Moll Flanders*, 1722)

Introduction

Locating such works as Frank McCourt's *Angela's Ashes* or Michael Herr's *Dispatches* in any bookshop or library often presents an unexpected challenge for the average reader. As a nonfictional account firmly embedded in the author's personal experiences, there is strong reason to think that such books would be included in the History section, comfortably situated amongst similarly factual texts of historical discourse. Curiously, however, they are often found sharing shelf space with deliberately fictional novels. This example of inconsistent categorisation is a concern for many readers of such narratives, highlighting the inherent difficulty in establishing the exact status of any written work. However, this issue is acutely relevant to the literary form embodied by texts such as *Dispatches*, one which combines a distinctly novelistic style of writing with the most meticulous reportage to present a genre known informally as the 'literature of reality' or creative nonfiction. There remains a distinct absence of literary theory relating to the genre. This issue remains unresolved and, thus, the primary goal of my project is to provide this genre with a body of theory comparable to that of all other literary genres.

Creative, Nonfiction?

Creative nonfiction came to prominence in the twentieth century as a by-product of the counterculture movement in the US, which emerged at least in part, due to the continuing American participation in Vietnam during the 1960s. The genre's aim is to re-produce a written account of actual people, historical events and places which is unchanged from the manner in which they occurred in reality. While this approach distinguishes it from

traditional fiction, creative nonfiction's use of literary devices normally reserved for fiction, such as character dialogue or the presence of a godlike narrator, differentiates it from conventional history or newspaper reportage. Yet despite this on-going uncertainty as to its exact character, the literary form has emerged as one of contemporary culture's predominant literary genres. Even more intriguingly, it has come to dominate nonfictional bestseller lists in both America and Europe, despite there being no obvious difference in composition between the nonfictional narratives and those typically found on the fictional bestseller lists.

Critics of the genre have regularly described creative nonfiction as a hybrid genre which is constructed by the author from fact, but conveyed to the reader using fictional techniques. However, by presenting a text where the factual and fictional are fused into one, the question remains as to what exactly the genre is; should it be viewed as a referential text much like a standard history book, or should it be interpreted as a highly subjective narrative very much similar to a personal diary and journal?

You weren't there man!! (So why the Vietnam War?)

The research material which will be used to resolve this issue is a selection of war literature inspired by the Vietnam War. The choosing of the Vietnam War is deliberate. As one of the most widely televised wars in history, the conflict in Vietnam exemplified the absence of a stable and objective authorial voice in its narration as both pro- and anti-war commentators offered startlingly contradictory commentaries on its events. This contrast was exacerbated by an independent media which, for the first time in modern warfare, was allowed unrestricted access to the battle-field. Their presence resulted in an outpouring of texts and imagery projecting horrors of war previously unseen by the majority and the widespread dissemination of a version of events completely at odds with that being propagated as fact by the dominant political and cultural forces in America. Such divergence inspired a tangible dissent amongst the American people which was appropriated and amplified by the Counterculture movement. As a consequence, a substantial body of fictional and nonfictional literature was produced, directly inspired by the Vietnam War, which directly questioned the very validity of America's own history.

Obviously, not all works of creative nonfiction are founded on military endeavour, either by the conflict in Vietnam or any other form of armed struggle over the centuries. However, the selection of the war-writing genre as the tool whereby I intend to test my definition of creative nonfiction is a deliberate choice of mine. It is a literary form dominated by works of creative nonfiction which was written by soldiers and journalists with personal and verifiable experiences of conflict. In addition, the representation of these experiences in literature emphasises one of the primary difficulties of creative nonfiction; accurately representing experiences without succumbing to the impulse to fictionalise certain events.

Nonfictional texts recounting recollections of conflict are often written with more than just commercial success in mind. They frequently represent the author's desire to both remember fallen comrades and to share the traumatic experiences of war with those who were not there. As a result, the presence of such emotionally-laden narratives in war writing challenge creative nonfiction's claim to present a detached and objective account of events, which in turn, provides a suitably similar genre of writing from which to form a definition of creative nonfiction. Yet the legitimacy of these nonfictional accounts is challenged when veteran-authors also incorporate the wartime experiences of these texts into other deliberately fictional novels depicting the conflict. Thus, based upon the same events and formed using similar literary techniques, these corresponding narratives replicate the hazy borders existing between accepted histories and fiction, and underscore the uncertainty inherent in the genre of creative nonfiction.

In the genre of creative nonfiction, particularly those derived from the experiences of war, the authenticity of the text is founded on the fact that the author bore actual personal witness to the people and events they document in their narratives. Introductions, prologues, dedications or other material such as biographical notes concerning the author's past, while located externally from the text, are known in literary theory as 'frames' and are capable of influencing the manner in which a reader interprets a text. In the case of creative nonfiction, these frames generally reinforce the sense of reality suggested by the narrative.

The making of a genre

My research has to consider the different bodies of thought in order to form a definition of creative nonfiction. Historiography, the study of how history is researched and presented, and autobiographical theory each highlight the many difficulties of reproducing reality on paper. Both raise the question of how valid such an account can be considering that it could quite possibly have left out as many significant events as it includes. Any attempt to construct a robust definition of creative nonfiction requires extreme clarity in each of these fields. The project's primary research material adds further theoretical concerns specific to Vietnam War literature and any proposed definition of creation nonfiction derived from texts generated by this conflict would be incomplete without addressing two other related issues, trauma studies and orientalism. Trauma study is the attempted literary representation of an extremely distressful mental or physical event. Studies on trauma have shown how the survivor of such incidents often experiences an inability to accurately recollect the exact details of these events. Given the horrific nature of armed conflict, this issue is a prominent one in war literature and has been shown to affect both perpetrators and victims of trauma. Yet, problematically, the depiction of trauma in creative nonfiction virtually mirrors its portrayal in fiction. Orientalism is a body of learning which

originally founded on the sense of difference between European and non-European cultures, specifically but not limited to, those found in the continent of Asia. It inferred a lopsided relationship between the respective societies, allowing Europe to hold the more dominant and civilised position. In the modern era, this role has been appropriated by the United States. Thus, in their military engagement with Vietnam, an alien culture which the majority of Americans were unfamiliar with at the time, the appearance of narratives which merely reinforced Western societal stereotypes of the orient instead of faithfully representing wartime experience was a common one, in both works of creative nonfiction and fiction.

Conclusion

Thus, using a selected body of Vietnam War literature, the primary concern of this project is to construct a body of literary theory for creative nonfiction, a genre which aims to faithfully represent reality, yet which at the same time, offers an extremely personal and subjective view of events. Despite having come to prominence over fifty years ago, aside from the occasional wave of New Journalistic nostalgia, it is under-theorised and under-discussed in comparison to many other literary genres.

Parkinson's disease: Can we move in the right direction?

Shane Hegarty

Department of Anatomy and Neuroscience, UCC

'Imagine losing the control of your own movements'

What do the worlds' greatest athlete and a wonderfully creative actor have in common?

Figure 1: Parkinson's disease sufferers

They both suffer from Parkinson's disease. Imagine losing the ability to control your own movements! This is not just a reality for Muhammad Ali and Michael J. Fox, as 2% of the world's population over 65 suffer from this disease. Terrifyingly, the incidence of Parkinson's disease is set to double in the next 20 years as people are living longer.

What happens in Parkinson's disease?

In Parkinson's disease, a very important population of brain cells, known as dopaminergic neurons, die. Let's imagine these dopaminergic neurons as a tree, with the tree's roots in the midbrain, located between the spinal cord and brain, and the tree's branches in the brain. These branches produce dopamine, which allows us to control our movements. We can almost think of dopamine as the 'fruit' of this tree. These branches are killed in Parkinson's disease, and the dopamine (in red in the brain scans) is lost in the brain (see Fig. 2).

This loss of dopamine leads to the loss of our voluntary control of movement, which means that the sufferers cannot move in the way that they want. These Parkinson's patients can
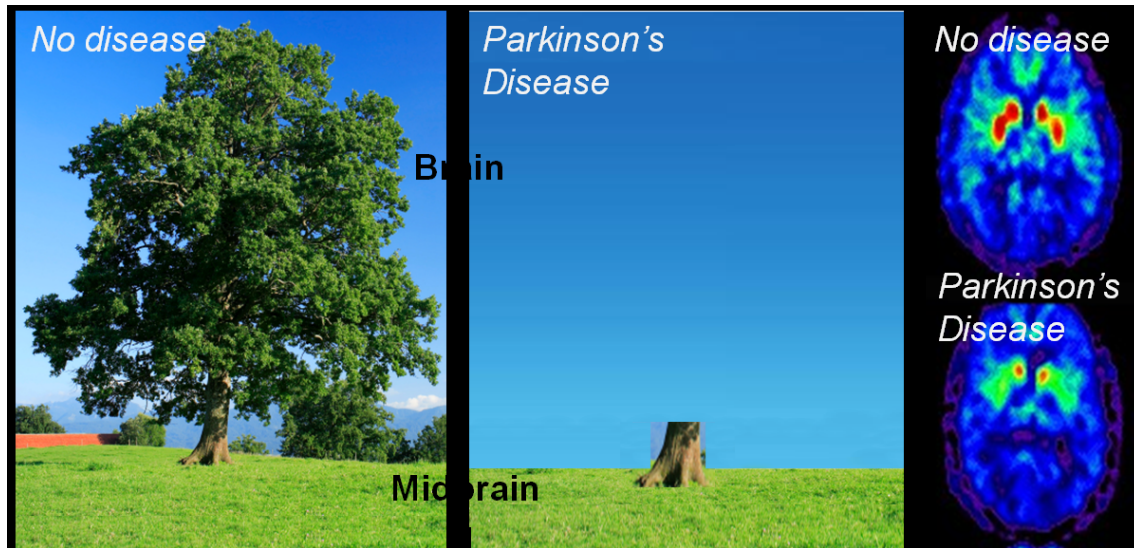
Figure 2: The dopamine tree

decide on the movements that they want to carry out, but they then cannot control how this movement occurs, or even if it occurs at all! It is hard to fathom the devastating effect that this disorder must have on a person's life.

Why is dopamine so important?

In a healthy brain, dopamine is released from the dopaminergic neurons and communicates with the brain to ensure that movements, decided upon by the brain, are carried out in a controlled manner. Without dopamine, this communication ceases, and the brain tells the body to move, or not move, in an uncontrolled manner. This communication breakdown between the midbrain and brain results in the movement symptoms of Parkinson's Disease, which are the 'shakes', stiffness, slow movement, and an unstable posture.

So how can we treat or cure Parkinson's disease patients? The main treatment for Parkinson's disease involves the replacement of the lost dopamine by giving drugs which either become dopamine (Levodopa) or act like dopamine. These drugs do provide relief from the symptoms of Parkinson's disease, however their effects wear off over time and they lead to disabling side effects. Furthermore, these current treatments do not stop, slow or cure the disease. Presently, there is no cure for Parkinson's disease.

Can we move towards a Parkinson's disease cure?

The fact that the loss of one, single, population of cells in the brain has such enormous consequences for the sufferer is scary. However, it provides the promising possibility that a cure for this disease may reside in finding a way to replace these specific cells. In order

Figure 3: Neurons and glia

to replace the dopaminergic neurons, we would need to produce these brain cells. And in order to produce these dopaminergic neurons, we would first need to understand how they develop. That's where the focus of much of the research on Parkinson's disease now lies, and is the main aim of my study. So how do dopaminergic neurons develop? What we do know is that they are produced by brain stem cells at a precise time during a baby's development.

Brain stem cells: Can a cure stem from them?

Brain stem cells, or seedlings in the analogy of the tree, can develop into any brain cell type given the right signals. They can also multiply indefinitely, which means that they can potentially generate an unlimited number of brain cells. There are two main types of brain cells; neurons (green cells) which provide brain function, and 'glia' (red cells) which support the neurons (see Fig. 3). For example, when a person sees (eye) an elephant with a charming hat, neurons in the eye communicate with neurons in the brain (mouth and ear depict the communication between the neurons) to tell us what we're looking at. There are many different types of neurons, such as optic neurons for sight, auditory neurons for sound, and sensory neurons for sensation. The main goal of my research is to investigate how these brain stem cells turn into the dopaminergic neurons of the midbrain. I grow these brain stem cells in the laboratory under special conditions which allow them to survive and develop. I then add different signals to the brain stem cells to try and turn them into dopaminergic neurons.

The big world of signals

These signals are present in the nervous system as it develops, and each different region of the nervous system has a different combination of signals telling the brain stem cells what to turn in to, e.g., an optic neuron in the eye region, or an auditory neuron in the ear region. If we imagine the nervous system as Earth, then each country is a different region
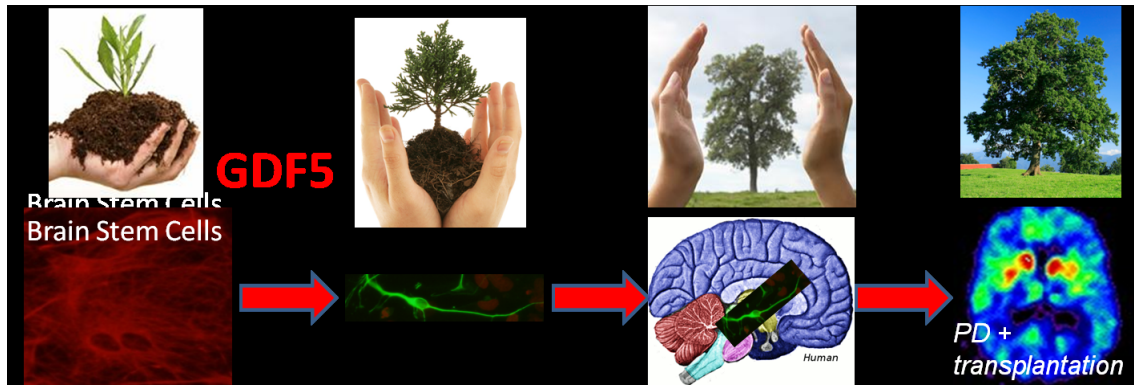
Figure 4: The production and replacement of dopaminergic neurons in Parkinson's disease

of the nervous system. If the brain stem cell is born and develops in France for example, then it will receive a specific combination of signals to become a French neuron. If we imagine these signals as the French language, and a strong affinity for berets and fresh croissants, then these 'signals' make a person French, excusing the stereotype.

Let's take this analogy a little further. Within these brain regions (or countries) there are different subtypes (populations) of brain cells (people) which behave in a different way to provide a separate function. Imagine, if you will, how a Cork person (such as me) behaves in a different way to someone from Dublin for example, despite the fact that we are both from Ireland. There are subtle differences in the signals that make subpopulations of brain cells from the same region of the nervous system unique. For example, the subtle (or not so subtle) difference between a Cork accent and a Dublin accent, if we imagine accents as another 'signal' that make us what we are. I am interested in what combinations of specific signals turn brain stem cells into dopaminergic neurons.

GDF5: Good Day For 5cience

From these experiments with brain stem cells and various biological signals, I have shown that one signal, known as GDF5, is capable of turning brain stem cells into dopaminergic neurons (see Fig. 3). This is a very encouraging result as it shows that dopaminergic neurons can be produced in the laboratory. However, there is much more research to be done until we know exactly how dopaminergic neurons develop, and what specific signals are involved in this development. That's where the future of my, and many other scientists, research lies for now. What is promising is that we are moving in the right direction. Whether this progress will allow Parkinson's patients to once again move correctly remains to be seen.

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Where do we move next?

What needs to be done next is to take these dopaminergic neurons that are produced in the laboratory, and transplant them into the midbrain of Parkinson's disease patients (see Fig. 4). Hopefully the 'branches' of these transplanted dopaminergic neurons will grow into the brain, take the place of the old, dead branches, and produce dopamine like before. If these transplanted cells achieve this, then they will likely restore the function that was lost when Parkinson's disease killed the old dopaminergic neurons. This is similar to how a transplanted organ achieves this in other clinical disorders. The fact that brain stem cells multiply indefinitely means that we have a renewable source of cells that can be used to produce dopaminergic neurons. This means that if these transplantations become a viable surgical therapy for Parkinson's disease, than there should be enough dopaminergic neurons produced for all sufferers of Parkinson's disease. What is most exciting about this ongoing research is that the transplantation of dopaminergic neurons could help Parkinson's patients all over the globe to once again control their movements.

The position of separated children in Ireland who turn 18: Aged out and excluded?

Aoife Horgan

School of Applied Social Studies, UCC

Introduction

My research investigates the position of independent child migrants, referred to as separated children, in Irish society. The research focuses on the transition period from being a separated child to an aged-out minor in Ireland. The transition from childhood to adulthood and turning 18 years of age is a significant one, a day that should be filled with excitement, anticipation and planning how to celebrate the big day with family and friends. For separated children living in Ireland, however, turning 18 can be accompanied by very different emotions and can be the start of a period of great uncertainty.

Who are separated children?

The Separated Children in Europe Programme (SCEP) is an initiative which was established in 1997 and aims to realise and promote the rights of separated children through the analysis of policy, research and advocacy at both a European and national level. The SCEP describes these children as

> '...under 18 years of age, outside their country of origin and separated from both parents, or their previous legal, or customary primary caregiver...' (SCEP, 2009, pp3-4).

Separated children began arriving in Ireland approximately ten years ago. According to Bhabha, a United States academic who has published widely on this area, separated children migrate from a wide range of countries including Somalia, Sierra Leone, China, Nigeria, Afghanistan, Iraq and Sudan. It is now known that many separated children complete this international migration alone; however a number of separated children are accompanied, some by adults who are unrelated to them while others are brought into destination countries by smugglers or by people trafficking them. There are a multitude of reasons for separated children's migration, including escaping civil upheaval, war and persecution, or they may have been the victims of trafficking or sexual exploitation. In addition to this, according to Mooten, who wrote a report on the circumstances of separated children

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in Ireland for the Irish Refugee Council, separated children may have experienced child-specific forms of persecution such as the forced conscription of child soldiers or female genital mutilation.

Arrival in Ireland

Ireland, under international commitments such as the United Nations Convention on the Rights of the Child and national law, the Child Care Act 1991, has a duty to care and protect separated children once they arrive in the country. This therefore places a responsibility on the Health Service Executive (HSE) to provide for separated children. However, the initial response towards separated children was very reactive and the development of policy and provision was protracted, with the phenomenon of separated children coming into Ireland being treated as a temporary one. A number of issues were brought to the fore with the arrival of separated children into Ireland, most notably the issue of immigration policy taking priority over care policy. Separated children were viewed as migrants first and children second and, according to Barnardos, this had a negative effect on the quality of care that was provided to separated children. According to the Ombudsman for Children report on separated children living in Ireland, the majority of separated children were accommodated in hostels in Dublin with few or no care staff present. With recent developments in care policy, such as the implementation of the HSE Equity of Care Plan, separated children are now being integrated into Irish society through a system of foster care placements.

Turning 18: Aged-Out Minors

This process of integration into Irish society is fractured when separated children turn 18 years of age and therefore 'age out' of the care system. Separated children in this position are described as being 'aged-out minors'. While the HSE has an obligation to protect and provide for separated children while they are minors, this responsibility changes once they reach 18 years of age. The majority of separated children have no immigration or legal status, other than being a minor who is in care, and this therefore leads to a position of ambiguity for them. The majority of separated children are transferred from the care of HSE and are placed in the adult system of hostel accommodation for asylum seekers, which is called direct provision. There is a newly implemented policy of targeted dispersal in place for aged-out minors. This policy of targeted dispersal means that once separated children reach 18 years of age, they can be removed from their care placements and dispersed to another part of the country. Previously, aged-out minors would have been accommodated in four dedicated centres in Dublin; however, this new policy means that

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they can be placed in direct provision centres throughout Ireland. Many aged- out minors are forced to leave their communities, friends and schools on turning 18 and cannot complete their leaving certificate. In addition to this, aged-out minors have little access to leaving care services, and there is no statutory obligation to provide aged-out minors with aftercare support. Once placed in direct provision centres, aged-out minors can wait for a decision on their application for asylum for a number of years. They receive a supplement of €19.10 a week and are not allowed to work or to participate in education.

Case Study

There is concern being voiced in relation to how the process of separated children ageing out of the care system is being handled and how policy is potentially excluding aged-out minors. A recent court case highlighted the lived reality of aged-out minors living in Ireland. Four aged-out minors who had been living in Dublin and were due to complete their Leaving Certificate were moved to Galway under the policy of targeted dispersal in the middle of the school year. In response to this, four aged-out minors took court action against the HSE in an attempt to be allowed to return to the schools they had previously attended to complete their Leaving Certificate there; however, their appeal failed and consequently they had to remain in their areas of dispersal. In relocating aged-out minors under the policy of targeted dispersal, there is the potential that this will isolate them, cut off access to their support network and result in the loss of friendships, in addition to there being no continuity in educational provision for them.

My Research

My research aims to investigate this transition period from being a separated child in Ireland to becoming an aged-out minor. This transition period presents a number of issues and challenges for aged-out minors living in Ireland and my research seeks to examine the impact and effect that these challenges have on aged-out minors. It will explore the effect of the policy of targeted dispersal in terms of the consequences for aged-out minors and will investigate this in relation to the impact that it has on the loss of friendships, community, participation in education and their social well-being. My research will also explore how the current lack of aftercare support for aged-out minors is impacting on them. This transition period is an area which has been recently highlighted by the Ombudsman for Children as an area of concern, particularly in relation to the lack of any statutory obligation to provide aftercare. In addition, my research will also examine the impact that current policy and legislation in Ireland is having on aged-out minors.

Method

My research will use a qualitative method of investigation. This method of research was chosen because of the exploratory nature of this research. Research in recent years has focused on the challenges and circumstances faced by separated children in Ireland, however there has been little research conducted on the experiences of aged-out minors living in Ireland and reports arising are largely descriptive. Utilising a qualitative method of enquiry will enable me to talk to aged-out minors and hear their opinions and thoughts. I will be conducting semi-structured interviews with aged-out minors in order to listen to their lived experiences of this transition period. I will use an interview discussion guide in order to focus the interviews however; participants will also have leeway in how they respond. Central to the discussion in these interviews will be the participants' views on the immediate impact that turning 18 years of age had on their lives, if they were given any information or notice on what would happen when they turned 18 and what life is like now for them. I will also be conducting semi-structured interviews with people working directly with aged-out minors such as social workers, guardian-ad-litems, who are appointed by the Courts to consult with separated children and advise of what is in their best interests, teachers and workers in non-governmental agencies in order to hear their view on this transition period and how it impacts on the lives of aged-out minors.

Ethical Issues

There are many ethical issues to consider when conducting this type of research. The principle of informed consent will be utilised. Participants will be informed of the purpose of this research and will be assured of confidentiality throughout the research process which will be achieved through the use of pseudonyms. Another issue which needs consideration is disparities of power and ensure the participants do not feel obliged to participate in the research because of a power imbalance between the participant and the researcher. Participation in this research is voluntary and participants can withdraw at any time. I have received ethical approval from the Social Research Ethics Committee within University College Cork.

Conclusion

The process of separated children ageing out of the care system in Ireland is a new phenomenon and one that requires investigation as the reports that are arising are largely descriptive and do not contain accounts or experiences from aged-out minors. Aged-out minors in Ireland are faced with numerous challenges and the policy of targeted dispersal

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can impact on their lives in relation to the loss of friendships, community, their social well-being and result in a lack of continuity in educational provision. While separated children are provided for within the care system, on turning 18 years of age not only do they lose key supports but they also lack a voice in the way policy shapes their future.

Ubi bene ibi Colonia

Helen Esther Luettgen

Renaissance Studies, UCC

Ubi bene ibi Colonia is a term with unknown roots and is a derivation of a quote by Cicero (Patria est, ubicumque est bene). Its modern translation "The place that is beautiful is Cologne" (or rather "Cologne is where the heart is") is a version of the idiom "Home is where the heart is," and expresses the immense pride that the citizens of Cologne have for their city. It has become part of the colloquial language in Cologne and can be found on souvenir items such as T-shirts, mugs and stickers. I have chosen this motto, as it best describes the topic of this article, which focuses on one particular aspect of my PhD thesis entitled "Religion, Identity and the Public Sphere in 16th Century Cologne," namely identity formation through representations of the city. In this study, I provide a small glimpse into the history of the cartography of Cologne, in particular the 16th Century, because it was this century that was pivotal in the development of maps, changing the representation of this city from a religious centre to one based on power and trade.

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Take a walk with me. Imagine we are walking through the streets of Cologne in Germany at the beginning of the sixteenth Century. Our starting point is just inside the city walls that protect it from possible attacks. Let us walk towards the river. We walk past churches, monasteries, houses, and the half-built cathedral with its wooden crane on its south tower. The building site of this cathedral is not busy. There is little money to finance the building, so only a handful workers are around. In a few years, work on this great gothic cathedral will cease altogether and not continue until the 19th Century. We continue our city tour and walk through small cobbled alleyways and across market squares. It is a busy city, and the streets are teeming with life. We pass all sorts of people: beggars, richly dressed merchants, peasants, nuns, monks, messengers on foot, a few noblemen on horseback and hand-drawn carts.

We hear different noises drifting to us from various corners of this part of the city: hammering and sawing, people on the markets crying their wares. The stench in the air is almost tangible: the smell of fish, the unmistakeable odour from the tanneries, and of course the stench from the alleys- there are no underground sewers. Everywhere we look, people are conducting their business. The churches we pass are also busy. There are quite a few of them. Many people are attending mass and praying, for this is also a very pious

Ubi bene ibi Colonia

city. After all, the relics of the Three Wise Men are housed in the large cathedral we passed earlier. We continue onwards and then we finally reach our destination.

We have reached the banks of the river Rhine. It is busy here too. There are ships moored at the harbour, boxes being loaded and unloaded, workers repairing rigging, merchants directing their goods, and a good many small barges are on the river too. Some are crossing over to the other side, towards Deutz, the small town just across from Cologne. The bridge that had existed here in Roman times has never been rebuilt, so there is no other way of crossing the river. If we look to the left or to the right, we can see watchtowers in the distance, guarding the city from unwanted intruders. But let me tell you a secret: I am a local, so I know my way around here. I know how to find my way through this maze of alleys, know shortcuts, places of interest and what areas to avoid. I wish I could give you a map of the city, but it is the beginning of the 16th Century, and street maps have not yet been invented for Cologne.

1531

So let us fast-forward a few years. It is the year 1531, and the first cityscape of Cologne has been produced by Anton Woensam, a skilled German engraver. It is called *Die große Kölnansicht* (The great view of Cologne) and is a coronation gift from the city to Ferdinand I, shortly to be crowned king, brother to the then reigning Emperor Charles V. It is made up of nine woodpanels, and its detail and splendour are overwhelming. What is presented to us here is a cityscape that captures the spirit of the city. Its piety is illustrated by the portrayal of no less than 40 churches, meticulously detailed and labeled. The city needs to defend its strong Catholic position, as Martin Luther and his Reformation movement have created unrest in many different cities in the Holy Roman Empire. Cologne wished to underline its unwavering alliance to the Church and especially to Emperor Charles V, as he was the one who had Martin Luther outlawed in 1521.

The portrayal of the city's activity is just as significant. Certainly noteworthy are the great number of trade ships on the river, as well as the docks which show the multitude of merchandise and skilled workers going about their daily business. Completing the cityscape are the city gates and the secular buildings. The city gates imply that the city is well fortified, and capable of defending its territory. The secular buildings highlight the presence of guilds and burghers in Cologne, and also illustrate the city's importance as an international trading post. Its prime location on the river Rhine linked the Alpine Region to the Lower Countries, facilitating the movement of many different products, including paper that was in high demand for the printing of books and leaflets. In the 16th Century, Cologne was already one of the five leading print centres in Europe.

Yet this cityscape is still not a street map useful for navigating through the city. Although beautiful, its perspective is not helpful. What we need is a different perspective, one from
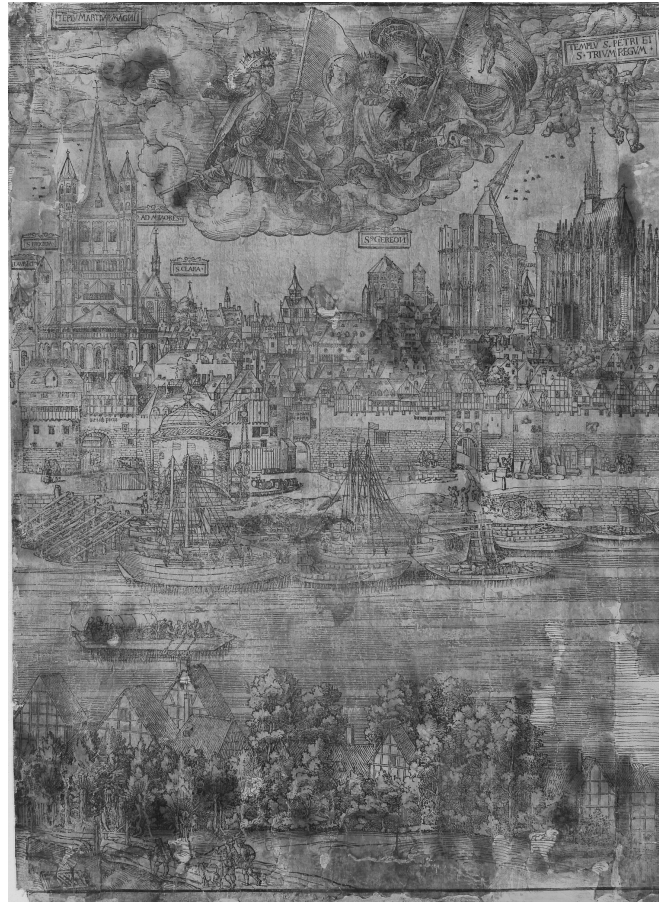
Figure 1: Fig. 1: Detail of *Die große Kölnansicht*, 1531. Wallraf Richartz Museum, Cologne

above, which is also known as the bird's-eye or oblique view where we can see the proper layout of Cologne. So we need to jump ahead a few years again.

1568

It is 1568 and Arnold Mercator, son of the famous Gerhard Mercator who invented the Mercator projection (a system of rhomb lines on a world map which facilitated ships to hold a constant course) produced the first accurate map of Cologne. It was commissioned by the city council in 1568, which not only wished for a realistic representation of the city, but also required a street map for a planned inspection of weapons in all households. Recent religious persecution in parts of the Lower Countries and other cities in the Holy Roman Empire had led to a large increase in immigrants, a fact the council was not comfortable with, as it feared that the surge of Protestants would destabilize the peaceful city which stayed Catholic in spite of several Reformation attempts.

The oblique perspective of this map allows the viewer to recognise the detailed buildings, of which places of interest, such as the city hall and the cathedral, are clearly identifiable. Note the construction crane on the south tower. Work on the cathedral has ceased, and

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Figure 2: Fig. 2: Mercator Map of Cologne, 1568. Rheinisches Bildarchiv, Cologne

the crane will become one of the prominent features of the city (and every representation of the city) until the 19th Century. Emphasis has also been laid on the different entrances into the city, underlining the land routes, as well as the access to the river, thus signifying the city's prime location for trade, and showing the city's strong fortifications. Here, again, we are able to see the richness of the city, including the use of agricultural land within the city walls. It is through maps like these that Cologne was able to assert its important presence within the European realm, as it was the largest city in the Holy Roman Empire and could compete in trade, power and prestige with cities such as London and Paris.

Thus ends our little excursion into 16th Century Cologne and the beginnings of city maps. Even though there is a vast amount of images of the city, representations of the city in the 16th Century is an area of Cologne's history that has yet to be studied in detail. While maps of Cologne of this particular period have been treated individually, they have not been studied in the specific context of identity formation. The images I have used in this study are particularly important in my research as they were seminal to the further development of maps and cityscapes of Cologne and ultimately shaped the relationship the citizens of Cologne forged with their city. It is, perhaps, not surprising, that the citizens of Cologne use the term with pride: Ubi bene ibi Colonia.

Old drug, new use: Can Amitriptyline improve mood and reduce skeletal muscle inflammation in a mouse model of Duchenne Muscular Dystrophy?

Jennifer Manning

Department of Physiology, UCC

Introduction

DMD is an inherited genetic disease affecting 1 in 3500 males. It results from the deletion of a gene which makes the protein Dystrophin. Dystrophin is essential for maintaining the structure of cells. In skeletal muscle, it acts as an anchor for structural components inside the cell. When dystrophin is missing, it leads to mechanical damage and tears in the muscle cell wall, which causes a cascade of events and leads to chronic inflammation.

The chemical components of this inflammatory response lead to extensive muscle damage in sufferers. Muscle tissue is replaced with collagen and fat cells, leading to a significantly weaker and dysfunctional muscle. Sufferers of DMD are wheelchair-bound by their teenage years, and don't normally live beyond their twenties. Clinical presentation of the disease occurs when young boys start walking; the weight put on the muscles of the calf exasperate the damage and they have difficulty running, jumping, they fall frequently or walk on their toes. It progresses quickly from here, with all weight-bearing muscles being affected. Other types of tissues in the body are affected by the loss of dystrophin too. Among them, weakened respiratory muscles lead to sufferers becoming dependant on ventilators. Eventually, the cardiac muscle of the heart is damaged. DMD is a progressive, debilitating and ultimately fatal disease.

Although DMD is currently incurable, there is vast research into the disease. Genetic therapy with aims to reintroduce dystrophin back into cells looks promising; however, this research area does not come without its challenges and extensive work still needs to be done before this therapy will be available.

Currently, the only available treatments are physical therapy and pharmacological intervention using steroids. The use of physical therapy is controversial as some believe it is critical to help retain normal muscle function but some believe it can worsen the damage in the muscles. Administration of steroids (Prednisolone) is the most effective treatment; it can improve and it certainly slows down the progression of the disease, leading to a

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further 2-4 years of mobility for some sufferers. However, steroid use can include side effects, some patients are resistant to steroid treatment and the halt in disease progression is only temporary for all sufferers.

An under-researched area relating to Muscular Dystrophies is the increased incidence of mood disorders. We hypothesise that, some sufferers of the disease may also have depression, which goes undiagnosed, due to the physical symptoms of the disease masking the signs of depression. These symptoms include apathy, fatigue, low mood and sleep disturbances. For example, fatigue worsens muscle symptoms by increasing the apathy of the patients and reducing their mobility, suggesting that the emotional status of the patient directly interacts with the rate of progression of the disease.

The "monoamine theory of depression" describes an imbalance of chemicals, called neurotransmitters, in the brain, and their association with altered mood. Imbalance of neurotransmitters can lead to depression, anxiety and other physiological disorders. However, another theory, states that the immune system can cause depression, leading to the "macrophage theory of depression", named after the immune cell central to this effect. We hypothesise that both theories may be relevant in DMD.

Co-morbidity is when two or more disorders exist, sometimes by coincidence, sometimes one causing the other. Co-morbidity is extensively seen between physical disease and depression, and more so inflammatory disease and depression. One explanation for this is that pro-inflammatory immune cells are dysregulated in diseases such as arthritis, irritable bowel syndrome and cystic fibrosis. One interesting study demonstrates this clearly, depression in patients who have either inflammatory rheumatoid arthritis or non-inflammatory osteoarthritis differ significantly, even though both types of arthritis have the same degree of disability and pain. A higher percentage of patients in the inflammatory rheumatoid arthritis group were found to have depression. If inflammation didn't contribute to depression in these cases, you would expect both groups to have the same prevalence of depression due to the comparative disability of the arthritis they have. We hypothesise that in a subset of DMD sufferers, the immune response may contribute to mood disorders.

Amitriptyline was one of the first drugs to be developed and prescribed as an antidepressant. It mediates the neurotransmitters, namely serotonin, involved in the pathogenesis of depression and anxiety. However, due to its chemical structure, amitriptyline has many different targets both in the brain and elsewhere in the body. Newer and more specific antidepressants are now available and amitriptyline is prescribed less frequently as a result, but new uses for amitriptyline have continued to emerge at different targets in the body. Amitriptyline is now prescribed for a variety of psychological disorders, such as anxiety attacks, attention deficit hyperactivity disorder, posttraumatic stress disorder and insomnia. It is a painkiller, an anti-oxidant and has anti-inflammatory properties. It is prescribed in low doses for cystic fibrosis, irritable bowel syndrome and chronic pain states such as neu-

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ropathic pain. The mechanisms of action for these effects are largely unknown. In various experimental models of disease, amitriptyline has been effective in reducing inflammation in different tissues. It is thought that this effect is due to its ability to modulate components of the immune system including the pro-inflammatory cytokines. If amitriptyline can mediate neurotransmitters and immune cells, it may be useful in DMD patients who suffer from depression, whether it's caused by a chemical imbalance or a dysregulated immune system.

We hypothesise that amitriptyline may be beneficial to the sufferers of DMD due to the depressive-like symptoms, the inflammatory response in muscle and a possible correlation and interaction of these symptoms of the disease.

In this study we used dystrophin-deficient mice, a mouse model of DMD, to first establish if the mouse exhibited depressive symptoms and whether amitriptyline could reverse this effect and secondly to investigate if amitriptyline works as an anti-inflammatory to slow the progression of the disease in skeletal muscle.

Methods

We first compared mice with dystrophin deficiency (Mdx mice) to healthy mice. Then we took a second set of Mdx mice and divided them into two groups, untreated and amitriptyline-treated and repeated the experiments.

To investigate whether the mice had mood disturbances, we used two established behavioural tests. In an open field test, exploratory behaviour was scored as mice entering the centre of the brightly lit arena as opposed to mice staying around the edges. Both exploring and hiding are natural behaviours of mice and the measure of exploratory behaviour correlates to anxiety. Ambulation was also analysed to compare the locomotor activity of Mdx mice compared to healthy mice, although it is reported that Mdx mice of this age (7 weeks) have no functional deficits in their muscles making them as active as healthy mice. Mdx mice and healthy mice then undertook a tail suspension test, which assesses behaviour in an inescapable environment. Depressed mice "accept their fate" they do not try to escape whereas non-depressed mice will try to escape.

To assess the anti-inflammatory effect of amitriptyline, skeletal muscle histology was undertaken. Skeletal muscle from the forelimb was dissected out, stained to differentiate between muscle and inflammatory cells and then visualised using bright-field microscopy. In these sections, infiltration of the muscle by activated immune cells can be scored by the distinct episodes of inflammatory cells invading the tissue and the total area of these inflammations per image.

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Results

Mdx mice spent less time exploring the open space in the open field behavioural test than normal mice. This indicates that the Mdx mice are more anxious than healthy mice. We then repeated the experiment with Mdx mice treated with amitriptyline compared to untreated Mdx mice. Amitriptyline-treated mice spent more time exploring compared to untreated mice — indicating that amitriptyline is effective in reducing anxiety in Mdx mice. When comparing ambulation in the open field test we found Mdx mice were not less active than healthy mice, indicating their muscles had no functional deficits at this age, but did not explore the open area as the healthy mice did. These control experiments further validate the behavioural test results, indicating that the anti-depressant and anxiolytic effects of amitriptyline are not obscured by alterations in mouse locomotion due to the disease.

Similarly, Mdx mice spent less time trying to escape the tail suspension test than healthy mice indicating depressive like symptoms in the mouse model. When treated with amitriptyline, Mdx mice spent significantly more time trying to escape than untreated mice, illustrating the anti-depressant effects of amitriptyline.

Inflammatory events were counted for both frequency and area of events per image of each section of muscle of both Mdx- and healthy mice. Mdx mice had a significantly higher frequency and area of inflammation than healthy mice which is consistent with previous studies. When Mdx mice were treated with amitriptyline, the frequency of inflammation and the area of inflammation were reduced in the Mdx mouse. Inflammatory events were defined visually, in line with previous histological studies of Mdx muscle. These results indicate that amitriptyline may be useful in reducing the inflammatory response in dystrophin deficiency induced inflammation. However, this warrants further study to establish which cells from the inflammatory response are involved and which cells are reduced with the treatment of amitriptyline.

Conclusion and Summary of Results

The Mdx mouse model of DMD exhibits more anxiety and depression than their control healthy mice in two behavioural tests. When we treated these Mdx mice with amitriptyline and compared them to untreated Mdx mice, we found that amitriptyline reduced depression and anxiety behaviours in the mice.

Ambulation is an important factor when comparing Mdx mice to healthy mice; if these mice suffered from loss of mobility, the test results would be obscured and not valid. Control experiments investigating ambulation show both the distance and time spent walking during the open field test were comparable between the strains, indicating that this is

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likely to be a true effect of amitriptyline.

Mdx mice had significantly more inflammation than healthy controls, as indicated by the frequency and area of inflammation. However, amitriptyline was effective in reducing both the frequency and area of inflammation in the Mdx mice skeletal muscle.

These results suggest that amitriptyline may be useful in providing relief from both psychological and physical symptoms of the disease and thus providing a better quality of life for patients with DMD. We are undertaking further investigations regarding both the type of chemical disturbances in the brain underlying the pathogenesis of the mood disturbances and also which type of immune cells are infiltrating the skeletal muscle tissue and by what mechanisms amitriptyline is working here. This study will further help us understand how amitriptyline works and may lead to a new use for an old drug.

The Irish in Mercia: A Cultural Context for the Earliest Anglo-Saxon Prayer Books

Kirsty March

School of English , UCC

1st soldier: You're using coconuts!

King Arthur: What?

1st soldier: You've got two empty halves of coconut and you're bangin' 'em together.

King Arthur: So? We have ridden since the snows of winter covered this land, through the kingdom of Mercia, through . . .

1st soldier: Where'd you get the coconuts?

King Arthur: We found them.

1st soldier: Found them? In Mercia?! The coconut's tropical!

(Monty Python and the Holy Grail, 1975, directed by Terry Gilliam and Terry Jones)

Mercia is a county in the English midlands, and its foundation dates to the sixth century. In studies of the Anglo-Saxon period, Mercia is overshadowed by its neighbour Northumbria as famous works of art such as, the Cuthbert Cross and Lindisfarne Gospel Book were manufactured in Northumbria. However, Mercia produced manuscripts which are thought to be the earliest surviving European devotional prayer books. My research focuses on these Mercian manuscripts as they are an underutilised source of information for scholars of early European religious history. Scholars often overlook these prayer books (most likely because of the outdated editions of the texts), however, my research overall hopes to demonstrate the value of these manuscripts. In this article, I briefly outline the cultural context of these prayer books because, to understand the texts and uses of the manuscripts, one must understand their background and the environment that created them. Here, I focus on their Hiberno-Saxon heritage as, in my opinion; it is one of the most interesting features of the prayer books since it demonstrates the close links between Ireland and Anglo-Saxon England.

Hiberno-Saxon

While Irish influence in Northumbria is well described in current scholarship, similar cultural exchanges in Mercia are often overlooked; this is something that my research hopes to remedy.The Mercian prayer books exhibit signs of Irish influence and are called: the

Book of Nunnaminster, the Royal Prayer Book, the Harleian Prayer Book and the Book of Cerne. These prayer books were produced in Mercia during the late eighth and early ninth centuries. The decoration of these manuscripts exhibit a fusion of Irish and Anglo-Saxon culture so knotted that their artwork would be better termed Hiberno-Mercian, meaning that they are influenced by both cultures. Manuscripts, such as these prayer books were produced in monasteries or nunneries. The early monastic culture of Anglo-Saxon England was strongly connected with Ireland, to the extent that the style of the artwork from this period (c. 600–900 AD) is often referred to as Hiberno-Saxon or Insular. The Book of Kells is one of the most famous artefacts associated with Irish history and it epitomises the combined Hiberno-Saxon culture. The Book of Kells is a seventh century illuminated (decorated) manuscript of the Gospels. While today the Book of Kells is linked with Irish culture, the place of its origin is uncertain as it could have been produced in Ireland or an area under Irish influence in northern England such as Iona. Though the manuscript is generally understood by many to be 'Irish', a more correct term would be Hiberno-Saxon or Insular, demonstrating this uncertainty and the closeness of these cultures.

How then did this combination of cultures occur? Irish monks such as Columba and Columbanus went on missions to preach the word of God across Europe and set up important monastic centres. Columba founded a monastery on an offshore island in northern England called Iona and Columbanus travelled as far as Bobbio in Italy, while another Irish missionary, Aidan, founded a monastery at Lindisfarne, another island off of the coast of England. Along with other ecclesiastical centres such as Wearmouth Jarrow, Lindisfarne and Iona became important centres of learning and culture. As Irish and Irish-trained monks taught the Anglo-Saxons, the cultures fused, to the extent that it sometimes difficult to differentiate between the two cultures (especially in terms of manuscript script and artwork) and the broader term 'Insular' culture is preferred.

The Irish in Mercia

Irish influence in Mercia is evident from the seventh century when Mercia converted to Christianity. The conversion is recounted in Bede's The Ecclesiastical History of the English People. This conversion was a consequence of a dynastic marriage. Marriages between important families strengthened political ties and helped to spread Christianity across Europe. The conversion of the southern kingdom Kent was a result of a marriage between the Kentish king, Æthelbertht, and a Merovingian princess, Bertha. The later Mercian conversion was also born of a political marriage. The Mercian Peada requested the hand of the daughter of Oswiu, a Christian king. Oswiu agreed to this alliance on the condition that Peada converted to Christianity. Peada agreed and was baptised by the Irish bishop Finan. Finan took four priests to Mercia with him: Adda, Betti, Cedd and Diuma. Diuma is described as *natione Scottus* ('an Irishman') and he became the first Mercian bishop. A line of Irish or Irish-educated bishops succeeded Diuma: Finn, Ceollach and Trumhere.

This created a situation in Mercia where Irish and Irish-trained clergy led and taught the Mercians. This historically accounts for the Irish influence on the prayer books, as it was in this Hiberno-Saxon milieu that the four early Anglo-Saxon prayer books were produced.

Hiberno-Saxon decoration of the prayer books

Zoomorphic lettering

The decoration of the early prayer books possesses an Irish flavour as they contain decorated elements popularly associated with Celtic artwork. The patterns consist of interlocking swirls and spirals (interlace); the colours are rich, deep and bright. The opening letters of texts are often made up of animals, where the terminal (one end of the stroke of the letter) has animalistic features. These types of letters are described as zoomorphic letters. If the feature is human, then the letters are called anthropomorphic. A more accurate description of this artwork is Hiberno-Saxon as it is common in both Ireland and Anglo-Saxon England. Examples of this type of decoration include the Book of Kells and Lindisfarne Gospel Book. The Mercian prayer books contain examples of these decorative zoomorphic initials.

The Book of Nunnaminster and Royal Prayer Book exhibit fine examples of the zoomorphic initials. Pages in manuscripts are referred to as folios (fols); the 'v' or 'r' refers to the front ('verso') or the back ('recto') of the folio. On folio 17v of the Royal Prayer Book, there is a zoomorphic 'N'. The crossbar of the 'N' is animal shaped. The Book of Nunnaminster has two major examples on folios 16v ('D'), 4v ('A'), 11v ('H') and other minor (much smaller) initials, such as on fol. 37v. The Royal Prayer Book 'n' is second letter of the word 'In'. The word takes up a quarter of the page. The down strokes of the 'I' and the 'n' are thick and black, and both letters are picked out by red dots. The down terminal of the 'I' is decorated with a yellow fish head. The top of the terminal links with the first stokes of the 'n' and is coloured red, green and yellow. The first stroke of the 'n' finishes with a green dog head. The cross bar of the 'n' is zoomorphic; the animal is perhaps some form of reptile. The dark green creature is formed of a tail, no visible back leg but has at least one wing and its two arms link the around the 'I' and the 'n'. The 'H' on fol. 11v of the Book of Nunnaminster is the most complex decoration in the manuscript. The letter begins and ends with head of a creature; it is not discernible as a particular type of animal. The first creature head is green and yellow; the second is black with pointed ears, its tongue long and tangled. Unlike the Royal initial, the Nunnaminster 'H' is not filled in but the shape of the letter consists of a fine black frame, and in between this frame, the letter consists of interlocking swirls.

Liber

The opening page of the Royal Prayer Book contains a decorated initial: the word *Liber* (folio 1r). The letters are illuminated by gold and silver ink, denoting the importance of this word. The decorated initial *Liber* in Insular illuminated gospels generally marks a passge of the Gospel of Matthew (I.18). This passage of the gospel begins the recitation of Christ's human genealogy. Christ's human nature was as important as his divinity to Christians; the importance of his humanity is demonstrated visually through the elaborate decoration of this initial. The *Liber* initial of the Lindisfarne Gospel Book (fol. 29r) is probably the most spectacular example. The word *Liber* takes up a quarter of the page while the second letter 'i' descends to the bottom of the page. The initial is decorated with brightly coloured complex interlace and animal heads. While the 'er' is less ornate than the 'Lib', the 'e' still finishes with an animal head (possibly a duck).

Book of Cerne Evangelist miniatures

Unlike the other three Mercian prayer books, the Book of Cerne contains full page drawings (called miniatures). These miniatures are drawings of the four evangelists, Matthew (fol. 2v), Mark (fol. 12v), Luke (fol. 21v), John (fol. 31v), in their symbolical zoomorphic and human form. By zoomorphic form, I mean the animal symbol of the evangelist. Scribes would sometimes symbolically depict the evangelists. Each of these symbols highlights a particular aspect of that evangelist's gospel. Matthew is represented by a man because his Gospel underlines Christ's humanity. Mark's symbol is a lion signifying Christ's Resurrection. The bull symbolises Luke, this sometimes represents Christ's priesthood. John's symbol is an eagle, because his gospel is considered more allegorical than the other gospels. In the Book of Cerne, arches frame the evangelists; at the apex of each arch is a disc with a small portrait of the evangelist.

There are many similarities between these miniatures and Irish depictions of the evangelist: particularly images from manuscripts such as the Stowe Missal, the Book of Dimma, Cadmug Gospels, and the Book of Mullig but also other Hiberno-Mercian manuscripts such as the Stockholm Codex Aureus. The Stockholm Codex Aureus depiction of the evangelist is very similar to those in the Book of Cerne as the arches are present.

Summation

Mercia is often overlooked in the history of Anglo-Saxon and later medieval spirituality. My research seeks to redress this imbalance by demonstrating the importance of these manuscripts, and therefore Mercia, to the history of religious devotion. While the most famous surviving artefacts from the Anglo-Saxon golden age are Northumbrian, the earliest

devotional prayer books are Mercian. The decoration and texts of these manuscripts are products of a Hiberno-Mercian milieu, demonstrating a strong Irish influence outside of Northumbria.

Further Reading

M. Brown, 'Echoes: the Book of Kells and Southern English Manuscript Production', in F. O'Mahony ed., *The Book of Kells. Proceedings of a Conference at Trinity College Dublin, 1992* (Aldershot, 1994), pp. 333–43

————-., The Book of Cerne: Prayer, Patronage and Power in Ninth-Century England (London, 1996)

Zoomable and colour reproduction of images from the Book of Nunnaminster and Royal Prayer Book are available on the British Library website: http://www.bl.uk.

Faster wireless for your home and beyond — smart optical wireless communication

Philip John Marraccini

Department of Electrical & Electronic Engineering, UCC

> All great scientists have, in a certain sense, been great artists; the man with no imagination may collect facts, but he cannot make great discoveries. (Karl Pearson)

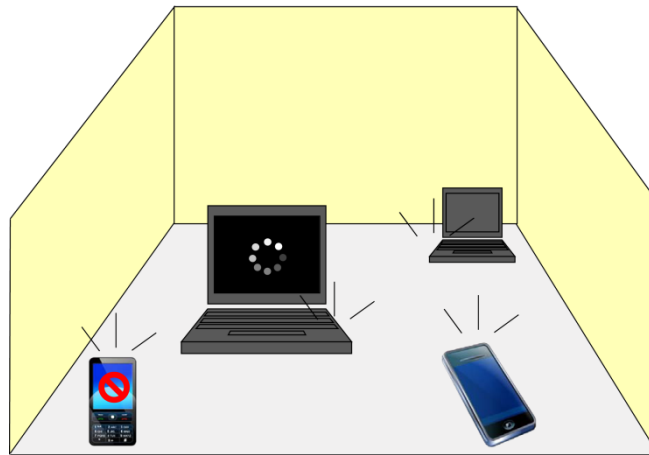## What is wireless technology like today?

Figure 1: : If too many wireless devices are too close to one another they can interfere/degrade the performance of the other wireless devices.

Picture yourself surrounded by a group of people all talking to you at the same time. Imagine that they all have voices that sound very similar. As more of these people start talking, it gets harder and harder for you to focus on just one person's voice and catch only what they are saying. All these additional people are causing interference in your conversation. This situation is similar to what is currently happening in peoples' homes and work environments where their iPhone, iPad, laptop, and other wireless devices are all operating at what is known as radio frequencies. Unfortunately, many of us have had the experience of using a cordless phone and hearing the voice on the other end get scrambled when someone uses the microwave or other device in the house. Some of you may have noticed that your stereo speakers start making a strange noise if your cell phone starts ringing when the speakers are close to it. Annoying isn't it? Additionally, it reduces call quality or slows down your internet video, but it can cause bigger problems. These devices also happen to interfere with some medical equipment, which could be detrimental to a patient or trigger false alarms on the patient's monitoring equipment. The bad news is that

unless there are some changes to current wireless technology, this situation will get worse and worse as more cell phones, iPads, and other portable wireless devices are brought into your home and the homes of your neighbors. Like in our analogy of a group of people speaking, the more devices that are close to each other, the more likely they are to interfere. Additionally, there are also government regulations and licenses associated with radio frequency devices. Thus in developing new technologies all these issues should be addressed.

So is there a way to improve this current situation? In order to answer the question, let us return to our analogy where a group of people were all talking at once. It becomes easier to distinguish them if their voices have different pitches (i.e., one has a high pitch voice and another low). So is there a way to adapt this analogy to address some of the issues current wireless technology has? Of course, one solution would be to use higher radio frequencies, but current government licensing in many countries makes this difficult. Instead we can use light to communicate between wireless devices! This is known as optical wireless communications and the modern concept dates back to 1880 when Alexander Graham Bell presented his photophone. It was not until the late 1970s that this field picked up interest again when Gfeller and Bapst demonstrated that infrared light could be used to fill a room and communicate with devices. Since then it has been an area of active research and development. Light has a much higher frequency (pitch in our analogy) and it does not interfere with the current devices operating at the much lower radio frequencies. Unlike current wireless technology, light is easily confined (i.e., does not travel through walls) so it will not interfere with devices in other rooms. This drastically reduces the amount of interference that can happen. Additionally, this makes optical wireless more secure since someone cannot steal your medical records or internet connection without you being able to spot them, whereas using current wireless technology your neighbors can detect your wireless network since it travels through walls. Of course that might mean you have more people sitting outside your windows trying to steal the internet, but at least now you can see them to chase them off! This is easily fixed though since there are coatings you can put on windows to prevent the optical wireless connection from leaking out into the street.

The use of higher frequencies would enable you to transfer your videos and pictures much quicker between our portable devices. It will definitely be a lot faster (more than 10 times) than Bluetooth or your current wireless adapter meaning you have to spend less time waiting to transfer your files. Additionally, this also addresses the issue of government regulations since optical wireless communication is highly confined, less regulation is needed. This does not mean that optical wireless communication will completely replace radio frequency wireless technology, since the current technology does have the advantage of covering large areas since it can travel through walls and other obstructions. In the future, these two technologies will exist side by side working together to make more secure and reliable wireless networks. Let us now take a closer look into the field of optical wireless communications.

(a)   (b)
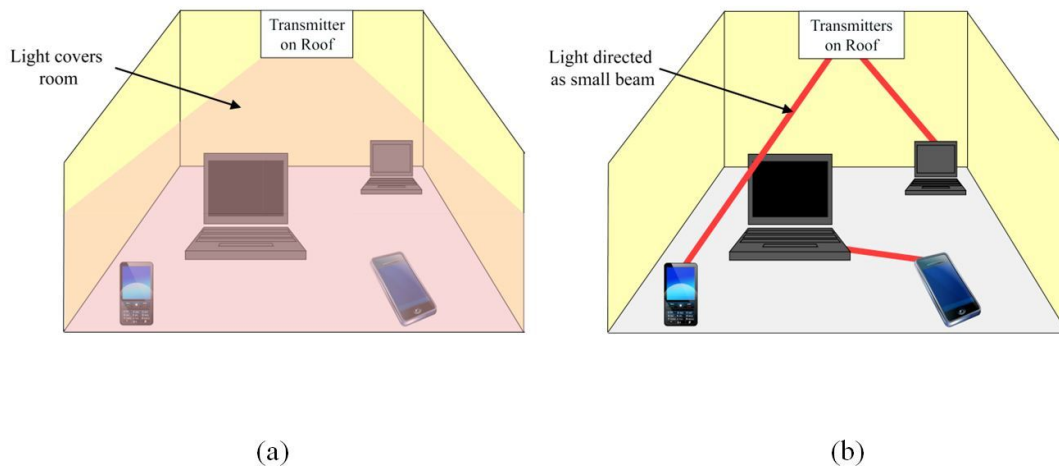
Figure 2: Examples of two optical wireless communication methods. In (a) Diffuse Optical Communication is shown. Here light from the source is shown spreading throughout the room, whereas (b) shows Line-of-Sight Optical Communication where the light is directed
i

How does optical wireless work?

One common method of sending data optically is to change the brightness of the source based upon the information that needs to be sent. The receiving device detects the changes in brightness and translates these changes into something that it can understand. Now you may ask, "How would this affect lighting in the room?" Luckily for us, the eye operates quite slowly. Think about watching a movie or TV where it seems that there is fluid motion. However, most movies and shows have less than 72 images per second! The rates that the brightness changes happen in optical wireless communication are at least 100,000 faster than this, so your eye does not have the capability to notice this. To your eye there will be a constant brightness level.

Optical wireless technology is classified based upon how much the light spreads out or how much space the light covers in a room and whether it reflects off objects as seen in Figure 2. Here we will discuss the two extreme cases of light spreading. The first method (Figure 2 (a)) is to spread light throughout the whole room and reflecting off the walls. This is known as diffuse optical communication and in many cases a light emitting diode (LED) is used as the source. You may be familiar with LEDs in car headlights, traffic signals or Christmas tree lights replacing traditional light bulbs due to being more energy efficient. The other method uses small beams of light to communicate with one specific device. This method is known as line-of-sight communication and commonly uses a laser as the source of light. In this method it is extremely important to direct the beam towards the device it needs to communicate with as seen in Figure 2(b).
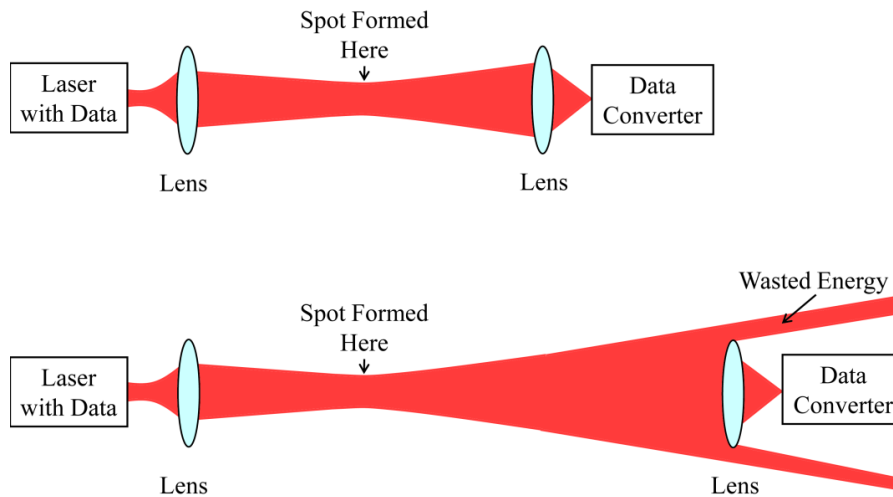
Figure 3: Optical wireless link using a fixed lens. The lens fixes the distance that the laser beam spot forms. The top picture shows the link operating at its designed range, whereas in the bottom picture that range is exceeded and energy is wasted.

Smart Optical Wireless

Focusing on the Line-of-Sight method, we need to make sure that the light can travel the whole distance to the device (e.g. laptop or cell phone). If you have played with a laser or flashlight you know there is only a certain distance that they can go. So how can we change this distance? Now most of us played with a magnifying glass when we were young and noticed that there was a specific distance that would allow you to see text at a bigger size. The more adventurous of you found out that there was an optimal distance to use the magnifying glass for burning leaves or other things. If you used magnifying glasses of different strengths you found this would happen at a different distances based upon their strength. Similarly, in Line-of-Sight optical wireless communications the lens will set the distance that the laser beam focuses at as seen in Figure 3. After this spot, it starts expanding again. This can cause a problem if you continue further than your original design range since not all of the light will be picked up by your laptop or cell phone receiver, causing less power to be received. This reduces the quality of the connection since many important factors (e.g. error rate) that determine quality all rely on the amount of power received. Additionally, it is very energy inefficient and thus this design will not reduce long term energy cost. Hence, in developing optical wireless technology we want to develop a system that is able to capture as much of the transmitted light as possible.

My work has focused on trying to do this. I have worked on designing smart optical wireless transmitters that capture all the transmitted light. The idea is to design a lens that has the ability to change its focusing power. The lenses I have been working with are controlled by changing the amount of electrical power you apply to them. By changing the focusing ability of the lens, the laser beam will focus at a different spot. Ideally, you want to make this spot smaller than the receiver on your laptop or cell phone so that all
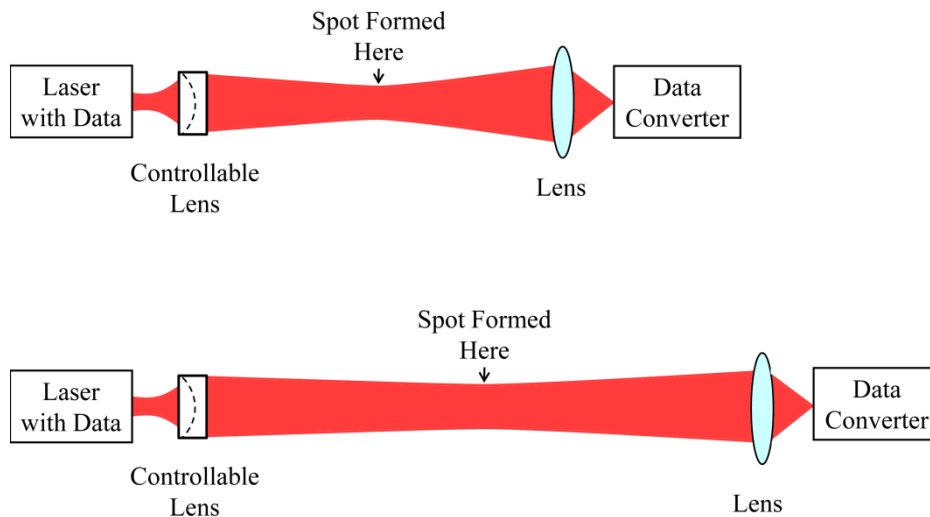
Figure 4: Using a controllable lens when the distance between your mobile device and the computer transmitter changes the lens changes its focusing power so that all light is captured by the lens. Shown here are two different distances and how when the lens focus

light sent out is captured. More captured light leads to a better quality connection and to the use of less laser or LED power being required. In turn, this also leads to better energy efficiency. This concept has been demonstrated for indoor environments, but it can be extended to outdoor and undersea scenarios with some modifications. Using this method, the amount of optical power loss was more than halved at a distance of 4 m from the transmitter when compared to the non-smart wireless system (Marraccini and Riza 2011).

Wireless technology in the future

Over the next few years, wireless technology will need to adapt to address issues that have developed. Part of the solution will be the use of optical wireless networks. Optical wireless will be used in situations where increased speed and security are required, whereas radio frequency networks will be used to cover large areas. These two technologies are complementary. Optical wireless technology will become more common in the home and work environment since it will be needed to meet the increasing demand for faster speeds due to the large amounts of data being uploaded and downloaded. Smart designs are needed since they will lead to better quality, reliability, and energy efficiency.

Further Reading

Marraccini, Philip J., and Riza, Nabeel A., "Power smart in-door optical wireless link design," Journal of the European Optical Society Rapid Publications, Vol. 6, 2011. `http://www.jeos.org/index.php/jeos$\_$rp/article/view/11054`>

Riza, Nabeel A. and Marraccini, Philip J., "Power Smart In-door Optical Wireless Link Applications," The 8th International Wireless Computing and Mobile Communications (IWCMC), IEEE Conference, Cyprus, 2012.

The Quest for Novel Antimicrobials from Bacteria

Alan James Marsh

Department of Microbiology , UCC

> If the world fails to mount a more serious effort to fight infectious diseases, antimicrobial resistance will increasingly threaten to send the world back to a pre-antibiotic age (Gro Harlem Brundtland)

Bad Bugs Fight Back

Imagine a world without antibiotics. A world where diseases such as syphilis, tuberculosis, meningitis were still commonplace, where a scrape on a leg could develop into life-threatening illness and the plague was still to be feared. Such was life before 1928, the year Alexander Fleming revolutionised the field of medicine by accidentally discovering penicillin, a mould which could kill bacteria. This drug became the world's first antibiotic and it spurred scientists to discover other classes of antimicrobial compounds, which together dramatically reduced the spread of disease.

However, this golden era of medicine will not last forever. After only a few years of use, disease-causing bacteria had emerged which were resistant to antibiotics. The most common of these so-called "superbugs", methicillin-resistant *Staphylococcus aureus* (MRSA), is now responsible for an increasing number of deaths, and is practically untreatable. Similarly, incidents of multi- drug-resistant tuberculosis are on the rise. Other drug-resistant bacteria are causing difficult-to-treat illnesses like pneumonia, urinary tract and bloodstream infections that lead to over 25,000 fatalities a year in the EU.

As time goes by, it is becoming increasingly likely that the discovery of the miracle-cure penicillin was a lucky break. Over the last 80 years, very few antimicrobials have been found that can rival its power. And for those that do, their shelf-life is limited due to bacterial resistance, a reality which has discouraged investment from the pharmaceutical giants.

New approaches and new sources are required to uncover novel antimicrobial agents. The good news is that there *are* other antimicrobial agents, albeit many which possess a smaller range of bacterial targets, and lack the mass destructive power of the classic penicillin-type antibiotics. One such type of antimicrobial agents are the bacteriocins.

Bacteriocins: Good Bugs Provide an Answer

Conceptually, the idea is simple. Bacteria are miniature, thriving machines with one aim: to survive. These little organisms occupy niche environments across the globe, to which they have adapted to survive. One key component in this strategy is their need to out-compete their rivals — especially other species of bacteria, to emerge as the dominant population in their environment. An essential element of this survival strategy lies in their ability to produce compounds that can destroy their enemies. These antibacterial agents, termed bacteriocins, are potent toxins, which penetrate or prevent the formation of the cell membrane, or skin, of other bacteria, causing them to bleed out their internal organs, culminating in cell death. These antimicrobial compounds are made of protein (and therefore, are referred to as peptides), which means they can be easily digested by humans and are thus considered harmless. What's more, bacteriocins are thought to be tougher for bacteria to develop resistance to.

Any environment where there are several communities of bacteria struggling for dominance are good, potential sources for bacteriocin discovery, for example, fermented food (cheese, milks, sausage... etc). Bacteriocins are unique because they are produced by bacteria, and their range of targets can be quite specific, which is useful when one only wants to kill certain types of bacteria. The aim of my research it to use the latest advancements in technology to expedite the screening of bacteria, and to find novel antibacterial agents, specifically, bacteriocins.

Advanced Culture Screening

For years, the standard method to discover new bacteriocins was to use an "overlay" approach. Here, bacteria from any source are grown on a nutritious medium called agar. An indicator bacterium, i.e. one which we would like to kill, is poured over the other bacteria. Any resulting area of clearing in the indicator overlay results in the detection of a possible bacteriocin. This technique, while still useful, is laborious and can be slow to yield results.

My current research uses a modernised approach to screen samples for antimicrobial activity. The most recent samples come from fermented food products, such as kefir, a yoghurt-style milk beverage. Here, the milk is fermented by a complex, unidentified group of bacteria to form an acidic beverage. The resulting product is diluted and spread onto different types of nutritious agars, which are incubated at different temperatures (typically 30° or 37°C) until colonies are grown. The QPIX2, a specially designed machine, can scan the surface of the agar, and using needles, picks each of the colonies and stores them in a liquid medium. These are frozen at -80°C. This process is repeated until a frozen library consisting of tens of thousands of colonies is created. Up to 2,300 of these colonies are then stamped onto large agar plates and allowed to grow. What follows is the actual

experiment for antimicrobial activity. The plates are overlaid with another layer of agar which is mixed with an "indicator" bacterium, (the microbe one wants to show activity against), such as *Staphylococcus aureus*, responsible for MRSA, or *Listeria*, a common food pathogen. The indicator will grow as a cloudy lawn over the existing colonies, and any resulting areas of clearing, or zones, indicate the presence of an antibacterial peptide. The colony number is recorded and cultured once again from the original frozen library for further testing. The producing colony is identified using specialised techniques, the full antimicrobial spectrum is determined and the peptide is eventually isolated and purified. Peptides discovered during the high-throughput screen are currently undergoing laboratory investigation.

Genetic Screening

All living life contains some form of DNA, be they human, plant or bacteria. DNA is, simply put, 4 repeating letters, A, T G and C, which, depending on their arrangement, form a sequence. These sequences encode the instructions for every action an organism takes, from making new proteins to cell reproduction. Technological advancements have made the sequencing of DNA common practice, wherein small sequences of DNA, like genes, or large scale sequences, such as an organism's total DNA, can be determined, or "mapped". These sequences are publicly available in enormous online databases, such as Genbank, for the benefit of other scientists.

Another aspect of my research was to screen all the bacterial DNA in these databases for the presence of new bacteriocins. This was achieved by taking the sequence of a well known bacteriocin, called Nisin, and entering it into an online search engine called BLAST, to screen against all the fully sequenced bacteria in the database, which, at the time of the study was 1178. This generated large volumes of genetic information, which were analysed in-depth for the presence of characteristic bacteriocin-associated genetic traits. Certain species of bacteria were shown to contain stretches of DNA similar, but not identical, to Nisin. This was considered to be a positive indication of a peptide that is biologically functional.

Forty nine "clusters" were shown to contain the group of genes necessary to produce an antimicrobial peptide. The bacteria which possess the codes for bacteriocin production are considered potential producers of antimicrobials. These species of bacteria were shown to come from a wide variety of unrelated habitats, such as mammalian intestines, soil, skin, dairy produce, and even deep-sea hydrothermal vents, demonstrating just how universally important bacteriocin production is for bacterial survival.

Moving Forward

It remains to be proven via laboratory experiments if these new peptides are indeed functional, and if so, how potent and wide-ranging these bacteriocins are. Thanks to the volume of genetic information we have acquired, we now have clues regarding the nature of the peptide. Previously published research has established that certain codes are common to groups of bacteriocins, and have been shown to play an important role in the biological activity of the peptide. With this pre-established information, we can begin research on how our 49 potential peptides might function, and determine just how novel these bacteriocins are.

Considering that it takes at least 10 years of trials before a new drug can reach the market, the time to make novel drug discoveries is now. Here, I have described our attempts to discover next-generation antibiotics, novel antimicrobials produced by bacteria, using high-throughput robotic screening and genetics. Bacteriocin-producers discovered by our high-throughput and genetic screening are currently in the next phase of analysis. The age of the superbug is fast-approaching and our arsenal of drugs is diminishing. The race is on.

Feel the pain!

Laura McKelvey

Department of Anatomy and Neuroscience, UCC

Introduction

Insensitivity to pain with anhidrosis (CIPA) is a very rare condition that does what it says on the tin, people that have this condition cannot feel pain and cannot sweat (anhidrosis). It is one of a spectrum of conditions collectively known as hereditary sensory autonomic neuropathies (HSAN). This is a bit of a mouthful, so let's break it down. HSAN means these are inherited pathologies or diseases that negatively affect our nervous system and how the nerves in our body work and results when the nerves in our body do not grow during development. This condition has a serious impact on those who suffer from it, such as the inability to feel pain. This means that the sufferer does not realise that they are injured and therefore cannot prevent injuring themselves further. Some sufferers die from hyperprexia (being too hot), because they don't have this sweat response to keep them cool. My research is focused on learning more about how these nerves grow, and identifying factors that help them to grow.
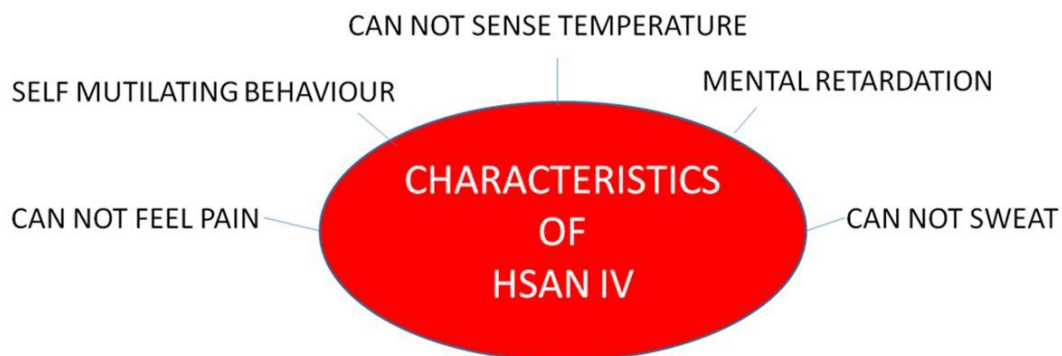

Figure 1: Symptoms of Hereditary Sensory Autonomic Neuropathy IV, a disease of the developing nervous system

The Nervous System

Our nervous system is divided into two parts, a central nervous system (brain and spinal cord) and a peripheral nervous system (everything on the periphery, such as arms and legs). Sensory and sympathetic nerves are nerves of the peripheral nervous system and are severely affected in CIPA. Sensory nerves carry information such as pain from the periphery to the spinal cord and eventually onto the brain, where it's recognised as pain. Sympathetic nerves are a type of autonomic nerve. This means that they supply organs or parts of the body that are not under conscious control. For example, we don't tell our heart to beat, it beats by itself because it is under unconscious control. Sympathetic nerves are involved in the well known 'Fight or Flight' response; let's say you see a big scary tiger....... your heart starts racing, you begin to sweat, and you are ready to fight or for flight, which is your sympathetic nerves in action.

Nervous system development

It is estimated that there are up to 100 billion nerve cells (also known as neurons) in our body, so you can imagine how complicated a process it is for these nerves to grow to their destinations, like the heart, the kidneys, the fingers and toes. How do they grow? Just like Hansel and Gretel use breadcrumbs, the nerves use blood vessels to guide them to their final target destination. Let's consider sympathetic nerves, which can be sourced from superior cervical ganglia (SCG). Ganglia are a cluster of nerves cells, and this particular ganglia is located high up in the cervical or neck region and therefore termed the superior cervical ganglia. More specifically, the SCG lies on the carotid artery in the neck, which is the artery that we commonly use to take our pulse. The sympathetic nerves from the SCG use the carotid artery as a guide to reach their final destination or target, including structures in the head such as the eyes, mouth and salivary glands.

Similar to the theory of 'survival of the fittest', these nerves compete for a limited amount of trophic factors. Trophic, comes from the greek *tro-fik*, meaning pertaining to nutrition. So, trophic factors that provide nutrition to nerves are therefore called neurotrophins. Neurotrophins are essential for nerves to survive and grow and are released from nerve targets. The most well known neurotrophin is Nerve growth factor (NGF). In order for sympathetic nerves to grow and reach their final target, they must receive a supply of NGF.

NGF will bind to the outside of the nerve cell *via* a receptor. Together, NGF and its receptor form a complex and this complex will be internalised by the cell, almost as if the cell is eating or engulfing it. This internalisation stimulates a cascade of signalling events. This means that different factors come into play to eventually tell the nerve cell to grow. We are learning more about this process of how nerve cells grow all the time.

GITR

My lab group has made an exciting new discovery, we have found a factor that is crucial for these nerve cells to grow! Glucocorticoid neurotrophic factor receptor (GITR) is a receptor located on many of the body's cells, including nerve cells. GITR is well known for having a role in immune responses. However, it has never been known to have a role in the nervous system. Until now.......

How do we know that GITR is needed for these nerve cells to grow? One way this was found was by using genetically modified mice. We have all heard this term 'genetically modified', but what does this actually mean? Genetically modified means that researchers have "knocked out," an existing gene in the mouse and replaced it or disrupted it with an artificial piece of DNA. This causes changes in the animal such as their appearance, or something we can't see, within cells of the body. By knocking out a gene, you can then discover its function.

This technique was used to discover the role of GITR in the nervous system. When the gene that encodes for GITR was knocked out in mice, GITR was never produced and sympathetic nerves from SCG did not grow. This tells us GITR is crucial for sympathetic nerves to grow and therefore crucial for the function of organs supplied by these nerves, such as the eyes and salivary glands. But, it only has this important role when NGF is present.

GITR is crucial for nerves to grow! What does this mean?

This is an exciting discovery; it tells us there is another player in the growth of nerves. It opens possibilities for future therapies to treat abnormal nerve growth and resulting conditions such as CIPA. But before getting too excited we need to know more about GITR and how it helps these nerves to grow. I will continue to study the role of GITR in the growth of these nerves. For the remainder of my PhD, I will investigate the section of GITR that is responsible for this growth in greater detail; look into what other factors it interacts with and lastly look closer at other organs sympathetic nerves supply and the effect of 'knocking out GITR' on the nerves of these organs, including the heart, lungs, kidneys, stomach and bladder.

Conclusion

In CIPA, the role of NGF is disrupted. We do not know how GITR is affected in CIPA. However, given their very close relationship in which one does not work with the other, you could imagine GITR is similarly affected. If this is the case, then GITR has great potential

in the treatment of these disorders and their symptoms. Symptoms not only including inability to feel pain and sweat, but also secondary complications such as self mutilation and bone fractures. Understanding the mechanism behind GITR and its ability to help nerve cells grow is paramount if we are to development therapies to treat conditions like HSAN and hopefully with GITR, sufferers of CIPA will eventually 'Feel the pain'!

Droit de Suite — The Artists' Resale Right

Anthony O'Dwyer

Faculty of Law, UCC, UCC

This article looks at the *droit de suite,* which is a legally recognised right that forms part of copyright law and more widely, intellectual property law. The article reviews the present restrictive application of the law, analyses the definition of the "artist" and discusses the merit of a wider interpretation and application of the *droit de suite*.

What is *droit de suite?*

The English translation of *droit de suite* literally means the 'right to follow' and, in the context of the artists' resale right, it allows artists to follow the future success of their artistic works. This future success involves an economic entitlement that the artist may participate in. In practical terms this means that, after the first sale of the artistic work, every subsequent public sale, for instance through a dealer or a gallery, is subject to a sort of royalty. Royalties in the traditional sense entitle various types of artistic creators, such as artists, musicians and writers, to receive a percentage of the profits arising from the use or exploitation of their creative work. It is in this sense that the artists' resale right operates. For every subsequent re-sale of the work, the artist has a right to claim a percentage of the price paid by the purchaser. In Ireland this percentage operates on a sliding scale starting at 4% and decreasing to 0.25% depending on how much the work is sold for. The amount recoupable is capped at €12,500 and the work must first be sold for over €3,000 before the right becomes active. For clarification, it should be pointed out that the resale right does not apply to the first sale of the work, only to re-sales there after, and that private sales are also excluded. In addition, the right cannot be assigned, waived or shared and there is no limit to the number of times that the resale right can be invoked, whether the work is re-sold once or a hundred times, the law enforces no limit.

Distorting the Market

At this point, those of us with a fleeting interest in the realities of the free market start to ask questions, such as, why should an artist be given this sort of economic advantage? And where should the line be drawn? What we're getting at here is that visual artists, musicians, composers, writers, and many more all benefit from the mass exploitation of their work through the collection of royalties. For every radio-play of a song, print

reproduction of original art or theatrical performance of the writer's work etc., a royalty is collected. This monetary compensation for the creator's efforts reflects the economic value derived from each use of the creator's work in a given medium; whether, print, TV, radio or live performance. Where such diverse categories of creators benefit equally from the public's use of their work, there would appear to be no sense in creating an additional sort of tax on art. If anything, such a system creates disparity amongst creators and it would seem that the only way of correcting this disparity is to allow all creators to avail of the *droit de suite,* or artists resale right. But why stop there? Does a builder not fall within the definition of a creator? After all, he or she creates something of value which can be resold multiple times, enjoyed by many, but no such royalty system exists for the builder. If anything it is the builder who is in need of the resale right, as he does not even have the safety net of a publishing or performance royalty to rely on. Is it therefore not a meaningless and arbitrary distinction that separates the builder from the artist? To answer these questions we must look to the origins and the rationale for the *droit de suite* or artists resale right.

Origins of the *droit de suite*

As the name suggests, the right of the droit de suite originated in France. It was after World War I that French philanthropists lobbied the French government to create such a right for artists. The need was said to derive from the fact that visual artists were unable to exploit their work to the same extent as other creators. At that time, artists were returning from the war, often penniless. They and their children were starving on the streets of Paris, while their works sold at auction for exuberant amounts, which far surpassed the artist's original recompense. There was a clear inequality between what the artist received for his efforts compared to the savvy art dealer, who created nothing. So, the right was seen as a response to the inequities of the free market and a desire to better balance the fortunes of artists and encourage the production of fine art, which benefited all of society. In its truest form, the *droit de suite* began life as a social welfare initiative and its various incarnations throughout the world are not far removed from this ideal.

The rational behind the right

So why were visual artists less able to benefit from their work than other creators? The writer and the composer created works that could be mass-produced resulting in unlimited exploitation or utilisation by the public, while the artist could not do so. This was because the writer's book and the composer's music score contained both tangible and intangible elements or layers. The tangible being the material, physical embodiment of the work, i.e.,

the book, painted canvas or music score, and the intangible being the manner in which the work could be accessed by the public.

To simplify and to aid our understanding of this nuanced point, imagine that the writer writes a book on his typewriter, that the book is then put into production and that thousands of copies are produced. Now let us ask the question; is there any difference between the enjoyment that the reader receives from reading the first copy of the book or one of the multiple copies that follow? The answer is no and while collectors vie for a first edition of a book, their experience from reading the first or second print edition is not altered. This is the intangible element or layer in the work, the part that exists on another plane if you will. It is irrelevant to our enjoyment whether we read the book on our laptop, e-reader, or in paperback. The physical manifestation of the work, whether in paper or digital form, is merely the medium through which the author conveys his ideas to us the reader. The material embodiment of the work and its intangible element are not joined at the hip but are separable and thus the work can enjoy mass use or exploitation.

Logic would dictate that the same rationale must apply to works by visual artists. My appreciation of Van Gogh's "Starry Night" is surely not lessened by the print reproduction that I purchased at a poster fair? I still receive enjoyment from viewing it. But, if this is so, why do we travel to galleries and museums all over the world to see original works of art by our favourite artists? The reason is this, when we stand in front of an original work of art, we receive an unaltered communication from the artist which represents his thoughts and feelings in the purest form. The richness of colour, the layering of paint, seeing the painters brush strokes close up, these all form part of our experience, leading to an appreciation and enjoyment of the work that far surpasses the print reproduction. If you doubt me, buy a poster of your favourite painting, view it everyday, if you can, and then if you are fortunate enough to someday see the original, compare your experience. Ask yourself the question, which viewing, which representation of the artist's work, gave you the greatest enjoyment and most fully communicated to you the artist's thoughts and feelings, as expressed in the work. Most would choose the original. Lastly on this point, what we are missing in viewing a copy of the original masterpiece is the equivalent of pages missing from a book; we may get the general gist but not the full story.

Now to our builder friend. He creates something which we enjoy, the building does not have an intangible element that can be mass produced and exploited like the music contained in a CD, and he received no publishing or performance royalties from the public's use of the building. So why shouldn't he receive a *droit de suite*? The first point would be that, even if the work, i.e., the building, contained an artistic quality, that quality would originate in the architect and not the builder. The builder could be viewed as the equivalent of the starving artist, where the property investor gains the most from the builder's labours, similar to that of the artist, art dealer relationship. Based on this comparison the builder should be entitled to a similar royalty. But this is where the crux of the justification

for the *droit de suite* lies. The artist contributes to the increase in value of his work by continuing to paint, thus promoting his work and growing his reputation. Indeed, often an artist's later works are mere shadows of the earlier creations but still demand a handsome price because we will say, "but it's a Picasso". On the other hand, property buyers do not buy a house on the basis of the builder's reputation. Clearly we can delineate between the work of the visual artist and that of the builder, but what about the architect? Based upon the preceding arguments there is indeed a case for including architects within the remit of the *droit de suite* legislation.

Where will my research take me?

With all that has been said, it is about time to say where my own research is placed within this area of intellectual property law. As contradictory as it may seem, my research looks at the potential expansion of the *droit de suite* to include multiple creators. Based upon the above analysis, it is clear that no justification exists for such an expansion, but it has been said that, when you don't like the answer to your question it's time to ask another question. With this in mind, my research looks at an alternative justification for the *droit de suite,* a justification which derives from a moral rights theory that focuses on protecting the personhood of the creator. This theory provides a basis for economic and non-economic rights that protect the creator. In light of social and economic changes affecting how musicians and writers now make a living, such an expansion may be necessitated. Once this necessity is framed within the context of a wider theoretical justification, a plausible paradigm for an expanded *droit de suite* or 'creators' resale right' may be extrapolated. The challenge, however, is to base the right on a legally sound theory that creates both a sustainable environment for all creators in which creative output can be maximised for the benefit of society, while ensuring that its parameters to do not extend so wide as to create perverse anomalies.

My research will critically assess whether this 'necessity for change' exists by comparing the social and economic conditions of these creators. Analysing revenues derived from royalties and then comparing these with published reports by the ESRI (The Economic Social Research Institute — Ireland) on the social and living conditions of such creators will provide a broad overview and basis for the research. The research will also compare two income streams of the visual artist, royalties from publishing and royalties from the *droit de suite.* This part of the research is timely as, to-date, no data has been collected which confirms the rights' efficacy and efficiency. After all, why argue to expand a right that is dead in the water?

Finally, the research will have significant consequences for the Irish and E.U. legal system as it will highlight any inequalities in the existing legislation by firstly questioning the limited application of the *droit de suite* to visual artists only. Secondly, the research will

explicate the successes and failures of the current *droit de suite* model in Ireland and the E.U. and in turn look to international experiences in an attempt to provide a more inclusive and effective model of best practice.

Trouble conceiving after a Caesarean section — let's cut to the chase

Sinéad Maria O Neill

Department of Epidemiology & Public Health/ Department of Obstetrics & Gynaecology, UCC

"Intellectual growth should commence at birth and cease only at death" (Albert Einstein)

Caesarean section rates climb to an all-time high

With birth by Caesarean section now being considered a very safe and convenient procedure, rates have peaked to the highest levels ever recorded worldwide. Surprisingly, more than one in four of all babies born in Ireland and one in three in the United States are born by Caesarean section. South American countries such as Brazil, Paraguay and Ecuador report Caesarean section rates of greater than 40% and Beijing in China reached an astounding rate of 51% in 2010. So why the increase? Are women becoming "too posh to push"? Some of the proposed driving forces behind this massive rise include perceived benefits to the infant including minimal trauma as the baby will not travel through the birth canal. In addition, there is a very real fear of malpractice litigation among doctors putting them under extra pressure to carry out more Caesarean deliveries. The increasing age of first-time mothers (currently 31.2 years in Ireland) brings with it the potential for extra complications including low birth weight, gestational diabetes and stillbirth, and therefore an increased risk of having a Caesarean birth. Higher socioeconomic status, greater levels of education, private health insurance and personal preference are also attributed with the rise in Caesarean section rates. Some women fear painful natural births and choose an operation because they believe it to be less risky. The convenience of planning the date and time of a baby's birth by elective Caesarean delivery is also a basis for increasing rates. Surprisingly, some hospitals are also motivated by the higher fees associated with operative delivery. "Health before wealth" does not come into play in these hospitals unfortunately, nor does the enormous strain put on health resources and funding as a result of these extra costs in the form of additional staff input, longer length of stay in hospital, increased rates of infection and intensive care admissions. According to a recent World Health Organization (WHO) report "Caesarean sections have reached epidemic proportions in many countries worldwide and Caesareans, even when uncomplicated, have been shown to cost twice as much as a natural vaginal delivery".
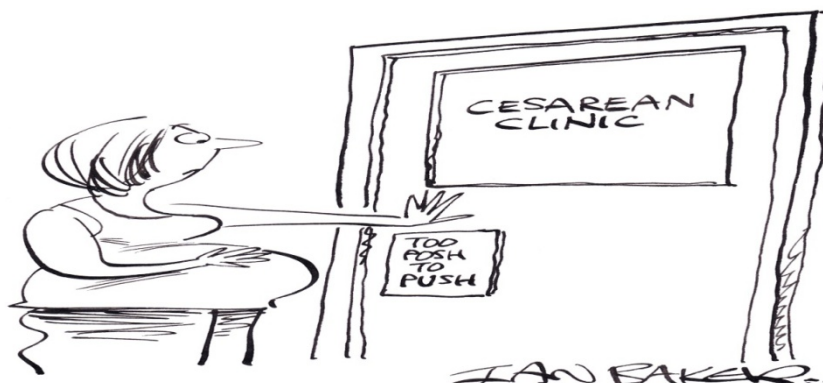
Figure 1: Too posh to push?

Whatever the reasons behind this massive rise in Caesarean sections worldwide, Caesarean delivery carries with it benefits as well as risks. A Caesarean delivery can be a lifesaving operation especially in emergency situations such as cases of very premature babies, or during labour if the baby goes into distress, or in the case of a very large baby. In addition, the operation itself has become much safer due to improvements in obstetrical training and surgical techniques and skills. A major benefit for mothers is that there is no labour pain in the case of maternally requested or planned Caesareans, in contrast to vaginal deliveries for which the duration of labour is unknown and may take many hours. The operation is in addition more private than a vaginal delivery it could be argued, quicker and can be scheduled in advance for convenience.

However, Caesarean delivery also carries risks for mother and baby. Risks to the mother include: infection at the site of the wound, rupture of the abdominal wall, blood clots and adhesions and in rare cases, even death. Moreover, the long-term consequences of a Caesarean section are now a matter of concern, as there is some evidence that operative delivery is associated with subsequent sub-fertility (i.e. a longer time interval between pregnancies), ectopic pregnancy (a pregnancy which occurs outside of the womb, is fatal for the fetus and one of the leading causes of early pregnancy deaths in women), and spontaneous miscarriage, the most common complication of early pregnancy, occurring in 10-15% of recognised pregnancies. Robust, large scale, population level research is lacking to date, which is surprising considering the serious nature of these outcomes and the ever increasing trend of 'elective' Caesarean delivery.

To have a Caesarean section or not to have a Caesarean section, that is the question

This quantitative research seeks to clarify whether delivery by Caesarean section is associated with longer intervals between pregnancies, ectopic pregnancy and spontaneous

Figure 2: "Ooh! A womb with a view."

miscarriage by using a large Danish population-based dataset, with health information on women during and after pregnancy. I will travel to Aarhus in Denmark on various different trips to collaborate with the National Centre for Register-based Research (NCRR) staff. Here, I will be given access to this rich data source, the Civil Registration System (CRS) data, which is comprised of many different registers including the Medical Birth Register (MBR), the National Hospital Register (NHR) and the *In-Vitro* Fertilisation (IVF) Register to name but a few. The linkage of a mass amount of data from these various registries is possible due to the incorporation of a unique identifier, a personal identification number, which is a six digit code given to each person alive or living in Denmark and stays with them until death. Registration is compulsory by law and so coverage is over 99.9% complete. Few countries have such detailed data available and this study will be the largest study of its kind to date. The size of the population to be included (over 800,000 women) will add to the power of the study and improve the trustworthiness and reliability of the results. A statistical test known as survival analysis will be used to answer the research question by comparing women who had a previous Caesarean section with women who had a previous vaginal delivery and following them up to their next pregnancy. The rates of ectopic pregnancy, spontaneous miscarriage and time to next pregnancy will then be compared between the two groups to investigate whether or not prior Caesarean delivery is responsible.

This research will have potential impact nationally and internationally, regardless of whether a positive or negative association between Caesarean delivery and subsequent pregnancy loss is found. First and foremost, the findings will better inform women's decisions regarding delivery choice. We should never forget that Caesarean delivery is a major abdominal surgery and every surgery poses a risk. Education is the key to informed decision making and if women are made more aware of the potential benefits as well as risks associated with not only operative delivery, but all modes of delivery, then they will make the best

choice that suits their individual situation in conjunction with their healthcare providers. Secondly, the findings may influence policy makers and their decisions regarding healthcare budgets and expenditure. Finally, in light of the recently published UK National Institute for Health and Clinical Excellence (NICE) guidelines, which support a woman's right to request a Caesarean delivery without medical reason, there is an urgent need to establish whether mode of delivery has a causal effect on risk of infant death and a woman's overall fertility. This research is imperative as Caesarean section rates are now at the highest ever recorded, and unfortunately fertility is becoming more of an issue with one in six couples having trouble conceiving. Moreover, with only a handful of studies existing to date with conflicting results, inadequate sample sizes and poor research methods, the question of which mode of delivery really is the safest becomes crucial. Ultimately, the aim of this research is to delve further into the often controversial mode of delivery and subsequent sub-fertility question and add to the field of research to date. In the case of delivery by Caesarean section, "the first cut may not be the deepest but it may have lifelong affects".

The other 1%: designing and testing new platinum anti-cancer drugs.

John O'Donoghue

Department of Chemistry, Analytical and Biological Chemistry Research Facility, UCC

> For years I've been saying this is the first platinum-based drug we discovered (Cisplatin). It can't possibly be the best one. It's disappointing that the scientific community has not been able to find better ones.

> (Barnet Rosenberg 1926-2009)

Background

Designing new drugs with different molecular structures is one of the keys to treating the various types of cancer that kill over 8,000 people in Ireland, and 8 million people worldwide annually. Of the 16,000 cases reported in Ireland each year, only half of these survive, with lung and prostate cancer being the main causes of death through cancer on this island.

The precious metal platinum is used in a wide range of industries annually such as catalytic converters in cars, jewellery and some electronics. As well as these, approximately 1% of all the platinum produced each year is used for anti-cancer research.

In 1844 the Italian chemist Michele Peyrone reported the discovery of a chemical substance which would later become known as Peyrone's Salt. The molecular structure of the salt was then determined by another chemist, Alfred Werner, in 1893, as part of his 1913 Nobel-Prize-winning work. However, it was not until 1965 that the biological activity of Peyrone's Salt was discovered by the physicist Barnett Rosenberg of Michigan State University, at which time the substance then became known as cisplatin. Rosenberg initially discovered that by passing an electrical current through some platinum electrodes it generated a soluble substance. This substance turned out to be cisplatin, which he reported as affecting the growth of E. coli bacteria. The bacterial growth itself actually continued but cell division was stopped, resulting in long filaments of bacteria.

When confronted with these interesting research results, Rosenberg, as well as deciding to pursue them vigorously, also sought the help of other scientists outside his primary field. He enlisted the help and expertise of researchers trained in microbiology, inorganic chemistry, molecular biology, biochemistry, biophysics, physiology, and pharmacology. Cisplatin was subsequently introduced into clinical practice in 1971 and became one of the

most successful anti-cancer drugs of all time with nearly 90% success rates against testicular cancer alone. It is still one of the most effective forms of treatment for certain types of cancer, such as non-small cell lung cancer (NSCLC), oesophageal (throat) cancer and ovarian cancer.

Cisplatin also started a whole new area of anti-cancer research based on platinum. Platinum-based drugs can induce death in cancer cells by the formation of chemical cross-links in DNA. All cells, both normal and cancerous, need DNA to replicate in order to multiply and survive. Platinum-based anti-cancer drugs act like throwing a spanner in this machine by preventing the DNA from replicating.

There are currently three platinum based anti-cancer drugs approved for clinical use world-wide: Cisplatin (1978), Carboplatin (1989) and Oxaliplatin (2002). Although these drugs have revolutionised cancer treatment, they have some very severe side-effects, including suppression of bone marrow activity and causing kidney problems, among others.

Research into finding new platinum-based anti-cancer drugs with less severe side-effects and increased potency is ongoing at various levels, from chemical coordination studies to cancer cell testing and clinical trials.

My project

All of the platinum-based drugs synthesised in my PhD project are designed to be stable, have minimum toxicity and to be effective against various cancer cells. Learning from over 50 years of platinum anti-cancer research, I successfully designed and synthesised 14 brand new platinum-based anti-cancer drugs. After various studies with bio-molecules commonly found in the body, such as Glutathione, I concentrated the rest of my studies on two of the best drugs, due to their solubility and ease of synthesis in the lab.

In order for anti-cancer drugs to make it to the manufacturing stage, they need to be easy to produce on a large scale; therefore, the design of new chemical drugs needs to incorporate how they are made. The two drugs I began concentrating on can be made in a "one-pot-synthesis", which is almost unheard of for my particular type of platinum-based drugs, and makes them far easier to produce, should they get approved for clinical use.

Throughout the project the experimental procedures used to test the manufacturing of these drugs were completed on a very small scale, to ensure that the cost remains low. Most of the drugs produced were in a very pure form which is also essential for determining their activity towards cancer.

The drugs designed in this project, **Figure 1**, contain a platinum-carbon bond, which makes them much more stable and resistant to being attacked by bio-molecules within the body. Unfortunately the drugs were not soluble in water but some were quite soluble in
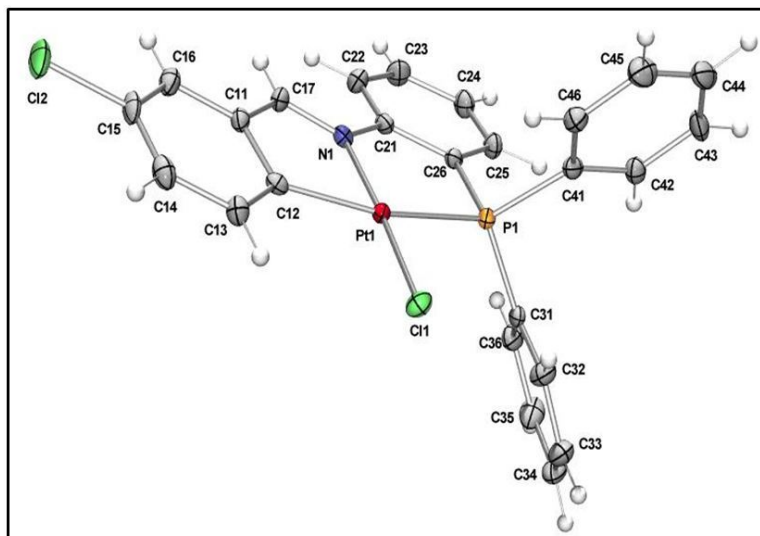
Figure 1: The flat, rigid molecular structure of a new platinum-based drug designed and made during this project. An atom of platinum (shown in red) is located at the centre and the drug is designed to slot into DNA strands of cancer cells.

ethanol and other organic solvents. The solubility of a drug is also very important for its success as many of them are given to patients in a solution by injection.

Testing on cancer cells

Two of my best candidate drugs were tested by the Cancer Research Facility in UCC under the supervision of professional cancer researchers. In a comparison test on human oesophageal (throat) cancer cells with Cisplatin (the main platinum anti-cancer drug currently on the market), my first drug (JOD1) was taken up (entered the cell) by an equal quantity of cancer cells, compared to Cisplatin. The second drug (JOD2), on the other hand, was taken up by almost four times the amount of cancer cells compared to Cisplatin over the same period of time, 24 hours, at the same concentration.

It can clearly be seen in **Figure 2** that the amount of non-viable cancer cells (cells that absorbed the drug) identified after 24 hours for my drug, JOD2, is significantly higher than those identified for Cisplatin. The five bars for each test substance represent progressively higher concentrations of the drug used in each test.

In a comparison of the tested cells after adding the drug it was also confirmed that there were significantly more dead cancer cells after addition of JOD2 than after Cisplatin. The method by which anti-cancer drugs kill the cancer cells is very important in determining whether it will cause side-effects during clinical trials in humans. Type II cell death causes the cell to "burst", leaving the nucleus behind, which in turn can cause problems later on for patients. Controlled cell death (Type I) is the desired outcome, as it uses the cell's own mechanisms to destroy itself and leaves very few remaining materials; as a result, this

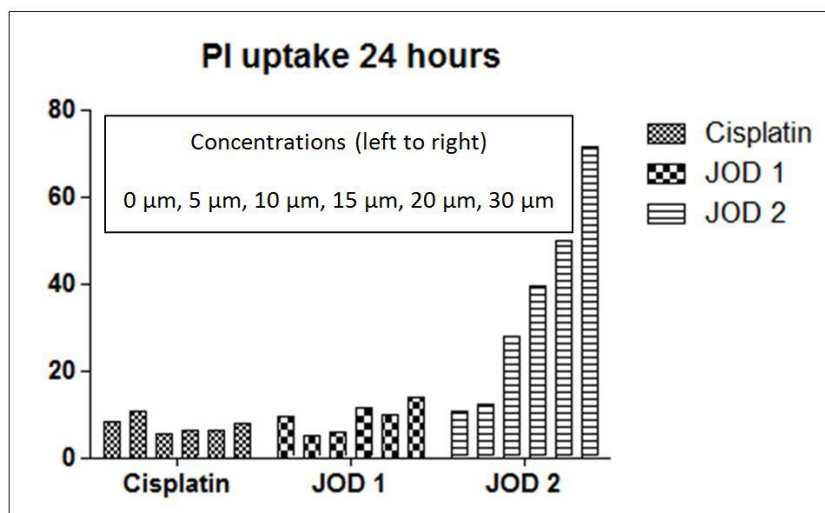The other 1%: designing and testing new platinum anti-cancer drugs.

JOHN O'DONOGHUE

Figure 2: Results from testing the platinum based anti-cancer drugs on cancer cells using five different concentrations, shown from left to right for each drug: 0 micromolar (μm), 5 micromolar (μm), 10 micromolar (μm), 15 micromolar (μm).

ensures fewer side effects for the patient.

This is one of the first reports in the world of this particular class of platinum-based drugs and the effectiveness of their action against cancer cells through inducing controlled cell death (Type I). This report will almost certainly make an impact on the continued research into further analogues of these drugs across the globe and, hopefully, assist in producing even better platinum anti-cancer drugs in the future.

On-going work

The next step with these drugs is to test for toxicity and confirm that they have fewer side effects than the current drugs available. From the tests already carried out, there are indications that JOD2 should have minimal side-effects in comparison to Cisplatin, but this remains to be confirmed. If these drugs, particularly JOD2, are found to have fewer side effects, then they will go on to be tested on further types of cancers, and eventually clinical trials with human patients.

The potential impact of these drugs on the treatment of certain types of cancer is enormous and, even with the results so far, it seems clear that this new structure of platinum-based anticancer drugs can be very effective against cancer cells by inducing controlled cell death.

What makes digital humanities, digital?

James O'Sullivan

School of English, UCC

> To be modern is to find ourselves in an environment that promises adventure, power, joy, growth, transformation of ourselves and the world — and, at the same time, that threatens to destroy everything we have, everything we know, everything we are. (Marshall Berman)

A Myriad of Terminology

While not quite a neologism at this point, the term "digital humanities" for some still bears a significant measure of ambiguity. What separates digital humanities from the humanities? Throughout this article, I will attempt to offer some clarity on this separation, outlining what it is that makes digital humanities, digital.

The field of scholarship now recognised as the digital humanities has not always held this particular mantle. Initially, this emerging discipline was referred to as "humanities computing", a term that gathered momentum as early as the late '70s, the evidence for which can be found in a quick n-gram of Google Books. N-grams offer an approach to probabilistic language modelling that can be used for a variety of purposes, in this case, to identify the frequency of a sequence of words in a set of texts.
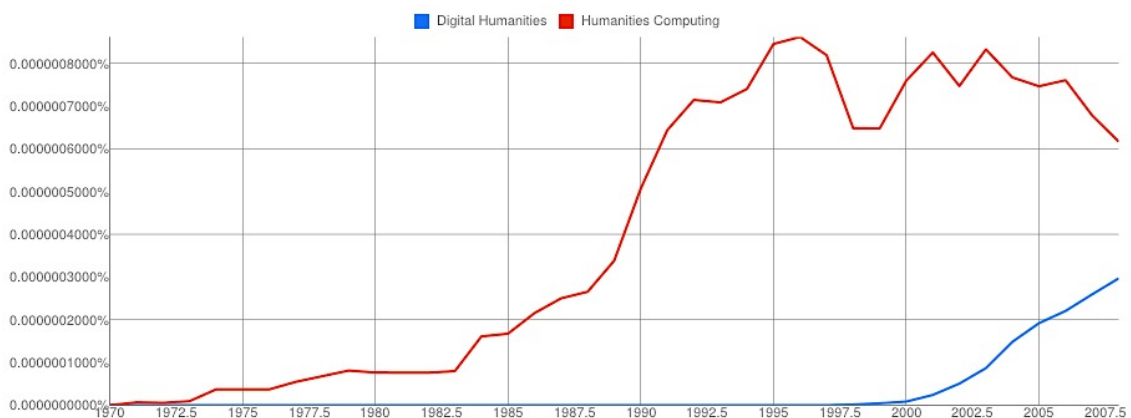

Figure 1: : Digital Humanities vs. Humanities Computing

Google Ngram Viewer is not a scholarly tool appropriate for research, but it is a good way of confirming any suspicions that you might have in relation to historical trends in public interest. One must take into consideration that Ngram Viewer currently only searches

up to 2008, and there has been a significant increase in the volume of literature within this particular field since then. Consequently, it is fair to say that this does not paint an entirely accurate picture. What it does show however, is that there was an explosion of interest in using technology to support humanist activities in the late 1980s, and that this continued right up until the turn of the century, at which point the growth in activity normalised somewhat. From the outset, the discipline was called humanities computing, and it wasn't until 2005 that the label of digital humanities emerged. In 2008, the former of the two terms was still very predominant, but the graph displayed in Figure 1 suggests that this trend was shifting; I'd very much doubt if there hasn't by now been a full reversal of those terms.

Many scholars and practitioners continue to use these two terms interchangeably, while others debate the legitimacy of applying the word "digital" across a broad spectrum of activities, many of which are focused on physical electronics and analogue technologies. As a result, those working within the discipline have devised and settled upon more specific terms that they feel reflect the particulars of their research with greater clarity. At any conference predominantly populated by digital humanists, you may find yourself traversing a myriad of terminologies: electronic scholarship, digital scholarship, computational analysis, electronic textual analysis, digital curation — and so forth. Essentially, all of these terms refer to academic pursuits that are concerned with the same thing: the place of technology in the arts and humanities.

Technology and the Humanities

Delineating the place of technology within the very many realms of humanistic study is a complex task. Technology offers the potential for new methodologies, augmenting traditional humanist research methods with empirical analysis that can be used to assist interpretation. Beyond its contribution to new methodologies, technology has been the driver behind complex shifts in the transmission and reception of cultural artefacts; in the creation of new knowledge, and in the exploration of old meaning. Technology has not just presented new modes with which humanists can interrogate and re-problematise old questions, but has itself given rise to a whole range of emerging issues that warrant deliberation. Let us consider each of these in isolation, beginning with the new methodologies being deployed by digital humanists.

My own research is partly concerned with computational stylistics, a branch of electronic textual analysis that seeks to use computers to find trends in literature. Computational stylistics combines statistics with linguistics in an effort to form authorial signatures which can be used to establish such trends, from which the interpretation of a text may then emerge. The key difference between this methodology and more traditional approaches is that the subsequent interpretation is based on an analysis that is supported by empirical
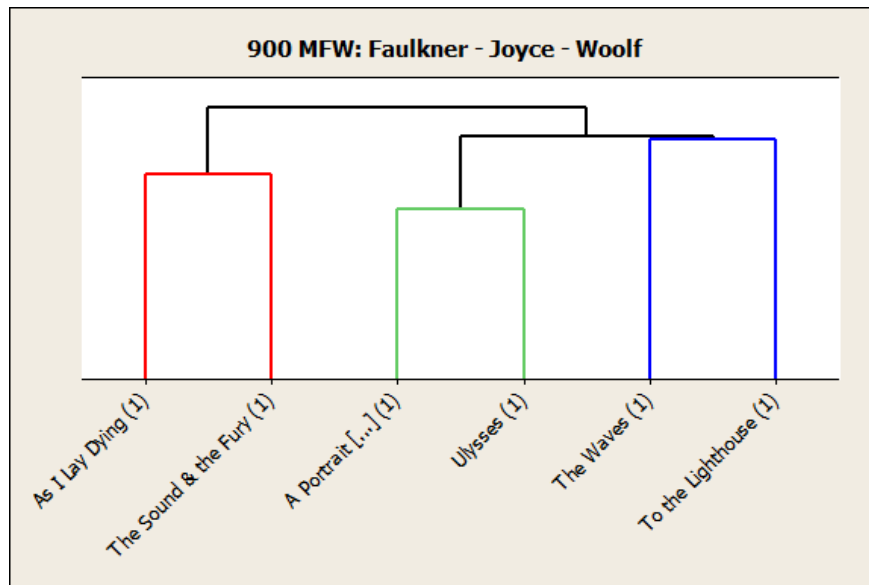
Figure 2: A cluster analysis of Faulkner, Joyce & Woolf

statistical findings. Conducting textual analysis in this fashion balances objectivity with subjectivity, offering additional evidence to interpretations based on close readings.

Electronic textual analysis can be used across all disciplines, but in computational stylistics, the focus is very much on literary texts, and the specific style used by an author in particular passages. One may be interested in authorship attribution, in which case a large sample from a writer's known corpus may be used to form an authorial signature to be tested against an unknown text, or a known text whose authorship is disputed. Alternatively, the focus may be on character dialogue, and the success with which an author is able to shape distinctive voices within their narrative. The limits are boundless, with some remarkable studies having already been conducted and published. Within computational stylistics, there are a range of statistically valid methods that can be used to examine a body of text, one of which is cluster analysis.

For illustrative purposes, I have produced a very simple cluster analysis, as shown in Figure 2, using a small sample of texts by the prominent modernist authors, William Faulkner, James Joyce and Virginia Woolf. The first step in this process was the creation of a most-frequent-wordlist, which can be produced using a variety of computational methods. Using the 900 most frequent words in each text, an authorial signature was formed, from which three distinct clusters were identified in a computer-generated dendrogram. Dendrograms illustrate hierarchical clustering, and thus can be used to measure the similarity between groups of texts. Reading the dendrogram in Figure 2 is relatively straightforward: the shorter the path between two titles, the more similar the authorial signature contained within these texts. For clarity, I instructed the system to colour-code the clusters. As can be seen, the computer has clustered the texts correctly, placing the two novels from each author within the same cluster, demonstrating that this method is entirely accurate. In-
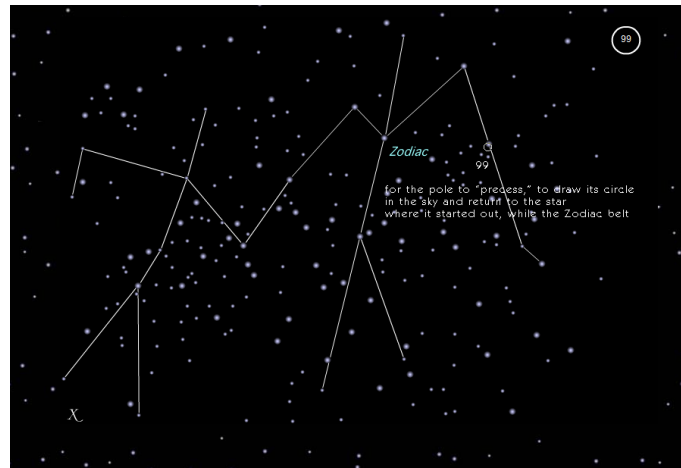
Figure 3: : Stephanie Strickland's *Vniverse*

cidentally, this data also shows that the novels by Joyce and Woolf are more similar in style than the Faulkner works. To reiterate, this is indicated by the proximity between the Joyce and Woolf clusters, although the difference is marginal. It is worth noting that, as this analysis was conducted for purely demonstrative purposes, the integrity of the textual data was not thoroughly checked.

As already noted, the study of digital humanities goes beyond the pursuit and use of new technology-based methodologies. Juxtapositions between the "old" and the "new" have caused complex shifts in scholarly consumption and artistic creation. Literature has experienced just such a cultural upheaval with many traditional literary practices having been merged with new media in an effort to achieve new forms of writing, style and textual construction. Consider Stephanie Strickland's *Vniverse*. Comprised of both a physical and electronic text, Strickland disregards the traditional separation between these differing media, using both forms in complement to generate a multiplex of reading possibilities.

Strickland's work is a textual construction that is not typically encountered in traditional literary practice: the reader's interaction determines the sequence of the piece. The text of the poem is either displayed based on the user's entry of a numerical value, which corresponds to a portion of the poem, or alternatively, on where the cursor is placed amongst the star-scape that appears on the screen, where constellations form, providing imagery alongside the text. Technology has provided authors with new aesthetics from which a new genre of electronic literature has emerged. The study of this literature is of particular interest to digital humanists, who hold an interest in both the electronic and literary elements that form such works.

What makes digital humanities, digital?

Let us return at last to the question at hand: what separates digital humanities from its traditional counterpart? Technology has long played an important role within the humanities. Scholars have been availing of increasingly feature-rich text processors, bibliographic software — even the printing press was once considered an advance in technology – the codex itself was once a form of new media. If such is the case, then why has this field of scholarship seemingly only recently emerged as a discipline? This might be attributed to ubiquity and sophistication. Technology has become ubiquitous, supporting the great majority of those activities that form our everyday lives. This exponential growth in the presence of electronic resources with rapidly progressing intricacies from which we can draw has led to change that requires assessment. It is on such explorations that the focus of digital humanists are centred. Digital humanities is more than the use of technology to display research findings in electronic form. Rather, it resides at the juncture between complex or novel uses of new media and traditional humanities research and artistic endeavour. It is concerned with the use of technology to reproblematise humanist questions, or oftentimes, the exploration of technology from humanist perspectives.

Digital humanities does not seek to replace the traditional fields that humanists have occupied for centuries, but rather, facilitate the study of how our new environment has impacted on such, and analyse the products of these transformations.

'Comfort Women' and the politics of responsibility

Gyunghee Park

Department of Sociology, UCC

Introduction

Japan's brutal military occupation of Korea from 1910 until the end of the Second World War is generally remembered as a period of grave injustice which has defined a large part of what it means to be Korean. Though the list of crimes is vast, today it seems that one of the most barbaric offences committed at the time was the formation of 'comfort stations' – a euphemistic term used to describe the sexual exploitation of mostly Korean women by the Japanese military and government. After a decisive end to Japan's military conquest of control over the Asia Pacific with the atomic bombings of Hiroshima and Nagasaki, former 'comfort women' were silenced for over half a century by a deeply systemic sense of shame. Korean patriarchy pressed many survivors to hide their plight or even back into different sectors of the sex industry. However, South Korea's democratization in the late-1980s and the rise of feminist movements and support groups provided platforms for survivors to step forward in the early 1990s, ultimately culminating in the politicization of the 'comfort women' issue.

Nowadays, the majority of Korean expats and nationals may not have experienced colonization or work in the 'comfort stations' first-hand, but they continually cultivate these memories through films, books, museums, and so forth to create and maintain a common identity. Sociologists refer to this as a 'cultural trauma'. This is basically when a group of people undergo a harrowing event so disruptive that it leaves an indelible mark upon their group consciousness. Traumatic events in history can be quite vigorous. As such, it is common for these experiences of group suffering to be carried through generations.

My PhD aims to study how these retrieved memories have come to be shaped by notions of justice and human rights ideals by examining the 'comfort women' redress movement and its international reception. Specifically, my research will examine the trend of official representations of the 'comfort women' memories in South Korea, Japan, and the U.S.

While modern Japanese society has tried to come to grips with their history of violence as well as their own experiences of victimhood (i.e., Hiroshima/Nagasaki), the West seems to exhibit a general sense of amnesia toward the violence in the Far East that coincided with a time revered as the great victory against fascism, the Nazis, and the end of the Holocaust.

Nevertheless, as the early 1990s also ushered in a shifting recognition of gender-based violence in times of conflict as violations of human rights, and rhetoric redefining rape as a weapon of warfare in reaction to the Bosnian 'rape camps' — the international community was primed to start remembering as well. Thus, my research will also address how multiple perspectives and contexts shape the general narrative.

The Asia-Pacific War and the 'comfort stations'

After many years of attempted negotiations with Russia, the United States, and Britain; Japan annexed Korea on 29 August 1910 and began a 35-year military rule over the then unified peninsula. However, Japan's imperial conquest of the Eastern Pacific did not end there as the Asian aggressor continued into mainland China (Shanghai, 1937; Hong Kong, 1941), the Philippines (1941), Guam (1941), Burma (1941), the Dutch East Indies (Indonesia) and Dutch Borneo (1942), Singapore (1942), the Solomon Islands (1942), and even the edges of India (1942). What has been known in much of the West as Europe's battle against totalitarianism coincided with the spreading of another brand of barbarism on the other side of the globe. Yet the acknowledgement of what made World War II a *world* war has yet to receive the kind of attention as events like the invasion of Normandy or violence of Auschwitz. In the East, Japanese colonization and the conflict that ensued has been predominantly referred to as the Great Pacific War or the Asia-Pacific War. What's more is that it has been a source of contention for the entire region since.

Also, depictions of violence are often masculinized. In 2011, Gloria Steinem pondered publically why it had taken 65 years to reveal the rape of Jewish women during the Holocaust. She asked, 'Why were they ignored?' and why it took 65 years to recognize that rape is a weapon of war. The unpleasant truth of the matter, however, is that gender-based violence against women has been going on for longer than 65 years. Nevertheless, it was not until the end of 1993 that the UN formally recognized the issue by ratifying the Declaration of the Elimination of Violence against Women, and in 2008 that they formally recognized rape as a 'war tactic'. So, the world's official memories of war still have much to recollect beyond the forgotten battles in faraway lands; they must also work toward remembering the silenced battles that are still prevalent today. The 'comfort women' are a prime example.

Japan's 'comfort stations'

In 1932, the first officially documented 'comfort station' was said to have been established in Shanghai, China. When the Nanking Massacre (a.k.a. Rape of Nanking) in 1937 initiated an onslaught of condemnation from the international community, the Japanese military and government was confronted with the problem of wartime rape perpetrated by

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their soldiers. At the time, it was concluded that men's carnal desires were inevitably unstoppable. A formal system that would theoretically eradicate the spread of venereal diseases and mass sexual violence was put forth. Hence, the 'comfort stations' soon spread throughout the occupied territories and the systematic recruitment of women began. Though the first 'comfort stations' employed working prostitutes from Japan, high demands led the government and military to look elsewhere. It is now estimated that up to 90% of 'comfort women' were Korean, and approximations of the number of women coerced into the stations range up to 300,000 (and as low as 27,000 — depending on who or where the information is coming from). Though there are reports of young women being forcibly taken from their homes, there is also evidence that some had joined the 'comfort stations' of their own volition for better living standards, as wartime often coincides with a rise in poverty. Also, the strict patriarchal culture of Korean society also led women to seek opportunities elsewhere, regardless of what they may have entailed. Some survivors recall having to service on average 70 men a day before battles, while others remember being with a few every week for up to three years of the war. While the general story told around the world simplifies the 'clients' as having been Japanese and the 'comfort women' as having been Korean, Japan found women from all their colonies and sometimes the soldiers had been Korean. In the end, many women were murdered, pressed to commit suicide, or left for dead, and years of shame denied them an opportunity to make their struggle public. To date, there are less than 70 registered survivors (from Korea, the Philippines, China, Indonesia, and the Netherlands).

The 'Comfort Women': movement for redress

Remembering and Forgetting: The Complications of Justice

Like individual memories, collective memories are not static. Memories have their own histories, and the relationship we share with them changes profoundly through time as we ourselves change through time. Moreover, not all massive disruptions become traumatic. Because trauma is not solely the result of a group's suffering, but of collective actors 'deciding' to represent social pain as an essential danger to their sense of who they are, where they come from, and where they want to go; the continued existence of memories is a selective process.

Between the late 1980s and early 1990s, when the memory of the 'comfort stations' began to take hold in regional mainstream discourses, 'comfort women' slowly spread into international consciousness as well. In 1991, Kim Hak-Sun became the first survivor to testify publically against the Japanese government, and was received by a worldwide audience. Koreans were quick to rally behind her, and since most of the 'comfort women' were Korean, South Korea has spearheaded the long-awaited call for justice. Though public sen-

timents in Japan are ambiguous, with some groups being passionately behind the call for redress and others not, many Japanese politicians have generally denied victims' claims or refused to take responsibility, and their apologies have been criticized as 'insincere'. The time also ushered in a shifting recognition of gender-based violence in times of conflict as violations of human rights. As such, the West was in position to start remembering as well — that is, in terms of the many Asian women who had been working in the 'comfort stations'. Japan had forcibly recruited some Dutch women living in Indonesia at the time, and a war time tribunal took place in 1948 on behalf of 35 of these women. Asian women were not considered in the trial. The same was true for the Tokyo War Crimes Tribunal in 1946, but in the latter case the 'comfort women' issue was not included at all.

Today, the matter has generally been woven as between the 'comfort women' and the state of Japan, but the memory is much more complex. With evidence of Korean-Japanese and U.S.-Japanese collaboration in the 'comfort systems', justice is more complicated than the common narrative. Moreover, most memory analysis of the 'comfort women' issue has centred on the nationalistic tendencies of the South Korean government and redress movement versus the Japanese nation-state in competition for recognition of their respective 'truths', but there has not been much said for how memories are no longer exclusive. With many ethnically Korean and Japanese people living in the U.S., the interest in the redress movement there has been exceptional to the rest of the Western world — but that is not to say the rest of the world is silent. The 'comfort women' redress movement has harkened the international community to demand apologies from the Japanese government with great vigour, and there have been resolutions adopted in the U.S. Congress, the European Parliament, and the United Nations.

Understanding the narrative using a discourse-historical approach

What is of utmost interest to my study are the terms used to describe the 'comfort women' and how their portrayals are then utilised to pursue justice in their name. In other words, I will examine the grand narrative that has been purveyed by activists, scholars, politicians, and media in Japan, Korea, and the United States with regard to this issue. Using a critical discourse analysis, which is the examination of what and how we speak about different topics, my aim is to compare and contrast the transformations in the memory of 'comfort women' over time. More specifically, I will be using a discourse-historical approach, which is the investigation of the historical and political contexts of texts. This means I will be studying anything from monuments and museums to news media and documentaries made during the period under review (1937 — 2012) about the 'comfort women' while making sure to include the changes of historical and political settings in each country as well.

Generally speaking, the majority of works in this regard have taken a broad view of distinct publics as different because of culture or religion alone, and have ignored the many other

ways in which people see themselves (for instance, by class, morals, or politics). My aim is to fill this gap in research using the aforementioned method, which suits to analyse the multiple layers of meaning embedded in what and how people speak and write about the 'comfort women'.

At present, I have compiled a detailed profile of key dates, actors, and works on the 'comfort women' issue. This has included (inter-)national political and discourses in the press and media; commemoration and apology discourses (i.e., museums, monuments, public demands for apologies and their terms); and documentaries, films, journal articles and books. To supplement my analysis of multiple discourse types, I will conduct interviews with eye witnesses, activists, and expert researchers; thereby adding an ethnographic dimension. Because the voice of former 'comfort women' themselves will form a central component of my examination, making trips to sites of memory production are crucial to my ability to yield accurate research. As such, I will go to Korea to speak with them and document various renditions of 'comfort women' memory at the source of its production, so to speak, and travel to Japan to do archival research. Additionally, I plan on visiting New Jersey and California (U.S.A.) to interview memory carrier groups (i.e., second generation survivors). With large Korean populations in both states, public protests and calls for apologies have been quite strong on either coast of the U.S. Finally, the third year of my thesis will be devoted to the analysis and write-up of my empirical data, and I will assess how struggles amongst competing voices are played out across the period under review (1937-2012).

Conclusion

The world's official memories of war still have much to recollect. In a world where we coexist, we share a history and we share a future. Our understanding of other's suffering is not a matter for the 'guilty', but a matter for us all. Why don't we all know about the 'comfort stations' or rape in times of conflict? Survivors are near the end of their lives, and have waited over 70 years for recognition. Understanding how justice is pursued in their name and how it will be pursued in times ahead is crucial not only to community identity, but more generally to the social life of human rights. Despite the general masculinization of war and our recollections of conflict, women have been the main targets of gender-based violence for as long as humans can remember, even if they chose not to. I intend to show in detail how witness testimonies of trauma can have a transformative impact upon representations of historical self when a society becomes receptive to notions of counter voice and memory.

Is Irishness part of the joke?: Martin McDonagh's drama on the Galician stage

Elisa Serra Porteiro

Department of Hispanic Studies, UCC

Introduction

My PhD research analyses Irish and Irish-themed plays that have been translated and performed in Galician, a minorised language spoken in Northern Spain, from J.M. Synge and W.B. Yeats to Martin McDonagh. What motivated the translation of their works? How is the adaptation process carried out? What impact have they had and continue to have? Ever since the publication of the first translations in the 1920s, the interest in Irish drama has persisted and is at present as strong as ever, with recent productions of Martin McDonagh's works enjoying successful runs on the Galician stage.

Since the mid-1990s, McDonagh has forged himself an international reputation for his daring plays and scripts, received with a great degree of enthusiasm and nearly equal measures of disapproval on the part of audiences and critics. The reactions range from flattering epithets such as "Tarantino-comes-to-Connemara" to accusations of paddywhackery and of the resurrection of the offensive "stage-Irish" in the bodies of the dysfunctional, sociopathic characters that he depicts. However, while McDonagh's works have travelled extensively, these censoring voices have not always accompanied his plays beyond Ireland. Clearly, pre-existing assumptions of Irishness affect the reception of such cultural products in other contexts. Not only that, but audiences' understanding of their own national identity can influence their reading of a play loaded with references to Irish culture, as is the case in Galicia.

The Far West

It is perched on the Atlantic. It rains. It rains a lot. The loss of population due to economically-motivated migration has shaped its social structure and the level of urbanisation is traditionally low. Sometime in the 15th century, it lost its political independence to powerful imperialist monarchs. It could be Ireland. But it isn't- it is Galicia, one of the seventeen autonomous regions that nowadays constitute the Spanish state. These and other similarities with Ireland, which could be easily applied to several other European regions, were utilised by the emerging Galician nationalist movement in the early 20th

century as a means to legitimise political claims. Ireland had achieved independence and, according to the nationalists, Galicia could rightly pursue the same goal. Beyond the political arena, the belief that the two regions shared Celtic roots became embedded in the collective subconscious and has often been referenced in Hispanic literary circles beyond the Galician context. Such a degree of identification is bound to shape the incorporation and reception of any cultural product perceived to emanate from Ireland, regardless of the authenticity of its origin; Martin McDonagh's plays are no exception.

Not Irish enough?

Born and raised in London to Irish parents, McDonagh's borderline national identity comes up repeatedly in commentary about his works. Despite the fact that he himself has avoided pronouncing on his own degree of Irishness, the issue continues to be debated at length. In the case of many other authors with liminal identities, the question of nationality is merely a shadow in the background. Why is it constantly highlighted when it comes to Martin McDonagh? It would be simplistic to attribute this preoccupation solely to the author's "Englishness", as this would imply ignoring the trigger of the debate – his works.

In Ireland, Martin McDonagh's detractors place ethnic characterisation and the action of the plays at the same level, pointing at an offensive association of Irishness and questionable conduct, depletion, lack of education or sociopathic behaviour. His character portrayals are sometimes considered insulting and have been labelled in the media a "mockery of Ireland", a resurrection of the "stage-Irish fool" and "paddywhackery".

It is worth noting that stereotypes are largely recognisable as such by the described social group, while for outsiders they are often regarded as almost inevitable descriptive generalisations. In this line, the sin of "paddywhackery" can only be committed by the other, by someone who does not truly belong.

Irishness is in the eye of the beholder

Some of the most controversial aspects of McDonagh's plays connect to the way in which he bestows Irishness upon his characters. In the so-called "Leenane Trilogy", the action takes place in a location homonymous to the Co. Galway town. However, several geographical references do not correspond to its real-life counterpart, hinting towards a fictitious dramatic setting while still maintaining the illusion of realism that allows McDonagh's work to reach out to the spectator. Also, the use of distinctly Irish phraseology, slang and turns of phrase provides characters with an ethnic identity, to the point that the speech of these dramatic personae is so consistently loaded with Irish features as to undermine its verisimilitude. In all three Leenane-set plays, we find abundant cultural

references that tie action and dialogue to an Irish context – Kimberleys and Jaffa cakes, poteen, Taytos, etc. In the frame of realistic depiction created by those markers, the inhabitants of this stage-Leenane exhibit dysfunctional, questionable and violent behaviour, sometimes so absurd or extreme that they slide into the caricaturesque.

Inevitably, all of these characterisation strategies operate at a different level once the plays are subjected to a translation process. Cultural references are decoded by translators, directors, actors and other participants in the process, who then must encode them again, to a greater or lesser degree, to confer them with meaning for the intended audience. Approaches can vary but translation always occurs in a specific socio-cultural context and is affected by stakeholders' preconceptions, prior experiences and perceptions of their own identity.

In the case of Galicia, the importation of Irish cultural products has historically been affected by the mystified connection between the two nations. Ireland is not only a political model but also somewhat of a mirror image of Galicia. In the course of an interview, I asked Avelino González, translator of the Leenane Trilogy into Galician, why he had taken the initiative to work on these plays: "I read McDonagh and I said to myself: "Damn, these guys are us"".

Figure 1: *Un cranio en Connemara/A Skull in Connemara* by Producións Excéntricas (2010). Photo: Pablo Silva

Conclusion

Instead of being problematic, Martin McDonagh's stereotyped – or rather, typified – representation of Ireland is utilised on the Galician stage. The borderline absurd realism of the plays is maintained and so is the empathic acting approach. The characteristic Irish lingo is replaced by a dialect of Galician vaguely linking the action to a coastal area. And the stage is filled with cultural references that transport the audience to Ireland – the calendar with *The Quiet Man* on it, the Manchester United "Keane" jersey, and the traditional music. It is not a question of authenticity; it is all wholly about providing a code that effectively connects with the stalls. If the reception of the plays in terms of reviews and attendance is anything to go by, we can talk about a success story. Others would simply call it "paddywhackery".

Further Reading

González, Avelino. Personal interview. 6 Sept. 2011.

McKinty, Adrian. "Is Martin McDonagh Irish Enough?". The Psychopathology of Everyday Life: Adrian McKinty's Blog. 10 Feb. 2009. 4 July 2012. http://adrianmckinty.blogspot.ie/2009/02/is-martin-mcdonagh-irish-enough.html

MacDonald, Henry. The Guardian profile: Martin McDonagh. 25 April 2008. 4 July 2012, http://www.guardian.co.uk/film/2008/apr/25/theatre.northernireland

O'Neill, Elizabeth. Theatre Review: The Lieutenant of Inishmore. 1 Oct. 2003. 4 July 2012, http: //www.rte.ie/ten/2003/1002/inishmore.htm

Olives, Oysters and Oranges: A new way of reading James Joyce's Ulysses

Flicka Small

School of English, UCC

Introduction

James Joyce's *Ulysses* tells the story of a day in the life of a city. The city is Dublin and the main protagonists are Leopold Bloom, an advertising canvasser of Jewish race; his wife Molly, a singer who is having an affair with a concert promoter Blazes Boylan; and Stephen Dedelus, an aesthetic young teacher.

In eighteen episodes, Joyce uses Homer's *Odyssesy* as a framework for his novel. Each episode is represented by a bodily organ which gives life to the city. Each episode also has an allotted hour of the day, and meals chart the progress of time. Bloom is introduced in Episode 4, 'Calypso', making breakfast in bed for Molly, and cooking a kidney for himself. Other episodes that I have mentioned in this paper are 'Lestrygonians', the land of the cannibals, which is almost entirely about food; 'Cyclops' which takes place in a pub; 'Circe' in a brothel; 'Ithaca' at the Bloom's home where Leopold makes cocoa for Stephen and tries to entice him to come and live with them; and 'Penelope' which is narrated in Molly's own voice, from the bed which has recently been vacated by Boylan.

This thesis looks at how food references are embedded in the text in a discourse that often has very little to do with food itself. By using a close critical reading of the primary text and an analysis that is based on archival, sociological and literary readings, I wish to prove that Joyce created a meta-text that not only used the visual, aural and olfactory representations of food to contextualise a city trapped between the famine and Irish Independence, but to make inferences such as Stephen's rejection of solid food being related to issues of identity, and Bloom's eclectic tastes in food as a sign of his otherness.

Methodology

Firstly I look at how Joyce uses this language of food to represent and authenticate the city. The city can be de-coded through the tangible evidence of newspaper cuttings, advertisements, diaries and his own letters, written at the time.

Secondly I look at how Joyce uses this language of food to engage with topics such as ritual, time, gender, politics, and otherness.

Figure 1: Tim Booth 'Ulys'

The result of this exploration is to show that Joyce's language of food adds to and enhances our understanding of *Ulysses*. Building on the body of work that has already been carried out on the text, which primarily references alimentary and digestive issues, I hope to make the novel much more accessible. A psycho-nutritional reading can be used to look at the significance of food items that Joyce chooses, other than merely their requirement to fuel the body. Similarly the choices that Bloom and the other protagonists make point towards a cultural or political signification.

Joyce carefully chose every food item in *Ulysses* and each food that is selected is repeated throughout the text. Foods that first appear as an innocent ingredient for breakfast or on a market stall, become inflated with other or additional meanings. I call this Joyce's food language or a meta-text, because by holding these individual items up for inspection, a whole story can be disentangled from each one. Whilst Joyce is initially depicting everyday life, the food becomes a fantastical means of escaping reality, particularly where it evolves, and returns in the hallucinatory brothel episode 'Circe'.

Olives, Oysters and Oranges

In the 'Ithaca' episode Bloom sees 'Four black conglomerated olives wrapped in oleaginous paper' languishing on the dresser in his kitchen. An unusual food, perhaps, to be found in the house of a lowly advertising canvasser, but Bloom seems to be familiar with many

exotic foods, possibly because he was raised in the Jewish area of Dublin called Clanbrassil Street, where ethnic foods would have been more readily available. Indeed olives *were* for sale in Dublin, in Findlater's price list for 1904 they are listed at 7d a jar. They were also for sale in Davy Byrne's bar where Bloom contemplates eating them in a salad. This is a typical example of where historical fact intersects with literary fiction in the text. Bloom shows his familiarity with Mediterranean foods when he reads a handout from the model farm at Kinnereth, in Palestine, where the land is planted with olives, oranges, almonds and citrons. Ever practical, he considers how olives would be more economical to produce because they wouldn't need much irrigation. In his mind's eye, he can imagine attending to the pruning and ripening of the silver powdered trees and packing the olives in jars for sale. In this way he is able to escape the grey and paralysing atmosphere that he sometimes associates with Dublin. Once, he bought some olives for Molly to try but she spat them out. He thinks this is to do with the taste of them but later in the 'Penelope' episode she says that she could never bear to look at them. The drinkers in Barney Kiernan's pub associate Molly with olives too because of her upbringing in Gibraltar where 'loquat and almond scent the air'. 'The garths of olives knew and bowed to Marion of the bountiful bosoms,' one of them comments. Bloom, who continually ponders on, and enquires about the workings of, the world around him adds olives to the supper table in his imagined painting of '*Jesus in the house of Mary and Martha',* which is in itself a meditation on the meaning of thought and the realm of ideas.

Similarly, Bloom is able to visualize oranges when he reads about them. He knows that they are packed in tissue paper in crates. Simultaneously he thinks about some friends of his in Dublin with the name Citron, whilst envisaging crates lined up on the quayside in Jaffa, handled by 'navvies in soiled dungarees'. This is in 'Calypso', the first of the Bloom episodes, but by episode 17, 'Ithaca', he is still contemplating the reclamation of land for the cultivation of orange plantations, now adding that they should be fertilised by human excrement. These are the simple and everyday (albeit Mediterranean) connotations of growing oranges, but the word orange has other nuances. In 'Nestor' Mr Deasy, the headmaster, says to Stephen, 'I remember the famine in '46. Do you know that the Orange Lodges agitated for repeal of the Union twenty years before O'Connell did…?' thereby referencing the famine and opening up issues of Unionism in a political thread which will run through the text and be exploited in a farcical rendering of a horse race in the nightmarish 'Circe', where the Orange Lodges goad Mr Deasy to 'get down and push mister. Last lap'. The two fruits, olive and orange, are brought together in the facial features of Bella Cohen, the Madam of the brothel, who has an olive complexion with orange tainted nostrils. 'Married I see,' she accuses Bloom, 'and the missus is the master. Petticoat government.' Anticipating 'Penelope', in which Molly remembers how Bloom beseeched her to lift her *orange* petticoat so that he could rub his trouser leg against her.

Oysters were not an exotic food in 1904, 2/6 a dozen according to Molly, although Bloom thinks the price is kept up by throwing half the catch back in the sea. Molly accuses the

maid, Mary Driscoll, of stealing oysters from their kitchen and gives her one week's notice, ostensibly for the theft, but more likely because she suspects Bloom of having a dalliance with the maid. Then, as now, oysters carried overtones of sexuality and aphrodisia. Bloom says as much in 'Lestrygonians' when he gazes along the food shelves in Davy Byrne's bar, but he also draws attention to how they are reared on sewage and he is inevitably reminded of Boylan. Molly's thoughts also move from the maid and the oysters to Boylan, who, she thinks, must have been eating a lot of them judging by the size of his member and the way he sang during their lovemaking. Seconds later she confuses a story she has heard about a chastity belt with an oyster knife, which is surely not a coincidence. Like the other foods, oysters prefigure their interpretation in 'Circe', where Mary O'Driscoll appears as a witness accusing Bloom of inappropriate behaviour, and an apparition of Virag Lipoti (Bloom's grandfather) is given the lines, 'Red Bank Oysters will shortly be upon us. I'm the best o'cook. These succulent bivalves may help us . . . Though they stink yet they sing'. To which Bloom replies absently, 'Ocularly woman's bivalve case is worse. Always open sesame. The cloven sex.' Oysters were, of course, forbidden by Jewish dietary law and Bloom never eats them himself.

Conclusion

These are just three examples of hundreds of foods that are referenced in *Ulysses*. Each food, deconstructed, points to a subtext that says much more about Bloom and about the city. A thread can be pulled, bringing together food items in their literal sense with more nuanced interpretations, until they are woven into a rich language. The authenticity of the city is established and through Bloom's interaction with it we can see his vulnerability, his exclusion and his otherness. His choices around food can be seen sometimes as a desire to escape and sometimes a wish to conform. What we eat on what occasions makes for a ritual within the society we belong to, and defines who we are. Bloom knows that it is the kind of food we eat that makes us what we are. Bloom says that vegetarian food can make you 'poetical' but 'you couldn't squeeze a line of poetry' out of 'one of those policemen sweating Irish stew into their shirts.'

When Joyce was editing the proofs of his manuscript with many revisions and additions he was making a major shift from mere facts to symbolism. I believe the importance of my research is to unravel the food clues and interpret them as a language that will provide an innovative and contemporary reading, bringing Joyce's great masterpiece to a wider audience, whilst academically enriching the field of study that has already been undertaken.

The art of conversation between plants and bacteria

Siva Linga Sasanka Velivelli

School of Biological, Earth & Environmental Sciences, UCC

Introduction

Plant pests and pathogens have been a serious problem for farmers for many years and have been a major threat to plant health and food production. Farmers use synthetic chemicals to improve crop yields and to control plant pathogens from destroying their crops. Chemical-based fertilizers provide immediate relief, but their excessive use also causes severe environmental problems and can have adverse effects on groundwater, plants, animals and even entire ecosystems. Many countries have banned highly toxic chemicals which are harmful to the environment. One of the key challenges facing plant biologists is the development of new technologies and environmentally friendly alternatives to chemicals for combating crop diseases. An increase in world population has resulted in a reduction in agricultural land area. However, this area will be required to produce 50% more food by 2050 to feed the 10 billion people living on the planet.

Biological control plays an important role in agricultural systems. It is considered one of the most promising methods for safe crop-management practices and is one area of rapidly expanding research. Biological control is defined as the use of beneficial microorganisms, such as bacteria, to control plant diseases. Bacteria are microscopic, single-celled organisms present in all soil samples. Plant roots interact with the surrounding soil and support a range of microorganisms that can have either a harmful or beneficial effect on the plant. Nowadays, emphasis is placed on beneficial microorganisms which play a key role in soil structure maintenance, soil borne disease control and plant growth promotion activities. These beneficial microorganisms are known as plant growth-promoting rhizobacteria (PGPRs) ('Rhizo' means root).

Plant growth-promoting rhizobacteria (PGPRs) are free-living soil bacteria (bacteria capable of living in a wide range of natural environments) that colonize root surfaces and have the capacity to enhance plant growth directly or indirectly. PGPRs have gained worldwide importance over the last few years. These can reduce plant diseases without a negative impact on the environment unlike that caused by chemicals. Plants are exposed to attack from a wide variety of enemy organisms (insect pests, pathogenic bacteria and fungi) and stressful environmental conditions. In order to protect themselves, plants have defence mechanisms to fight against their invaders. As part of their defence mechanism, plants

emit a range of volatile organic compounds (VOCs) from leaves, flowers and fruits into the atmosphere and from the roots into the soil. Volatile organic compounds (VOCs) are chemical compounds that generally have a high vapour pressure. These volatiles help in communication to the outside world and can carry both private and public messages and transmit information within a plant and potentially between plants. VOCs that are released from infected plants can serve as airborne signals and can be used as alarm-cues. These airborne signals warn neighbouring plants about pathogen attack and elicit the activation of the defence mechanism thus allowing for a stronger response in future attacks.

How is the plant defence mechanism activated? It is through the use of plant growth promoting rhizobacteria. Rhizobacteria also release a wide variety of volatile organic compounds which stimulate plant growth and suppress the growth of plant pathogens via VOC emissions. Different rhizobacteria release different volatiles and these can serve as a mode of intra-and inter-species communication between plants and rhizobacteria. Some rhizobacteria release 2,3-Butanediol. This is a VOC which can promote plant growth and can interact with plants in many different ways by triggering a plant-mediated induced systemic resistance (ISR). ISR is defined as a state of enhanced defensive capacity developed by a plant against a broad spectrum of plant pathogens and pests. In recent years, plant scientists have become interested in the use of rhizosphere microorganisms that release a complex blend of volatile organic compounds in a way that can influence plant health and play a key role in the suppression of plant pathogens. In this present study, a commercial rhizobacterial strain, *Bacillus subtilis* FZB24, was used as a model to develop the system at the laboratory level for the early detection and selection of novel PGPRs that may have potential as biocontrol agents in crop production.

My Research

My research project (VALORAM -Valorizing (meaning- adding value or to assign value) Andean microbial diversity through sustainable intensification of potato-based farming systems (using rhizosphere isolated from the Andean potato)) aims at exploring the large biodiversity of existing soil microorganisms for their ability to antagonise (ability to suppress plant pathogens), promote growth and protect against disease in Andean traditional agriculture (In the Andes, potato plays a central role in livelihood systems and many people still use foot ploughs for farming). This could help to reduce excessive use of agrochemicals and support sustainable agriculture and environmental protection. This project was focussed on potato because of its global importance for small-scale farmers in the central Andean highlands (Ecuador, Peru and Bolivia).

A commercial rhizobacterial strain, *B. subtilis FZB24* (using rhizosphere isolated from the Andean potato) was used as a model at the laboratory level for the early detection and

selection of novel PGPRs through characterisation of an array of their volatile organic compounds.

A rhizobacterial strain was grown in a liquid culture to gather a rhizobacterial volatile, a solid phase microextraction fibre (SPME — a technique for the extraction of volatile organic chemical compounds from liquid), coated with polydimethylsiloxane was used. In this process, chemical vapours rise above the liquid test sample and stick to the fibre. The fibre (SPME) was then placed in the Gas chromatography machine coupled with mass spectrometry (GC/MS — It is a technique that can be used to separate and identify chemical compounds) to detect VOCs produced by the commercial rhizobacteria (Fig.1). i. vials inoculated with rhizobacteria, ii. Extraction of volatiles by SPME, iii. GC-MS analysis.

Figure 1: Analysis of rhizobacterial volatiles by SPME-GC/MS (Copyright: Shimadzu GC/MS)

Findings

This research examines the detection of volatile organic compounds (VOCs) emitted from the commercial rhizobacterial strain, namely, *B. subtilis FZB24*.   The GC-MS analysis identified different volatiles in laboratory conditions. Among these, 2,3 butanediol seem to be the most promising compound because, 2,3-butanediol can trigger the greatest level of growth promotion in plants. (Ryu et al., 2003). A number of antifungal compounds were also detected including 1-decanol and 2-hexen-1-ol which suppress the growth of the plant pathogenic fungi (Archbold et al., 2003 and Kai et al., 2009). A Gas chromatogram (Chromatogram is the visual representation of a chemical compound) of volatiles from the commercial rhizobacterial strain is shown in Figure 2.

> Gas chromatogram of volatiles from the commercial rhizobacterial strain (Bacillus subtilis FZB24) where 2,3-butanediol (1) was found. (Identification of the chemical compound was confirmed by the comparison of the retention time (retention time: time taken for a chemical compound to come out of the gas chromatograph) of the chromatographic peak (1) to a sample pure chemical compound.
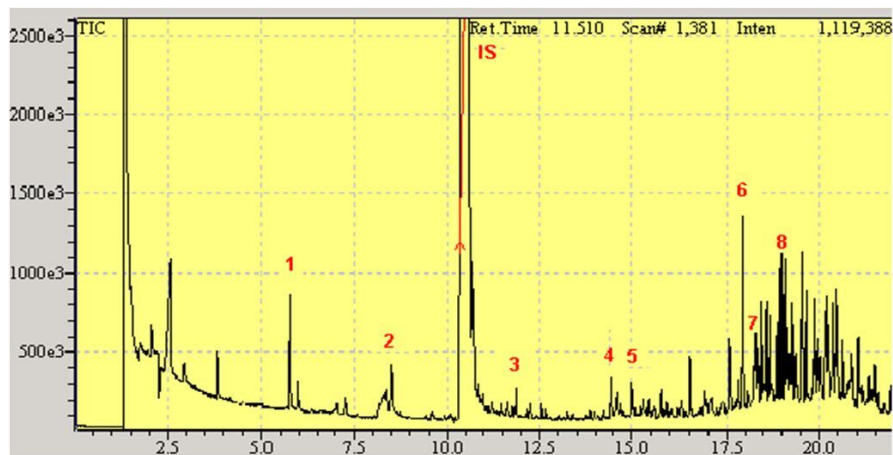
Figure 2: Gas chromatogram of volatiles from the commercial rhizobacterial strain

Conclusion

Rhizobacteria that promote plant growth and yield have gained worldwide importance in recent years and offer an attractive way to reduce the use of chemical fertilisers. The selection of novel and efficient PGPRs which promote plant growth and control plant diseases is very important in the promotion of sustainable agriculture, environmental and human safety and for the preservation of biodiversity. SPME-GC/MS profiling of rhizobacterial volatiles detected different volatile blends including the growth promoting VOC i.e., 2,3 butanediol. Further research will be carried out on different rhizobacterial strains (isolated from Andean potato rhizosphere) at the laboratory level for the early detection and selection of novel PGPRs through characterization of an array of their volatile organic compounds. The results from this project (VALORAM) will directly benefit to farmers by using natural microbial resources as inputs to improve production of high quality potato crops.

Medical Research with New-Born Babies: What are the Legal and Ethical Concerns?

Katherine Wade

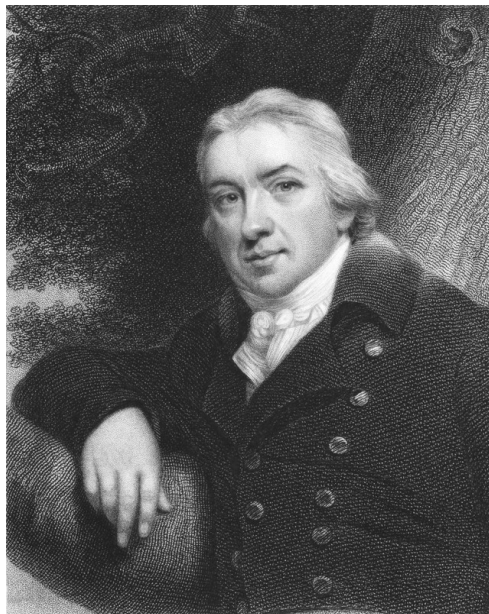Faculty of Law, UCC

Introduction

Figure 1: : Edward Jenner

Edward Jenner is accredited with one of the greatest feats of medical science, which is responsible for saving millions of lives. In 1796, he invented the smallpox vaccine. Jenner discovered the vaccine by observing that milkmaids were generally immune to smallpox. He hypothesised that the pus in the blisters that milkmaids received from cowpox protected them from smallpox. He then infected an eight year-old boy with cowpox, which he obtained from the blisters of an infected milkmaid. Afterwards, he injected the boy with smallpox material and the boy showed no sign of infection. He subsequently vaccinated a group of orphan children. The vaccine was also tested on 48 children in an alms-house in Philadelphia. It was through these experiments with children that Jenner created the vaccine for smallpox. While it cannot be denied that these experiments contributed greatly to the progress of medical science and the health of human beings, such a research design would be unlikely to be condoned today. This is because it does not conform to generally accepted ethical standards. Jenner did not conduct any preliminary laboratory research or animal studies. His subjects were particularly vulnerable, being

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Figure 2: Neonate

under the age of consent. Many of them were institutionalised and orphaned and, thus, lacked parents to make decisions in their best interests. Jenner also deliberately infected healthy children with a disease-causing substance, which was not for their benefit but for that of others. Throughout his experimentation, there was no emphasis on the role of informed consent or the protection of the rights of research subjects.

Medical research ethics has come a long way since 1796. International research ethics were formulated after the atrocities of Nazi experimentation on concentration camp populations came to light. Medical research is now reviewed and regulated by Research Ethics Committees and it must conform to ethical standards laid down in European and international regulation, such as the Nuremberg Code 1947 and the Helsinki Declaration 2008. For example, informed consent is a central requirement in research, there is a right to withdraw at any time, and research must minimise risks for research subjects. Research ethics and regulation seeks to strike a balance between encouraging medical progress and protecting research subjects' rights to life, health, autonomy and dignity.

Why do we need Research with New-Born Babies?

Medical research with all age-groups, including new-born babies, is important for the progress of medical science. A new-born child or a "neonate" refers to a child in the first 28 days of life. It is crucial that medical research, such as clinical trials, genetic studies and research with medical devices is carried out with this group of children. Neonates are not miniature adults. Their entire physiology differs from adults and so they require drugs and medicines which are suitable for their needs. However, there is a lack of appropriate treatments for neonates. Many medications provide no prescribing information for children. This means that physicians often administer adult treatments to neonates and simply lower the dose of the drug being administered to the infant by guessing its proportionate

weight relative to an adult. However, as it is impossible to know whether adult-tested drugs will be safe for use with children, this practice could lead to over-dosing, under-dosing or specific adverse effects not evident in adults.

Notwithstanding these dangers, such "off-label" or unapproved treatment of neonates occurs on a frequent basis. For example, a European study showed that up to 90% of neonates in intensive care across Europe receive such prescriptions.

It is often argued that administering unapproved treatments to infants is, in itself, a form of uncontrolled experimentation, as the effects are unknown. It could also be argued that the untested medical care which is given to neonates as a result of "off-label" prescriptions is unethical and a violation of their right to health and life as protected under the *Convention on the Rights of the Child 1989*. Thus, it is crucial that neonatal medical research is encouraged. However, there are impediments to the encouragement of neonatal medical research. This area poses ethical concerns and thus is seen as difficult to legally regulate. One area which raises particular ethical concerns and which poses particular regulatory challenges is the issue of informed consent.

Informed Consent and Medical Research with New-Borns: What are the Ethical Issues?

Obtaining informed consent from research participants is a core ethical requirement of medical research. However, as a neonate cannot consent to his or her involvement in research, parents and guardians may give consent on their behalf. There are a number of ethical concerns in this area. The first relates to understanding. In general, research protocols can be difficult to understand, as they can include complicated scientific information and design. However, parental consent in neonatal medical research can pose additional challenges. For example, a mother's ability to make an informed choice may be inhibited, as she could be under the influence of pain relieving medication post-labour. In addition, parents may have just learnt of their neonate's illness, causing stress anxiety and stress. These factors could lead to parents having difficulties understanding the research information and making an uninformed decision about their child's involvement in medical research.

Secondly, parents' understanding can also be affected by therapeutic misconception. This means that they fail to distinguish between treatment and research, and they believe that the research has a wholly therapeutic intent. In particular, this can occur if the researcher who seeks consent is also the treating physician. The parents may assume that the research is in the best interests of the child, since they are being informed about the research from the clinician who is treating their infant. Another worrying aspect of this situation is that parents might feel obliged to consent to research. They may not want to be seen as

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Figure 3: Scales of Justice

unhelpful, and may feel that if they did not consent, their relationship with their physician might be affected, which in turn might impact negatively on the care of their infant. Thirdly, parents' decisions may be affected by a researcher's vested interest in the project. For example, a researcher could have a financial or professional interest in the research and this may influence how information is conveyed. He or she may paint the research in a particularly positive light and stress the possible benefits, while downplaying the potential risks.

These issues can affect the validity of the parent's informed consent. As they may not understand the research or may not receive objective information, their decision may not be fully informed and based on the reasoned balancing of options. In addition, feelings of obligation towards healthcare professionals can mean that their consent is not completely voluntary as parents feel under pressure to make decisions which they would not otherwise make.

Research Aims: What can the Law do?

Ethical research with neonates must be encouraged, in order to improve their well-being and protect their right to life and health. Law plays an important role in this. A robust regulatory framework can lead to the promotion of medical research, as researchers are protected by defined rules in relation to what constitutes ethical research. Regulation can also contribute to the protection of the rights of parents and their children to autonomy and dignity as researchers must conform to certain ethical standards. However, at present, there is a lack of legal regulation of neonatal medical research in Ireland. Outside the area of clinical trials, there is no legislation governing medical research with neonates. Neither

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are there professional guidelines in relation to obtaining parental consent for a neonate's involvement in medical research.

My thesis will make recommendations for legal reform in the area of neonatal medical research, focusing on the areas of informed consent and the role of Research Ethics Committees. It is important that the issue of informed consent is regulated by legislation, professional guidelines and professional training programs. Consent must be free from the influences of researcher bias and therapeutic misconception, and parents must be given time and support, so that they can adequately protect the rights of their child in the context of neonatal medical research. It is also important that the consent process is informed by children's rights as set out in the *Convention on the Rights of the Child 1989*, including the child's right to life, the right to health, the right to have their best interests to be considered as a primary consideration, and the right to be free from exploitation. Ireland ratified this Convention in 1992, and thus is bound to protect these rights through legislative and administrative measures under Article 4. While neonatal medical research is focused on parental consent, it must be borne in mind that the informed consent process is primarily about promoting the neonates' rights and ensuring that their interests are protected. The aim of reform should be to ensure that consent procedures respect the inherent dignity of the neonate as a human being. This is done by ensuring that parents are facilitated to make decisions which are in their child's best interests and which protect their human rights.

In summary, it is important that medical research is carried out with neonates in order to promote the right to life and health of this group of children. In order to encourage medical research in this area, Ireland needs to develop law and policy for neonatal medical research. However, there needs to be a balance between promoting research and protecting neonatal human rights. Medical research must be encouraged, but not at the price of the violation of the human rights of a vulnerable population. As Freund notes, it is important to remember that a slower progress in the conquest of diseases may be preferable than having research practices which lead to the erosion of moral values, the loss of which, would make the most dazzling triumphs of scientific progress not worth having (P. Freund, *Experimentation with Human Subjects*, 1969).