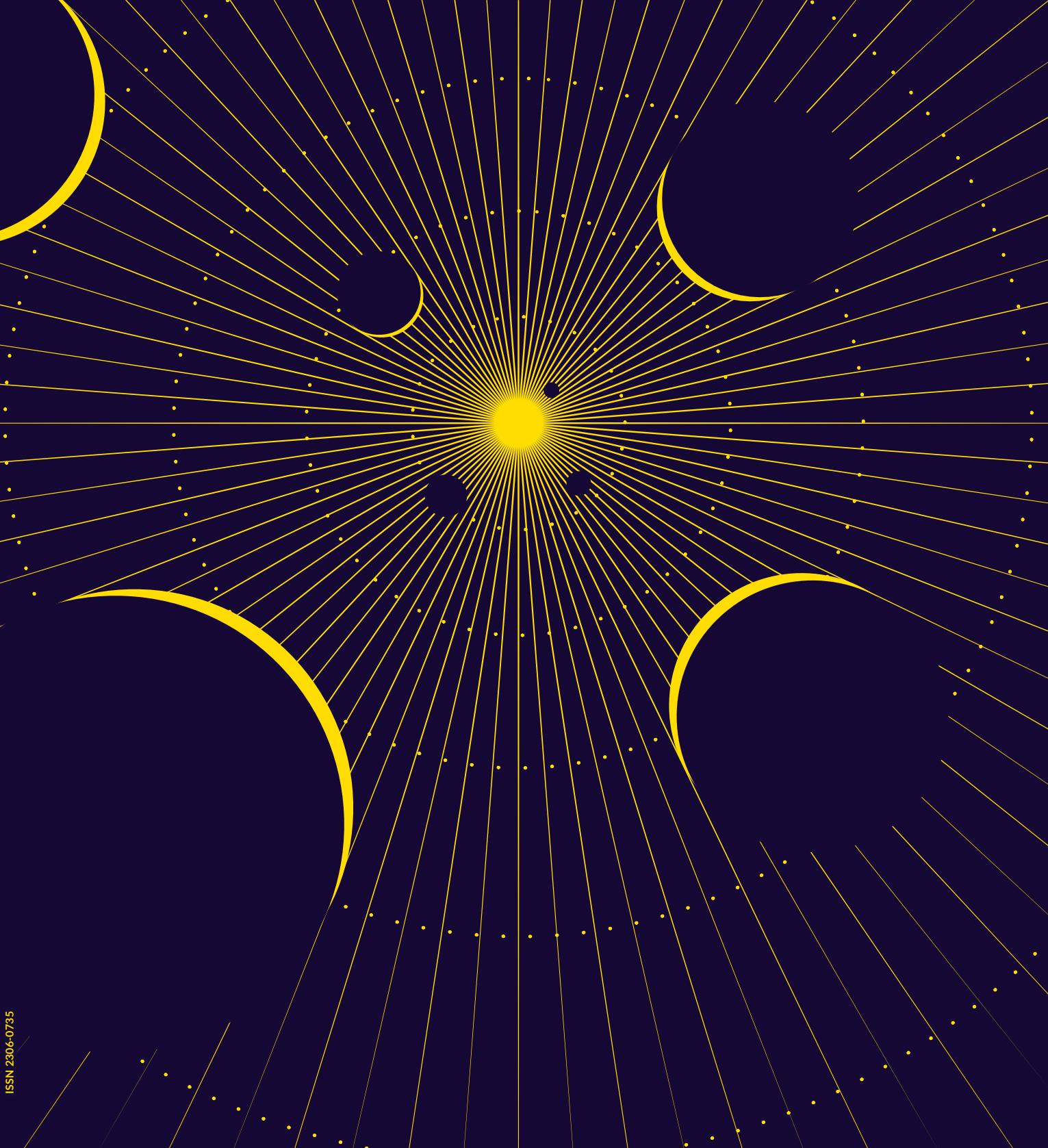


MARCH 2021 • ISSUE 34

THINK

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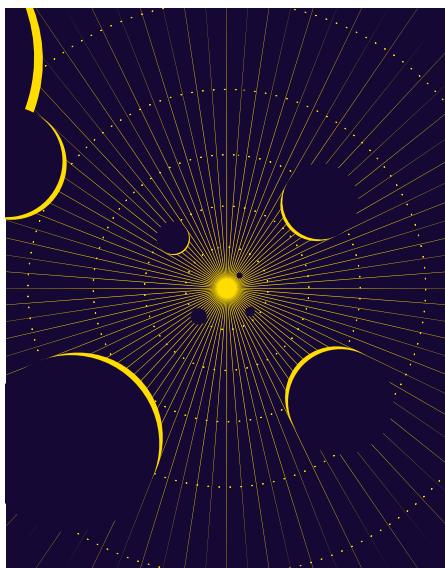
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Are you a student, staff, or researcher at the University of Malta? Would you like to contribute to **THINK** magazine? If interested, please get in touch to discuss your article on think@um.edu.mt or call +356 2340 4438

COVER STORY



CREATION

Time can be endless, it could also have had a beginning. Universes could be endlessly cycling, passing from a single point of infinitely small mass expanding beyond our imagination and contracting back to that point. The cover of this THINK issue shows a minimalist interpretation of that moment in creation.

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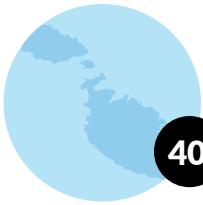
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THINK

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**L-Università
ta' Malta**

TOOLKIT

Capturing the Unseen: Merging Science and Cinema

Author: James Moffett

Science and cinema are in essence, two disparate fields. One relies on recording evidence and gathering data for research. The other captures visual and auditory art primarily for entertainment purposes. Yet something extraordinary is taking place inside the Electronics Systems Lab (Faculty of Engineering, University of Malta). **THINK** was invited to observe the on-going development of a high-speed performance video camera.

The MEMENTO Project is a tangible demonstration of the unusual and exciting combination of technology that serves both scientific and cinematic purposes.

With the ability to process up to 2,500 frames per second at Full HD in minimal light conditions, this camera is a piece of equipment that will not only ensure precise lab testing and analysis, but also offers high-quality image capabilities for videographers.

Mechanical Engineering Masters student, Alec Fenech, has been working on the design of the camera – ensuring a balance between the camera's attractive aesthetics for video professionals, without compromising the high technical specifications required for scientific

use. Co-supervisor Dr Ing. Marc Anthony Azzopardi, from the Department of Electronics Systems Engineering, asserts the camera's wide range of capabilities, including frame interleaving, multiview imaging, and real-time stitching of video footage. 'Such possibilities are appreciated in the creative media industry as well as in various scientific applications.' Another innovation being developed is the inclusion of new sensor-cooling technology that will allow low-light observation without compromising image quality.

From the elaborate circuit boards and complex system design, it is easy to think of such a product being developed by some high-tech industrial company. Yet at the heart of all this lies the emphasis on collaboration. A deep passion for the project is evident in the way students, researchers, and academics spoke to **THINK** about this innovative camera, affirming how teamwork thrives across several departments, entities, and individuals with a like-minded approach towards research, development, and creativity. As Andre Micallef, co-supervisor to MEMENTO, admits: 'Managing the interaction between technical

departments was no mean feat. But once you see all systems working like clockwork, it's all worth it in the end. We also learnt a lot from each other, with UM implementing industry workflows whilst the private partner (MST AudioVisual Ltd.) got to explore new experimental designs.' Current collaborations also extend beyond Malta; the project is going international.

Project supervisor, Dr Ing. Emmanuel Francalanza, from the Department of Industrial & Manufacturing Engineering, confirms that 'by bringing together a number of different engineering fields, this project enabled us to better understand the process of designing a product for different markets and users. This in turn helps us to improve both the design and the manufacturability of the components and product.'

Sure, Canon might be the go-to brand for shutterbugs, but the MEMENTO project might just blow them out of the water! 

The MEMENTO Project secured close to €200,000 of funding from the Malta Council for Science & Technology through FUSION: The R&I Technology Development Programme.



Andre Micallef (left) and Alec Fenech (right) working on the Memento Camera

Photo courtesy of Marc Anthony Azzopardi



A prototype of the Memento Camera

Photo courtesy of Alec Fenech

WITHOUT BORDERS



Towards Living Together

Author: Raven Hodgson

Religion is meant to bring people together, but it can become a barrier. In schools, this border transforms into bullying because of different faiths, skin colour, and even diets. All of this needs to stop. As the world has become more and more globalized, it has become increasingly important to understand each other's cultures and religions.

One project is trying to do just that, bringing people of different faiths together to understand each other more. The research team for Living Together: Towards Understanding Each Other's Culture is led by Prof. Adrian-Mario Gellel (Faculty of Education, Faculty of Theology, University of Malta), with the assistance of Dr Zoi Arvanitidou, Julian Galea, and Christine Rossi.

The aim of this two-year project has been to develop data as well as training and resources. All of the findings can be found on their website (livingtogether.mt), including a great deal of frequently asked questions, which provide essential information

about the customs, beliefs, and even religious etiquette of the various faith traditions currently found in Malta.

This project has highlighted the difficulties experienced by people of different religions during their process of integrating in Malta, especially when it comes to education, social care, and health care. By gathering information from relevant professionals and third country nationals, the project aims to understand the needs and issues of different religious communities.

The results should benefit those in medical, educational, and social fields, while helping develop a stronger and more unified community. With a little understanding, we can reduce the fear and hostility that exists.

As part of the project, Gellel's team also created several short documentaries which provide some insight on the different faith communities in Malta, such as Buddhism, Hinduism, Islam, Judaism, Sikhism, and many more.

The whole project has been a long time coming, as Gellel shares how

he actually came up with the idea back in 2010 but was unable to find funding until recently. It was clear to him even then that the population was changing with Malta having been an EU member for six years. There wasn't a huge influx of migrants yet, but it was already evident that the religious composition was changing.

Gellel mentioned how, in order to strengthen our religious education in schools and expand it, we must also do the same for our ethics. Ethics should have strong religious components, but until it is taken seriously at schools and at home from a young age we are still far from taking religious literacy seriously. T

Living Together – Towards Understanding Each Other's Culture is part-financed by the Asylum, Migration and Integration Funds of the EU, and is conducted in collaboration with the Inter-Religious Commission of the Catholic Church, as well as the Malta Ecumenical Council, with the support of several local faith communities.

DESIGN

Darkness at Noon

Author: Gabriel Zammit

Darkness at noon is an occurrence which violently alters established patterns of nature — a frightening moment. In literature and poetry, this motif has been abstracted and appears repeatedly throughout time.

Towards the end of the *Odyssey*, for example, when Ulysses returns home to Ithaca and finds a gang of lusty suitors vying for his wife Penelope, there is a moment of madness before the final massacre. The suitors gorge themselves one last time on the cows of Ulysses, and under the flat white light of noon, they feel a deep darkness in their souls as they intuit the return of the king and their impending doom. Again, in the Bible, darkness at noon accompanies that moment when Christ dies on the cross, symbolising the moment when the ancient world is pulled out of its torpor and into a new modernity.

A sense of the uncanny accompanies these moments, real or imagined. Freud defines it as 'that class of the frightening which leads back to what is known of old and long familiar.' The uncanny is both a species of fear and a tool for understanding human thought and feeling. It is a window into a deep analysis of formative human impulses.

Within contemporary life, darkness at noon is that intuition that things are not going quite as well as they should, be it the corrupt and amoral political situation in Malta, the COVID-19 pandemic, or commonly felt 21st century angst. There is a deeply felt darkness at the centre of our contemporary noontime brightness, and the exhibition *Darkness at Noon* explores this through the work of artists Gabriel Buttigieg, Charles Balzan, and Paul Scerri. The exhibition investigates the primordial

architecture of human consciousness by utilising the uncanny as a tool for examining the unconscious human depths which make us who we are, the aim being to challenge and offer a way out of our artificially manipulated lives, which seem to exist for suffering and consumption.

As co-curators of this project, Joe-Philippe Abela and I presented the three artists with this idea, and they each created a body of work in response. Buttigieg's monumental canvasses explore the mythic underpinnings of our humanity through the lens of psychology. Balzan's eerie photo-video installation, inspired by George Bataille's short essay '*The Mouth*', explores the physical body as the contact point between the primal and the civilised. Paul Scerri's delicate yet disturbing sculptures distill the theme through the artist's own experience of suffering and distance from the world.

Their work manages to gesture to the forces that lurk under the surface of experience. Reminding us of our hidden and forbidden formative impulses — those rooted in nature, history, and survival — it challenges our perception of what it means to be civilized.

The exhibition *Darkness at Noon* challenges visitors to ask which one of these characters am I? What would I look like if I opened myself up to the probing eye of the artist, and who am I, really, when no one is looking? 

Darkness at Noon is a project funded by the Arts Council Malta and supported by ILabPhoto, Studio7, and the Splendid.

Cocurated and produced by
Gabriel Zammit and Joe-Philippe Abela.

**Charles Balzan - Detail from
Extremely Loud and Incredibly Close
Photo and video-work installation,
The Splendid, 2021**



**Paul Scerri - Ostracised
Ceramic and metal, 2020**



Joe-Philippe Abela



Gabriel Zammit





Putting a price tag on quality of life

Timothy Alden

Alternative measures for a country's success beyond measuring Gross Domestic Product (GDP) are needed. Wellbeing and quality of life do not always follow from economic growth. This realisation goes as far back as the 19th century. Air pollution triggered one of the first societal shifts to improve the environment. The factories of the Industrial Revolution blanketed cities like London in smog, which as early as 1891 led to urgent and severe government action in the form of the Public Health Act. Polluting businesses faced financial penalties unless they cleaned up their act. Air pollution in London has decreased ever since.

This brings us back to how GDP can be replaced as a measure of a country's success. Quality of life and wellbeing are hard to measure; however, they are important to measure since they also have a tangible impact on the economy. Unhappy and unhealthy people inflate a country's healthcare costs, and stressed workers produce poorer quality work. A community rendered unrecognisable due to rampant overdevelopment has consequences on people's sense of place, purpose, and identity.

One of the world's leading reinsurers, Swiss Re Institute, recently released its Biodiversity and Ecosystem Services Index, explaining that 55% of global GDP is dependent on ecosystem and biodiversity services. Malta is listed in the top five countries at risk of ecosystem collapse as a result

of a decline in biodiversity services – worrying news for Malta. This index demonstrates that progress is being made to understand the relationship between our environment, our financial success, and our wellbeing in ways which many would not have imagined a few decades ago.

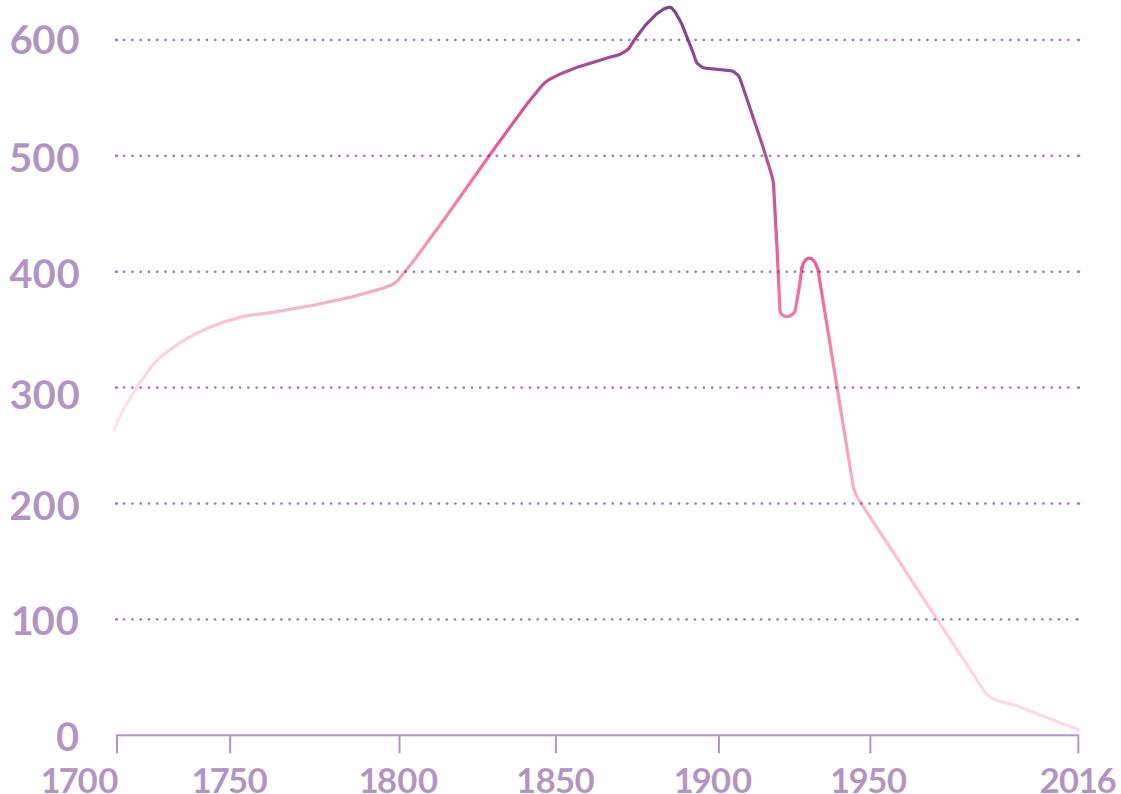
Our economies have been built on the assumption of eternal abundance. As we push up against our natural limits, we are no longer plucking wild fruit, but we are robbing and harming our neighbours, even when this is not immediately obvious. Take deforestation of the Amazon, which directly impacts every person on Earth. Such consequences mean that we must redefine where we consider our rights to begin and end. Short-sightedness and short-term gains lead to the Tragedy of the Commons, where everyone ends up losing when instead everyone could have gained.

The European Union is trying to rebalance things internationally. Its Carbon Border Adjustment tool will penalise unsustainable products entering the EU's single market from third countries. Such policy instruments are being increasingly refined and adopted, but not quickly enough. To prevent ecosystem collapse and reduce climate change, we must start recognising the true value of our natural resources today, not tomorrow. Malta certainly has the potential, as a small country, to be a leader and set an example for others to follow. 



Air pollution, London, 1700 to 2016

Average concentrations of suspended particulate matter (SPM), measured in micrograms per cubic metres in London over the long-term.



Data sourced from Our World in Data
ourworldindata.org

STUDENTS



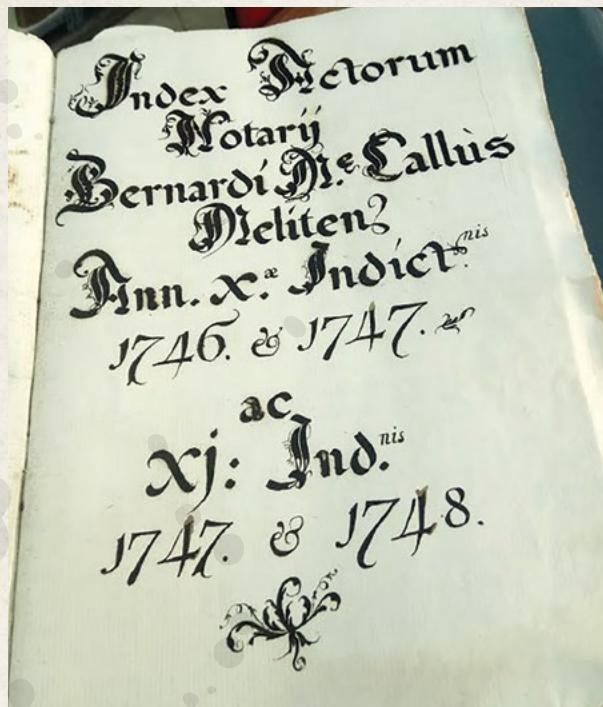
A life-time
worth of stories

Rakele Fiott

Like a painting, society is created out of different, colourful brush strokes of social, legal, economic, political, and religious aspects. The work of Notary Bernardo Maria Callus depicts the changes and developments, traditions and values, and aspirations of the Order of St John's and Maltese individuals' needs. The acts of Notary Callus are important for the study of continuity, change, and interaction in mid-eighteenth century Hospitaller Malta.

By examining the second volume of notary Callus under the supervision of Dr Emanuel Buttigieg (Faculty of Arts, University of Malta), I encountered a new perspective about the administration of the Order of St John. Individual knights created foundations, similar to today's financial organisations, which leased property to the Maltese. Subsequently the income was invested into military, naval, or charitable needs of Maltese society (and the Order itself). By examining these contracts, I was able to continue building the picture of 18th century trends in leasing and renting property in Malta, as well as the architectural and rural needs of the Maltese population at the time. This study helped piece together some of the changes in Malta's landscape left by people.

With every page I turned, a new story emerged: a family adopting a child from the Holy Infirmary, fiscal receipts

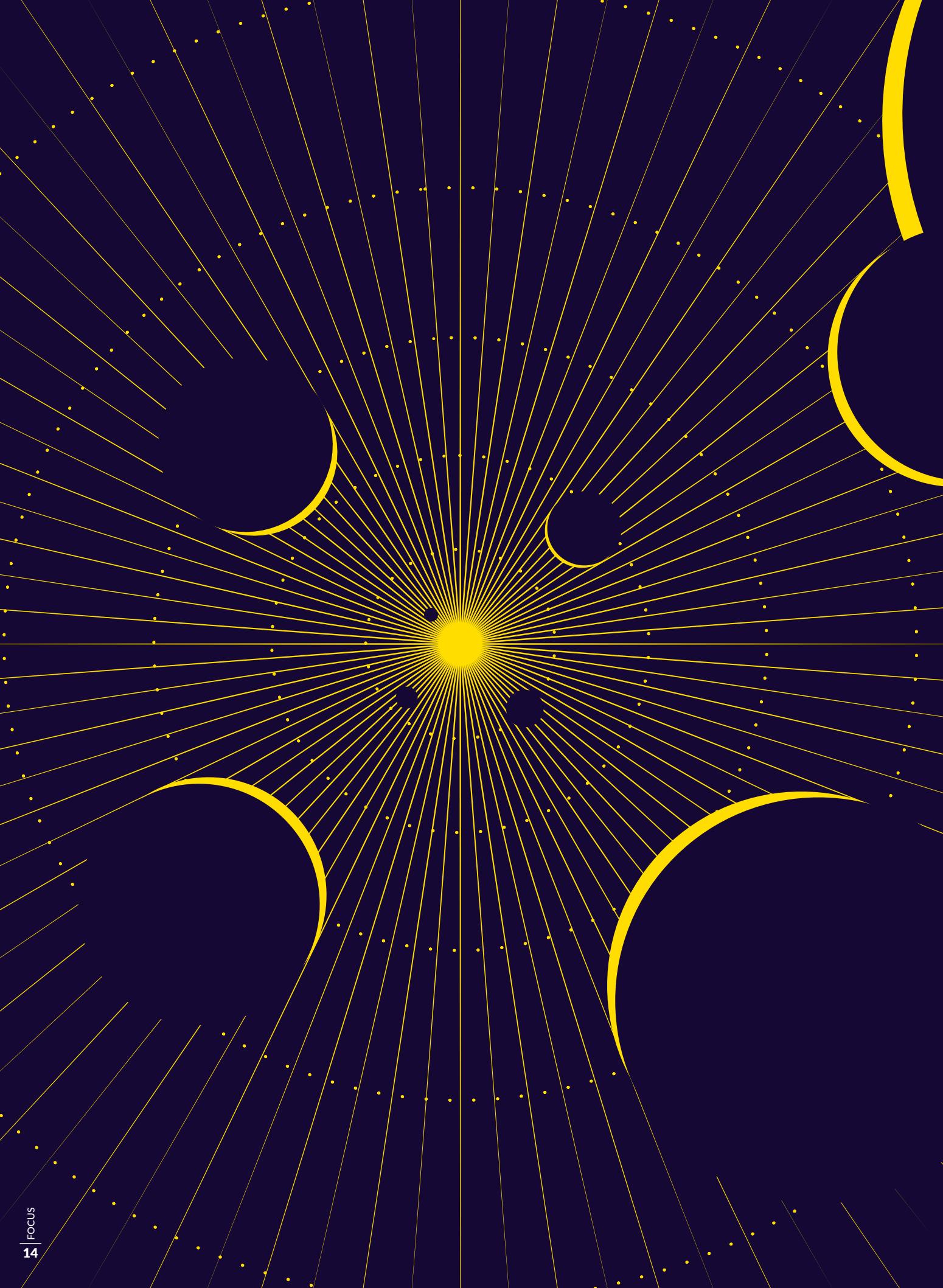


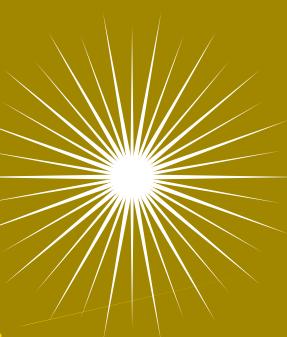
The Acts of Notary Callus
Image reproduced with permission of the Office of the Notary to Government, Notarial Archives, Valletta.

for parties, a drunkard asking the Grand Master for help in paying his debt, a woman noting her last wishes on her deathbed, or a father describing his daughter's dowry. Notarial documents are full of these stories and much more. This research was a wonderful adventure, allowing me to immerse myself in the stories of mid-eighteenth-century Malta. It provided new insight on the daily lives of Maltese individuals, the work of the notary, the voice and power of women in society, and the changes to our islands' landscape. In order to keep piecing together this puzzle, I have embarked on an MA in History to research the history of children and youths in Malta.

History is not only a story. It is an opportunity to learn from past mistakes. It can help rediscover traditions that explain our identity. By studying historical documents and continuing to piece together our history, we can help bridge our historical past and the effect it has on today. T

This research was carried out as part of the Bachelor of Arts in History, Faculty of Arts, University of Malta. The study is called: The economy, women and social interactions in eighteenth-century Malta: A study of the acts of Notary Bernardo Maria Callus, Vol.2, 1746–1748.





CREATION

Creation is the process of bringing something into existence. This might be something tangible, such as the creation of new materials. But it can also

refer to something more abstract, such as the creation of social constructs like identity or gender. In this FOCUS we look at research that gives birth to novel ideas and concepts.



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Feminine in the Trinity

Western tradition tends to view gender as something binary, either male or female. **Fran Borg's** research takes a closer look at how Sanskrit philosophy understands the inseparability of gender through language and mythology.

The act of creation incorporates the notion of destruction, and encapsulated within creation and destruction is the idea of maintenance. This is symbolised and understood in Hindu religion and philosophy within the Trimurti: Brahma as Creator, Vishnu as Preserver, and Shiva as Destroyer

While the masculine trinity is well-known in the West, the feminine aspect is often overlooked. In Sanskrit, the concepts of male and female are inseparable from one another. This is not only reflected in the mythology, but it is also embedded within the language of Sanskrit itself. One researcher, Fran Borg, grapples with the Sanskrit language and mythology and reveals a surprisingly modern interpretation of gender.

THE TRINITY: THE TRIMURTI AND THE TRIDEVI

The trinity, Brahma, Vishnu and Shiva, are manifested from the Absolute, referred to as Brahman. It is through Brahman that the manifestation of the Universe takes place and that the cycle of creation, maintenance, and destruction can unfold. Rather than viewing Brahma, Vishnu, and Shiva as three separate entities, it is important to note the relationship between them. Creation cannot occur without destruction, and destruction without preservation.

Borg argues that to fully appreciate this trinity one must also understand their feminine parallel. In fact, for Borg, this is the starting point to understanding how gender is conceptualised in Sanskrit.

The female counterpart, known as the Tridevi (the three goddesses), are the consorts of Brahma, Vishnu, and Shiva. The Tridevi consists of Saraswati, Lakshmi, and Paravati, and each holds a union with the Trimurti.

SARASWATI AND BRAHMA

Brahma is seen as the creator, and his consort, Saraswati, aided in giving order to creation. She is the goddess of wisdom, the arts, and the 'stream of speech.' She is often depicted as sitting on a white lotus. In mythology, Brahma and Saraswati are acknowledged as having created the Sanskrit characters. This is one of the ways in which the Sanskrit language is understood as divine or transcendental. The Sanskrit script is named the 'Devanagari' script; *deva* is translated as 'god', and *nagari* is translated as 'town, or village'. Indeed, Sanskrit is considered as the language of the gods. It is claimed that Saraswati holds the divine word while Brahma manifests it into all that is identified as real — creating the Sanskrit symbols of language.

LAKSHMI AND VISHNU

Lakshmi in turn is Vishnu's consort. Just as Vishnu is seen as the 'Preserver', Lakshmi also maintains balance in creation through fortune and misfortune. She symbolises beauty, happiness, and surplus and has been compared with the Greek goddess Aphrodite. She is often depicted as holding lotus blossoms. In myth, Lakshmi and Vishnu are 



‘Force without forcefulness would not be made manifest, while forcefulness without force, on the other hand, would have no means to action, remaining motionless.’

inseparable and are born together in their various forms; when Vishnu was born as Parashu-Rama, Lakshmi was Dharani. When he was incarnated as Raama, she was his consort, Sita.

PARVATI AND SHIVA

Shiva is seen as the god of destruction, granting limits to reality to give shape and form to the Universe. His consort, Parvati, brings limits to Shiva's destruction, balancing his unbridled passions. She is also depicted as having a playful character as seen in one myth where she covers Shiva's eyes. At that moment a third eye appeared on Shiva's forehead so that the Universe would not be enveloped in darkness. Parvati is closely identified with *prakriti*, natural or primal matter. She is also the 'world mother goddess' or 'the divine mother' and in philosophy is identified as the notion of *shakti*. She embodies Law.

Shakti is understood as feminine energy and contrasted with masculine energy, is passive energy, or even

the limited energy of humankind. In the *Atharvaveda* (a revealed Vedic scripture of Hinduism), there are references of power or natural power being associated with pure female energy. Borg points out how shakti becomes associated with Shaivism wherein each goddess is considered to be pure power, force, indeed a shakti. Linked to shakti is the sacred symbol of *yoni*, depicted as the female genital organ, symbolised by a triangle with its apex pointing downwards. It is the source of all things and is understood as the origin of all life.

GENDER IN SANSKRIT: LINGA

The complementary nature of Tridevi and Trimurti is also reflected in the grammar of Sanskrit. Thus Borg's research takes a closer look at Sanskrit translations and grammar to better understand the relationship between genders.

The term *linga* can be roughly translated to 'gender'. *Linga*, however, is actually far more nuanced. In

Sanskrit, the terms used for male and female (*punlinga* and *strilinga* respectively) come from the same root, *ling*. This already highlights the inseparability between the two terms. However, this is taken a step further when we understand that the prefix *pun* carries the sense of 'push' or 'force' while the prefix *stri* has the sense of purity and that of a source. In this way, the masculine can be seen as 'forcefulness' and the feminine as its necessary 'force'. As Borg succinctly puts it: 'Force without forcefulness would not be made manifest, while forcefulness without force, on the other hand, would have no means to action, remaining motionless.'

To explain this, Borg points towards the relationship between the seed and the stem. 'The seed contains the potential plant within it, representing the force of femininity (*strilinga*). As the stem pushes out of the seed during growth, this push can be seen as the forcefulness of masculinity'

Formed words		Root of a word		Prefixes	
Sanskrit Term	Denotation	Sanskrit Term	Attitudes	Sanskrit Term	Underlying senses
Napunsakalinga	First Gender		1) Carries the sense of going 2) Carries the sense of art	Na-	Signifies not, nor, or neither
Punlinga	Male/Masculine	-ling-		Pun-	Has the sense of a push
Strilinga	Female/Feminine			Stri-	Has the sense of purity and source

(*punlinga*). Through this forcefulness manifests the force of femininity.'

Much like the seed and the stem, the force and the forceful cannot be set apart from one another, nor should the one be understood in isolation from the other.

Borg is quick to point out that this does not imply that genders are the same, or that men and women do not take on different social or gender roles, but that the concepts of masculinity and femininity are inseparable from one another. When conceiving of the masculine or the feminine, we cannot talk about one without remembering the other. In mythology, this is reflected in the gods and goddesses. Indeed, when one is invoked the other is necessarily present.

TRANSCENDENCE OF GENDER

In some languages, there is also the 'neuter gender' (such as the term 'it' in English or 'das' in German). Similarly, in Sanskrit, *napunsaka* is

used to refer to inanimate objects. However, this gender also represents the transcendence of gender. The transcendence of gender includes both, in such a way as to contain both whilst being contained by neither.

This can be seen through the formation of the word *napunsakalinga*, 'neither-masculine-nor-feminine'.

This is reflected in the Absolute, which supersedes gender. The manifestation of the Universe and the existence of the deities can only exist and become reality through the Absolute.

In the West, we tend to take a binary view on gender, either male or female, though gender goes beyond the constructions of male and female. However, the structure of Sanskrit as well as the mythology behind it suggests a surprisingly modern view of gender. Rather than viewing male and female as two distinct forms, Sanskrit and the relationship between Trimurti and Tridevi frames them as inseparable and interdependent. Is

this non-dual approach to gender the key to dismantling our preconceptions of gender in our society? [T](#)

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The crystals that really heal

Crystal engineers have the power to create bespoke materials capable of advancing many scientific and technological fields. **Prof. Liana Vella-Zarb** and her team at PharmaTaxis use X-Ray crystallography and their knowledge of atomic blueprints to create new ways to carry medicine around the body, leading to safer, more effective treatments. Words by **Chris Styles**.

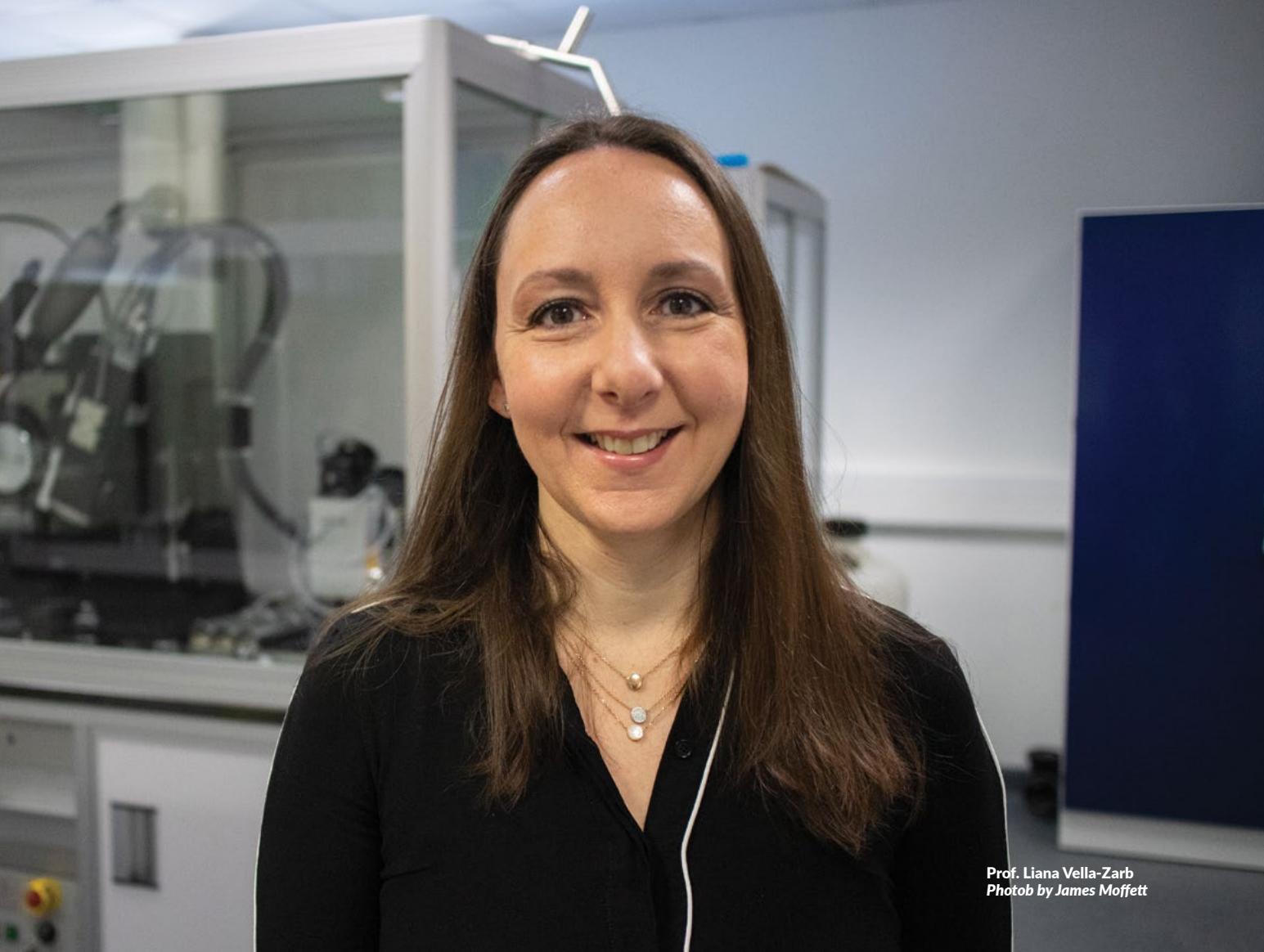
We are surrounded by crystals, but these are different from your amethyst and tiger eyes. Much of solid matter is formed from a specific arrangement of atoms fitting together: a specific three-dimensional structure which repeats in a regular pattern. Depending on the atoms the material consists of, the way these atoms fit together changes how the material behaves. How atoms fit together is more important than what they're made from. Atomic carbon can either take the form of diamond, one of the hardest substances on Earth, or graphite, one of the softest; crystal structure is everything.

Prof. Liana Vella-Zarb is a materials chemist at the Department of Chemistry, University of Malta, and a crystal engineer. Vella-Zarb is the founder of the PharmaTaxis project, leading a team of researchers that develop new methods of delivering medicines. By altering the atomic structure of a crystallised solid, crystal engineers are able to create a material with bespoke physical characteristics. PharmaTaxis uses these new materials and incorporates

them with pharmaceuticals, creating new methods to deliver the active pharmaceutical ingredients (APIs) of medicines to the precise part of the patient's body. 'Like a taxi, but for molecules,' Vella-Zarb explains.

DRUG TAXIS

When an effective drug treatment for a disease has been discovered, the next major step for researchers is to decide on the best delivery system for this medicine to most effectively get the API to where it needs to be. In a hospital, drugs can be delivered in many ways. Otherwise, delivery is limited. Most medicines are either injected intravenously, directly into the blood, or taken orally as a pill or capsule; either way, the medicine enters the patient's bloodstream and eventually ends up where needed. This long-winded route for drug delivery can lead to issues, such as the reduction of the drug's potency because the body breaks it down, or potential negative side effects caused by the drug's effects on other organs, or the potential toxicity of the medicine. The technology



Prof. Liana Vella-Zarb
Photob by James Moffett

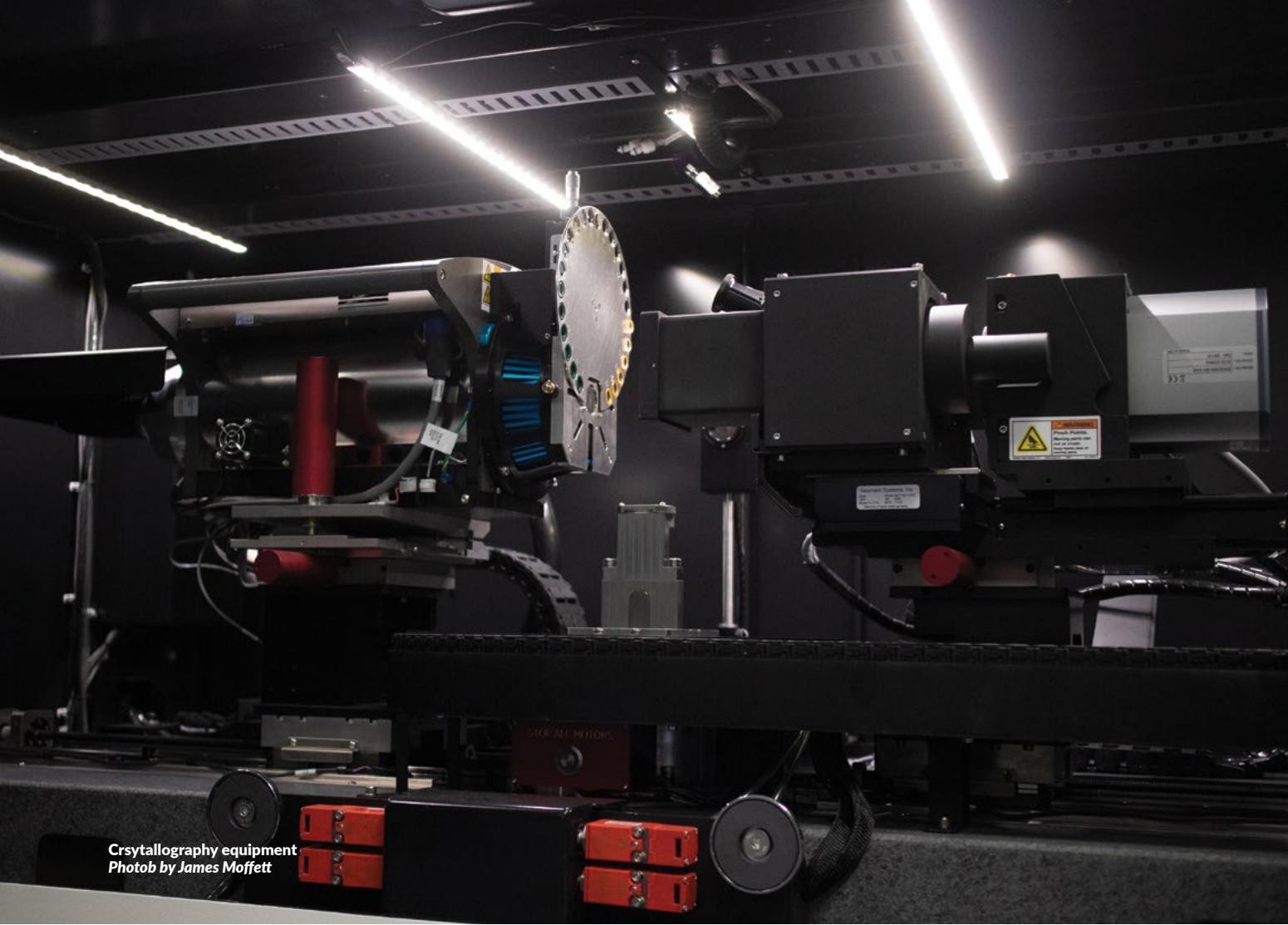
developed by PharmaTaxis could result in more effective treatment regimes, lower the active dose required for effective treatment, and reduce negative side effects.

Vella-Zarb and her team are producing materials which act as a protective coating for medicines. The coat unravels, releasing the active ingredients only where and when they are needed. These drug delivery systems work because of the unique properties of the materials produced by the researchers at PharmaTaxis. These drug-carrying materials are reverse-engineered, using information about the crystalline structure of the medicine. With this information, crystal engineers are able to determine the physical characteristics that are required from the protective coating they are creating. They manage this by manipulating the material's atomic structure. These materials need to bind to the API and act as a 'taxi' to drop off the medicine when it arrives at its final destination, a process called active targeting.

How these carriers transport and release the API varies greatly. Distinct drugs need to be transported in

different ways because of the method of active targeting that each molecular taxi uses. Some carriers act like a cage (made from weak molecular bonds) which holds the APIs while they are in transit around the body. When these complexes come into contact with changes in stimuli, like pH or temperature, the weak bonds break down, releasing the medicine from its cage.

Another type of carrier is formed by the creation of cocrystal structures, a combination of two or more compounds which create a unique crystalline structure. With this material, active targeting works slightly differently. The API is held within the crystal structure through intermolecular forces (like how opposite ends of a magnet are attracted to each other), rather than through chemical bonds. When these drug carriers reach their target site, the crystal starts to become less stable. The regular crystal lattice starts to get jumbled, and it loses its structural stability. At this point, the structure unravels, releasing the drug. All methods of active targeting result in the drug being released where it is needed, be it in the ➤



Crystallography equipment
Photo by James Moffett

lungs or the brain for anticancer agents, or breaking up uric acid deposits in the joints of patients with gout. 'These are just a few of the ones we're about to publish. Hopefully more to come in the near future!' says an excited Vella-Zarb.

CRYSTAL BLUEPRINTS

So, how are these bespoke materials created? Well, first we need to understand how crystals are formed and how they can be put together. Different crystals have different configurations of atoms, depending on the atoms that they are made up of and the shape of the crystalline structures (distance between atoms, the number of bonds each atom has with its neighbours etc). By first understanding the atomic structure of the drug and then knowing the conditions found at the medicine's target site, the team can start to design a new structure that has the qualities needed to transport and release the API. This is usually done by tweaking the atomic structure of a material which already possesses some useful property, like being stable at high heat.

Changes to the crystal structure can be made by altering the material's atomic composition (the type of atoms present and where they are placed), or by controlling the environment

in which these atomic crystals form. Vella-Zarb and the team create different crystallised structures by altering the pressure or temperature when the crystals are forming; 'We like to push the boundaries when it comes to crystallisation and cocrystallisation environments,' says Vella-Zarb.

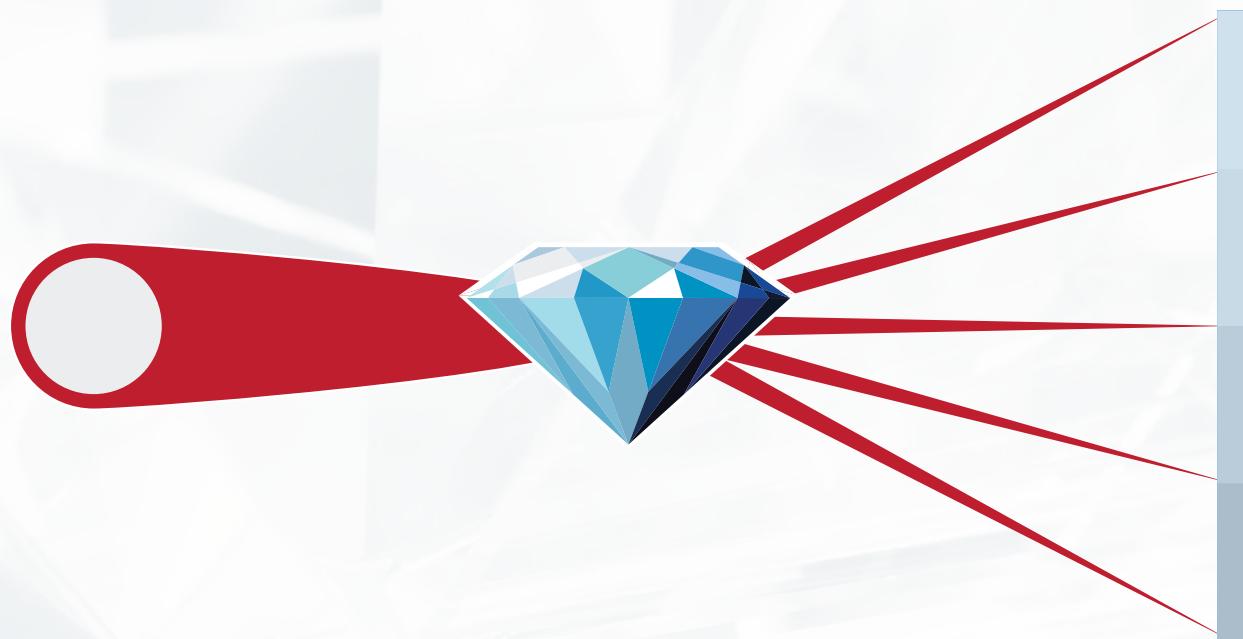
X-RAY VISION

This hopefully results in new crystals which have the desired physical properties to deliver the medicine properly. One important step to figuring out if they have the right properties is a process called X-ray crystallography, which can obtain a 3D shape down to an atomic level. By comparing these images to their initial models, researchers can figure out if they have the crystal they want.

X-ray crystallography works by hitting crystals with an X-ray beam. The beam scatters when it hits atoms, leaving a specific shadow or pattern (areas of higher and lower exposure to the X Rays). By continuously firing x-rays from different angles, the pattern that forms from the scattered beams can be used to recreate a 3D image.

The X-ray patterns need complex mathematical equations to figure out. A materials chemist can use

X-RAY CRYSTALLOGRAPHY



X-ray Crystallography and its applications in Proteomics

this data to map out the atomic structure of crystallised matter in 3D. This includes the type of atoms present, the angle and distance between the atoms, and the strength of the forces that hold them in place. This understanding is the foundation of how crystal engineers are able to know how atoms work together, how easy the crystal is to modify, and what properties you might end up with if you change the shape of the crystal.

A PHARMACIST'S DREAM

Vella-Zarb reminisces about the day she first came up with the idea of creating designer materials as a way to deliver pharmaceuticals. During her time studying for her PhD at the University of Birmingham, she met a visiting academic from Kansas State, USA. At the time, the field of crystal engineering was still in its infancy, but the academic talked about how they were using this new technology and the potential to create solid materials with tailored physical characteristics. Approaching the speaker after the talk, Liana asked about using this technology to deliver pharmaceuticals. 'Perhaps in our wildest dreams,' the academic replied.

Vella-Zarb now thinks that this dream is possible. A few years ago the process used by PharmaTaxis was much slower, as the team in Malta only had access to the equipment needed to create these new crystals but not the ability to analyse their final structures. 'So we'd prepare the samples, select the few that were most promising, send them abroad for data collection, and then process the data ourselves,' explains Vella-Zarb. This cost the team a lot of time. That all changed after PharmaTaxis secured an investment of 4.8 million euros from the European Regional Development Fund. 'We have shiny new solid-state laboratory facilities,' she happily explains, with the capability to both create and analyse these designer crystals within the Chemistry Department of the University of Malta, although due to its large size, it is based off-site.

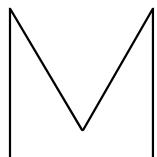
The research still isn't plain sailing; even with all this new equipment, instrumental downtime is still an issue. 'Every time there is a power cut, for example, we incur thousands of euros worth in damages, not to mention delays to projects,' Vella-Zarb explains. Despite these hurdles, with her new lab and a great team, Vella-Zarb and PharmaTaxis may be a bit closer to turning the pharmacist's dream into reality. **T**

CREATIVITY in the corporate suite





*When we speak about creativity, we might imagine a lonely, tortured artist working feverishly in a darkened studio long into the night. But could ideas that come out of a corporate meeting room be considered creative? Words by **David Mizzi**.*



ichaelangelo and Picasso are well-known creative geniuses. Their creativity flourished within the *bottega* (workshop) surrounded by other apprentices or in artistic circles that fostered debate and discussion. Corporate creativity could be cast in a similar vein.

Artists do not have a monopoly on creativity. Dr Margaret Mangion and Dr Leonie Baldacchino from the Edward de Bono Institute (University of Malta) point out that, although many people associate creativity exclusively with the arts and cultural industries, it is widespread in many different domains including business, and it is relevant in all sectors. Baldacchino notes that creativity is needed at every level of every type of organisation. Mangion adds that creativity is not limited to outstanding achievements but even a seemingly insignificant act like browsing through your fridge to prepare dinner may be a creative act. If one can 'better organise [one's] day or write a report in a new or more effective way, then this is every bit a creative act.'

Creativity, which refers to the generation of ideas that are original and useful, and by extension innovation, which is the implementation of creative ideas, are highly valued at executive levels. In a study by the IBM Corporation, 1,500 chief executive officers from

around the world classified creativity as a leader's key quality. Creative thinkers such as Edward de Bono who look at creativity from a practical stance (and develop the tools to prompt it), have turned creativity into something akin to a muscle that can be exercised.

Baldacchino and Mangion both see creativity as a skill which can be taught and cultivated. If upper management wants to foster a creative workforce, there are tools and environments they can implement which will encourage it. But what helps creativity flourish?

MOTIVATION

Without the proper motivation, you can forget about any work getting done – let alone something creative. But motivation is far more nuanced than your pay cheque. Your salary is an extrinsic motivator. Another motivator is wanting to see a project through. For many creatives, there is a strong 'want' to see a project run successfully. This, coupled with an inherent interest in doing the task, can be a positive influence, especially in the business world.

This intrinsic motivation is a more powerful incentive. It's also known as passion, a fantastic motivator. Without a strong sense of passion for your work, the task at hand can quickly become a chore. Personal projects make us feel invested, leaving us excited because we want to rather than because ➤

A positive work environment is not limited to physical space. Being surrounded by a talented and supportive workforce helps to foster creativity.

we have to. Individuals are most creative when they find what they are doing interesting, satisfying, and enjoyable.

Oddly enough, in his study 'What makes the creative, creative?' Matthew Miggiani points out that expected rewards reduce intrinsic interest but unexpected rewards do not. Providing creatives (such as the author of this article *bats eyelashes*) with a bonus, or even a small gesture of gratitude can help motivation.

What about fear, I hear you graduates from the Stalin School of Management cry. While failure can be used to learn and develop new techniques, fear (itself an extrinsic motivator) can actively harm the creative process. Baldacchino points to Malta, where it seems as though everyone knows everybody else. Failure, like success, is easily visible and becomes widely known. This lack of anonymity and privacy may serve as a deterrent for creatives, and fear of failure often undermines creative and entrepreneurial activity.

Stepping out of the corporate world for a moment, imagine an art lesson where the teacher constantly criticises a student's work. This would stifle creativity. Instead of fear, an environment that supports its staff gives creatives the space to experiment and innovate.

ENVIRONMENTAL INFLUENCES

A study by Maryna Grechna (a former Master in Creativity and Innovation student at the Edward de Bono Institute) showed the increased reliance on staff's creative and innovative thinking abilities. This has encouraged organisations to nurture a positive work environment, one that allows employees to freely explore their creative potential.

Big technology companies like Google and Apple invest heavily in work environments that bolster their employees' creative output. Miggiani interviewed several creative directors. They point out that a physical environment that allows comfortable seating, light, good temperature, and the space to move around can contribute towards creative behaviour.

A positive work environment is not limited to physical space. Being surrounded by a talented and supportive workforce helps to foster creativity. One participant in Miggiani's study mentions how being around talent and



Dr Margaret Mangion
Photo by James Moffett

people that they like 'empowers' them. Being part of a supportive staff can allow creatives to psychologically relax and be happy. It might seem obvious, but Miggiani's research shows that being happy at work makes you more productive and instinctively makes you want to work more.

Research by Zelenski, Murphy, and Jenkins shows that 'at a trait level, happy people are more productive, and people are more productive when they are happy.'

Being surrounded by talented individuals, feeling that we are part of something bigger, and being part of an environment where we feel that we are valued is not only beneficial for our well-being, but allows us to fully realise our potential. It is the main reason why teachers go to such lengths to create a positive classroom culture in order to bring out the best in their pupils.

CREATIVE MANAGEMENT

During our interview, both Baldacchino and Mangion mention the need for a 'creativity champion.' Someone who drives the project and manages the entire process.



Dr Leonie Baldacchino
Photo by James Moffett

Miggiani points out that Creative Directors are meant to be enterprising thinkers that have an eye for detail with an avid business sense. Their central goals are to come up with novel ideas that can carry a company's brand, product, marketing, advertising, web, or media development objectives.

The creative team needs to be 'managed' in a way that is understanding and compassionate – in a way that does not negatively impact the team dynamic. Therefore, it is likely that a supportive leader will help employees be more creative. On the other hand, controlling, critical leadership inhibits creativity.

The key to management is finding people who 'fit' with the rest of the staff. Each individual brings something unique to the table. It is not just about replacing a skill set but maintaining the harmony within the entire team. While on their CVs, two candidates might be virtually identical, one might be a better fit because they contribute to the natural back-and-forth found in a creative space.

Baldacchino and Mangion also point out the misconception that structure is a creativity killer. Divergent thinking is the ability to produce multiple and unique solutions to problems,

and is what we often associate with creativity. Convergent thinking is the process of narrowing down alternatives to identify an ideal solution. Most of the time, convergent thinking follows divergent thinking and precedes innovation. An ingenious idea might quickly fizzle out unless a management structure exists to help keep a project on track.

Creativity is traditionally seen as an individual process: the lone artist painting. However, creativity often happens in team settings when individuals are motivated and happy in a supportive environment.

The business world is in constant flux, and managers are constantly faced with unexpected challenges (*cough* viral pandemic). Past success does not predict future improvements. Creative problem solving techniques are needed by top management, all the way down to the very bottom. That creativity is something that can be nurtured and taught to allow corporations to overcome such difficulties.

While great artists, writers, and musicians will always stand out as creative geniuses, we shouldn't let that stop us from cultivating our own creative talents. Sure, most of us might never reach the heights of Michaelangelo and Picasso, but by developing the right frameworks, we can train ourselves to become creatives, whether that's for our professional or personal lives. T

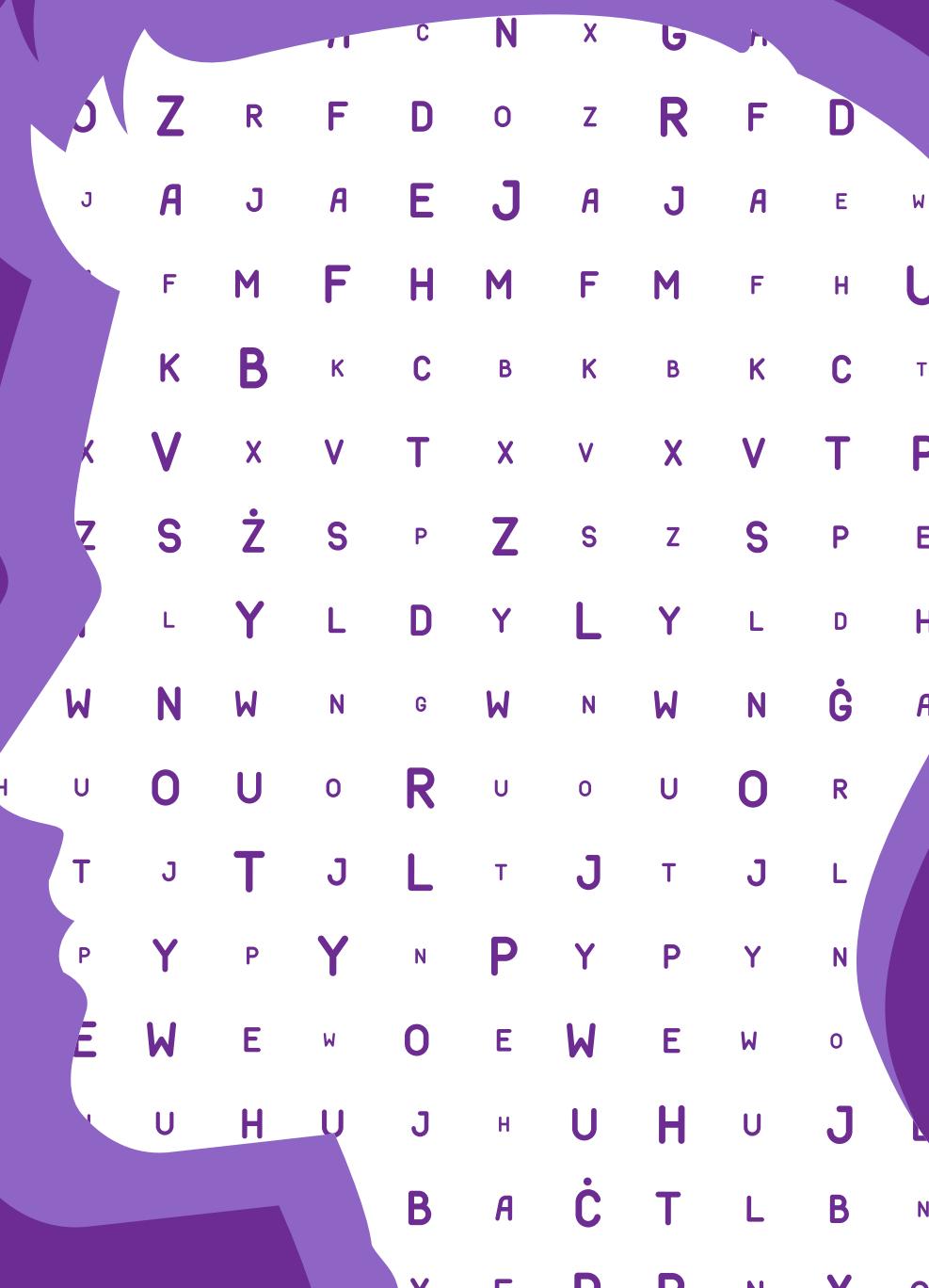
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Tnewwilli one of those please?



In an existence where change is constant, language is no exception. **Caroline Curmi** meets **Dr Sarah Grech** to discuss Malta's English language patterns and what data our language and word choices reveal about us.

A young woman once approached a greengrocer's counter to ask for some 'bully beef'. The poor shopkeeper was confuddled by her request and demanded she repeat herself. She eulogised a louder /bʊlij bɛf/ to no avail, but a breakthrough was finally made when she motioned to some tapered, rectangular tins stacked directly behind the shopkeeper. The latter, thinking this some bland prank, brusquely retorted with: 'Why didn't you say corned beef if that's what you wanted? *Donnok minn wara l-muntanji int!*' ((Literal translation: You must be from behind the mountains! Common interpretation: You sound like a disconnected, undomesticated simpleton!).

The woman, whose face by then was redder than the tin, hastily handed over some coins and ran out, vowing never to let her accent and choice of words betray her again. This scenario provides an interesting insight into the inner workings of Malta's local speech communities as well as indigenous dialects and the public understanding of them. A simple misunderstanding resulted in an abrasive display and an embarrassed reaction. Senior lecturer Dr Sarah Grech (Institute of Linguistics and Language Technology, University

of Malta) explains the dynamics at play behind this interaction: 'As we speak, we pick up cues about how our output is received, and we reshape or reinforce our subsequent language accordingly,' she says. This is done on both a conscious and subconscious level and reflects an 'interactive and circular process of production, feedback, and re-alignment,' she elaborates.

Grech's reflections are reinforced by author and psychology professor Lakshmi Bandlamudi (City University of New York), who in her reference to Mikhail Bakhtin (referred to as the 20th century 'patron saint of Dialogism'), offers a breakdown of the multi-faceted verbal communication model: 'Individuals are forever engaged in language games — co-constructing, asserting, refuting, dismissing, and twisting meanings. These transactions are never straight and steady, but full of zigzags and coils...'

Indeed, there are many elements at play in verbal interactions: linguistic, psychological, anthropological, and sociological. But it is the physiological aspect that provides the first clear path. 'Our voice pitch gives away quite a bit in relation to whether we're old or young, male or female, and even — with a bit of study — our ➤



MaltE showcases certain British and American language traits but also exhibits an Italian influence. Up until 1934, Italian was also one of Malta's official languages.

ethnicity,' Grech explains. This is particularly relevant to Malta when one considers its multilingual status and its position as an economic migrant hub. The amalgamation of Maltese and English – Malta's two official languages – is the subject of concern in many an online forum. Somewhat understandably, members fear the demise of the indigenous Maltese language, and stereotypes have only grown in potency.

LANGUAGE REVEALS ALL

On a local level (and as something of a national pastime), language use nods towards one's education, social status, and town of origin. For example, it is not an uncommon bias that Maltese-dominant locals with a recognisable accent are largely deemed rural folk (*minn tar-rahal*), while English-dominant citizens from central areas such as Sliema are infamously considered snobs (*tal-pepe*). Interestingly, citizens living in the island's North side rely more on the English language yet are not met with the same misconceptions.

To a degree, the mechanism behind these stereotypes is backed up by research: '[it] suggests that a listener reacts and makes judgments about a person which can tentatively be said to correlate – or at least covary – with the kinds of phonetic details that I'm studying,' says Grech. However, she is also quick to diffuse some popular misconceptions on the matter: 'We can't really say that more/less English/Maltese is confined to different geographical pockets in Malta/Gozo, because, a bit like a city, people move around a lot,' she explains.

For example, Grech continues, a Maltese-dominant person from Qrendi ordering a meal in a St Paul's Bay restaurant might: 'need to make an order in (Maltese) English to [a] Serbian waiter, who in turn, will use English, but will also have picked up some Maltese English patterns, usually of intonation or melody of speech to be more easily understood here.' From a migrant's perspective, both Maltese and English morph into a Lingua Franca,

but on a national level, such an exchange creates an interesting dynamic that allows native listeners to pick up a vast deal of information in the speech signal, which the other speaker may not be in full control or conscious knowledge of.

A THIRD LANGUAGE?

Grech and researcher Prof. Alexandra Vella from the Institute of Linguistics are co-investigating these prompts and cues. Their research focuses on MaltE, a post-colonial form of Maltese English spoken by most bilingual locals, to identify aspects of the Maltese English accent. While not a widely accepted research topic, its use by over half a million people spread locally and in Maltese speech communities abroad demands it. 'It is definitely worth studying further for many reasons. If not for its own right, then for the sake of learning a little more about ourselves and our identity as a small island nation with three official languages, one of them being the one



A language is in a constant state of flux; a process that is indicative of the sociological changes within the community that makes use of it.

in question,' explains Grech, adding that this area deserves highly focused research which it is presently lacking.

Brushing 'good' or 'bad' English language use aside and focusing on phonetic features – or the physical properties of a language's sound – Grech's research does not only examine basic social scenarios but also delves into interactions with chatbots like Siri, Alexa, and Cortana, amongst others, to determine whether this variety of English emerging locally can be easily understood.

While collecting data may prove difficult due to the noticeable shift in language use between formal and informal settings, Grech draws on the works of William Labov, Sali Tagliamonte, Penny Eckert, and Miriam Meyerhoff to highlight a language's constant state of flux: a process that is indicative of the sociological changes within the community that makes use of it. Grech explains that awareness is key to collecting accurate data. 'It's

important...to know that if I make a person read aloud, they are going to have one accent (which they probably learnt in school) because their speech might be more careful, but if I record someone chatting with a friend, they'll probably have a different accent,' she says.

LANGUAGE USE IS EVER-CHANGING

Grech says that fluctuations in language use are a common occurrence until a person reaches 25 years of age and small modifications continue to occur throughout one's life. Such changes are generally indicative of one's willingness to adapt to the other's speech pattern, and a practical example is brought up: 'In my case, if I'm speaking to an older, well-educated person in a semi-formal environment, I will probably drop my r's in words like 'heart' or 'car', but if I'm speaking to a younger person, also in an informal setting, I might have more of a pronounced 'r' in the same words,' Grech says.

Similar modifications may be observed when one yearns for acceptance – or even, in some instances, rejection – from a particular community. To receivers endowed with high critical awareness and sensitivity, such communication is generally more conspicuous, however, shy or insecure English speakers need not be made too self-conscious by this statement as these traits require serious training. Nevertheless, a mischievous and semi-serious question arises: how does GDPR protect unwitting speakers from casual and leisurely analysis by linguists while out for a coffee or cheeky G&T? Well folks, that's a conversation for another time. **T**

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Science imitating life



Researchers are taking inspiration from the dynamic nature of life to create synthetic systems that behave in new ways. **Dr Maria Cardona** spent her PhD developing a structure that imitates parts of a biological cell. Words by **Emma Clarke**.

Chemistry doesn't only happen in the lab. Right now your body is home to countless reactions that are working together to keep you alive. The cells that make up your tissues and organs are not static, but changing continually in response to their surroundings and to signals from other cells. Our biology is always adapting. Now, chemists are taking inspiration from life's dynamic properties to create lab-made systems that can behave in new and innovative ways. By mimicking nature, these researchers are trying to push the boundaries of what synthetic chemistry can achieve.

FROM NATURAL CELLS...

Cells are the living units of our biology, and to function they need to move and communicate. Within their jelly-like centre, cells contain a mesh of protein called a 'cytoskeleton'. It is the cytoskeleton that forms the shape of the cell and drives the mechanics of movement. The cytoskeleton is not rigid but constantly in flux, disintegrating and reforming to meet the cell's changing demands. This fluidity is possible because of how it uses energy.'

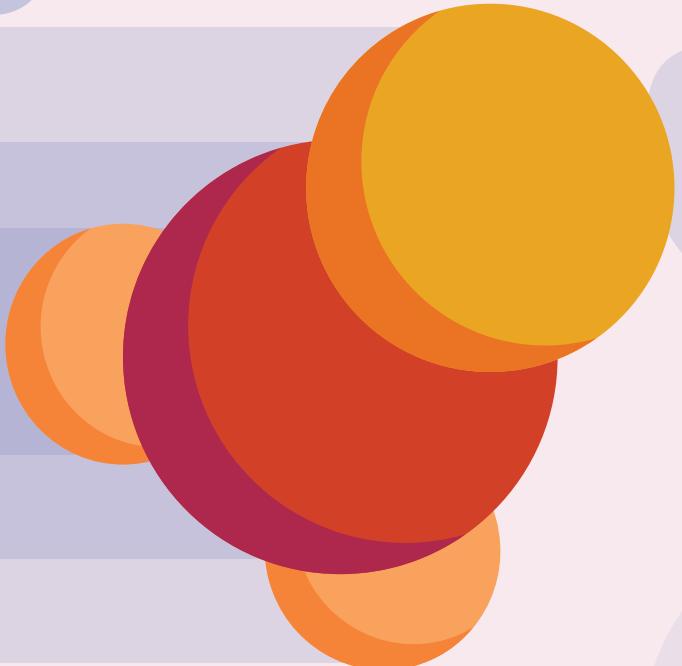
In the same way that a car is fueled by petrol, the cytoskeleton is fueled by a type of energy called ATP

(Adenosine triphosphate). When ATP is present, protein's building blocks can gather the energy they need to join together into strands, like towers of lego pieces. As soon as the ATP is used up, these strands disintegrate into their parts. This energy-dependent system means that the individual strands of the cytoskeleton can form temporarily, as and when they are needed. What results is an adaptable network that can quickly change the direction of the cell's movement or modify its shape.

Though researchers are a long way off from replicating the sophisticated inner workings of a cell, they are keen to imitate some properties of life in synthetic systems. During her PhD at the University of Padova in Italy, Dr Maria Cardona began to create a chemical structure that could assemble dynamically, inspired by processes in biology.

TO SYNTHETIC CREATIONS

Cardona was working to create a very small 'nanosized' container. To put this scale into perspective, a nanometer is around a billion times smaller than a meter, so Cardona was working with structures far too small to be seen by the human eye. These containers can hold chemicals inside them, a bit like miniature reactors. They are unique ➤



because, just like the strands of the cytoskeleton, their existence is dependent on the presence of energy. When the energy is used up, the containers self-destruct.

This property is exciting because it gives researchers a precise level of control over the system. By changing the supply of energy, they can determine the number and duration of these containers that exist. This could be useful in many contexts, but one potential future application is in drug delivery. The nanoscale containers could be used to transport the components of a drug to a certain place, then self destruct and allow the release of the chemicals they hold. Reactions can take place within them, like minute chemical factories, or they could keep chemicals separate for a set length of time, for example if a chemist needs to time a reaction precisely. An example could be if a drug needed to be released only at a certain time or in a certain place. This kind of system would allow the researcher to control the release of the drug and direct the treatment.

PRECISE AS A SWISS WATCH

Building on the work of her supervisor, Professor Leonard J. Prins, Cardona developed the containers so that they would only form in response to ATP, one of the fuels naturally found within cells. By showing how her reactions absorbed light, she demonstrated that the containers would disintegrate when the molecule of ATP was used up, and that adding ATP again would allow them to reform.

Cardona's second hurdle was to control the exact amount of energy to pump into the system. In nature, ATP is consumed by an enzyme called alkaline phosphatase. Like a car engine burning through fuel,

the enzyme processes ATP, using it up. By adding alkaline phosphatase to the reaction at a set time point, Cardona saw that she could quickly use up the ATP in the system, triggering the destruction of the containers. Like a stop button, this system allows a precise level of control over the chemical reaction.

With some hard work and persistence, Cardona managed to refine her system so that it behaved how she wanted it to. By adding different amounts of ATP and alkaline phosphatase, she was watching the containers form and degrade in controlled cycles. She had managed to create a synthetic structure that could behave dynamically.

Next, to study the system, Cardona took advantage of the fact that the containers could hold small amounts of fluorescent dye. Cardona needed to be able to see whether the structures were intact or not, so she used a specific type of dye that glows brighter when enclosed within the containers. Using a fluorescence microscope, Cardona could see exactly how the containers were behaving by measuring how strong the signal was from the dye. Less fluorescence meant that more of the containers had disintegrated and released the dye into the solution. This handy strategy provides one way that the containers could be monitored if they were to be used commercially. It also allowed Cardona to carefully investigate her system and gather more information about how it reacted to different conditions, for example different concentrations of the enzyme.

Cardona's work shows how nature can inspire research. There is a ton more work needed before the system can be used, but Cardona hopes that structures like



Dr Maria Cardona

There is a ton more work needed before the system can be used, but Cardona hopes that structures like these could one day improve drug delivery to treat disease more effectively.

these could one day improve drug delivery to treat disease more effectively. It will be fascinating to see what other ideas take root as synthetic chemists look to the world around them for inspiration. [T](#)

This research was carried out as part of a doctoral programme at the Department of Chemical Sciences at the University of Padova supported by the Marie-Sklodowska Curie ITN 'MULTI-APP' grant agreement 642793.

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Being Human?

Nika Levikov virtually sits down with **Dr Sandro Lanfranco** to understand what it means to be human, how our understanding of humanity has changed over time, and whether any of it matters.

The question of what makes us unique as a species has taunted – or intrigued – humans for thousands of years. Many would agree that religions did a brilliant job of placing humankind on a pedestal, just below our gods. After all, we can reason, we wear clothing, and we have complex thoughts. Surely there are no other species that can do the same? I spoke with Dr Sandro Lanfranco about his recent piece in *Melita Theologica: Journal of the Faculty of Theology* titled 'Pavel Florensky and the Uniqueness of Man' to gain insight into just how much our understanding of humanity has evolved since our earliest philosophical and religious wonderings.

'WE'RE JUST APES'

'What makes us human is a set of arbitrary qualities that our culture has decided are the hallmark of humanity, for instance, having a moral code...ways of acting in public, etc., while other animals act in ways that come from instinct.' Outside of this construct we have created for ourselves comes a very simple fact: 'We're just apes.'

There it was, plain and simple: being human is being an animal. We behave and exist like other animals and subscribe to a category called 'species', which in itself is an

arbitrary label. But beyond this biological understanding, there is also a psychological one. Humans are able to develop a morality which other animals aren't capable of, at least not to the extent that humans are. Furthermore, we have consciousness (while some philosophers do argue that animals have a consciousness, it is still an open question). I asked Lanfranco if it was possible to define consciousness: 'Consciousness is a human construct... Being self-aware gives the capacity to invent concepts like consciousness which mean everything and nothing. It is not something that you can see or touch or measure.'

The core reason for defining humans and understanding consciousness for much of modern history has been political: to avoid chaos and to keep people in their rightful place through organised religion. 'Many creation narratives put humans as the pinnacle of creation, which of course they're not.' In fact, Lanfranco continued, the only way that we may be considered special is in our ability to destroy the planet at a rate much higher than that of any other species.

According to Lanfranco, philosophers of the past felt the need to explore the differences between humans and other animals to assert just how unique our species really is. For Aristotle, it was our rationality that set us apart, calling man



a rational animal. Descartes took this further, relegating animals to automata (complex machines). For Arnold Gehlen, it was our ability to adapt to various environments that sets us apart, while Cicero called it a 'divine spark'. And if holding ourselves under divine light was no longer an acceptable viewpoint, then there must be another way to feel special. It was found in the ability to use tools, not simply the existence of tools themselves. This was the crucial distinguishing characteristic. Yet theologians and philosophers alike soon understood that *Homo sapiens* were not the only species that could both use and make tools.

IT'S THE TOOLS, THE LANGUAGE!

What even is a tool? For Lanfranco, this was quite difficult to define. Is it the manipulation of an object? Just how much change or 'creation' is required for something to be considered a tool? Humans are capable of insight, and we learn how to improve. While a bird may make a nest as it is genetically programmed to do, a human can build a home based on complex thoughts, reflection, and ideas of how to improve the home through the act of building it. Perhaps it is this that makes the tools utilised by humans distinct from those used by other apes. Just when I thought I had arrived at

a point of clarity, Lanfranco reminded me that it is simply a higher brain capacity that gives humans this ability – and that is entirely unremarkable. What about language? Could the ability to develop a complex form of communication be the distinguishing factor? Of course other species have language, explained Lanfranco. I added the little known prairie dog to our list of species, a rodent that is able to describe threats in terms of size, colour, and other physical traits. Our quick agreement on the fact that other species possess language led us to discuss cognitive abilities. As Lanfranco notes in his article, it is the *degree* of cognitive abilities that sets us apart. But can we even go that far if we are not able to clearly define what language actually is? We can hardly agree on what makes something a tool and what doesn't. You can look at the degree quantitatively, Lanfranco told me, but not qualitatively. It might be impossible to look at tool use along a trajectory and pick the precise moment in which a particular form of utilisation becomes uniquely human.

As we continued our conversation, I found myself wondering, what's the point of all this? We can comfortably say that a power drill is a more sophisticated tool to make a hole than jabbing a pointy rock at the wall. And surely the words in this article contain a richness and meaning that goes ➤

A large, abstract graphic on the left side of the page features a stylized flame or organic shape composed of overlapping layers of orange and yellow. The shape is roughly triangular, with the widest part at the bottom and tapering towards the top. The colors are bright and saturated.

*Meaning, like consciousness,
is something we create and
depends highly on context.*

far beyond an alarm call of 'male human, green, tall' when warning other members that a predator approaches. Lanfranco brought me back to a simple truth: we're not special. Perhaps it would be better to recognise and be amazed by all the ways in which we're not special – that prairie dogs and chimps and countless other species are existing and doing things in very similar ways – than to strive to arrive at some kind of measurement or concrete idea of how we are different.

YOU'RE NOT SPECIAL

Lanfranco's article delves into the Enlightenment period, when people started drawing the conclusion that we are not special at all, and in fact, the Earth and the galaxy aren't either. I asked him about this shift, admitting that the thought of humans and all life being rather insignificant was humbling, but also terrifying. How can we have meaning if everything is meaningless? Lanfranco smiled and offered an alternative viewpoint, that not being special is separate from having no purpose in one's life. Meaning, like consciousness, is something we create and depends highly on context. So I'm not special, I thought to myself, but I matter – not to the universe, but to a handful of people who themselves are not particularly remarkable. 'We have the same DNA that every animal has; we're made of the same molecules; we breathe the same air, eat the same food... We live on a planet that is unremarkable, orbiting a star that is unremarkable, which is located in an unremarkable corner of space.'



Dr Sandro Lanfranco is a Senior Lecturer of Biology at the Faculty of Science. Besides questioning what it means to be human, his research also dives into aquatic biology and ecological habitats as well as understanding how to best conserve local biodiversity.

Photo by Edward Duca

So, if we are floating around in non-special ways within a non-special universe, what are the consequences of feeling superior to other species? 'We're not entitled,' Lanfranco firmly proclaimed and returned to an earlier point, that the one thing we may confidently say we've excelled in as a species is, ironically, destroying the very environment that sustains us. It might be tempting to point towards the advancement of civilization as the hallmark of human achievement and success. If by success we mean expansion, aggressiveness, and a focus on profit, then yes. However, it is worth considering that perhaps these should not be our yardsticks. Of course, many of us are not thinking about success in this way; it's much more natural to manipulate – and decimate – our surrounding environment simply because we *can*.

It's important for people to feel special, Lanfranco continued. What if we found a way to understand our place in the world by investigating other forms of intelligence in different species, I asked. It's important, no doubt, but for Lanfranco, the cold reality of research priorities is hard to ignore. We want to be healthy; we want medicines that cure diseases. This priority will always override a curiosity as to whether a goldfish feels pain and how. Funnily enough, explorations into consciousness or how plants may display intelligence might still end up serving humans' selfish desire to advance the economy and health. It's impossible to escape.

We can only go as far as our own minds, and for Lanfranco, that is a beautiful, extraordinary, and unremarkable limitation.

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Big Science in Little Malta

A study conducted at Stanford University identifies the most impactful research in recent history, analysing data from 1965 to 2019 and covering approximately 7 million scientists. Seven academics from the University of Malta are ranked in the top 2% scientists in the world - quite an impressive feat for a small university! **THINK** takes a closer look at their groundbreaking work.
By **Jasper Schellekens**.

Impactful research has the potential to change the world. The Internet was born of research at UCLA and SRI International (a research spin-off of Stanford University), vaccines have revolutionised global health, and Deep Blue opened up the possibilities of artificial intelligence. A study by Prof. John Ioannidis and his team at Stanford University identified the most widely cited researchers in their fields. They analysed data from 1965 to 2019, covering

around 7 million scientists in 22 major fields. The list identifies the top 100,000 scientists across all fields. Dividing the scientists by field provides context for their performance; after all, comparing sociology research with research into surgical procedures can be like comparing apples to oranges.

Seven University of Malta researchers were listed as being at the top of their fields in 2019, and we'd like to highlight their work.



1. PROF. GODFREY BALDACCHINO

Department of Sociology, Faculty of Arts

Field: Geography | Rank: 485/12,879

Prof. Godfrey Baldacchino has published ground-breaking research into 'island studies' or nissology – the interdisciplinary study of islands on their own terms. Founder of *Island Studies Journal* and *Small States & Territories*, he has pioneered research into the political and creative economic strategies of islands and small states. Small states, most of which are islands or archipelagos, comprise approximately a fourth of all nations, so understanding strategies that cater to their specific strengths and weaknesses is of critical policy interest to many nations, including Malta.

One of Baldacchino's most influential papers is *The Coming Age of Island Studies* in 2003, where he offers insights into the then-emerging academic field of island studies.

'I have now been appointed thematic Malta ambassador for islands and small states; so this brings the worlds of policy and diplomacy very close to those of learning and research: in a way that perhaps only a small country with a great university can.'



2. PROF. GEORGIOS N. YANNAKAKIS

Institute of Digital Games

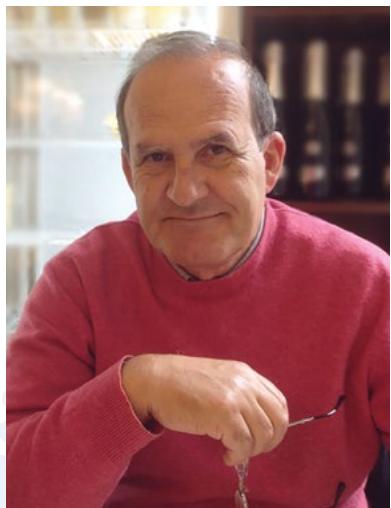
Field: Artificial Intelligence & Image Processing | Rank: 1,096/215,114

Prof. Georgios N. Yannakakis is one of the pioneers in artificial intelligence (AI) and Games research, specifically in the area of procedural content generation and player modelling. He has also co-authored the first textbook on AI in games.

While most AI researchers focus on AI algorithms that play games, Yannakakis explores the ways AI can make, test, and improve games. Testament to the impact of Yannakakis's research outside academia (via his co-founded company, modl.ai) are his two US patents of algorithms – one for game-bot generation and one for player modeling.

One of Yannakakis's most influential and awarded publications, *Experience-driven Procedural Content Generation*, addresses the use of algorithms to create content through affective and cognitive modelling, coupled with real-time adjustment of the content according to user needs and preferences. His impact on AI and games research stems from his multidisciplinary and collaborative take on science.

'Our research focuses on the ways games can assist AI to advance and conversely the way AI can assist games to advance further. Beyond games, we explore this interaction and find applications in areas such as creativity, architecture, health, education, and culture.'



3. PROF. ALBERT CARUANA

Department of Corporate Communication,

Faculty of Media & Knowledge Sciences

Field: Marketing | Rank: 520/10,464

The Head of University of Malta's Department of Corporate Communication, Prof. Albert Caruana's most impactful research has focused on the importance of service quality, reputation, and loyalty. His 2002 publication on the importance of service quality in the *European Journal of Marketing* proposes a mediational model linking service quality to service loyalty through customer satisfaction and has been cited a whooping 2,916 times.

He was further instrumental in setting up Prof. Juanito Camilleri's DegreePlus initiative at the University of Malta. It provides students an exciting and diverse range of opportunities to help broaden their horizons.



4. PROF. MICHAEL A. BORG

Department of Pathology, Faculty of Medicine & Surgery

Field: Microbiology | Rank: 1,804/134,369

Prof. Michael A. Borg heads the Department of Infection Control at Mater Dei Hospital in Malta and chairs the National Antibiotic Committee. He has been an influential force in studying antibiotic resistance, especially within the Mediterranean region, advising the European Centre for Disease Control (ECDC). Antibiotics save lives, but their effectiveness is jeopardised by excessive use. Preventing these superbugs requires correct antibiotic prescribing and simple, effective infection control measures such as hand hygiene. Compliance with these measures is problematic worldwide. Borg has extensively researched and lectured internationally on why healthcare professionals often do not follow these procedures. He pioneered studies on the behavioural elements behind antibiotic prescribing and infection control decision-making.

'If we are to make inroads into the global antibiotic resistance challenge, we need to better understand why antibiotics are prescribed incorrectly and simple measures like hand hygiene are not followed by well trained and educated healthcare professionals. Above all, we need to come up with effective behaviour change interventions to correct these practices which are compatible with local cultures and expectations.'



5. PROF. GIUSEPPE DI GIOVANNI

Department of Physiology & Biochemistry, Faculty of Medicine & Surgery

Field: Neuroscience, Neurology & Neurosurgery | Rank: 4,399/227,881

Prof. Giuseppe Di Giovanni has published influential research on a number of neuropsychiatric conditions such as Parkinson's, depression, and epilepsy. His seminal work on brain activity that results in absence seizures has provided a paradigm shift in how we view and treat most aspects of childhood absence epilepsy. His recent work, focusing on the study of serotonin receptors, is set to make an important contribution towards understanding the mechanism of psychoactive molecules, including antipsychotics, antidepressants, and drugs of abuse.

He is the president of the Mediterranean Neuroscience Society and is involved as editor-in-chief of the prestigious *Journal of Neuroscience Methods* by Elsevier and '*The Receptors*' book series by Springer/Nature. He is the Treasurer (previously the Chairmen) of the Malta Neuroscience Network Programme at the University of Malta and the Scientific Publication Manager of *Xjenza Online*, the official Journal of the Malta Chamber of Scientist.

'My group is focused on epilepsy with a holistic approach; we want to treat both seizures and comorbidities – serotonin and cannabinoids may offer new hope. We aim to move from targeting control of symptoms to strategies for prevention and cure of epilepsy.'



6. PROF. JOSEPH N. GRIMA

Department of Chemistry, Faculty of Science

Field: Applied Physics | Rank: 971/224,856

Prof. Joseph N. Grima's world-leading work has focused on applied physics. He leads a research group on materials and structures exhibiting 'negative properties'. Materials with negative properties behave in the opposite way to most other materials. Imagine a rubber band that becomes thicker when stretched instead of bigger. These materials have a negative Poisson's ratio, and Grima and his team found that, in our bodies, tendons behave in this way. Grima has also worked on materials that become smaller when heated instead of expanding, termed negative thermal expansion. Other materials express negative compressibility, increasing in size under pressure instead of decreasing.

His research has uncovered some mechanical properties of graphene, tendons, and materials with regular, microporous structures that make them useful as adsorbents and catalysts. Discoveries like these can help rethink the treatment of injured tendons.



7. PROF. RUBEN GATT

Metamaterials Unit, Faculty of Science

Field: Applied Physics | Rank: 3,405/224,856

Prof. Ruben Gatt is a frequent co-author with Grima (97 shared publications) and also an influential researcher in the field of applied physics, having worked on materials with negative Poisson's ratios, negative thermal expansion, and negative compressibility. He is a co-inventor of three patents filed in Malta, the UK, and Italy. His patent for 'Stents with Zero Poisson's Ratio Cells', filed together with Grima and Prof. Aaron Casha, was awarded First Prize for Scientific Innovation at the Malta Innovation Awards 2011. Gatt and his group, in collaboration with Smart Materials Ltd, are developing foams with negative Poisson's ratios, an innovative process that can be a major game changer in the multi-billion foaming industry.

'True innovation comes from collaboration; no one person can be an expert in all fields of science. The magic, or in this case science, happens when different people from different fields are intrigued by a similar question and work together. In our case, we are trying to bring auxetic materials to the market so that their beneficial uses may be enjoyed by everyone. We are also trying to introduce novel, safe, and environmentally friendly ways to disinfect foods whilst improving crop yield.'

Research is not performed alone. Many of these top researchers work in teams of very talented people. These few profiled achievements reflect the University of Malta as a whole. It has nurtured a dynamic environment where academics are supported to focus their efforts on impactful research. These colleagues motivate peers and students to push the boundaries of knowledge to inspire the next generation of innovators and scientists. 

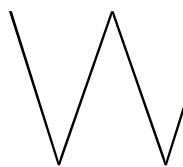
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Dictating the Market

What is it about a story that can make us so invested? **Antónia Ribeiro** muses over marketing, emotions, and Nazis under the light of **Dr Mario Cassar's** research in storytelling.



hen in 1933 Hitler took his place as the head of Nazi Germany, the stage was set for one of the darkest periods in Western civilization's history.

HITLER'S FAIRY TALES

Hitler had a clear goal: expand the greatness of Germany by conquering new territory. Ostracized – dare we say, humiliated – by the Allied forces after World War I and left in economic shambles, Germany was the outcast with a bone to pick. Hitler fed the population's resentment and fear, promising the reestablishment of the once-great Germany (does 'Make Germany Great Again' sound familiar to anyone?). His goal was territorial expansion, and the only way to achieve it was through invasion.

To legitimise his pursuit, Hitler created a scapegoat. The Jews, Slavs, homosexuals, and Jehovah's Witnesses, painting them as the precursors of the entire country's misery. By demonising the 'undesirable' minorities and fuelling feelings of otherness and discrimination, Hitler laid the foundation for inhumane acts.

It's a cunning strategy, honed through history, and still employed today by extremist political parties. With

modern values and knowledge, we may think of Hitler as a monster, manipulator, or abuser. But one word that may not come as easily to mind is 'marketeer'.

Stripped to his bare bones, Hitler (with the aid of his Minister of Propaganda, Joseph Goebbels) was a masterful storyteller, capable of spinning a tale that pulled the country's heartstrings. Even if for nefarious purposes, his masterfully woven ideals convinced the population and unified Germany in the pursuit of a common goal.

STORYTELLING, A JACK OF ALL TRADES

Storytelling is an approach applied to all kinds of communications, such as fiction, scientific writing, teaching, public speaking, and marketing. Referring either to the structural organisation or the underlying narrative, the technique captures attention, boosts the reader's focus, and helps assimilate and memorise new information. But it can be difficult to guess the purpose lurking beneath the story. In his book, *Mein Kampf*, Hitler reinforced the population's insecurities while hiding his true motif.

At the University of Malta, the Deputy Director of the Marketing, Communications and Alumni Office, Dr Mario Cassar, is well aware of the usefulness 



Dr Mario Cassar
Photo by James Moffett

of storytelling; he has a whole PhD thesis on the subject. By evaluating the persuasiveness of this technique, he clarifies how stories can be channeled in marketing and help the University of Malta.

Cassar describes storytelling as 'the brain currency to store information,' since our brain stores and retrieves information as episodes (be it stories, experiences, or incidents). Online reviews of products are highly persuasive in marketing due to their 'story-like structure.' This narrative approach is also thoroughly used in brand marketing

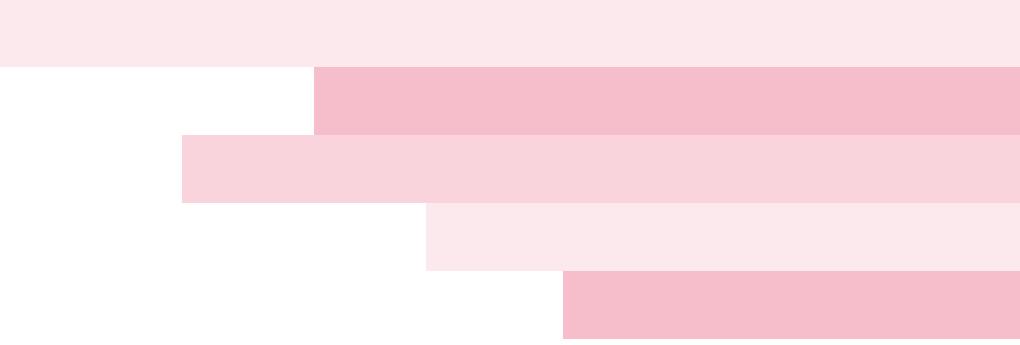
while constructing an identity. We relate to, and ultimately consume, brands that we identify with. This connection is crafted through stories that also push people to action. In his thesis, Cassar questions how storytelling compares to factual information. He directs these assessments on persuasive power towards university marketing. He wonders what spikes more interest: detailed information on the available courses at a university or testimonials on the 'college experience.'

EMOTION OVER LOGIC

We like to think of ourselves as rational beings, capable of making decisions based on the logical analysis of the data available to us. Yet, humans take decisions based on emotions. We choose sides not by their empirical value but according to how they make us feel. And stories are a powerful way to pass on emotion. Our brains are literally hardwired to focus and retain more information when it is conveyed as a quirky tale.

What is it about stories that keep us so enthralled? The answer may be in our past. Stories were one of the main ways our ancestors communicated where the dangers lay. In a time when there were no written textbooks on survival, much less Bear Grylls' 'resourcefulness' on TV, stories were a memorable way to pass on information. Similarly, we have been taught how to navigate society through fairy tales and fables.

Even though storytelling triggers emotive responses, it seems that narratives fuelled by anger tend to deviate from this method, according to Cassar's study. Online reviews become more argumentative when the opinion is negative. And yet, these negative reviews seem to be more persuasive. These results suggest that what we feel about a product affects the perceived credibility of our opinion. We are more convincing when we are angry.



Marketing is a tool that can be employed to positively influence our views of the world. But as any tool, it can be misused. Just as companies shouldn't spread misinformation, customers need to become savvy.

What about the length of the description? Cassar's research suggests that the most persuasive reviews are short and narrative. A short technical review will not convince the sceptics. This means that, independently of someone's knowledge of the product they are buying, stories are more appealing than technical details.

In the same way, testimonials of the university experience on a website were more interesting than technical ones. Narrative ads increased the interest rate by 45% comparatively to descriptive ones. This increase in perceived interest often correlates with increased purchase intention of students looking for a course.

"CECI N'EST PAS UNE PIPE"

It turns out that storytelling is exceptionally good at capturing our attention, and it is also very persuasive. The German Nazi regime used the method to manipulate the population. Nike uses it to inspire us to be the best version of ourselves (even if it implies that the right way to do that is with their products). Even Christmas marketing campaigns take advantage of the emotive power of storytelling every year.

This article does not want to imply that marketing is analogous to a fascist regime. Marketing is a tool that can be employed to positively influence our views of the world. But as any tool, it can be misused. Just as companies shouldn't spread misinformation, customers need to become savvy. As consumers, we need to learn the patterns and how to critically evaluate the messages that are being fed to us.

A TALE TO RULE THEM ALL

Cassar's research shows how storytelling can affect emotions, attitudes, and behaviours. There is a big difference between the marketing of tertiary education and

the propaganda that fascist regimes of the 20th century used. Yet marketing can influence the very core of society. In Cassar's words, 'Marketing is an organised way to persuade people.' To him, more than storytellers, marketers are observers of their culture and social environment.

For its wide range and keen understanding of the social-political context, Hitler's mastery of storytelling may be the harrowing proof of the persuasive power of a well-crafted tale. 

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IDEA



Content
for free



Librarians and pirates the world over have started a controversial movement to make access to academic research free. **Veronica Stivala** heads underground to find out more.

The paywall behind digital libraries for academic texts could soon become a thing of the past. The change is controversial to say the least. Currently, universities and individuals have to pay huge sums if they wish to access academic content such as research papers and journals. Furthermore, researchers and academics themselves, who have often contributed the content, need subscriptions to access their own work.

But this story is about more than just subscription fees. It is one about how a private industry has taken over the institutions of science, and consequently, how librarians as well as academics are fighting to regain control.

Firstly, it is important to note that it is not just the academic texts that are being made available for free, but also the months and years of research material, unpublished data, raw data, and so on, often referred to as open access. Think of the endless possibilities for collaboration and progress that this can open up, not to mention the time saved.

THE GOOD FIGHT

The University of Malta (UM), particularly Kevin Ellul, Director Library Services, has been fighting strong since 2014 when UM launched its own institutional repository – OAR&UM (Open Access Repository for University of Malta) – where UM academics and researchers can upload their research content and peer-reviewed journal articles. Essentially, the University of Malta decided it didn't want knowledge hidden behind paywalls, taking a stand against the cost of academic publishing, which has gotten out of control.

Take publishing company Elsevier, which owns some 3,000 academic journals. Its articles account for a whopping 18 percent of the world's research output. Elsevier therefore generates billions of dollars from its journals.

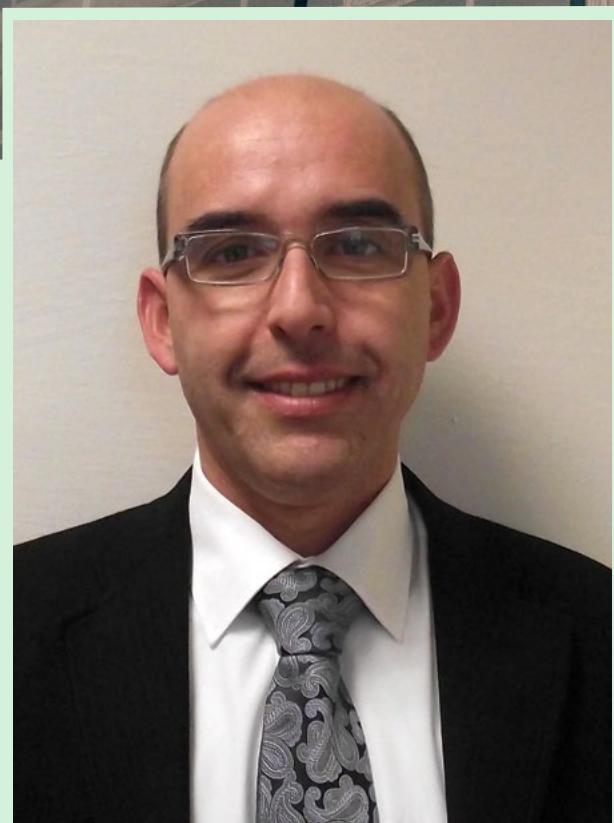
Ellul does not mince his words when he says, 'We are against publishing houses.' In this new format, the universities are becoming the publishers. In Ellul's words: 'We are escorting our academics to publish. It is their ➤



duty to do so.¹ The system therefore creates a fairer distribution of finances in that the money remains in-house as it were, rather than going to an external entity.

How so? In addition to salaries, universities use the taxpayer money they receive to provide support, library offices, labs, and so on. The research is done by its scholars, who then compile academic articles and forward them to publishers, without any remuneration going to the author. Companies such as Elsevier and Springer Nature have succeeded in becoming immensely profitable by receiving taxpayer-funded, highly skilled labour for free, while charging a premium for access to it. Not only that, but the academics themselves as well as the university that provided the support and infrastructure for the research to be carried out would also have to pay exorbitant licence fees for work written by its very own writers. And this is precisely what new open access systems, such as OAR&UM, are fighting against.

How does the OAR&UM platform work? The content is openly available, and anyone who uses the research is obliged to acknowledge the author. The content is available to anyone with an internet connection, in academia or not, further opening up important research and potential collaboration with a wider public. Content is king, and this



Kevin Ellul

Content is king, and this service would naturally be nothing without the academic material.



service would naturally be nothing without the academic material. So subsequent to its implementation, the library also set up an open access policy and is now encouraging its academics to upload their papers, dissertations, and theses to their repository. To date 56,000 items, which include peer reviewed articles, have been submitted.

THE DEVIL IN THE DETAILS

Quality control is vital. As content becomes free, the divide between the World Wide Web, where everybody and anybody is a publisher, as opposed to quality-driven, peer-reviewed, publisher-approved academic material could theoretically and worryingly narrow. While still in inception, an open peer reviewing system is being introduced, whereby experts in the field will take on the role of peer reviewers.

Speaking further about maintaining quality levels, Ellul is keen to stress that the platform they are using – Dspace – maintains the highest EU research standards. The open access software is being used by prominent universities to set up their own repositories.

An interesting question that arises is how the content will be found now that it is not being hosted in better known digital libraries. To this, Ellul answers confidently that all the university's content is being harvested by prominent

Open Archive Initiatives (OAI) providers, including Base and Core, as well as Google. This means that the material will show up in these searches. The system therefore enhances not just research, but also leadership and visibility, which play a central role in universities' cutthroat competition to score high in their rankings and attract students.

DAVID VS GOLIATH

Universities the world over are essentially all in the open access race, all at different stages. So, where does Malta stand? 'Somewhere in the middle,' reveals Ellul.

It comes as no surprise that publishers are against all of this, but they are struggling to adapt their business models and come up with transformative agreements, which they need to do quickly. It is generally agreed that the future is open access, and universities still have a lot of work ahead of them when it comes to protecting things like copyright. Also, universities alone are not strong enough to overcome the open access battle. There still exist a lot of incentives for academics to work with publishers; their careers are highly dependent on the number of publications they have in high-profile journals. So as long as these incentives exist, open access journals will not stand a chance. The success of open access lies heavily in the hands of the academic. T

START UP



Making home ownership easier for everyone

Dardingli is the brainchild of **Beatrix Rodríguez Sanz** and **Xabi Rivera**, two people from very different professional and personal backgrounds. They struggled to find a home, a common problem in Malta, so they decided to solve the island's real estate woes. **Inna Korchilava** finds out more.

Trying to find property online is challenging. Jumping from one real estate website to the next makes it a tedious endeavour. Dardingli (housed at TAKEOFF, the University of Malta's business incubator) has created a service that places properties from real estate agents and owners under one roof, making it simple.

The concept of Dardingli was born in 2019, when the founders, Beatrix Rodríguez Sanz, Chief Executive Officer, and Xabi Rivera, Chief Experience Officer, struggled to find a house that met their expectations. The chaotic market offered many options; however, navigating the endless listings quickly became tiring. This experience unveiled a gap in the market: the lack of a specialised service that would help narrow down the search.

Beatrix and Xabi decided to combine the strengths of the two most volatile industries, technology and real estate, through Property Technology (Proptech). Proptech is the technology that helps maintain consumer experiences. The tech ignited the possibility to create a whole new experience for property owners, agents, and property seekers. What the local market needed was a centralised online database of property listings.

The creation of Dardingli depended heavily on two main components. First was business, which Beatrix took on by relying on her long-term business experience and entrepreneurial attitude. The second was the actual platform. That was taken on by Xabi, who combined his knowledge and experience in UX design to build the Dardingli platform creating a new real estate experience within the Maltese market.

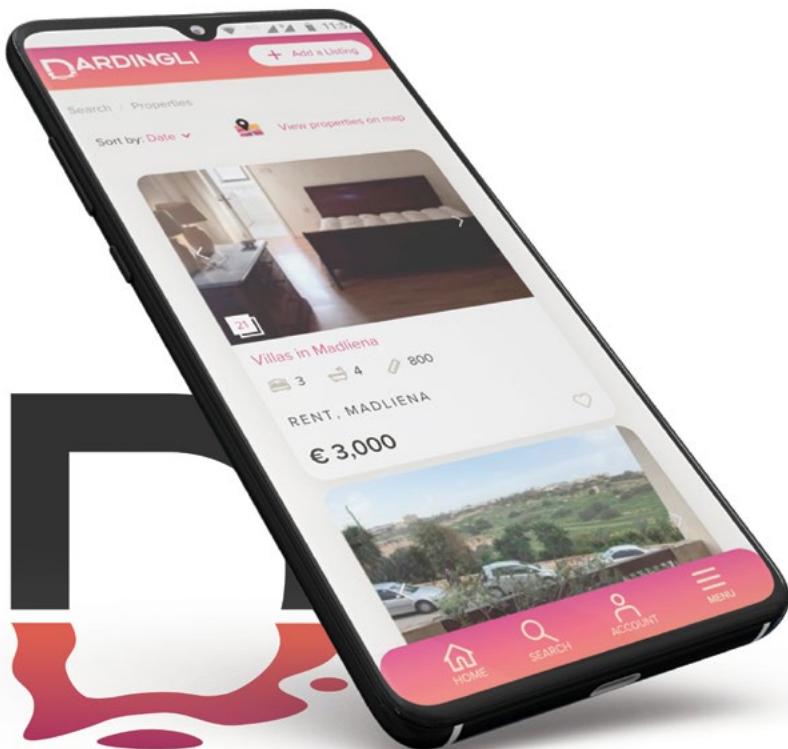
FILLING A GAP IN THE MARKET

The real estate market has always been important to Malta; however, the creators of Dardingli noticed a disadvantage when compared to other European countries. They found an immense division within the property market: almost 200 agencies, several freelance agents, and multiple social media or classified pages. This makes the search for the right property seem an impossible mission. It was clear to Beatrix and Xabi that this needed to be improved. They brought their experience in Spain to Malta. Beatrix and Xabi adapted a technological system together with a business model to meet the needs of the Maltese property market.

The platform is based on a classified advertisement website. There are no direct sales on the website. Their main service ➔



Beatrix Rodríguez Sanz and Xabi Rivera, co-founders of Dardingli
Photo courtesy of Dardingli



is to directly connect property seekers with owners or real estate agents.

Consumer interaction with businesses is being radically changed by digital technologies. For Beatrix, 'technology is the tool which optimises and improves the processes of buying, selling and renting properties.' These technologies help businesses make better decisions that improve performance and mitigate risks. Dardingli focuses on adjusting their platform to an ever-changing market and user habits.

Beatrix makes it clear that 'clients and users are our focal point.' They recognise that placing customers' needs first is crucial in order to forge a relationship that will contribute towards growth and long-term sustainability.

The company aims at striking a balance between the social, economic, and environmental aspects of an organisation. Every day, Dardingli looks

Beatrix and Xabi set up the company to be easy, effective, and ethical. They have a sophisticated property search tool that is free, with no hidden costs for buyers.

towards creating actions to establish a relationship between society and their company. This is done in two main ways: managing impacts through corporate social responsibility and community collaboration. The most recent example is Dardigl's Covid-19 free or reduced rental campaign. The company's goal was to help provide apartments to vulnerable sectors and healthcare workers helping battle Covid-19.

A GROWING TEAM

The Dardigl team is small, young, and dynamic. The company promotes an inclusive environment where differences are valued, and employees can innovate to drive the business forward. Their team includes professionals and consultants with the technical knowledge and managerial experience for such an ambitious project.

Beatrix commented that 'sometimes the solution is not only having the best technology, but the one that best suits the circumstances.' Since its inception, the company has grown to over 30,000 online listings, and it continues to work with the goal of 'positioning itself at the benchmark of the sector in Malta.' The company provides a complete package for owners, helping them with photography and video production to represent their property for sale or rent. They provide a 'full-360 real estate experience.'

Beatrix and Xabi set up the company to be easy, effective, and ethical. They have a sophisticated property search tool that is free, with no hidden costs for buyers. The tech behind it all, Proptech, is relatively new to Malta. Beatrix feels that when looking for a new property, people are only given 'a scattered offer based on limited and

outdated technology.' The traditional property search and property listing system uses non-specialised portals, social media networks, and individual websites, creating frustrations for the consumer. Beatrix explains that real estate agencies invest a huge amount of money in marketing on unrelated channels to try to reach their customers. They also spend a huge amount of time uploading sale and rental properties 'that often end with little or no results.' Dardigl also tries to cater for smaller clients with one free listing for owners.

Rather than having to hop from one website to another, Beatrix, Xabi, and their team have found a way to bring owners, agents, and developers under one roof. And in Malta's chaotic property market, that means finding a home has become that little bit easier! 

LAB TO LIFE



Gathering *kuraġġ* to stand up against bullies

Malta's first anti-bullying NGO, bBrave, has recently launched its mobile application to raise awareness on the different faces of bullying. The all-volunteer-run organisation, thanks to the supporting help of members and sponsors, is spearheading education into bullying, helping those individuals in need.

By **Christian Keszthelyi**.

lassmates would make every day feel like hell on earth for Hector (not his real name) in elementary school. Between the constant name-calling, public mockery, and physical harassment, Hector quickly grew insecure.

Bullying happens everywhere. However, a small team in Malta have found a way to help individuals stand up to bullying. In 2017 Aaron Zammit Apap founded bBrave, the first anti-bullying NGO in the country. 'We set up bBrave as, while bullying has been around forever, strangely enough, there was no organisation to raise awareness and support victims. Bullying affects everyone and is present in all levels of society,' Zammit Apap tells **THINK** Magazine.

bBrave is run exclusively by volunteers. There are no employees in the organisation. The volunteers spend their nights, lunch breaks, and weekends working together to help those who have experienced some form of bullying. 'The team is very committed, and I am very proud of the place we got to in the

past four years,' Zammit Apap says about the organisation that has grown to help so many.

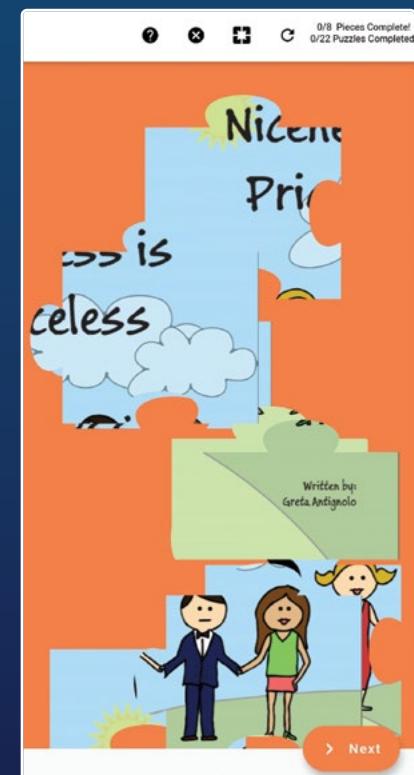
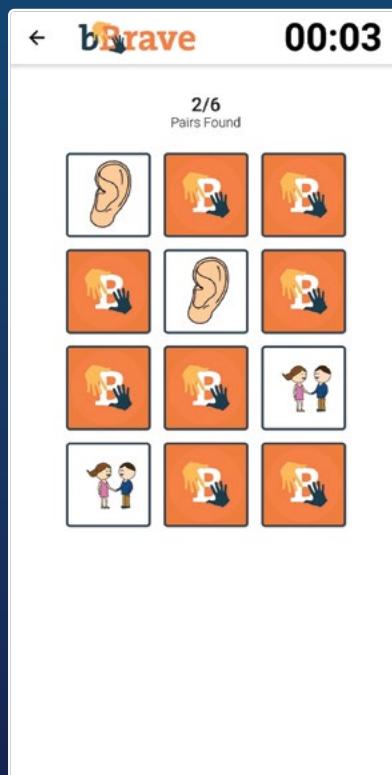
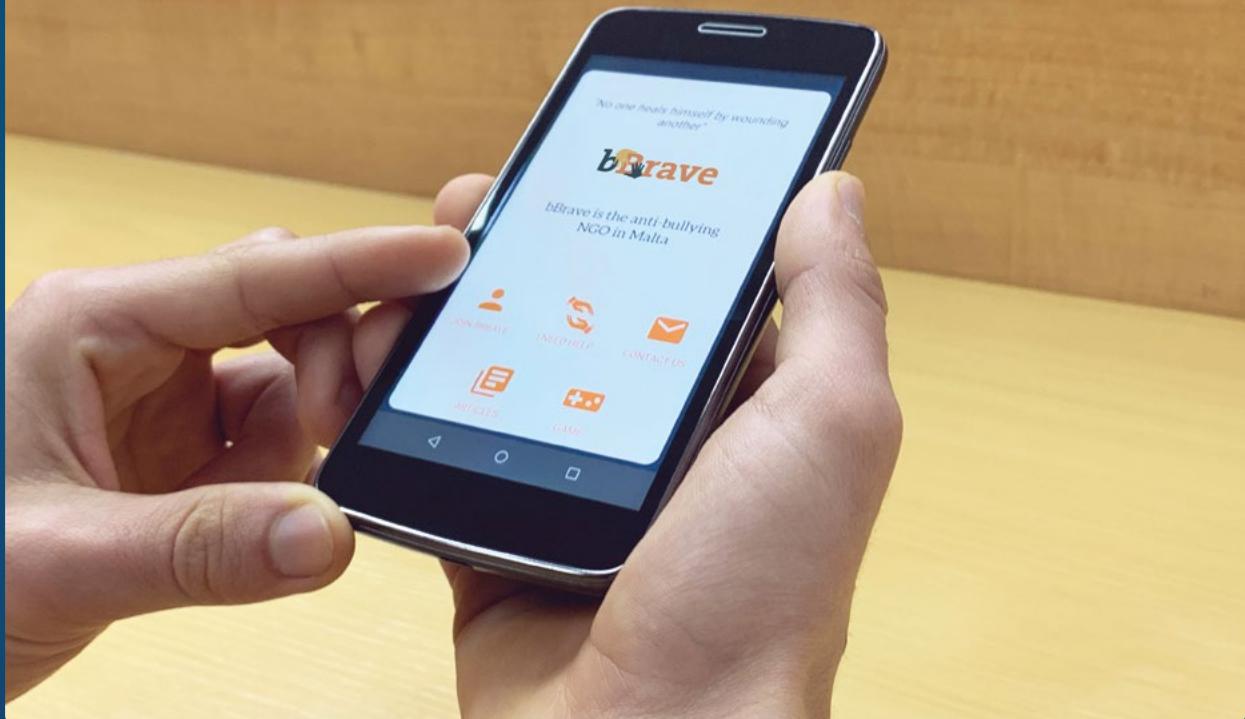
The reach of bBrave was greatly expanded when Apap Zammit's path crossed with that of Dr Mark Micallef, Head of Department of Computer Science, Faculty of ICT at the University of Malta, who applies a rather practical approach to educating future professionals.

'The focus is not on what the students build but how they build it, the way they work together, and the problems they solve. Sometimes we encourage clients to be difficult and ask students to do more than they can do,' Micallef tells **THINK**.

Apap Zammit became a client, and Micallef's students aligned with the organisation's mission and created an app.

Fast forward a few months, and the bBrave app offers extensive support to those who have been bullied or harassed. If people need help, the app will list a number of organisations that could assist them. The app also has two retro-

The bBrave mobile application in use



Memory and Jigsaw Puzzle games inspired by
Greta Antignolo's book *L-Għajnuna hi Prezzjużha*
Images courtesy of bBrave



Aaron Zammit Apap
Photo by Gary Bugeja



Greta Antignolo
Photo by Gary Bugeja

style games, inspired by primary school teacher Greta Antignolo's book, *L-Għajnuna hi Prezzjuža*, which helps children realise the gravity of bullying in a playful manner.

EDUCATION IS KEY

During his high school years, some of his water polo teammates would give Hector a hard time on and off, which would trigger unpleasant memories from elementary school, further denting his self-respect. Education is a key shield to bullying. But without resources, this is hard to accomplish. Antignolo, herself a former bullying victim, researched bullying for her thesis. She quickly realised that there was no book about bullying in the Maltese language. So she ended up writing one herself, entitled *L-Għajnuna hi Prezzjuža*. The book ties into the Maltese syllabus, complementing it so that when primary teachers introduce body parts in Maltese in the classroom, they can also elaborate on how to behave appropriately, Antignolo tells **THINK**. One example would be using hands for clapping or hugging instead of hitting others.

The bBrave app gives another twist on the book by turning its contents into interactive jigsaw puzzles. Via gamification, the player completes fun puzzles and reads the entire book at the same time. The application is a genius example of the marvels of technology married with good intention. But innovation has its dark sides.

The internet has given us various ways to enrich our lives, but it also makes bullying more severe for victims. 'Unfortunately, if someone was bullied before the advent

of the internet, they could go home and find a safe haven by getting away from it all. Today, even if they crawl into bed, they may be bullied on social media. It goes on 24/7. It does not stop,' Apap Zammit points out. Cyberbullying is not only present in social media anymore. It can be found on messaging and other community-building platforms as well.

AFFECTING ADULTS TOO

At the age of 30, just when Hector thought he had become thick-skinned and old enough to bear anything, his line manager would bully him to the extent that he considered quitting for good, after almost a decade spent in his line of work.

It is not only kids who suffer bullying. Adults are bullied in their workplace or in relationships. Although the bBrave app targets children, the organisation's volunteers want to expand the app's reach. 'We do intend, eventually, either to develop the app further or create another stand-alone version of the app for adults,' Zammit Apap says. He adds that the thirst for education and awareness-raising on bullying is immense.

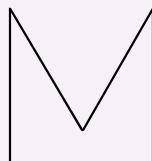
Verbal or psychological bullying is often overlooked. Dialogue and knowledge sharing are key, especially when our media is dominated by a discourse of power play. An imbalance of physical or social power is at the core of any type of bullying.

For the record, Hector is your writer: the very author of this article. Additionally, bullying does leave scars for a lifetime or, at least, as long as I can tell. **T**



A promising early career researcher

Though she did not take the easiest path, a desire for new knowledge and the application of mathematics in complex problems has led **Dr Martha Borg** to critical acclaim in the field of theoretical chemistry. Here she tells **Becky Catrin Jones** how she fought through many challenges to achieve her goals.



Mathematics has always been my passion', the new Dr Martha Borg tells me as we sit down to discuss over video chat.

Although ultimately she has gained a doctorate in theoretical chemistry,

Martha is quick to point out that her journey didn't start there. She started her BSc in Maths & Physics course in 2003 at the University of Malta (UM) and graduated in 2007. But during this time, exposed to different subjects, fields, and guest lectures, she saw how maths was so easily connected to many other exciting fields. The way maths is applied to other problems is what really excited her.

Having completed her degree, Martha went straight back to complete a postgraduate certificate in education (PGCE) and started teaching maths and physics at a local high school. 'Teaching is something that I like to do,' Martha says. 'It helps you appreciate your subject more.'

While Martha speaks very fondly of her teaching, this was not her dream career. Her passion for academia and the pursuit of knowledge was much stronger. It was no surprise then that, after two years of teaching, Martha returned to the Faculty of Mathematics at UM to work towards a Master's degree.

MAKING THE MATHS WORK

It was during this time that Martha was introduced to Professor Irene Sciriha, a UM professor particularly interested in graph spectra theory. This was to become Martha's study focus.

Martha used our video chat as an example of graph spectra theory. She asks me to imagine that we are two points in space – or vertices. We are connected, on the video call, by millions of internet connections – or edges. Together, this makes the graph. And from there, you can explore all possible connections and links between them.

Graph theory is a basic mathematical theory that is very easily applied to other fields. Martha's work took advantage of this principle to investigate whether single particles might act as conductors or insulators of electricity. In time, this work might revolutionise batteries and electrical devices. What if, instead of a battery, we could use a single particle to power our phones?

NEXT STEPS

With a master's degree under her belt, Martha turned her focus back to teaching while she worked out what exactly she wanted to study next. Although the interest was clear, she needed a solid project plan to be able to progress further. 'I wasn't sure what I wanted to do. I needed to find a suitable research question.'

It took Martha a couple of years to decide on a subject that made it worth returning to academia. She pitched her idea, an expansion on her master's project identifying potential conductive particles, to Sciriha, who, despite being enthusiastic about the project, had some reservations around whether she was the right person to lead her through the degree. ➤



The
University
Of
Sheffield.



'Professor Sciriha was worried that by the time I was finishing the PhD, she may have retired from her post,' Martha explains. Having already had a long and illustrious career in research and academia, Sciriha was considering retirement and did not want to leave her without a supervisor, so she politely declined.

This was a big problem. Having taken such time to develop a research question that Martha really wanted to pursue, it seemed that it might not be possible. After all, Sciriha was the only active researcher in Malta with an interest in that field – where else could she go?

Luckily, Sciriha had another idea.

'Professor Sciriha had some very good links with Professor Patrick Fowler at the University of Sheffield,' says Martha. A collaborator of Sciriha, Fowler was an established name in theoretical chemistry and a fellow of the Royal Society, a prestigious title assigned to those who excel in their field. Sciriha passed on his contact details and her support. Martha then reached out to the UK professor.

'I contacted him with my humble idea, and he said he would be very happy to take me on as his research student!' And so, in 2013 Martha started reading towards her doctorate.

WORKING OUT THE DIFFICULTIES

But not before a few more hurdles had to be overcome. 'It would have been ideal to give up teaching and instead focus on my studies, but there was a bit of a funding issue! At the time, Martha found it difficult to find funding schemes that applied to her and her more abstract research,

so she would have to fund herself – university fees, flights, accommodation, and all. She would need to keep working full-time at the high school to support herself.

Such was her drive to continue in research and her passion for the project that, despite all the difficulties, Martha decided she was willing to work to pursue her career in academia. She accepted the offer of a part-time, long-distance PhD with the University of Sheffield, knowing she would spend little time in Sheffield.

'In fact, the University of Sheffield had never taken on a candidate like me before.' Martha's long-distance learning meant that she was unable to do most of the things her peers would take for granted: a chat about a problem with a colleague over coffee, attending a guest lecture from a travelling scientist, or even daily communication with a tutor to discuss both small and complex problems that arise when delving into the unknown.

Martha had to make things work for her. Although she missed out on the activity at the Chemistry department in Sheffield, she had an agreement with UM that she could attend relevant lectures there instead. Weekly meetings with Sciriha kept her research on track and anchored to the world of academia. Sheffield even agreed to reproduce some of their learning modules online for her benefit.

An understanding head of school gave Martha much needed flexibility, giving her permission to leave her teaching job on some Friday afternoons to visit Sheffield and work on her PhD. During these precious times she had to make the most of Fowler's

Left: The UK Turner Prize 2020 presented to Dr Borg
Right: Dr Martha Borg receiving her PhD
Photos courtesy of Dr Martha Borg

guidance and experience. 'I spent the whole time I was in Sheffield by Professor Fowler's side – from 9am in the morning till about 7pm at night on a daily basis!'

THE POWER OF A GOOD MENTOR

Although the circumstances by which she undertook her PhD were far from ideal, Martha is truly grateful and humble about the whole experience. 'I really have nothing to complain about,' she says often, offering it almost as punctuation between the numerous challenges she faced. 'I am grateful to have had good mentors, backing from different people who have kept me pushing.'

It's clear from our conversation how much of an impact Sciriha in particular has had on Martha's career. Finding a mentor to guide and encourage her has made a difficult journey seem possible, knowing she had someone in Malta to turn to for advice.

And thanks to this support, Martha completed her doctorate a whole year earlier than planned. After completing her viva successfully and achieving her title of Dr Martha Borg, she was granted one more, unexpected accolade.

The UK Turner Prize, in memory of the late chemistry professor William Turner, is awarded to four PhD students annually who have produced an outstanding thesis. Impressing her examiners, Martha was given the honour of receiving the title this year, alongside a £50 financial prize and a commemorative ballpoint pen. 'It was nice to get the recognition, and to come full circle,' she says with a smile, pointing out that Fowler himself had once been the recipient of the award.

LOOKING FORWARD

Martha has returned to teaching for the time being but is keeping her eyes peeled for her next opportunity to get back into research, whether that be in Malta or abroad. 'The application of maths is what really excites me – I want to be a bridge between the different sciences'.

Despite the challenges she faced while earning her PhD, Martha would still wholeheartedly recommend others to do the same. 'If you have the passion, don't stop at the first closed door.' The opportunities are there if you keep searching, and Martha has no intention of stopping. **T**



TO-DO LIST

PODCAST



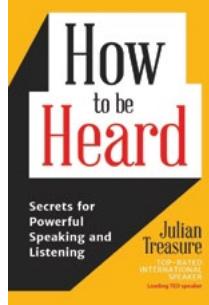
The Argument



The Argument

If we want to mature as a society, we need to hear both sides of the debate (and not just the side we agree with). People from both sides of the political spectrum, who often disagree, come together to hash it out on ***The Argument*** every week.

BOOK



How to be Heard

Have you ever felt that people hear you but don't actually listen? **Julian Treasure**, renown TED Talks speaker suggests how to speak so that people listen, and how to listen so that people feel heard.

MOVIE



The Minimalists: Less Is Now

Is minimalism the solution to the prevalent (and unsustainable) consumerist mindset of the 21st century? **Joshua Fields Millburn** and **Ryan Nicodemus** share how our lives can be better with less.

TV



Midnight Gospel

Who knew psychedelic visuals and philosophical discussions could work so well together? *Midnight Gospel* is the brainchild of Adventure Time creator, **Pendleton Ward** and comedian **Duncan Trussell**, and follows the adventures of Clancy Gilroy as he interviews various guests for his space cast.

YOUTUBE CHANNEL



Psych IRL



An ex-research assistant who uses her B.A. in psychology to analyze contemporary themes, pop culture, and the internet.

MUSIC



Rare Changes (EP)



Sit back and unwind to the smooth R&B sounds of DJ turned soul singer, **Mayer Hawthorne**.

INSTAGRAM



joshuaweissman

Food, glorious food! Mouth-watering food porn to inspire your next culinary adventure!



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in the fields of Energy and Water

The Energy and Water Agency will be publishing a competitive Call for Proposals in March 2021.

€700,000 is available to support R&I projects with a focus on Energy and Water. Research grants range from €60,000 to €120,000 per project.

Project proposals from a wide range of disciplines are encouraged – from engineering and natural sciences to social and behavioural sciences, big data and artificial intelligence.

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