CONFERENCE PROGRAM

#SoMA22

Scientific Program

Science of Magic Association Meeting

21 July—22 July, 2022

Goldsmiths University of London

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Goldsmiths
UNIVERSITY OF LONDON

A Message from the SOMA Committee

Welcome to London for the third biennial(ish) meeting of the Science of Magic Association! Since our last conference in Chicago, and despite a global pandemic, substantial progress has been made by academics and magicians around the world toward enhancing our understanding of the nature, function, and underlying mechanisms of magic. In London, we hope to build upon the foundation that was laid in the previous two conferences, providing more opportunities to establish collaborations and identify new shared interests between magicians and academics. This would not have been possible without the help of our sponsors (see page 26). Thank you for your support! Thanks also to our abstract review committee members, Jeanette Andrews, Geoff Cole, Amory Danek, Vebjørn Ekroll, Shringi Kumari, Kevin Ladd, Mark Pepelea, and Ron Rensink.

Gustav Kuhn
Anthony Barnhart
Matt Tompkins
Jay Olson
Jeniffer Ortega
Alice Pailhès
Jason Leddington

The Science of Magic Association

Gala Show 2022

20 July — 19:00

The Amersham Arms, 388 New Cross Road, London

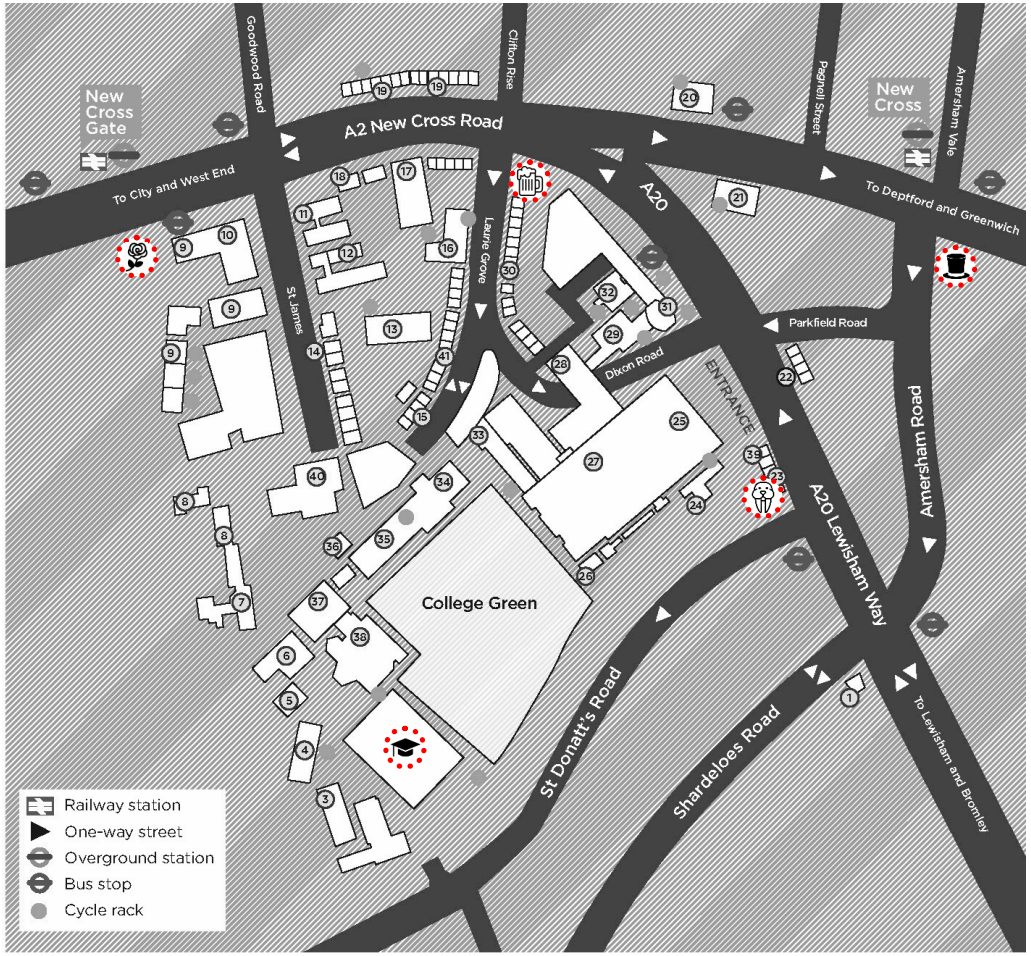
Performers include...

Paul Zenon

Julius Frack

Laura London

Edward Hilsum



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Conference Locations:

Gala Show: The Gala Show is hosted at The Amersham Arms, 388 New Cross Road. (https://www.theamershamarms.net/)

Presentations: All presentations take place in the Professor Stuart Hall Building, lecture hall LG 02, on the campus of Goldsmiths University of London.

Food & Drinks: Informal dinner and drink events will be held at New Cross House, 316 New Cross Rd. (https://www.thenewcrosshouse.com/)

Additional recommendations for food & drink:

The Rose Pub & Kitchen, 272 New Cross Road (https://www.rosepubandkitchen.com/)

The Fat Walrus, 44 Lewisham Way (http://www.thefatwalrus.com/)

Keynote & Invited Speakers:

Chris French

Real magic? Putting the claims to the test.

21 July — 10:15

Laura London

From Chaos to Order

21 July — 13:30

Sophie Scott

The science (and magic?) of laughter

22 July — 11:30

Luke Jermay

Magical Thinking

22 July — 14:00

Derren Brown

Guest of Honor Q&A

22 July — 16:00

Program at a Glance:

Wednesday, 20th July, 2022

19:00	Science of Magic Gala Show The Amersham Arms, 388 New Cross Road *Featuring Edward Hilsum, Laura London, Julius Frack, & Paul Zenon*

Thursday, 21st July, 2022

9:00-10:00	Registration & Coffee	
10:00	Gustav Kuhn	Welcome to SoMA 2022
10:15	Keynote Address: Chris French *Real magic? Putting the claims to the test.*	
Talk Session 1: (11:15-12:00)		
11:15	Ralf Laue	A taxonomy of multiple outs
11:30	Gustav Kuhn, Cyril Thomas, & Tom Griffiths	A multidimensional taxonomy of magic tricks
11:45	Dr. Matt Pritchard	Designing deceptions: The art and science of crafting illusions
12:00-13:30	**Lunch Break**	
13:30	Keynote Address: Laura London *From Chaos to Order*	

Talk Session 2: (14:30-16:00)		
14:30	Jacky Baltes, Jaesik Jeong, Jeehyun Yang, Saeed Saeedvand, & Jill Chuang	Magic as a robotics challenge problem
14:45	Matthew L. Tompkins, Lars Hall, & Petter Johansson	Genuine fake mind reading: Using mentalism magic methods to explore perceptions and misperceptions of AI and neurotechnologies
15:00	**Coffee Break**	
15:30	Vebjørn Ekroll, Vilde Standal Borgen, Nanna Hauge Langholm, Paula Marie Olsen, & Sigrid Stølen	Intuitive reasoning about blind spots
15:45	Pablo R. Grassi, Vincent Plikat, Julius Frack, & Andreas Bartels	The experience of magic in a predictive mind
16:00	**Panel Discussion: Skepticism & the Science of Magic** Contributors: Chris French, Deborah Hyde, & Paul Zenon	
17:00	Poster Session Lightning Talks	
17:30-19:00	**Poster Session & Drinks**	
19:15-??:??	**Food & More Drinks at New Cross House**	

Friday, 22nd July, 2022

9:30-10:00	Registration & Coffee	
Talk Session 3: (10:00-11:00)		
10:00	Gil Greengross, Paul J. Silvia, & Sara Crasson	Thrill seeking, magical beliefs, creativity and psychotic traits among magicians
10:15	Anthony S. Barnhart, Kaitlyn Richardson, & Shawn Eric	Magician, deceive thyself! Tactical blinking in magicians
10:30	Peta Masters, Steven Bagienski, Gustav Kuhn, & Wally Smith	Deceptive combinations and counterfactuals: an experimental study of 'the veil principle'
10:45	Alice Pailhès, Rubens Fihlo, & Gustav Kuhn	Sharing secrets: The effects of sharing the secret method behind a magic trick on perceived trustworthiness, closeness, and the art of magic
11:00	**Coffee Break**	
11:30	**Keynote Address: Sophie Scott** ***The science (and magic?) of laughter***	
12:30-14:00	**Lunch Break**	

14:00	**Keynote Address: Luke Jermay** ***Magical Thinking***

Talk Session 4: (15:00-15:30)

15:00	Brian Rappert	Magic mind and beginner's hands: Reflections from an autoethnographic study of learning
15:15	Kevin Ladd	Centaurs, secrets, and the inquisition: The early days of science and magic
15:30	**Coffee break / Intermission**	
16:00	**A Conversation with Derren Brown**	
17:00	Closing Remarks & Discussion on Building SoMA	

Poster Presentations

Thursday, 21st July, 17:30-19:00

1	Alice Pailhès, Kole Lee, & Gustav Kuhn	Misdirecting memory: How magicians use misinformation to create false memories
2	Convin Splettsen	Theory and practice of natural Magic in the enlightenment
3	Elias Garcia-Pelegrin, Rachael Miller, Clive Wilkins, & Nicola S Clayton	Of fingers and thumbs. The intersection between manual action expectation and biomechanical ability in two species of New World monkey.

4	Rudi Solon	Algorithmic illusions: Magic as a tool for digital literacy
5	Suyash Joshi	Fooling AI & fooled by AI
6	Vincent Plikat, Pablo R. Grassi, Julius Frack, & Andreas Bartels	Magic in the brain: Neural codes for prior knowledge, surprise, and perception
7	Daniel Harrysson, Matt Tompkins, Lars Hall, & Petter Johanson	Genuine fake predictions: Simulating Newcomb' s paradox with magic methods

Fin

Talk Schedule:

Talk Session 1:

Thursday, 21st July 11:15-12:00

11:15 A taxonomy of multiple outs

Ralf Laue; University of Applied Science of Zwickau, Germany; info@recordholders.org

The ultimate aim of the author's effort is to develop (in future work) a pattern language of techniques for designing mental magic tricks in the tradition of architecture patterns (Alexander) or software design patterns (Gamma et al.). In this presentation, multiple-outs (MO) will be discussed as a first pattern for such a pattern language.

Whaley's "Encyclopedic Dictionary of Magic" defines MO as "a set of several built-in outs for one trick that permits alternative endings…", while an out is "any method that a magician introduces to salvage an effect if the original intended method fails". This, however, does not reflect the usual meaning of this term – preparing a variety of different ways to end a magic trick depending on a spectator's choice or other events. Therefore, the first aim of this work is to discuss a proper definition of the concept "multiple-out".

Surprisingly, literature on methods for designing magic tricks (e. g. Fitzkee or Sharpe) contains almost no discussion on MO. To fill this gap, the author studied descriptions of MO in the magic literature, including 106 of the 176 entries tagged with "MO" at conjuringarchive.com. The result of this small survey was a taxonomy of 10 different techniques to achieve a MO. Examples of such techniques are showing different objects (as being "the" prediction), showing different parts of the same object, modifying an object, but also using disambiguities, homonymes or homophones as well as simply refraining from showing an effect.

Advantages and disadvantages for each such technique are discussed. For example, only some techniques allow to give a prediction to a performer before the trick starts. Furthermore, it will be discussed how MO techniques can be used together with other techniques (e. g. limiting possible choices), showing the relation to other patterns in the pattern language under development.

11:30 A multidimensional taxonomy of magic tricks

Gustav Kuhn, Cyril Thomas, & Tom Griffiths; Department of Psychology, Goldsmiths, University of London; g.kuhn@gold.ac.uk

Stage magic is an artform that allows us to experience things we believe to be impossible. There are thousands of magic tricks and several attempts have been made to classify them along a range of dimensions (e.g., props, physical proximity, causal violation). We

propose a new multidimensional taxonomy of magic that allows use to describe each magic trick along two largely independent dimensions – the magical phenomenon and the causal attribution to this phenomenon. Our first dimension provides objective descriptions of the magical phenomenon (e.g., object disappears) that are independent of the causal attribution (e.g., the magician's magical powers). Within this category we broadly separate tricks into physical tricks (e.g., objects appear, change spatial location), and non-physical tricks (e.g., extraction of information, cognitive skills). The causal attribution dimension attempts to categorize the casual attributions that the performer intends their audience to endorse along two main categories – magical causation (e.g., magic dust) and non-magical causation (e.g., psychological skill).

Our multidimensional taxonomy provides sufficient flexibility to account for the complex nature of magic and we believe that it can capture all magic tricks within a relatively formal structure. Our taxonomy is independent of the method used to create the effect, and the props involved, which means that the categories can easily be applied to new tricks. The taxonomy tries to organise magic effects based on common mental representational and qualia (i.e., how the trick feels), and we believe that this provides a valuable starting point to study the psychological mechanisms that underpin our experience of magic. Our taxonomy refocuses the emphasis from magical effects to the causal attribution of the effect which has important practical and theoretical implications for the performance of magic.

11:45 Designing deceptions: The art and science of crafting illusions

Dr. Matt Pritchard; Science Magic Shows; matt@sciencemagicshows.co.uk

Optical illusions have both an aesthetic and scientific appeal as they question our perception of reality. This talk will deconstruct the development process of creating new illusions. Charting the journey from first inspiration, through practical hurdles, to the final design and public impact. It will also explain how optical principles and smart materials can be exploited in magic effects. In doing so it will illustrate the collaborative interplay of scientists and magicians.

The speaker, Dr Matt Pritchard, is a previous winner of the international Best Illusion of the Year Contest. During the two years of the pandemic, his work has focused on creating novel illusion videos that have delighted/frustrated the magic community and have been described by Popular Mechanics as "charmingly analog".

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Talk Session 2:

Thursday, 21st July 14:30-16:00

14:30 Magic as a robotics challenge problem

Jacky Baltes, Jaesik Jeong, Jeehyun Yang, Saeed Saeedvand, & Jill Chuang; National Taiwan Normal University; jacky.baltes@gmail.com

This talk introduces the Humanoid Application Challenge Robot Magic (HAC-RM) - a research initiative and competition that uses robot magic as a benchmark problem for research in intelligent robotics and human robot interaction (HRI). The community has held yearly competitions since 2016.

I have long been a strong advocate of using robot competitions to guide and evaluate our research progress. My students and I have participated in prestigious robot competitions (e.g., Federation International Robot-sports Association (FIRA) https://www.facebook.com/groups/firarobot/ or RoboCup http://www.robocup.org) and have won many awards. I am also an active member of the organization of those competitions.

One focus of the research is to use robot magic to examine the workings and limitations of attention in human reasoning. Current AI technology focuses on one-shot processing of information, whereas humans pay attention to a subset and use this information to guide further processing.

Magicians have entertained crowds for centuries. They seemingly produce rabbits out of a hat, make cards disappear in front of your eyes, read your mind, levitate a flower, and escape from locked coffins. They are masters of misdirection, exploiting biases in human attention, perception, and reasoning. Research into robotics can benefit from better understanding these aspects of human intelligence, since it will not only allow robots to better understand and manipulate their environments, but also to better interact with humans.

But robot magic also includes many technical aspects and require abilities that are important robot skills useful in many other applications, e.g., small scale manufacturing, task planning, or speech recognition in noisy environments. In particular, sleight of hand requires fast and dexterous manipulation of small objects such as cards. Some magic tricks also require novel research into advanced computer vision algorithms. For example, a well executed "peek" requires fast object tracking and recognition.

Acknowledgements:

This research was partially supported by the "Higher Education Sprout Project" and "Center of Learning Technology for Chinese" of National Taiwan Normal University (NTNU), sponsored by the Ministry of Education, Taiwan, R.O.C. and also funded partially by the Ministry of Science and Technology, Taiwan, R.O.C. under Grant No. 109-2221-E-003 -019 - and 109-2634-F-003 -009.

14:45 Genuine fake mind reading: Using mentalism magic methods to explore perceptions and misperceptions of AI and neurotechnologies

Matthew L. Tompkins, Lars Hall, & Petter Johansson; Lund University Cognitive Science; matthew.tompkins@lucs.lu.se

Recent advances in neuroscience and computing have made it possible to read human minds, to decode and predict various aspects of mental processes directly from brain activity, without participants reporting how they think or feel. Potentially, these developments could become the ultimate invasion of human privacy, threatening our subjective agency and integrity. Or perhaps the converse is true, that brain reading will deepen our understanding of ourselves and others, and further our empathy and social connections? These questions are critical to investigate, as humans are ill equipped to forecast their psychological reactions to future events. To address these challenges, we used techniques derived from the art of performance magic—specifically mentalism—to simulate the psychological experiences of having one's brain read or manipulated by future technology. Mentalism is a genre of magic that specifically involves creating the appearance of supernormal powers. By pairing mentalism tricks with realistic, but faux technologies, we created compelling illusions of thought reading, mind control, and behavior prediction systems. Participants in our study were led to believe that they were interacting with a novel technological system that could analyze them by using biometric information from their webcams and microphones. We propose that participants' reactions to these illusory experiences not only represent useful insights not only into how people might react to the development of genuine technologies, but also more generally into the psychology of critical thinking and belief in free will. The science fiction writer Arthur C. Clarke famously asserted that "Any sufficiently advanced technology is indistinguishable from magic." But here, we believe that the reverse is also true; in the right context, magic illusions can be indistinguishable from advanced technology.

15:30 Intuitive reasoning about blind spots

Vebjørn Ekroll, Vilde Standal Borgen, Nanna Hauge Langholm, Paula Marie Olsen, & Sigrid Stølen; University of Bergen; vebjorn.ekroll@uib.no

Blind spots play an important role both in the art of magic and in traffic accidents. Previous work suggests that a perceptual illusion called "the illusion of absence" can create a compelling, yet potentially misleading impression that a blind spot is empty. This illusion may go a long way in explaining why things often seem to appear "out of nowhere", both in magic shows and traffic accidents, but other factors may be involved as well. Here, we present results from an online experiment suggesting that people exhibit a bias in intuitive reasoning about occlusion geometry, where they often erroneously neglect the possibility that a comparatively small occluder can hide the view of very large objects.

15:45 The experience of magic in a predictive mind

Pablo R. Grassi, Vincent Plikat, Julius Frack, & Andreas Bartels; Department of Psychology, University of Tübingen, Tübingen, Germany; Centre for Integrative Neurosciences, Tübingen, Germany; Max-Planck Institute for Biological Cybernetics, Tübingen, Germany; pablo.grassi@cin.uni-tuebingen.de

When engaging with magic we are moved by seemingly impossible events that contradict our prior knowledge and beliefs. Magic shows us – in the real world – incredible events of, for example, things disappearing, levitating, destroyed and restored, against background knowledge about what we believe possible in the world. We have recently proposed a Bayesian predictive framework of magic, in which the "wow" effect of magic can be thought of as an increase in surprise evoked by the prediction error between deeply held beliefs about the world and incoming sensory information and misdirection as means to create and maximize this error (Grassi and Bartels, 2021). Building on this predictive coding account, we will make a case for the use of magic stimuli in cognitive neuroscience, how it can be used to investigate the representation of different forms of expectations, surprise and beliefs in the human brain and discuss direct implications of the framework. Finally, we will present empirical data from a recent functional magnetic resonance imaging study investigating the role of prior knowledge and the representation of different forms of prediction error using magic videos focusing on the relationship between behavior and neural representations (Plikat et al., forthcoming).

Talk Session 3:

Friday, 22nd July 10:00-11:00

10:00 Thrill seeking, magical beliefs, creativity and psychotic traits among magicians

Gil Greengross, Paul J. Silvia, & Sara Crasson; Department of Psychology, Aberystwyth University; humorology@gmail.com

Magic performances have been popular throughout history and are prevalent across cultures. In recent years, there has been growing interest in the scientific study of magic, however, very little is known about the magicians themselves. While there are several studies on other creative performers, such as musicians, actors, dancers, and stand-up comedians, almost none have looked at magicians. As both creators and performers of magic, magicians are a unique vocational group, and studying them can illuminate various aspects of creativity, cognition, personality, beliefs and many other psychological processes and traits.

The purpose of the current study is to shed light on some of the unique characteristics and experiences of magicians and learn more about how they might be different from other people. To do so, we compared 218 magicians to 185 people with similar ages on a variety of well-established psychological scales measuring various personality and

cognitive traits.

The results show that magicians scored higher than the general population on various sensation seeking measures, including being more thrill seeking and more likely to get bored easily. Perhaps surprisingly, magicians did not show higher levels of magical thinking than the general population, but did tend to be more spiritual. Magicians had higher scores on psychotic measures compared to the general sample, something that is common among creative people. In particular, magicians reported higher levels of self-control, greater ability to focus, being less antisocial and less impulsive.

Lastly, magicians value their creativity very highly, and have strong belief in their own creative abilities. In total, the results suggest that magicians have very distinct characteristics and experiences compared to other people, something that might help explain their interest and careers in performance magic.

10:15 Magician, deceive thyself! Tactical blinking in magicians

Anthony S. Barnhart, Kaitlyn Richardson, & Shawn Eric; Carthage College; abarnhart@carthage.edu

Magicians frequently rehearse their sleight of hand before a mirror in order to gain the perspective of their audience. However, magic instructors often warn that this practice can lead to self-deception, as many novice magicians unconsciously blink their eyes when engaging in deceptive action, thereby blinding themselves to evidence of their proficiency. There are few concrete examples of self-deception in the literature that provide definitive evidence in support of deep self-deception, where a person both knows the truth and pushes that truth outside their consciousness. In the experiment presented here, we attempted to elicit magicians' blinking behavior under well-controlled laboratory conditions and to identify variables that impact a performer's tendency to engage in it. We invited magicians to learn a difficult set of coin magic sleights over the course of a week and to perform the routine in a rehearsal setting (with a mirror) and a performance setting (without a mirror). We quantified blink rates in the videos of these performances. Indeed, magicians were more likely to blink when engaging in deceptive action than when not, and blinking was more prevalent when performing more difficult sleights. However, this tactical blinking was only evident in the performance setting. We suggest that rather than serving as self-deception, tactical blinking may enhance deception of the audience through encouragement of synchronized blinking in spectators. Alternatively, self-deception may emerge later in the learning process, after some basic motor proficiency has been established.

10:30 Deceptive combinations and counterfactuals: an experimental study of 'the veil principle'

Peta Masters, Steven Bagienski, Gustav Kuhn, & Wally Smith; King's College London; peta.masters@kcl.ac.uk

Magicians often deploy two or more deceptive mechanisms in tandem during the performance of a single trick. Such combinations are believed to provide greater protection against the discovery of the overall method, an idea that has been described as the 'veils principle' (Darwin Ortiz, 'Designing Miracles') and in various related ways such as 'connected false assumptions' (Al Schneider, 'The Theory and Practice of Magic Deception'). We examined the efficacy of the veils principle in an experimental study (suggested by a 2016 blogpost on The Jerx) in which spectators were asked to offer explanations for a trick performed by a magician who was able to correctly name the cards of a well shuffled deck as they were dealt down. In one condition, the cards were face-down and the magician wore a blind-fold, requiring spectators to produce a two-mechanism explanation of the card-naming in terms of marked cards plus a see-through blindfold. This was compared with two other conditions that each required only a one-mechanism explanation of the effect: the cards were face down but there was no blindfold (explained simply by marked cards), and the cards were face up and the magician wore a blindfold (explained simply by a see-through blindfold). We found that about half of our participant spectators readily produced a correct explanation when just one mechanism was deployed: i.e., just marked cards, or just a see-through blindfold. However, spectators were far less likely to produce a correct explanation for the card-naming when both mechanisms were deployed together. One explanation, explored in this talk, is the human tendency to engage in counterfactual reasoning – a phenomenon which has lately emerged as a key concept in the field of Artificial Intelligence, particularly in the contexts of explainable AI and causal inference.

10:45 Sharing secrets: The effects of sharing the secret method behind a magic trick on perceived trustworthiness, closeness, and the art of magic

Alice Pailhès, Rubens Fihlo, & Gustav Kuhn; Abracademy and Goldsmiths University of London; apail001@gold.ac.uk

'A magician never reveals their secrets'. Although having secrets is common in everyday-life, the field of magic is particularly surrounded by secrecy, and magicians have gone to great lengths to protect the methods behind their tricks. Magicians are sworn to ethical codes not to reveal the secrets behind their piece of magic. Secrecy and the effects of secret-sharing have only recently started to receive more attention in research.

The present study examined how participants evaluate a magician and the art of magic based on the information the magician shares with them. Participants watched a magician perform a vanishing silk trick and then either watched him explaining how the trick was performed (secret-sharing condition) or broader historical information about it (no secret-sharing condition). They then had to evaluate (1) the magician/secret-sharer on trustworthiness and closeness, (2) how receiving the information they got changed their perception of magic and magicians and (3) how it changed how likely they were to seek out watching magic in the future. The results showed that sharing the secret method behind the trick led to higher ratings of trustworthiness and closeness relative to sharing other information. Moreover, these participants also reported greater appreciation and interest for the art of magic, and being more likely to seek out magic in the future compared to the other participants who did not got the secret. Mediation analyses

showed that all these effects were mediated by how special receiving the information made them feel. I will discuss these results in regard of the recent psychological literature on the effects of secret-sharing as well as of the issue and debate surrounding exposure in the world of magic.

Talk Session 4:

Friday, 22nd July 15:00-15:30

15:00 Magic mind and beginner's hands: Reflections from an autoethnographic study of learning

Brian Rappert; University of Exeter; B.Rappert@exeter.ac.uk

How can we understand the nature, function, and underlying mechanisms of magic? Among the range of approaches that can inform the Science of Magic, this presentation seeks to understand conjuring as a form of social interaction through research methodologies in the social sciences. More specifically, it relays key findings of a four-year autoethnographic study I undertook to learn and perform magic. In the tradition of so-called self-studies, I used my immersion into an activity as a novice as a basis for considering how practical reasoning and embodied skills are acquired; in part through relating my first-person experiences to the arguments of seasoned practitioners and the findings of experimental studies. How then can a study starting from a position of ignorance provide insights? This presentation offers three vignettes that address the questions:

- How can instructors teach students to recognise what is natural?
- How can instructors teach students about the limits of human perception through acts of perception?
- How are performances of magic constituted through forms of audience cooperation?

Based on these vignettes, the presentation offers a heuristic characterisation of skill in magic. It closes by offering reflections on how this line of study can help reframe attempts to improve magic through marshalling research evidence.

Supporting funding through internal sources from the University of Exeter.

15:15 Centaurs, secrets, and the inquisition: The early days of science and magic

Kevin Ladd; Indiana University South Bend; kladd@iu.edu

The science of magic is arguably more like Medusa than Athena. Instead of coming to life fully formed, there are many tentacles slithering into the far reaches of history. One such distant place in history is personified by Giambattista della Porta (1535-1615). Positioned at the intellectual transition point of what would later be deemed the Scientific Revolution, della Porta's life and writings provide insight into the tumultuous early relation between science and magic.

This talk will provide an overview of one pathway from della Porta to the present, noting that the shifting definitions of both magic and science simultaneously created boundaries

and frontiers that remain notoriously permeable, yet critically independent. In the tradition of C. P. Snow's observations regarding the "two cultures" of thinking, work in the current domain of science and magic is cast as an opportunity to embrace this liminality through interdisciplinary projects.

Poster Presentation Abstracts:

Thursday, 21st July, 17:30-19:00

1 Misdirecting memory: How magicians use misinformation to create false memories

Alice Pailhès, Kole Lee, & Gustav Kuhn; Goldsmiths, University of London; apail001@gold.ac.uk

Although we like to think that our memories are stable, research shows that they are based on reconstruction rather than true retrieval. Magicians sometimes play with our memory's flaws and use memory misdirection techniques to manipulate how spectators remember what happened during a trick. In this study (N=337), we showed to participants videos of the same magic tricks in which the magician either recapitulated the event sequence by providing misinformation about who shuffled the deck of cards (i.e., stating that the spectator shuffled the cards when he was the one who did it) or no misinformation. The results showed that misinformation significantly impacted participants' memories, as well as their confidence in their memories. Significantly more participants wrongly remembered that the spectator shuffled the cards when misinformation was given than when not (17 vs 3%). Moreover, this misinformation also impacted other unrelated actions for which no misinformation was given (i.e., who cut the deck of cards). The results are discussed regarding memory malleability, suggestibility and eyewitness testimonies literatures.

2 Theory and practice of natural Magic in the enlightenment

Convin Splettsen; Goethe-Universität Frankfurt; convin.splettsen@gmx.de

In the late 18th century the german pharmacist and chemist Johann Christian Wiegleb started a big book series „Unterricht in der natürlichen Magie" – in english it would translate as „lessons in natural magic" – which is basically a manual for scientific tricks with some exceptions like card magic or economical tricks. Besides that there is a treatise in Wieglebs book about natural magic written by the theologist, doctor, mathematician and physicist Johann Peter Eberhard . Magic is already understood in a modern way. Magic relies on science, trickery or preparation.

This talk focuses on the term magic and shows in what kind of subdivisions magic was devided including some examples for the subcategories. For a deeper understanding

some historical background and the transformation of magic up to this point in time will be added. Finally, the extent to which the subdivisions are still relevant today will be examined.

3 Of fingers and thumbs. The intersection between manual action expectation and biomechanical ability in two species of New World monkey.

Elias Garcia-Pelegrin, Rachael Miller, Clive Wilkins, & Nicola S. Clayton; University of Cambridge/ National University of Singapore; eg573@cam.ac.uk

Being able to predict the manual actions of others is a crucial ability for primates as it allows for coordinated reaction. However, little is known regarding the intersection between the biomechanical ability to perform a manual movement, and the necessary expectation that allow for such predictions. The French drop technique involves mimicking the grab of an object being transferred from one hand to the other through the pantomimed enactment of a precision grip. Here, we investigated how two different species of platyrrhine with inherently distinct manual biomechanical ability experienced this magic trick – Common marmosets (Callithrix jacchus) that can physically not oppose their thumb, and thus not perform a precision grip (Fox et al., 2019; Fragaszy & Crast, 2016), and Yellow-breasted capuchins (Sapajus xanthosternos), which can produce a precision grip (Costello & Fragaszy, 1988). Moreover, to further investigate the relationship between experience and ability performing an action and their influence on the expectations of the individual, we also performed an adapted version of the French drop named Grab drop, which utilised a power grip to take hold of the reward instead of the precision grip, thus removing the opposable thumb as the causal agent of the effect. When observing a French drop, capuchins were significantly misled by the movement, and were unable to differentiate a real transfer from a French drop, a pattern that can also be observed in humans (Garcia-Pelegrin et al., 2021, 2022). Conversely, marmosets significantly chose the correct hand in the French drop condition and were significantly incorrect when observing a real transfer. However, when observing the new conditions that do not contain an opposable thumb as the causal agent of the movement, marmosets performed similarly than capuchins, by being fooled by the magic trick and correct in the real transfer. The data presented here strongly suggests an evident interaction between manual biomechanical ability, and the expectations that primates have when observing the manual actions of others.

4 Algorithmic illusions: Magic as a tool for digital literacy

Rudi Solon; Univesity of São Paulo; rudi.solon@usp.br

Through the process of creating an audiovisual series that uses magic to promote algorithmic literacy, the object of study of this article is the interface between magic and the algorithm in the learning process. Using the proposed separation of studies on algorithms proposed by Lee & Larsen (2019), we analyze the process of production of videos that use the language of illusionism to approach the ecosystem of algorithms, their functioning, algorithmic bubbles, bias in algorithms, and the transcodification of the apparent universe by numbers. Since magical art has its essence in a technique to produce the impossible, we see the relevance of using this art as a discursive element in

the digital media scenario to promote digital literacy based on technicity and questioning what is real and what is an illusion.

5 Fooling AI & fooled by AI

Suyash Joshi; suyash@suyashjoshi.com

Clarke's 3rd Law states that "Any sufficiently advanced technology is indistinguishable from magic". In this paper we will put this question in the forefront and investigate three key related questions:

1. How modern advanced technology like Artificial Intelligence performs feats that are like magic ?
2. Can can it fool human beings the way a magician does?
3. Can human magicians fool advanced technologies like Artificial Intelligence (Computer Vision)?

6 Magic in the brain: Neural codes for prior knowledge, surprise, and perception

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Magic violates deeply held prior beliefs about the world and is hence uniquely positioned to examine neural mechanisms of predictive coding at different levels of the brain's hierarchy. Yet, only a handful prior studies examined corresponding effects in the brain. Most previous studies investigating violations of expectations focused on responses to artificial stimuli based on newly stablished associations or simple violation of sequences (e.g., oddball-paradigm) and only few investigated the neural correlates of high-level prediction errors using ecologically valid stimuli (e.g., something disappearing). In this functional magnetic resonance imaging (fMRI) experiment, we aimed to investigate neural responses to violations of different deeply held beliefs using magic tricks and the role of prior knowledge in the perception thereof. We created and validated a set of stimuli showing either magic, control actions or surprising events. The magic videos consisted of three effects (appear, change and vanish), performed with three simple objects and presented with and without knowledge about the underlying method behind the shown magic tricks.

Univariate whole brain analyses revealed two types of responses: the first were specific to the three effects, the second were generic across all tricks. These results were obtained by comparing responses to magic videos with and without prior knowledge about the underlying method. Specially the anterior cingulate cortex, an area involved in signaling unexpected outcomes, was active in all tricks. Effect-specific contrasts revealed distinct regions in posterior sensory processing regions. Moreover, multivariate cross-classification analyses revealed that specific prediction errors (i.e., effects) were

preferentially decodable in posterior regions and less so in prefrontal areas, revealing an exclusive encoding of violations of specific expectations in sensory areas. Together, these results suggest a generic representation of violation of high-level expectations in the prefrontal cortex with concurrent effect-specific representations in sensory areas involved in the processing of the expected information.

7 Genuine fake predictions: Simulating Newcomb's paradox with magic methods

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Newcomb's paradox is a notorious problem amongst philosophers, mathematicians, and decision theorists. This thought experiment invites people to imagine that they are engaged in a simple game- in which they can make either low risk but low reward choice or a risky high reward choice. The twist is that they are 'playing' with an entity that can predict their behavior with incredible accuracy. Academics and lay audiences alike tend to be sharply and confidently divided over the optimal decisions that ought to be made under these imaginary circumstances. To date, the problem has only ever been presented as an abstract imagination exercise. However, using methods derived from performance magic, we are able to give participants the (illusory) experience that they are genuinely interacting with a real-life predictor entity. For the first time ever, we have been able to observe how people might genuinely behave when faced with a 'real' Newcomb's Paradox scenario. Participants in our pilot experiment were initially presented with the original text of Newcomb's problem to read, and then they were told that they would be experiencing the scenario in real-life, with the predictor entity being an AI-powered system that they could interact with over Zoom. Participants then experienced a series of hoax 'calibration' procedures that were designed to establish the power and accuracy of the AI system. In reality, they were actually experiencing mentalism-style magic tricks being performed by the experimenter. Our preliminary results suggest that not only do participants find such a prediction entity to be plausible, but that participants in our hoax experiment tend to make different choices than participants who simply imagine Newcomb's Problem as an abstract thought experiment.

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