



## Scientific Program

Science of Magic Association Meeting

15 July—16 July, 2019

The Chicago Magic Lounge

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**Code of Conduct:** The Science of Magic Association is committed to providing a safe and professional environment during our meeting. All SoMA members are expected to conduct themselves in a professional manner. Any form of harassment is prohibited. If you have any concerns, please ask to speak with a conference host.



THREE DAYS OF MAGIC, SCIENCE, AND WONDER

# THE SCIENCE of MAGIC

CONFERENCE

CHICAGO  
MAGIC LOUNGE

JULY 14 - 16 2019

FOR TICKETS AND INFO, VISIT:  
[WWW.SCIENCEOFMAGICASSOCIATION.ORG](http://WWW.SCIENCEOFMAGICASSOCIATION.ORG)

## CONFERENCE PROGRAM



## A Message from the SoMA Committee



Welcome to the Windy City for the second biennial meeting of the Science of Magic Association! Since our last conference in London, 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. The work of this organization's members has been profiled in a variety of media outlets, popular science books, and television documentaries. In Chicago, we hope to build upon the foundation that was laid in London, 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 31) and the members of SoMA. Thank you for your support!

Anthony Barnhart  
Gustav Kuhn  
Lise Lesaffre  
Jay Olson

Jeniffer Ortega  
Cyril Thomas  
Matt Tompkins



# The Science of Magic Association Gala Show 2019

14 July — 19:00

The Chicago Magic Lounge, 5050 N. Clark St., Chicago  
(tickets must be purchased separately at <https://soma2019gala.bpt.me>)

### Performers include:

Mac King, Ginny & Simon Aronson, Tom Stone,  
Jeanette Andrews, & Danny Rudnick





Program at a Glance:

<u>Sunday, 14<sup>th</sup> July, 2019</u>	
19:00	Science of Magic Gala Show The Chicago Magic Lounge, 5050 N. Clark St.

<u>Monday, 15<sup>th</sup> July, 2019</u>	
9:00-10:00	Registration & Coffee
10:00	Welcome to SoMA 2019
10:15	Invited Address: Tom Stone <i>Art &amp; Applied Science</i>
<b>Talk Session 1 (10:45-11:45)</b>	
10:45	Vebjørn Ekroll When imagery fails: Topological tricks as a challenge for cognitive science
11:00	Matt Pritchard Words on Wonder – insights on creativity, curiosity, and conjuring
11:15	Jeniffer Ortega, Anthony Barnhart, & Gustav Kuhn Metacognitive illusions: The error of overestimating and underestimating others’ ability to detect a change in a magic trick
11:30	Jeanette Andrews Fantasy based on fact: Using the scientific method to design effective magic.
11:45	<b>Coffee Break</b>



12:00	Keynote Address: Daniel Simons <i>Seeing and Believing</i>	
13:00-14:30	Lunch Break	
<b>Talk Session 2 (14:30-15:30)</b>		
14:30	Nicola S. Clayton & Clive Wilkins	What corvid cognition may reveal about magic
14:45	Adam Simmons (presented by Jon Armstrong)	The Breathe Magic Intensive Therapy Programme: Combining magic and science as a clinical therapy for young people with hemiplegia.
15:00	Alice Pailhes & Gustav Kuhn	A psychologically-based taxonomy of magicians’ forcing techniques: How conjurers influence our choices, their outcomes, and how to use it as a tool to study psychological mechanisms.
15:15	Wally Smith, Gustav Kuhn, Liz Sonenberg, Frank Dignum, & Michael Kirley	Magic by Machines: Exploring the possibilities and consequences of computers using conjuring principles to deceive people
15:30	<b>Coffee Break</b>	
15:45	A Conversation with Mac King	



**Talk Session 3 (16:30-17:00)**

16:30	Matthew L. Tompkins	Forgotten memory studies: Re-examining Hodgson and Davey's mal-observation report
16:45	Poster Session Lightning Talks	
17:00-18:30	<b>Poster Session &amp; Drinks</b>	
19:30-??:??	<b>Magic &amp; Music at the Chicago Magic Lounge (plus some surprises)</b>	

Tuesday, 16<sup>th</sup> July, 2019

9:00-10:00	Registration & Coffee	
10:00	Workshop 1: Magic in the Classroom Anthony Barnhart	
10:30	Workshop 2: Science for Magicians Gustav Kuhn	
11:00	<b>Coffee Break</b>	
11:30	<b>Keynote Address: Elizabeth Loftus</b> <i>The Fiction of Memory</i>	
12:15-13:45	<b>Lunch Break</b>	



**Talk Session 4 (13:45-14:45)**

13:45	Jon M. Armstrong	Magic and the co-creation of experience
14:00	Christine Mohr & Gustav Kuhn	News from the front – Impact of magic on paranormal and pseudo-scientific beliefs
14:15	Jay A. Olson, Michael Lifshitz, Michael Stevens, Amir Raz, & Samuel Veissière	The magic of medicine: Placebos as performance
14:30	Jason Leddington	Impossibly curious
14:45	<b>Coffee Break</b>	
15:15	<b>Guest of Honor: Simon Aronson</b> <i>The Illusion of Impossibility</i>	
16:15	<b>Awards &amp; Podium Discussion on the Future of SoMA</b>	



### Poster Presentations

1	Curtis Frye	Prospect theory as a narrative tool
2	Douglas Yang	Pattern predictive Gilbreath card trick
3	Brian Rappert	Learning magic: An autoethnographic study of skills acquisition and intersubjectivity
4	F.D. Becchetti	Illustrating nature's magic with magic
5	Yuxuan Lan & Gustav Kuhn	Forcing you to experience wonder: Unconsciously biasing people's choice through strategic physical positioning
6	Shringi Kumari, Sebastian Deterding, & Gustav Kuhn	Creating the illusion of free choice - How forcing can influence video game design
7	Steven Bagienski & Gustav Kuhn	The magical means of building close connections and community during the college transition: A novel arts-based positive intervention
8	Dillon J. Krupa, Anthony S. Barnhart, Cheyenne Duckert, Alyssa N. Ruediger, & Lexington C. C. Fitzpatrick	The symmetry of deception: When symmetrical action shifts event boundaries

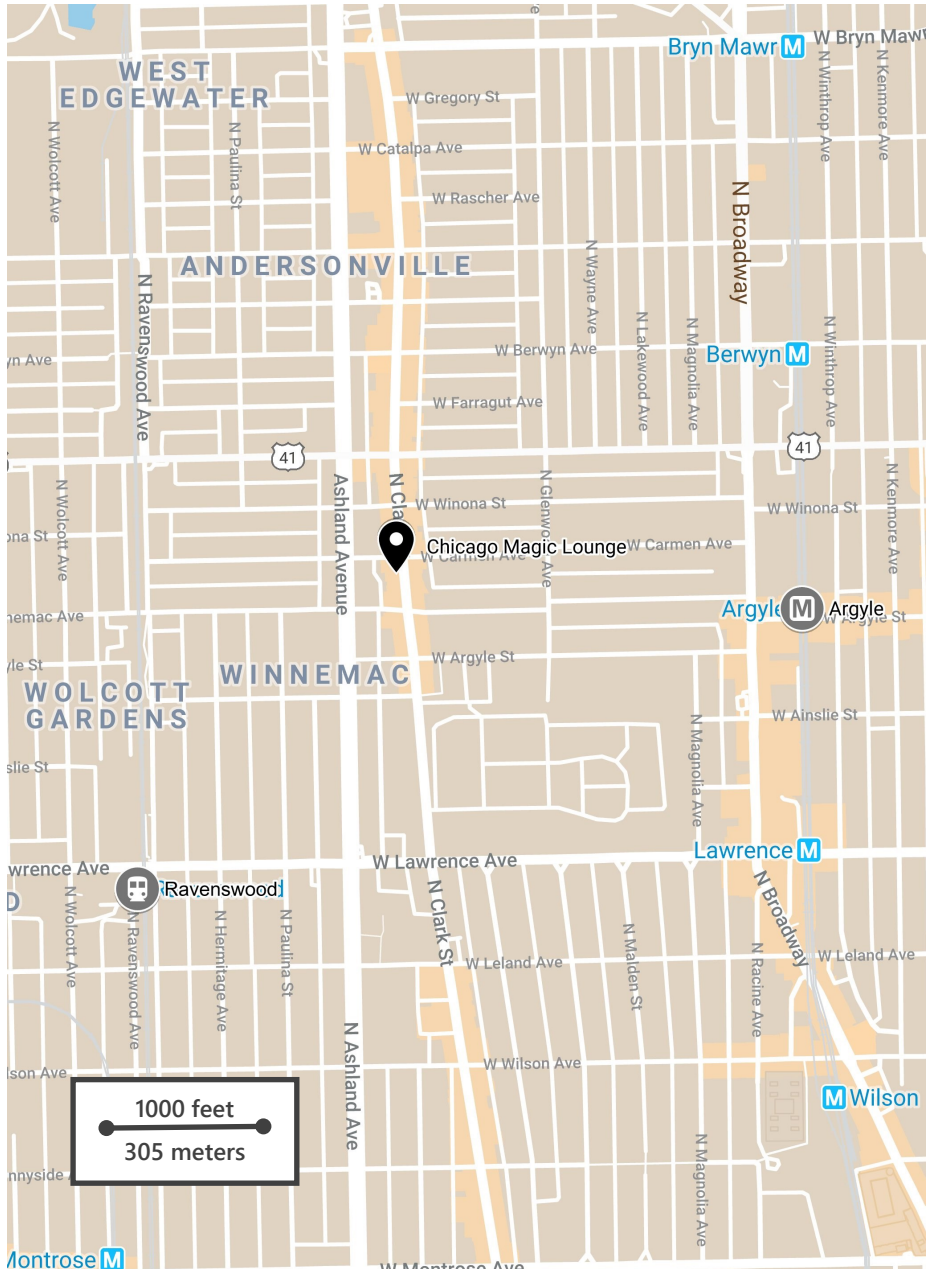


9	Matthew L. Tompkins	A modern-day replication of Hugo Münsterberg's (1907) classroom demonstration of inattentional blindness
10	Anne-Sophie Coiffet	Figure-ground reversals
11	Convin Splettsen	Comparison of science and magic
12	Olivia M. Krahn-Bockhop, Anthony S. Barnhart, Noah Griser, Carisa Hendrix, Matthew Schuler, Jeanette Andrews, Danny Rudnick, & Jaime K. Utter	Misdirected by gender: The impact of performer gender on perceptions of a magic performance
13	Lise Lesaffre	The way you make me feel! Just pretend to talk to the dead
14	Kevin L. Ladd	Meaning, magic, and hope: Theoretical considerations
15	Thomas Strandberg	False beliefs and confabulation can lead to lasting changes in political attitudes
16	David Frank	A table magician's greatest trick: Affecting patrons' tipping habits without them knowing





# Locations:



**Gala Show & Conference Venue:** The Chicago Magic Lounge is located at the corner of Clark Street and Carmen Avenue in the Andersonville neighborhood.

**Public Transit:** The Magic Lounge is near stops on two major train lines. The **Ravenswood** stop services the Union Pacific North Metra line, running from the Ogilvie Transportation Center in Chicago to Kenosha, Wisconsin. The **Argyle** stop services the Red Line of the Chicago 'L,' a North/South line that traverses Chicago.

**Food & Drinks:** The Andersonville neighborhood has a variety of restaurants and pubs. Walk in any direction and you'll find something exciting!

A large map highlighting restaurant and pub suggestions is posted in the lobby of the Magic Lounge.





## Keynote & Invited Speakers:

**Tom Stone**  
*Art & Applied Science*

15 July — 10:15



**Elizabeth Loftus**  
*The Fiction of Memory*

16 July — 11:30

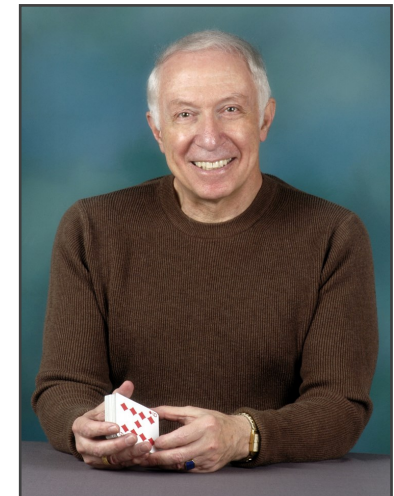


**Daniel Simons**  
*Seeing and Believing*

15 July — 12:00

**Guest of Honor:**  
**Simon Aronson**  
*The Illusion of  
Impossibility*

16 July — 15:15





## Talk Schedule:

### Talk Session 1:

Monday 15<sup>th</sup> July, 10:45-11:45

#### 10:45 When imagery fails: Topological tricks as a challenge for cognitive science

Vebjørn Ekroll, Department of Psychosocial Science, University of Bergen;  
vebjorn.ekroll@uib.no

Broadly speaking, magic tricks work because the spectators are unable to imagine the secrets behind them. In some cases, knowledge from cognitive science can offer quite plausible explanations of why people are unable to imagine what is really going on. For instance, the failures of visual metacognition associated with inattention blindness or amodal completion readily explain why the secret methods used are difficult to imagine. In this presentation I delineate a class of magic tricks, which I believe constitute an important challenge to cognitive science. This class of tricks, which has been largely neglected in scientific research on the psychological principles underlying the art of magic, can be loosely defined as topological tricks because they involve flexible materials such as paper, cloth, rope and rubber bands. I argue that two major factors underlie topological tricks, namely (1) a sort of “topology blindness” where knots are represented as perceptually unorganized entities rather than well-defined 3D objects, and (2) a limited ability to mentally simulate deformations of flexible objects. I also speculate that failures of meta-cognition associated with these factors explain why these tricks evoke magical experiences. This is consistent with the more general proposal that failures of meta-cognition are the key factors underlying magic. A detailed understanding of how all of these tricks work remains elusive, but more research on this topic appears necessary and potentially very rewarding. In particular, the scientific study of topological tricks may provide important new insights in the domains of visual imagery and visualization.

#### 11:00 Words on Wonder – insights on creativity, curiosity, and conjuring

Matt Pritchard, Science Magic Shows (UK); matt@sciencemagicshows.co.uk  
The www.WordsonWonder.com project has interviewed a host of artists, magicians, and scientists about their views on curiosity and wonder. These creative individuals include paper engineers, cake decorators, optical illusion designers, jugglers, puzzle inventors, and special f/x artists. Amongst the diverse interests and experience of the interviewees there were many common themes arising in their answers. Equally, several conflicting views and internal struggles were shared.

In this illustrated talk, the project coordinator Dr Matt Pritchard will highlight key findings from



the project and explain the connections between individual accounts and a theoretical framework of curiosity, wonder, and magic. He will then go on to explore how we can cultivate a sense of wonder; with a particular emphasis on how parents and teachers can practically help to sustain it in children as they grow up.

#### 11:15 Metacognitive illusions: The error of overestimating and underestimating others’ ability to detect a change in a magic trick

Jeniffer Ortega, Anthony Barnhart, & Gustav Kuhn, National University of Colombia; jenifferortega@gmail.com

In a previous study, we found that noticing how a magic trick was done led participants to believe that others would be more likely to spot the method of the trick, whereas those who failed to notice it judged that others would be less likely to notice it as well. In other words, noticing or missing a salient stimulus or change may be a source of biases in visual metacognitive judgments (Ortega, Montañes, Barnhart, & Kuhn, 2018). However, the findings did not provide direct evidence that detection success or failure led to errors of overestimation or underestimation. We conducted another experiment using the Princess Card Trick, which exploits change blindness. We manipulated the saliency of the change to create two conditions: subtle and salient. Participants (n = 95) watched the trick and estimated the probability that others would detect a subtle change or a salient one. Noticing the subtle change led to an overestimation effect whereas missing the salient change led to an underestimation effect. Those who missed the change in both conditions reported a high and similar level of surprise, which suggests that they have prior beliefs about their perceptual skill. Altogether, our findings suggest that the availability heuristic and prior beliefs underlie errors of visual metacognition.

#### 11:30 Fantasy based on fact: Using the scientific method to design effective magic.

Jeanette Andrews; info@jeanetteandrews.com

This talk utilizes the ten-month long process behind the creation “Invisible Roses,” (commissioned by the Museum of Contemporary Art Chicago for their 50th anniversary in 2017) as a framework to discuss employing the scientific method to design effective magic. This process utilized previously published data on magic psychology and science of magic performance to inform decisions including choice of table, garments, and materials (based on the research of Amory Danek, and others). The discussion will also detail the documentation of my own trial and error processes on materials and methods, and using 25 years of technical magic experience to construct the most compelling effect possible. The central piece in the work, a ‘cut and restored’ effect utilizing a 18’ length of fabric, will be performed during the SOMA gala show as a preface and demonstration for the presentation.





## Talk Session 2:

Monday 15<sup>th</sup> July, 14:30-15:30

### 14:30 What corvid cognition may reveal about magic

Nicola S. Clayton & Clive Wilkins, Department of Psychology, University of Cambridge, UK; nsc22@cam.ac.uk

Corvid cognition illuminates interesting facets concerning the biological basis for perception, memory and prospection, which parallel the conceptual intrigues the stage magician capitalizes upon. This lecture explores our research on the cognition of food-caching and surprising parallels and improbable connections between corvid tactics and the feints used by magicians. When it comes to corvids protecting their caches from birds who may steal, jays take into account what the pilferer can and cannot see, and does and does not know. They remember who was watching when they cached. Corvids use a variety of distraction techniques, including taking in account lines of sight, and time delay, as well as using misdirection, to secretly hide their food. Most strikingly, they re-cache food multiple times, in order that any potential pilferers are made uncertain of the final location. Experienced jays, i.e. those who have pilfered others' caches, move their caches to new places, once a potential pilferer has left the scene; something not done if they have cached in private, or if they have been observed by their mate, with whom they share caches. Naïve birds, not having had the opportunity to pilfer, don't exhibit re-caching behavior. These results suggest that their ability to anticipate future needs, using what magicians would call the 'one ahead principle', is dependent on past experience of pilfering and an ability to plan for the future. This suggests that jays are capable of 'experience-projection', a complex cognitive ability related to Theory of Mind~ 'it takes a thief to know a thief'.

We present our lecture as a double act, exploring the art and the science of the psychology of deception and, with direct reference to the performing arts and a series of live demonstrations, illuminate the biological basis for the understanding of cognitive illusions~ essentially, why magic effects work.

### 14:45 The Breathe Magic Intensive Therapy Programme: Combining magic and science as a clinical therapy for young people with hemiplegia.

Adam Simmons, Breathe Magic; adam@breatheahr.org (presented by Jon Armstrong)

The Breathe Magic Intensive Therapy Programme uses close-up magic and performance skills as a mechanism to deliver intensive upper-limb therapy to young people with hemiplegia, a one-sided weakness or paralysis following a congenital or acquired brain injury. Occupational therapists, Magic Circle Magicians and scientific researchers work together in 1-to-1 group therapy settings to develop motor and bi-manual skills enhancing independence, confidence and self-esteem.



Participants learn magic tricks designed to improve the use of their affected hand and arm in everyday bi-manual activities. The programme totals 90 hours of clinical time per participant divided into 78 hours of direct therapeutic input over a 10-day intensive camp followed by 3 bi-monthly club workshops to consolidate functional application and psycho-social development.

Each magic trick incorporates a series of precise exercises required in everyday upper-limb function (e.g. forearm rotation, grasp and manipulation). With practice, the affected hand and arm's range of movement, strength and dexterity improves whilst promoting new neurological motor pathways.

Breathe Magic delivers clear clinical benefits, and our clinical data demonstrates significant improvements are achieved in the use of the affected hand. For many, the Magic Camp is the first time they have ever used both hands to perform daily tasks such as dressing themselves, cutting up food or tying their shoelaces.

Increased independence results in a reduction of up to 4 hours per day of parents and caregivers time previously required to support their child in daily activities. The ability to perform a professional magic trick on stage develops confidence and communication skills leading to greater participation with friends.

The programme has been published in medical journals and received many awards from health-based organisations for its innovative approach to therapy. We believe that 'Magic is a Gift', and our programme delivers this gift to help make a meaningful difference in improving the lives of young people.

### 15:00 A psychologically-based taxonomy of magicians' forcing techniques: How conjurers influence our choices, their outcomes, and how to use it as a tool to study psychological mechanisms.

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

Magicians have developed a vast range of techniques that allow them to systematically, yet covertly, influence people's decisions: forcing techniques. These forcing techniques use a wide range of psychological principles to influence a spectator's choices without him/her becoming aware of it. Many of these techniques are extremely reliable, yet only a handful has been investigated scientifically (Shalom et al., 2013; Olson, Amlani, Raz & Rensink, 2015). The magician's forces illustrate a powerful error in our sense of control over choices and their outcomes, and these illusions have important theoretical, clinical, and applied implications. To this day, only two types of forcing have been identified by psychologists – physical and psychological forcing. Magicians have proposed a range of forcing classifications which are all based on the methods used to perform them (Annemann, 1933; Jones, 1994; Banachek, 1998). We developed a psychological theory of forcing, and established a taxonomy of forcing, analogous to what has been done on misdirection (Kuhn, Caffaratti, Teszka & Rensink, 2014). We



argue that a psychologically based taxonomy of forcing techniques will help explain the psychological mechanisms that underlie them, as well as the knowledge transfer between magicians and psychologists. The research used magic literature to help identify effective forcing techniques as well as behavioral human experiments to investigate the psychological mechanisms underlying them.

### **15:15 Magic by Machines: exploring the possibilities and consequences of computers using conjuring principles to deceive people**

Wally Smith, Gustav Kuhn, Liz Sonenberg, Frank Dignum, & Michael Kirley, University of Melbourne; wsmith@unimelb.edu.au

We are increasingly accustomed to computers acting as a medium of human deception through misinformation and countless digital scams. A less familiar scenario, but one which might become a reality through AI of the near future, is that of software that is itself able to devise and enact deceptive strategies on people. In this talk, we report two related lines of work that draw on the theory and practice of conjuring to explore this future scenario.

In the first part, we report a study to investigate people's reactions to magic tricks performed by an app; tricks that in reality depend on simple self-working effects or secret human assistance. Our findings concern both the nature of the experience created, from unsurprised acceptance to 'No Way' moments (Ortiz, 2007) or 'Astonishment' (Harris, 1996), and wonder derived from a conflict of beliefs (Rensink & Kuhn, 2025). We also report the kinds of explanation offered by the spectators of magic effects performed by machines.

In the second part, we describe our ongoing attempt to design and build a software agent that is truly capable of using conjuring techniques (such as misdirection) to devise and enact deceptive strategies on people within the environment of a specially-created human-computer game. Building conjuring principles into a software agent, we argue, allows us to formalise elements of what might be called the 'deep structure' of magic deception. This contributes to a longstanding lineage of magic theory, in particular Maskelyne and Devant's (1911) rules of good magic performance, Fitzkee's (1944) so called 'trick brain' that systematizes the design of new tricks through the random recombination of elements, and more recently Darwin Ortiz's (2007) insightful and important account of the 'design' of magic tricks.



## **Talk Session 3:**

**Monday 15<sup>th</sup> July, 16:30-17:00**

### **16:30 Forgotten memory studies: Re-examining Hodgson and Davey's mal-observation report**

Matthew L. Tompkins, University of Oxford; contact@matt-tompkins.com  
Contemporary researchers are increasingly turning to performance magic to inspire new avenues of investigation into human cognition. This idea of using magic trick methods as a tool to study perception can arguably be traced back to one particular series of experiments that were published in 1887. The experiments were designed by psychical researcher Richard Hodgson who had teamed-up with an amateur conjurer, S.J. Davey. Together, they produced a report detailing the limitations of eye-witness accounts of anomalous events. Participants in their elaborate experimental hoax were invited to attend 'séances' hosted by Davey, and they then were asked to write letters detailing what they had seen. Hodgson and Davey collected 27 accounts of 17 separate staged séances and highlighted the dramatic errors and inconsistencies wherein participants' reports deviated from the real events. Critics at the time argued that the severity of errors reported was fundamentally unbelievable- an outlook which mirrors modern day popular misunderstandings of human perception and memory. This talk will explore the context and impact of Hodgson and Davey's project both at the time of their publication and also in light of subsequent developments in cognitive and anomalistic psychology. Finally, I also examine the biographies of the two men, particularly Hodgson's apparently dramatic later-life transformation from skeptical debunker to committed spiritualist believer.

### **16:45 Poster Session Lightning Talks**

## **Talk Session 4:**

**Tuesday 16<sup>th</sup> July, 13:45-14:45**

### **13:45 Magic and the co-creation of experience**

Jon M. Armstrong, Guildhall School of Music & Drama; jon.armstrong@gsm.d.ac.uk  
This paper examines how the underlying mechanisms of magic such as framing, direction of attention and the concept of the moment of magic overlap with those in both immersive theatre and experience design. The rise of these two cultural forms demonstrates an increasing desire for experiences which are co-created with the participants, and provides an opportunity to rethink the nature and function of magic in relation to its audiences. The paper will synthesise insights from magic and immersive theatre and apply them to the broader practice of experience design. It will draw on my work as a magician and theatre



practitioner in order to suggest a series of performative and design methodologies that move beyond the field of performance and can be utilised to co-create experiences beyond the spaces of theatre.

#### **14:00 News from the front – Impact of magic on paranormal and pseudo-scientific beliefs**

Christine Mohr & Gustav Kuhn, University of Lausanne; christine.mohr@unil.ch  
Psychologists' study of human belief has been mainly correlational. Over the last three years, we ran a number of studies in which we looked at belief change as a function of a magic performance that figured as central event. Once, participants saw a paranormal performance and once a pseudo-scientific performance. Repeatedly, we framed the performances. For paranormal performances, we told half of the sample they would see a psychic / conjuring performance. For pseudo-scientific performances, we told half of the sample they would see a magician / psychologist. Respectively, we assessed their paranormal and pseudo-psychological beliefs before and after the performance. In some studies, we also assessed their belief-related cognitions before and after the performance. Always, participants indicated how they explain what they just experienced. Across all studies, we observed that many participants showed a high willingness to endorse the content of the performances they saw. We found no changes in belief or cognitive functions. We found, however, an increase in beliefs when questions closely captured the content of the performance. Unexpectedly, framing had no effect on post-performance beliefs or the way participants' explained the performance. Our study results yield evidence that our design could be a useful tool in the study of belief change as well as stability. Regarding our performances, belief change seems very specific. Researchers and magicians should also be aware that pre-performance information has no impact on how the performance is perceived (e.g., conjuring versus psychic); potentially, the intensity of the performance overrode the deeper treatment of this information.

#### **14:15 The magic of medicine: Placebos as performance**

Jay A Olson, Michael Lifshitz, Michael Stevens, Amir Raz, & Samuel Veissière, McGill University; jay.olson@mail.mcgill.ca  
Medicine has a large element of performance. The medical paraphernalia, white coats, and rituals contribute to healing partly by priming positive expectations. Placebo researcher Ted Kaptchuk claimed that "with good showmanship, a well-designed, totally inert stage prop ... can produce exaggerated placebo effects". We previously convinced people that such an inert prop — a sham brain scanner — could assess their personality or insert thoughts into their head. Combining principles of magic and showmanship, we tested whether we could make people believe that this machine could heal their brain. In this feasibility study, we recruited 11 children with various conditions: Attention Deficit Hyperactivity Disorder, Tourette Syndrome, chronic skin picking, and migraines. After watching a celebrity endorsement video of the procedure to establish credibility, the children and their families met a team of researchers in white coats at a neurological hospital. To enhance expectations, a film crew and celebrity science communicator



were present to document the procedure. We introduced the children to an elaborate sham fMRI scanner that we explained was inactive but could still help their brain heal itself through the power of suggestion. Over two to four sessions, children entered the scanner for 15 minutes as we gave them positive suggestions that the procedure would reduce their symptoms and improve their strengths. At one- and three-week follow-ups, we collected qualitative data from video-taped home visits and interviews. Ten of the eleven children showed improvements in symptoms or functioning. Two showed complete remission of symptoms (skin picking and migraines), one of whom remains symptom-free a year later. Studying the performance aspects of medicine may lead to novel and safe complements to conventional treatments. Further, understanding the psychological and social factors involved could lead to practical ways to improve treatments by capitalising on placebo effects.

#### **14:30 Impossibly Curious**

Jason Leddington, Bucknell University; jason.leddington@bucknell.edu  
On a view that is surprisingly common among magicians, the appeal of magic is explained by its theatrical framing. This view holds that, because it's not fun to be fooled, the magician must hide "the sword of magic...behind the cape of theater" (Haydn 2009). Moreover, this agrees with many models of cognitive motivation. For example, according to drive-based theories of curiosity (e.g., Berlyne 1954), the experience of not-knowing provoked by an external incongruity is fundamentally aversive. However, I think this view of magic and the models of cognitive motivation that agree with it are wrong. Instead, I recommend a view on which (most) spectators actually enjoy the not-knowing provoked by the incongruities they encounter in capable magic performances. Building on the view of the experience of magic developed in Leddington (2016), I explore the possibility of explaining this enjoyment by appeal to recent developments in the psychology and philosophy of cognitive motivation and aesthetic enjoyment. If successful, this explanation will illuminate something that the common view above cannot explain—namely, that a magic spectator's desire to know is often trumped by her desire for continued not-knowing. Thus the exclamation: "How did you do that? Wait—I don't want to know!" The talk concludes with reflections on the relationship between curiosity and wonder.



## Poster Presentation Abstracts:

**Monday 15<sup>th</sup> July, 17:00-18:30**

### 1 Prospect theory as a narrative tool

Curtis Frye, Technology and Society, Incorporated; curt@curtisfrye.com  
In his classic book *Maximum Entertainment*, performer and director Ken Weber states: "Emotions lubricate the gears of the entertainment experience. Without emotions, you're doing a lecture." The performer's challenge is to introduce emotion in a manner that meets the needs of the audience and the piece. Kahneman and Tversky's prospect theory provides a useful lens through which performers can gauge and shape the emotional content of their presentations.

Theatrical magic and psychic entertainment posit a scenario where the performer can accomplish interesting and useful feats that seem impossible, such as plucking endless streams of coins from the air as in the *Aerial Mint* (later known as the *Miser's Dream*) or discerning a participant's thoughts. These abilities would offer significant advantages and happiness if real and generally applicable, but many artists want their audiences to experience a range of emotions. Prospect theory, which maintains that losses of a specific amount hurt more than gains of the same amount provide pleasure, offers one mechanism through which performers can introduce contrasting emotions into their programs.

This presentation describes Kahneman and Tversky's prospect theory and places it in the context of theatrical performance, drawing in part on David Krasner's work on empathy and theater as well as Barbara Minto's storytelling framework of situation, complication, and solution. After this structure is established, several examples of gain and loss (imagined, potential, remembered, and real) from artists and creators such as Derren Brown and Mac King will illustrate how a performer can, with the aid of comedic or dramatic framing, use prospect theory to "spin the dial" on potential gain or loss to affect the audience's emotional experience.

### 2 Pattern predictive Gilbreath card trick

Douglas Yang; dyang20@andover.edu  
This work generalised and modified the well-known Gilbreath card trick, such that after a riffle shuffle, the performer can predict the pattern of the cards, such as the colors, strengths of suits from the back colors.

This work proves the theorem behind this novel card trick. The riffle shuffle process is modeled as a non-deterministic algorithm, the deterministic patterns are discovered by heuristics, then proved using oriented graph theory and automata theory. The theoretic result may lead to a boarder range of magic design applications.



### 3 Learning magic: An autoethnographic study of skills acquisition and intersubjectivity

Brian Rappert, University of Exeter; b.rappert@ex.ac.uk  
Within academic and practitioner theorizing about magic, while conjuring is often depicted as a form of social interaction between magicians and audiences, the tendency is to treat such interactions in one-directional terms. Agency, knowledge and the scope for action predominately rest in the hands of performers. The magician is cast in the role of manipulator and the experience of conjuring is predominantly told from the perspective of (highly adept) practitioners.

Against such tendencies, this presentation considers findings from an autoethnographic course of self-study by a novice. Across varied qualitative traditions in the social sciences, self-studies of acquiring practical knowledge and skill have elaborated how the honing of cognitive and bodily capabilities enables ways of seeing, feeling, and acting. In this presentation I will recount selected embodied and materially situated forms of competency training in my first year of study; including data derived from twenty-four recorded small group performance sessions. Especially by starting from the experiences of a beginner without claims to expertise, I want to advance sociological considerations for how both audiences and magicians mutually accomplish the performance of magic through moment-to-moment unfolding forms of reciprocal action. In doing so, I also ask how the study of magic can help reformulate prevailing social science theorizing regarding: the process of skills acquisition, the definition of learning, and the meaning of intersubjectivity.

Funding Source: Internal - University of Exeter  
For further information on this line research see <https://brianrappert.net/magic>

### 4 Illustrating nature's magic with magic

F.D. Becchetti, Dept. Physics, U.Michigan-Ann Arbor MI; fdb@umich.edu  
As a scientist and educator at a large public university, I often give talks to the general public, to HS and other students, and to various organizations illustrating some of Nature's magic\*: quantum physics, particle-wave duality and quantum tunneling, relativity including  $E=mc^2$  and the twin paradox, the standard model of elementary particles, etc. While others often use conventional magic as part of such a talk, I have found that altering or developing magic more directly related to the science, based on anecdotal evidence, is more effective. Thus, instead of a normal deck of cards, I use a deck of quarks with a routine predicting an elementary particle created by the audience. This leads to a discussion of the standard model, including the need for fractional charges. Quantum tunneling and nuclear decay processes are illustrated with special penetration-type routines. This introduces radioactive dating, the age of the Earth and human evolution. My book tests use science books and likewise I use other mind reading effects to introduce certain relative topics (EM transmission of information, brain waves). Relativity and nuclear fusion, demonstrating  $E=Mc^2$ , the source of the Sun's energy and ultimate limit on its lifetime, are illustrated with special routines, one using a 2 dollar bill and another using a vanish box. I also typically do a swap out of all gimmicked apparatus with non-gimmicked apparatus, so



If demanded I can (apparently reluctantly) handout items for inspection or show them to be "normal". This has proven very effective as I still have past audience members come back and ask me "How did you do that??" They obviously remember what I did and, better, usually know the Nature's magic being illustrated by the effect.

\* See for example "Nature's Magic" : Fred Becchetti - Saturday Morning Physics - 04/02/11 - YouTube

## 5 Forcing you to experience wonder: Unconsciously biasing people's choice through strategic physical positioning

Yuxuan Lan & Gustav Kuhn, Tsinghua University; lanyuxuan1997@126.com

A large body of magic literature describes ways of forcing a spectator to choose specific card, but relatively little is known about the psychological mechanisms that underpin these principles. In this article, we investigate the physical location force, a force in which four cards (from left to right: 1-2-3-4) are placed face-down on the table in a line, after which participants are asked to push out one card. The force is thought to rely on a behavioral bias in that people are more likely to choose the third card. As predicted, most of our participants (60%) selected the 3rd card, which was by far the most frequently chosen card. After selecting the card, participants were asked to estimate the number of other people who would choose the same card. There was no significant difference in estimates between those who chose the target card (i.e. 3rd card) and those who selected a different card. Moreover, participants significantly underestimated the actual proportion people who would select the target card. These results illustrate that participants' behavior was heavily biased towards choosing the third card, but that they were oblivious of this bias. Our final analysis looked at the sense of wonder people experienced after discovering that the magician correctly predicted the spectator's choice. We found a significant negative correlation between the participants' estimates of the proportion of people who would choose their card, and the feeling of wonder the trick elicits. These results add weight to the idea that errors in metacognition have a direct impact on creating the feeling of wonder that magic elicits.

## 6 Creating the illusion of free choice - How forcing can influence video game design

Shringi Kumari, Sebastian Deterding & Gustav Kuhn, University of York; sk1382@york.ac.uk

Video game designers face similar design challenge as magicians: crafting believable and engaging illusions. Hence, magic can provide an untapped wealth of design principles and techniques for game designers. One particularly pertinent case is forcing: perceived free choice where none exists.

We analyse the illusion of choice as it is fundamental to enjoyable gameplay. Even though providing players "total" freedom of choice is both practically impossible (due to production limits) and undesirable (as designers aim to craft particular journeys), most game designers want



to retain the impression of free choice to give players an immersive experience. Magicians have faced the same dilemma and developed forcing as a powerful and versatile tool to influence a person's choice while maintaining the impression of freedom. We discuss four particular forcing techniques which we consider valuable for game design: equivocation, stereotypical choice patterns, saliency, and identical choice. For instance, game designers face the challenge of making non-player characters with pre-programmed and thus limited behaviours appear to engage in rich, varied, responsive interaction with the player. This maps neatly with how magicians appear to genuinely interact with the audience while actually using equivocation to lead them through carefully pre-defined scripts.

We bring these principles to light in order to encourage a broader dialogue between game designers, magicians, and researchers to further explore how the two creative practices may inform each other.

## 7 The magical means of building close connections and community during the college transition: A novel arts-based positive intervention

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There has been a growing interest in utilizing magic to enhance wellbeing and improve people's lives. While the existing empirical literature highlights some promising benefits, improved methodological approaches are needed to gain a deeper understanding of magic and wellbeing. To address this, we present the largest randomized control trial to date that investigates the impact of learning to perform magic. A cohort of first year university undergraduates participated in either a magic lessons workshop or a control workshop that learned mindfulness. Dependent variables were students' self-esteem, sense of community, closeness, and general wellbeing. We hypothesized the magic workshops to be beneficial for first year undergraduates because the transition to college requires students to become independent and is often accompanied with challenging new experiences. Results indicated that students perceived the magic workshops to be more helpful in improving their self-esteem, sense of community, closeness, and wellbeing than the mindfulness workshop. While pre and post measures revealed a significant positive effect for both interventions, the pre and post measures did not yield any significant effects between the two groups. One reason could be a not large enough sample since most positive interventions tend to have smaller effect sizes than clinical interventions. These results are discussed in the context of how learning to perform magic may help enhance psychological & community wellbeing.

## 8 The symmetry of deception: When symmetrical action shifts event boundaries

Dillon J. Krupa, Anthony S. Barnhart, Cheyenne Duckert, Alyssa N. Ruediger, & Lexington C. C. Fitzpatrick, Carthage College; dkrupa@carthage.edu  
Sleight-of-hand performed by magicians encourages audiences to interpret incomplete



information using assumptions constructed from experience with environmental regularities (Barnhart, 2010). One frequently-exploited regularity involves symmetry. Symmetry allows for “filling-in” of incomplete perceptual information (Ekroll, Sayim, & Wagemans, 2017, Perspectives on Psych. Science). The current experiments explore whether this filling-in applies to action patterns. Magic theorists suggest that deceptive actions will evade detection if they are part of a symmetrical action sequence (Sankey, 2003, Beyond Secrets). Symmetry is emphasized in a piece of sleight-of-hand known as the top change, wherein a playing card is switched for the card on top of a deck. If the action underlying the switch is performed with mirror symmetry (i.e., the hand with a single card approaches the deck and then the hand with the deck retreats in the same direction of motion), magicians predict it will evade detection more than if the action is asymmetrical, with the same hand approaching and retreating.

In Experiment 1 participants watched videos containing symmetrical or asymmetrical top changes (or non-deceptive trials), pressing a button upon detecting a switch. Participants were slower to detect top changes in symmetrical than in the asymmetrical conditions, supporting the notion that symmetry encourages “filling in” and reduces attentional deployment toward the deceptive actions. Experiment 2 explored other forms of symmetry, including motion on the depth plane (toward/away from the camera) and action initiated by the hand holding the deck. We replicated the symmetry effect, but showed that it changed across motion conditions. We interpret these symmetry effects as impacting event perception by shifting event boundaries to reduce memory and perception of actions between coarse event boundaries.

## 9 A modern-day replication of Hugo Münsterberg's (1907) classroom demonstration of inattentional blindness

Matthew L. Tompkins, University of Oxford; contact@matt-tompkins.com  
In McClure's Magazine in 1907, the experimental psychologist Hugo Münsterberg published a short article on the unreliability of eye-witness testimony. In the article, he reported a short classroom-based experiment that he conducted during one of his lectures at Harvard University. The experiment was only briefly described and does not constitute what a contemporary researcher would consider a formal write-up, but, nevertheless, it does provide a fascinatingly prescient description of what we might now consider to be the phenomenon of inattentional blindness- wherein observers can look directly at a clearly-presented stimulus yet fail to perceive it when their attention is otherwise engaged. Based on Münsterberg's brief write-up, I conducted a modern-day replication of his experiment as part of an undergraduate psychology lecture. Of 101 students who participated in the experiment, 50% appeared to be inattententially blind to at least 1 of 3 centrally-presented critical stimuli. These results indicate that Münsterberg's paradigm shows promise as a tool for contemporary researchers who wish to investigate inattentional blindness for 'live' centrally-presented stimuli.



## 10 Figure-ground reversals

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Magic tricks rest on an incongruous play between appearances and disappearances. The magician must both hide gestures and images, concealing the secrets of the magic trick, while, on the other hand, highlighting disappearances—e.g., the disappearance of a rabbit, a room, etc. She must conceal in order to reveal. Magic is the “art of hiding”, an art of camouflage.

Elephants vanishing from inside cabinets, rabbits disappearing from hats, women in boxes cut in half, certain images are located outside the visible frame. For the magic trick's form to take shape, the magician must pay special attention to what is outside the frame. In other words, to forge a magic trick, the magician must shape the negative space around it. She must construct a background to produce the foreground. The magic trick's staging is a kind of an inverted presentation.

Magicians borrow from Gestalt theory to deceive their audiences, inter alia: the law of proximity, the law of closure and the law of continuity. One of the theory of perception's core concepts is figure-ground. As one's attention shifts with respect to an object or a pattern, a figure emerges from the ground. The interplay between figure and ground is dynamic and ongoing: the same ground may give rise to several different figures and a given figure may itself become ground.

Illusions create ambiguous perceptual experiences where the dichotomy between the visible and the invisible continuously evolve. Appearing and disappearing figures introduce us to experiences of the reversibility between tricks themselves and spectators' fantasies, the world as we perceive it and as it physically exists, figure and background, possible and impossible objects, presence and absence.

The magician proceeds physically and semantically to reverse all references. She creates shadowy areas on-stage, reflections through mirrors, inversions of gravity, the passage of the real into the imaginary.

## 11 Comparison of science and magic

Convin Splettsen, Goethe-University Frankfurt; convin.splettsen@gmx.de  
This talk will discuss the similarities between magic and science. It will start with some theory of science and magic and terms like concept, observation, fact and experience will get introduced. Are there similar concepts alike or do such terms have a different connotation? To answer this an historical example will be presented in which a mathematician wants to prove a theory of the fourth dimension. For this he was working together with a spiritist. Based on this case I will come back to the question about similarities and differences between magic and science.





## 12 Misdirected by gender: The impact of performer gender on perceptions of a magic performance

Olivia M. Krahn-Bockhop, Anthony S. Barnhart, Noah Griser, Carisa Hendrix, Matthew Schuler, Jeanette Andrews, Danny Rudnick, & Jaime K. Utter, Carthage College; okrahnbockhop@carthage.edu  
Anecdotal accounts suggest that female magicians are more adept at controlling attention than male performers (Johnson, 2017, Scamapalooza Podcast). This could be due, in part, to differences in engagement with female faces, compared to male faces (Okazaki et al., 2010, Brain Topography). We examined the impact that a performer's gender and perceived expertise has on the audience's tendency to be misdirected. We monitored participants' eye movements while they viewed videos of a naive male or female magician performing two magic effects from prior inattentional blindness (IB) research: One in which a coin vanishes and reappears (Barnhart & Goldinger, 2014, *Frontiers in Psychology*) and one in which a lighter vanishes (Kuhn & Findlay, 2010, QJEP). Importantly, the method underlying each illusion happened in full view, allowing us to measure misdirection efficacy through self-reports of method detection. After each video, participants also provided ratings of enjoyment and "magicality." Jay (2016, *MAGIC Magazine*) showed that participants enjoy magic more if they believe the performer has an impressive reputation. This may also impact misdirection efficacy. Viewing of the critical effects was preceded by a performer introduction listing achievements that were more impressive (e.g., performance on the *Tonight Show*) or less impressive (e.g., performance at State Fair). We predict that IB rates will be highest with female and high-accolade performers. We also predict a greater proportion of fixations to the performer's face in the female than the male condition. Because IB will be moderated by performer gender, we expect more fixations on the IB stimuli for male performers and low-accolade performers. Gygax (2017, *SoMA*) provided initial evidence that audiences judge magic to be less impressive when performed by a female. If our predictions are correct, however, this audience bias could be counterbalanced by an increased ability to deceive.

## 13 The way you make me feel! Just pretend to talk to the dead

Lise Lesaffre, University of Lausanne; lise.lesaffre@unil.ch  
In previous studies, we observed that when experiencing a supposedly paranormal event, many observers were willing to endorse that this was a demonstration of a genuine paranormal phenomena. Also, observers seemed confused and emotionally involved (Lesaffre et al., 2018). Yet, these latter observations were anecdotal. In two studies, we set out to test whether confusion and affectivity can at least partially explain how such an event is explained. In a first classroom study, 419 students saw a performer take contact with a dead person. After the performance they indicated how they explained the event and how they felt about it. About 65% endorsed a paranormal explanation. Moreover, those who reported on affective reactions (open question) were also more likely to endorse a paranormal explanation. The type of affect (positive, negative, unspecified, mixed) did not matter for this relationship to occur. In a following study (one year later), new groups of participants (n = 98) saw the video of the supposedly paranormal



event in group sessions. We assessed their affectivity (negative and positive) and self-reported anxiety (state and trait anxiety) before and after the performance. Again, they indicated how they explained the event afterwards. We observed a decrease in negative affect and no change for positive affect. Moreover, participants' anxiety increased after seeing the demonstration, while their negative affect decreased. The more anxious people were, the more they provided paranormal explanations. Results from these studies show that the experience of paranormal phenomena is an affective experience. On the one hand, paranormal explanations seem to be facilitated when triggering affective reactions or when participants respond anxiously, such experiences can also reduce negative affectivity. This co-existence of increased anxiety and reduced negative affect could explain why people actively expose themselves to anxiety inducing situations.

## 14 Meaning, magic, and hope: Theoretical considerations

Kevin L. Ladd, Indiana University South Bend; kladd@iusb.edu  
The ambiguous term "meaning" incorporates at least three facets of contemporary psychological writings: life makes sense; there are goals to achieve; and personal existence is important. Experiencing meaning in this sense is by no means a given, with roughly 20% of people expressing quite modest rates of sensing personal meaning in life. Can experiencing magic increase meaning for observers? Perhaps. But what if magic touches a human need that is more fundamental than meaning in the sense of psychological motivation? In this presentation, I observe that meaning offers explanations and gives life direction; it relates to why things are as they are and is susceptible to motivational forces. Magic, however, emphasizes the unpredictable thereby creating a space emphasizing experience over motivation. Instead of solidifying meaning, magic fundamentally challenges anticipated, rational order, creating emotions of wonder, awe or amazement that are difficult to sustain. More lasting is the potential of magic to instill a sense of hope; things can be different, with all the ambiguity that implies. Following the lead of Emily Dickinson's poem, *Hope is the Thing with Feathers*, and incorporating work from a variety of other academic sources, I present the idea that whether or not it results in finding meaning, the experience of hope generated by magic can be transformational in its own right.

## 15 False beliefs and confabulation can lead to lasting changes in political attitudes

Thomas Strandberg, Lund University; thomas.strandberg@fil.lu.se  
Choice blindness describes a powerful dissociation between our actions and their underlying reasons. In an experimental situation, choice blindness can occur when participants receive false feedback about an attitude they just expressed, accept the false feedback as their own attitude, and rationalize it with seemingly introspective (albeit confabulated) arguments. But what might be the impact of falsely believing and rationalizing an attitude you in fact never expressed? In two experiments, we present evidence that false beliefs about one's own prior attitudes and confabulatory reasoning can lead to lasting changes in one's attitudes. In Experiment 1 (N 140), participants stated their opinions about salient political issues, and using the Choice Blindness Paradigm we covertly altered some of their responses to indicate an opposite position. In the



first condition, we asked the participants to immediately verify the manipulated responses, and in the second, we also asked them to provide underlying arguments behind their attitudes. Only half of the manipulations were corrected by the participants. To measure lasting attitude change, we asked the participants to rate the same issues again later in the experiment, as well as one week after the first session. Participants in both conditions exhibited lasting shifts in attitudes, but the effect was considerably larger in the group that confabulated supporting arguments. We fully replicated these findings in Experiment 2 (N 232). In addition, we found that participants' analytical skill measured with the Cognitive Reflection Test correlated with their correction of the manipulation, whereas political involvement did not. This study contributes to the understanding of how confabulatory reasoning and self-perceptive processes can interact in lasting attitude change. It also highlights how judgments can be both stable in the context of everyday life, yet flexible when argumentative processes are engaged.

### **16 A Table Magician's Greatest Trick: Affecting patrons' tipping habits without them knowing**

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Tipping is an international phenomenon that shows one's gratitude towards another person's actions (Lynn, 1993). Many people in the service industry depend on tips as a major source of income. Previous research has found that if restaurant servers leave their customers with free candy at the completion of the dining experience, their tips increase (Strohmetz et al., 2002). This study tests how the "candy effect" generalizes for table magicians. The experiment was conducted at a Long Island, NY restaurant on Friday nights over several months and involved 65 dining parties. A table magician (also an author of this paper) performed for customers at individual tables, asking one member from each party to sign one card from the deck, and either providing them with a souvenir of that signed playing card at the completion of the magic routine or not. Upon finishing his routine, the magician accepted any proffered tips and recorded the condition assigned to the specific table as well as the amount of the gratuity. Data suggest that a table magician receives more frequent tips when he gives the customer one of the cards from his deck as a memento ( $p=.000119$ ); however, this study doesn't provide any reliable evidence that this same action increases the size of non-zero tips ( $p>.05$ ). Ultimately, the tip enhancing technique that was implemented in this study can be applied by workers in different areas of the service industry using a multitude of gifts.



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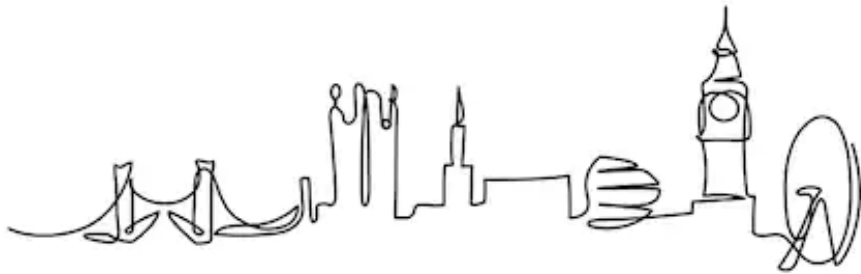
For over eighteen years, they have been building a body of work that forwards this mandate. They reach directly into the community with their local outreach programs for both children and senior populations. They produce theatrical shows and presentations that raise the public's awareness and appreciation of magic as an art. They stage a variety of conferences, seminars and workshops on magic and its history. They publish books and journals on magic. They curate and host online exhibitions about great magicians, their history and their contributions to the art, and they host and maintain an enormous archive of magic videos. They are also the administrative body for the Allan Slaight Awards, which are awards that celebrate exceptional achievements in magic by individuals and organizations across the globe.

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