Psychology departments around the country face a series of new and difficult challenges as online universities gain traction in the educational landscape. Without the overhead of a brick-and-mortar institution, online universities can offer courses on the cheap that can be taken anywhere there is an internet connection, at any time, by students who often have full-time jobs during the day. With aging faculty members who are uncomfortable adapting to digital education and who are already spread too thin between standard teaching and research commitments, many traditional academic departments are having a difficult time being competitive in the online market. A second, tangentially-related concern is the status of psychology among the sciences. For most students who are not psychology majors, the only experience they have with the field is in an introductory psychology course, which often waters down the scientific components of the discipline in favor of "touchy-feely" content with broad appeal. This teaching bias tends to be magnified in the realm of online courses where science becomes more difficult to communicate, leading to a widespread misperception that psychology lacks scientific rigor.

With these concerns in mind, I was approached by the director of undergraduate studies in psychology at Arizona State University, where I am a doctoral candidate in Cognition, Action, & Perception, with a lofty request. Could I create an online course with broad appeal, minimal barriers, and solid grounding in science? Many courses with broad appeal (usually "special topics" courses) come with a host of pre-requisites (e.g., Research Methods, Statistics, etc.), which tends to limit enrollment to students who are psychology majors. Thus, many opportunities are missed for introducing non-psych majors to psychological science. Given my training as a magician and cognitive scientist and the recent trend to bring the methods of magicians into the laboratory, it seemed natural for me to build a course on the psychology of magic. Over the last decade, many empirical papers have been published that have built upon theories derived by magicians or that have used the methods of magicians to improve the ecological validity of research that typically employs artificial laboratory tasks. Thus, there could be a strong scientific basis for the course, but magic also has widespread appeal that should entice students from many different fields to enroll.

As I have no experience teaching online courses (I haven't even taken an online course!), it was decided that my first attempt would be in the form of a hybrid course. The class would meet face-to-face once each week, and the remainder of the course requirements would take place online. The following semester, I would attempt to convert the course to an entirely online format. I settled upon a structure that was inspired by courses I had taken as an undergraduate while participating in the study-abroad program. The best (and arguably most interesting) way to learn is through immersion in the content area. For example, many people are amazed at the ease with which they learn a new language while living in a culture that speaks the language. In my years as a graduate student, I've had the opportunity to befriend many of the movers and shakers in the new "science of magic" movement, so why not try to immerse my students in this

scientific culture to which I have been graciously allowed entry? I decided that I would attempt to have each face-to-face lecture period begin with a guest lecture from one of my friends or acquaintances from the worlds of science and magic. The students would learn the content directly from the scientists and magicians who generated it! Then, I would take over for the second half of each class period to try to relate content from the guest lecture back to readings and previous lectures as well as to more general topics from the psychological literature, thereby wrapping each lecture up with a nice little bow.

I am in a great location for teaching a course of this kind. Phoenix, Arizona has more magic researchers per capita than any other city in the world…There are three of us. Phoenix happens to be home to the Barrow Neurological Institute, where Stephen Macknik and Susana Martinez-Conde, authors of the book *Sleights of Mind* and regulars at TAM, are laboratory directors. In fact, I had the pleasure of making contributions to their book and acting as their magic instructor during its writing. Thus, I decided that *Sleights of Mind*, the first book on the neuroscience of magic written for the general public, will be the textbook for the course. It will provide a structure for the course and act as a springboard into discussion of deeper scientific issues in psychology and neuroscience. Plus, the students will have the opportunity to meet the authors when they visit the class to present a guest lecture! Chapters from *Sleights of Mind* will be supplemented with readings from relevant journal articles and essays by magicians.

As I write these words, a little under a week remains until the start of ASU's Fall semester, and enrollment in the course has nearly reached its 50-person cap. Registrants represent a wide swath of the ASU community. As you would expect, psychology majors dominate the list of enrollees, but it also includes students with majors in English Literature, Philosophy, Communications, Kinesiology, Business, and something called Urban & Metropolitan Studies. Broad appeal? Check! Currently, twelve researchers and magicians have agreed to visit the course (either physically or digitally) to present guest lectures, and two others are tentatively scheduled. There may also be some unexpected celebrity visits!

My first physical lecture is scheduled for August 28th, and I have a few goals for this initial meeting. Firstly, at its heart, this course will be about science. This means that many of the readings and discussions will be difficult to follow without a basic understanding of scientific methods, and I cannot assume that my students have taken a course in research methods. So, my initial lecture will contain something of a crash course in experimental design and logic. However, my plan is to embed this crash course in a discussion of the history of scientific interest in magic. Around the turn of the 20th Century, partially as a response to the rise of spiritualism in America, a group of prominent psychologists took an interest in examining the

methods of magicians as a way to understand the limitations and tendencies of human perceptual and cognitive systems. This interest led to the publication of a few theoretical treatises on the value of magic for psychology, including one by Alfred Binet , the pioneer of intelligence testing. This early manuscript contains a host of hypotheses that lend themselves perfectly to simple empirical testing. For example, Binet references a hypothesis put forward by Max Dessoir, a French psychologist who had also written on the psychology of magic, saying:

[Dessoir] supposes an illusionist taking an orange, and after having shown it to those around him, throws it up into the air and then catches it in his hand as it descends. He repeats this performance once, twice, and the third time, after having placed the orange in his pocket without the knowledge of those looking on, he takes a pretense of again throwing it up in the air. Mr. Dessoir thinks, and we think with him, that many of those present misled by this action would believe they again saw the orange being tossed into the air as on the two other occasions and would be greatly astonished at not seeing it descend as they had reason to believe it would. (Binet, 1896, pp. 556). I will encourage students to brainstorm means of testing Dessoir's hypothesis, being sure that any methods contain independent and dependent variables, accompanied by clear operational definitions. However, even if the hypothesis holds up, the quotation does not provide a concrete mechanism to explain the effect. I will further encourage students to generate their own hypotheses predicting the conditions under which people would and would not be susceptible to the illusion. Then, I'll drop the bombshell: Turn the clock forward by about 100 years, and Gustav Kuhn and Michael Land (2006) have directly tested this hypothesis and its basis in a very straight-forward way, showing that the illusion is driven by social cues to attentional deployment provided by the magician. I wonder whether their method will parallel any of the suggestions provided by students. It will be an important demonstration that there are multiple methods one can use to test any hypothesis.

The initial lecture will also contain a crash course on "magic lingo" so that students can keep up with theoretical readings from the magic literature and a brief discussion of proper etiquette for watching a magic show as a student of magic. Any magician will tell you that an audience of magicians can be one of the coldest audiences you ever play to, so I want to insure that my guest lecturers are welcomed by a warm audience and not a bunch of cold, analytical stares.

Although *Sleights of Mind* is focused primarily on cognitive neuroscience, the course has a broad scope. I am attempting to traverse nearly every subfield of psychology. The first weeks of the course will focus on the mechanisms and processes involved in attention and perception, including substantial discussion of inattentional and change blindness, with a guest lecture by cognitive scientist and magician, Robert Teszka . I will devote an entire lecture to addressing perceptual processes that happen without attention (many of which align with the "Gestalt Laws" addressed in any introductory psychology course), as these "pre-attentive" processes are
regularly exploited by magicians by virtue of their automaticity. This discussion will introduce one of the themes of the course. We almost always experience our perceptions to be veridical.

However they are usually based on incomplete sensory information. Perceptual psychologist Richard Gregory (1980) described perceptions as analogous to hypotheses, where conclusions are derived from imperfect data. Most of our perceptions are constructed partially through sensory information and partially through expectation and prior experience. Thus, we are making assumptions that are useful for successfully navigating the world, but which allow for us to be deceived when the assumptions turn out to be incorrect, as in the case of a magic show. The fallibility of our cognitive systems will come up again and again throughout the course, as I highlight mental shortcuts that are used to simplify processing of our complex environments.

The discussion will segue into the second unit of the course, delving into clinical and social psychology. I will begin with an examination of theories of autism and their relationship to magic. In *Sleights of Mind*, it was suggested that, since autistic populations are thought to be less sensitive to (or at least less attentive to) social cues, they should be less susceptible to social misdirection by magicians. However, an experiment carried out by Kuhn and colleagues (2010) suggested just the opposite, that autistic participants were more susceptible to social attention cues in magic. This outcome will be considered in light of controversies in the autism literature regarding social attention. With a critical eye, I will also discuss the "broken mirrors" theory of autism and mirror neuron theories of action understanding which have been invoked to explain why audiences are fooled by sleight of hand.

Continuing with examination of the social components of magic, we will touch on the topic of magical thinking at the individual and group levels as a way to control the fear elicited by uncertainty (and to reduce cognitive dissonance). This line of thought will touch upon the culture of the magic community, itself, and recent speculations on the relationship between magic and skepticism. Discussion will be supported by survey data collected on belief systems and skepticism in the magic community (see Nardi, 2010) and a guest lecture by Catholic priest and magician, Fr. Jim Blantz.

The third unit of the course could very generally be described as an examination of how our behaviors are driven by prior experience. One of the exciting lectures in this section will be given by magician Barry Schorr on children's magic. I have arranged to have a group of children visit the class. Barry will perform a show for the kids so that students can experience the unique dynamic of a kids' show (and the challenges of performing for kids). After the show, Barry will discuss the reasons why kids' magic differs from adult magic, and I will lecture on experiments in developmental cognition that speak to some of Barry's programming choices. This topic will be further addressed in a guest lecture by magic researcher, Irina Demacheva. This section of the class will also contain content devoted to mechanisms of memory (with a

special presentation by Kenton Knepper) and aspects of decision-making and mathematical cognition (with a visit from magician and researcher, Jay Olson).

The final segment of the class will be devoted to future directions in the science of magic, including a shift of focus to the mind of the magician. Do cognitive mechanisms in the magician change as he or she learns to deceive the senses? Neuroscientist, Flip Phillips , will visit the class to discuss interesting work that he has carried out on the motor mechanics of deception. The course will conclude with a discussion of recent controversy surrounding a call for future research in the science of magic to be grounded in neuroscience. Katy Inglis , a magic researcher who has spent a lot of time considering the future of the movement, will drop in to facilitate this discussion.

In keeping with the immersive nature of the course, students will not be evaluated through exams. Instead, they will be graded based on a series of writing assignments designed to foster online discussion. They will also carry out a project over the course of the semester wherein they attempt to learn a magic trick. They will document their learning process while considering the psychology behind the magic trick that they have chosen to learn. The semester will culminate with group presentations where the students perform their tricks and discuss the psychological basis of each effect. “The Psychology of Magic” promises to be an interesting experience for everyone involved. If you want to follow along with the course, I will plan on posting occasional updates to my collaborative blog on the science of magic at www.scienceofmagic.org . I am excited to see how students adjust to this new course model and to a content area that is sure to be foreign to them all. I hope that they will come away from the course with a few things: (1) A new-found appreciation for the art of magic, (2) a realization that they can’t always trust their senses, and (3) a few new tricks up their sleeves!

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The Culture of Psychology and Magic

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