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Applying insights from magic to improve deception in research: The Swiss cheese model☆,☆☆

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ABSTRACT

Social psychologists, placebo scientists, and consumer researchers often require deception in their studies, yet they receive little training on how to deceive effectively. Ineffective deception, however, can lead to suspicion and compromise the validity of research. The field of magic offers a potential solution; magicians have deceived audiences for millennia using a variety of robust techniques. As former professional magicians, we propose the *Swiss cheese model of deception* and argue that deception should be subtle yet elaborate. Subtle deception involves techniques such as fake mistakes, planted assumptions, and convincers. Elaborate deception involves layering many of these techniques rather than relying on a single cover story. We have demonstrated the potency of these principles by making participants believe implausible ideas, such as that a machine is controlling their mind or that the placebo they consumed was a psychedelic drug. These principles can help researchers reduce demand characteristics, improve blinding, and increase the generalisability of studies that require deception.

Magicians have been deceiving audiences for millennia (Lamont & Steinmeyer, 2018). In that time, they have developed and refined various methods of effective deception. This deception is integral to magic; if audiences can see through it, the tricks become impotent. Unlike other deceivers such as con artists or pickpockets, magicians must overcome the challenge of having onlookers suspicious and aware of the deception upfront. Further, audiences actively try to figure out the tricks and some of them even try to heckle. Despite these challenges, magicians have developed deception techniques that work on the majority of people across ages, cultures, and contexts (Kuhn, 2019; Kuhn et al., 2008). These techniques have been leveraged in other fields; one of the CIA manuals of deception, for example, was written by a magician (Melton & Wallace, 2009). In medicine, researchers have used these techniques to improve blinding by creating more convincing control groups and sham interventions (Braithwaite et al., 2020). Other fields may similarly benefit from using these robust deception techniques.

Fields such as social psychology, placebo science, and consumer research often require deception to answer research questions. Researchers, however, generally receive little training in effective deception; there is no standardised curriculum let alone a comprehensive handbook on the topic. Instead, researchers improve their deception through trial and error, but this process is rarely described in publications (Wilson et al., 2010). As a result, deception training is often relegated to "undocumented laboratory folkways or more implicit norms passed from one generation to the next" (Galang, 2018, p. 10). Despite advances in related topics such as the detection of deception (Hauch et al., 2014), there has been little discussion on how to improve deception in research protocols.

Ineffective deception can be harmful as it promotes suspicion, which in turn reduces the quality of research. If suspicion leads participants to uncover the research hypothesis, they may act in ways to either confirm or disconfirm it (Nichols & Edlund, 2015; Nichols & Maner, 2008; Orne, 1962; Stricker et al., 1967). Suspicious participants are also more likely to behave in socially desirable ways, second-guess the experimenter, or act apprehensively, ultimately distorting measurements of natural behaviour and threatening internal validity (Hertwig & Ortmann, 2008; Ortmann & Hertwig, 2002; Pascual-Leone et al., 2010). MacCoun and Kerr (1987) recount a case of a participant having a genuine epileptic seizure during a mock jury study. When interviewed after the incident,

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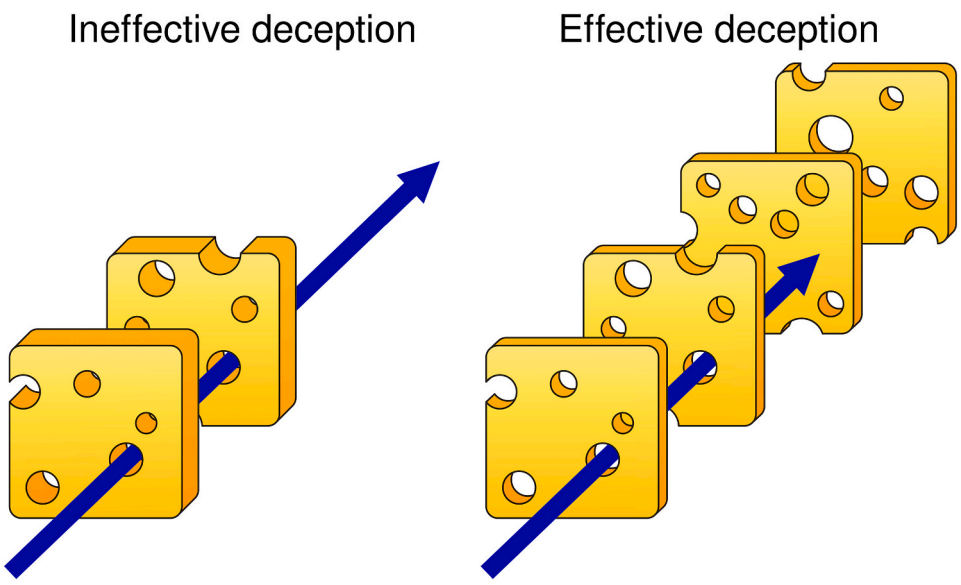

Fig. 1. The Swiss cheese model of deception. Each component of the deception represents a slice of cheese with natural holes (imperfections) in it. Ineffective deception uses a few thick layers, so the holes often line up, letting participants see through the deception. Effective deception uses enough thin layers that participants rarely see through all of the holes.

the majority of the participants in the room reported being suspicious and thinking it was part of the experiment. One participant remained suspicious even after the paramedics arrived. The first participant to help the victim was one of the few with no background in psychology. In general, the more participants know about psychology, the greater their suspicion in studies (Ortmann & Hertwig, 2002; Rubin & Moore, 1971).

Researchers can attempt to reduce some of these issues by excluding suspicious participants during the debriefing (Mills, 1976; Page, 1973). However, there have been few studies on how to accurately assess suspicion (Nichols & Edlund, 2015) and little progress has been made in this domain for decades (Blackhart et al., 2012). On the one hand, if the criterion to exclude suspicious participants is too conservative, it may fail to exclude those who are merely playing along or who are reluctant to admit they saw through the deception (Taylor & Shepperd, 1996; Wilson et al., 2010). In one study, a confederate informed 100 participants about the purported hypothesis; the participants later behaved in ways to confirm this hypothesis yet none of them admitted they knew anything about the goal of the study during the debriefing (Nichols & Maner, 2008). Similarly low disclosure rates have been found across various other studies (Blackhart et al., 2012). Indeed, disclosures of suspicion are often unreliable (Taylor & Shepperd, 1996) and can be influenced by demand characteristics or personality traits (Blackhart et al., 2012; Nichols & Edlund, 2015; Rubin & Moore, 1971). On the other hand, if the exclusion criterion is too liberal, it may accidentally exclude deceived participants who became suspicious in response to the debriefing itself or those who are confabulating about their prior scepticism (Martin & Sayette, 1993; Wilson et al., 2010). These criterion choices considerably influence estimates of suspicion (Bernstein et al., 2016; Nichols & Edlund, 2015). Even if researchers determine the perfect criterion to exclude only suspicious participants, the remaining naive subset may not represent the general population, thus threatening external validity (cf. MacCoun & Kerr, 1987). In any case, suspicion is not always assessed in psychological research. In a replication attempt of 100 studies (Open Science Collaboration, 2015), only 20% of those using deception probed for suspicion at all (Galang, 2018), but current estimates may be higher (Blackhart et al., 2012). Overall, ineffective deception can impair the quality of research, and current methods of screening for suspicion provide little remedy.

One potential solution for this issue would be to make the deception more effective. Such studies involving elaborate deception, as typified by Milgram and Gudehus's (1978) obedience studies, have fallen out of favour in part for ethical reasons (Kelman, 1968; Nicks et al., 1997; Ross et al., 2010). Pascual-Leone et al. (2010, p. 248) advise researchers to ask: "Is there any way that this study could be done either without, or with a lesser degree, of deception?" They argue that "the degree to which research participants are [misled] should be minimised wherever possible." We agree that deception should only be used when necessary; but when it is, overshooting the amount of deception required may be better than undershooting. Overshooting may help avoid the worst case scenario: the use of ineffective deception, ultimately generating unreliable data while wasting resources and the participants' time. When this occurs, there are all of the costs of using deception in research without the benefits of drawing valid scientific conclusions. We would argue that this scenario is thus less ethical than deceiving participants effectively, provided that there is little additional risk. In short: if you must deceive, deceive well. This article, written by two former professional magicians, presents a new model for doing so.

1. The Swiss cheese model

The *Swiss cheese model of accident causation* describes how multiple layers of safeguards help prevent hazards from causing damage (Reason, 2017). In aviation safety, for example, layers such as safety training, co-pilots, and automated procedures provide redundancy to help prevent unexpected turbulence from causing a plane crash. A similar idea can apply to deception. Each component of the deception, such as the cover story, serves as one slice of Swiss cheese. Each slice naturally contains holes — imperfections that reduce the effectiveness of the deception. If all of these holes happen to line up, suspicious participants can "see through" all of the various aspects of the deception, rendering it ineffective (Fig. 1). However, if many slices are layered together, the holes are less likely to all line up, making the deception more opaque. Typical research protocols use a few thick layers, such as a cover story or a key confederate (Sieber et al., 1995). In contrast, magic generally uses many thin layers, providing subtle yet elaborate and effective deception.

1.1. Deceive elaborately with many layers

Co-author A.R. used to perform an act in which he would appear to read the mind of an audience member. The secret was simply that the audience member he selected for the demonstration was a paid confederate; the apparently impromptu mind reading was actually a scripted exchange. In the middle of one show, a man in the theatre stood up and shouted, "I was here last week and he chose the same

woman. She's a stooge!" After some commotion and hesitation, the magician invited the heckler onto the stage and then proceeded to read *his* mind instead. The act was powerful for the audience and particularly so for the initial confederate. The magician later "confided" to her that he could indeed genuinely read minds, but it was cognitively taxing for him, which is why he hired her as a confederate. The confederate was so impressed that she praised his magical powers in front of friends and colleagues for years after the performance. As it turns out, the heckler was the magician's uncle — yet another confederate. This additional layer of deception was intended to fool the audience as well as the initial confederate.

Magicians often use such elaborate forms of deception (Kuhn et al., 2014; Teller, 2012). Audiences may suspect stooges in a magic show, but they are less likely to suspect one stooge to cover up another. In other cases, magicians may show up at a restaurant hours before a performance to stick playing cards under each of the tables, one of which will be used in a casual magic trick over dinner. Or, the spouse of a magician may pretend to not understand English in order to discreetly eavesdrop and signal information undetected from the audience. Such elaborate acts, requiring considerable time, money, or effort, can be difficult for lay audiences to imagine and are thus particularly deceptive (Teller, 2012).

In research, deception is often confined to a few layers, such as a bogus device or a false explanation of what a task is measuring (Sieber et al., 1995), though adding more layers may increase the effectiveness of the deception. In one study (Olson et al., 2016), we had to convince educated participants that a (sham) MRI scanner could both read their mind and insert thoughts into their head; we were testing whether the delusion of *thought insertion* could be reproduced in a non-clinical population. To do so, we used various layers to strengthen the deception. The first 30 min of the protocol included fake MRI safety screenings, a lab technician (surrounded by scientific paraphernalia) describing the complex workings of the machine, and a sham calibration procedure. As in magic, such deception can lead participants down one explanatory path (e.g., that a novel technology will control their mind), making them less likely to discover the underlying "secret" (Thomas & Didierjean, 2016). These many layers constitute *costly signalling*: the effort involved in the procedure was specifically intended to make participants less likely to infer that it was all a sham (Galang, 2018). In a replication, removing one of the key layers of deception made the procedure less convincing (Pailhès, Olson, & Kuhn, in progress). Related studies of machine mind reading and thought insertion that used fewer layers of deception have also resulted in higher rates of suspicion or somewhat weaker effects (Ali et al., 2014; Swiney & Sousa, 2013).

Elaborate deceptive methods are occasionally required in placebo research. In a study applying the Swiss cheese model, we used a dozen researchers in lab coats, a security guard, a handful of confederates, sham blood pressure feedback, and fake drug information sheets to convince participants that the placebos they consumed were actually psychedelic drugs (Olson et al., 2020). Accordingly, some of the participants reported alterations in consciousness similar to what one would expect from a moderate dose of the actual drug. In a study of placebo alcohol, Bernstein et al. (2016) also used various layers of deception: confederates made off-hand comments about friends who got drunk while previously completing the study, the researchers sprayed the room with an alcohol scent, and the (non-alcoholic) drinks had real alcohol rubbed along the rim for subtle taste cues. Another placebo study used fake brochures, attractive logos, stethoscopes, and assistants in crisp business suits in order to promote the appearance of a credible pharmaceutical trial (Ariely, 2009; Waber et al., 2008). Several of these studies achieved more effective deception and less suspicion rates than typical studies that used fewer layers (Bernstein et al., 2016; Olson et al., 2020).

Another type of deception that is common in magic, but relatively rare in research, is the use of *fake mistakes*: seemingly spontaneous events or errors that are in fact carefully planned to increase the effectiveness of the deception (cf. Melton & Wallace, 2009; Wilson et al., 2010). This concept is illustrated by the previous example of the magician's confederate heckler. To the audience (and to the first confederate), it appeared that the heckler's interruption was unplanned and out of the magician's control, making the deception even more effective. Magicians have theorised that if tricks are too smooth and perfect, they end up seeming less impressive than ones with minor flaws (Kuhn, 2019). Mentalists — those who mimic parapsychological abilities such as telepathy — apply this idea often (Lamont & Wiseman, 2005). When guessing three people's chosen playing cards, they will intentionally get the last one slightly wrong (e.g., guessing the Seven of Diamonds rather than the Seven of Hearts) to make the situation appear more plausible and lead people to believe it is telepathy rather than a trick (Burger, 1983). This trickery is effective because it is more difficult for audiences to imagine that such seemingly costly mistakes would be carefully planned to improve the show (Galang, 2018).

In experiments, researchers can similarly add intentional imperfections to mask deceptive elements. For instance, in our thought insertion study (Olson et al., 2016), we made the procedure more believable by having the machine make a few errors throughout the process, prompting the (fake) lab technician to recalibrate the (sham) MRI. Several studies have used other types of equipment malfunctions. Wilson et al. (1995) had the light bulb of a slide projector appear to burn out in the middle of their procedure, which reduced suspicion as to why participants only viewed a subset of the stimuli necessary for the experimental manipulation. Another possibility is to have confederates appear more natural by mimicking the errors and uncertainties seen in pilot participants. For example, the confederate could "forget" to put the date on the consent form before the experimenter corrects this error. If using a task that ostensibly involves interactions with other participants online (e.g., Williams & Jarvis, 2006), a network connection error could prompt the experimenter to return to restart the task. For similar studies online, participants could wait longer than expected for other participants to "arrive" before the task begins. Simply put, experimental procedures that mimic the imperfections of daily life may appear more realistic.

Of course, these fake mistakes should be subtle and appear natural (Melton & Wallace, 2009). Magicians accomplish such seeming naturalness through hours of rote practice (Jones, 2011), making them better at executing deceptive actions than lay people are (Cavina-Pratesi et al., 2011). Experimenters and confederates should likewise over-practice the various elements of deception until they appear natural and do not raise suspicion.

1.2. Deceive subtly with thin layers

Teller (2012, Teller et al., 2005), from the renowned magician duo Penn & Teller, gives an example of another common type of deception:

> "David P. Abbott … used to make a golden ball float around his parlor. After the show, Abbott would absent-mindedly leave the ball on a bookshelf while he went to the kitchen for refreshments. Guests would sneak over, heft the ball and find it was much heavier than a thread could support. So they were mystified. But the ball the audience had seen floating weighed only five ounces. The one on the bookshelf was a heavy duplicate, left out to entice the curious."

As Teller (2012, para. 12) concludes: "Nothing fools you better than the lie you tell yourself". Abbott did not explicitly emphasise the weight of the ball nor did he offer guests to hold it, which would have raised suspicion. Planting the implicit assumption that the ball is too heavy for a thread is arguably much more convincing than explicitly stating it. Indeed, explicit statements can draw attention and attract scrutiny, while implicit assumptions do not. Accordingly, magicians using gimmicked playing cards rarely state that they are using a "normal" deck; instead, they let participants assume this by handling the deck casually or by having a participant shuffle it. Other magic tricks using objects

Table 1
Strategies to promote subtle yet elaborate deception across common deceptive areas (cf. Sieber et al., 1995).

Area	Strategy
Cover story	• Begin the cover story early, during recruiting or as part of the study screening (e.g., Bernstein et al., 2016; Olson et al., 2020). • Show rather than tell. Let participants "fill in the blanks" to reach their own conclusions about non-essential information rather than stating it explicitly (Teller, 2012). Participants could overhear a conversation between researchers (or confederates) to learn details of the study (Bernstein et al., 2016; Nichols & Maner, 2008). • Increase credibility with affiliation logos, lab coats, security guards, safety screenings, fake certifications, print-outs or links to seemingly related news articles, and so on, as appropriate (Ariely, 2009; Cialdini, 2009). For online studies, follow established guidelines to communicate trustworthiness (Fogg et al., 2001) such as carefully polishing written content; even a single typo can undermine credibility. • Use "costly signalling" (Galang, 2018); spend more time, money, or effort on deceptive elements than participants would expect. For example, filler tasks or sham setup procedures could take a long time, there could be more confederates than expected, or there could be elaborate safety procedures (Olson et al., 2016). • Use fake mistakes to obscure experimental manipulations (Wilson et al., 2010). Well-timed computer errors (Bargh et al., 1996) or equipment malfunctions (Wilson et al., 1995) could be used when delays or procedural changes would otherwise raise suspicion. • Add subtle convincers to back up the cover story. If all participants should believe that they are in the intervention group, for example, the experimenter could select "Intervention" from a "Condition" drop-down menu on the introduction screen of computer tasks. Or, a run sheet with the participant's name and purported experimental condition could be left visible while the experimenter momentarily leaves the room. For online studies, the website address could include fake condition information (e.g., https://example.org/study?group=intervention&participant=42).
Fake materials	• Sham tasks, devices, or procedures should attempt to mimic the imperfections of daily life. Participants could wait an extended time for the other participants to show up for online tasks (e.g., Williams & Jarvis, 2006). Bogus devices could take time to set up or calibrate while making occasional errors (Olson et al., 2016). • Meet participant expectations. If participants would expect the bogus device to buzz, make it buzz. If it is a high-tech device, have other expensive-looking equipment in the room. • If credibility is needed, lead the participants to assume that the device/procedure is well-known (e.g., "Have you heard of it?", "Ever used a [device] before?"; Olson et al., 2016).
False feedback	• De-emphasise the false feedback. Give enough information that participants can draw their own conclusions without needing the experimenter to state it too explicitly (Olson et al., 2016). • Make the feedback look imperfect or more random, such as performance being in the 29th rather than the 30th percentile.
Related studies presented as unrelated	• Make the second study seem like an unimportant afterthought. The experimenter could step out and ask another researcher, "My participant is done early, do you need any more for your [topic] study?" • Have the two studies occur as physically separated as possible, such as in different rooms, on different user accounts, or on different websites. • Give the participant an apparent choice of the second study to run, even though all of the options lead to the same outcome. In online studies, for example, participants could select from a list of vague study titles to run next, though they all point to the same place.
Confederates	• Confederates should mimic the errors and uncertainties of participants, such as forgetting to write the date on the consent form. Observe pilot participants and mimic their mistakes. • The experimenter could lead the participant to assume that they do not know the confederate, such as by forgetting or mispronouncing their name. • Confederate behaviour should not be too smooth, such as having the confederate arrive right after the participant. • Confederates could engage in costly behaviours as appropriate (Galang, 2018), such as waiting outside for 15 min before the study begins so that participants have the chance to see them waiting for a while. • Confederates could play a minor role, such as mentioning a friend who did the study previously or making a phone call from the waiting room that participants overhear (Bernstein et al., 2016; Olson et al., 2020).

such as coins commonly exploit the assumption that these objects are normal and not gimmicked (Melton & Wallace, 2009). Relatedly, magicians will sometimes add subtle *convincers* to reinforce erroneous beliefs (Kuhn, 2019). A magician will ensure that coins make a sound when pretending to transfer them from one hand to another before making them vanish. The sound serves as a thin layer of deception reinforcing the belief that the coins were tossed into the other hand; in reality, the sound was artificial and the coins never moved. The effectiveness of these types of deception lies in their subtlety; explicitly pointing them out would likely have the opposite effect.

In research, it may analogously be easier to question explicit cover stories rather than implicit assumptions. For example, during the thought insertion study (Olson et al., 2016), we planted several such assumptions to imply that the technology was credible without stating it explicitly. To do so, we led participants to believe that this was a multi-site medical study by casually pointing out some of the medical areas while walking through the research institute; also, the lab door had several institution logos on it with the name of the project (cf. Cialdini, 2009). Further, we asked participants, "This is part of the Neural Activation Mapping Project — have you heard of it?", to make the project seem well-known without having to state it explicitly.

Similarly, when participants received the feedback of the apparent mind reading, we wanted them to draw their own conclusion about the success of the process in order to minimise suspicion. The participants first entered the machine and thought of any two-digit number. From their point of view, the machine then analysed their brain activity and a lab technician wrote the machine's guess of the number on a sheet of paper. The experimenter then retrieved the paper, asked for the participant's chosen number, then turned over the paper to reveal that it matched what the lab technician had previously written down. It thus appeared as if the machine had read the participant's mind. In reality, we used a magic trick to achieve this illusion. The technician wrote nothing on the paper; the experimenter discreetly added the chosen number to the paper only *after* having asked the participant for the number. Further, instead of explicitly drawing the participant's attention to the fact that the written number matched their chosen one, we orchestrated the interaction so that the participants would discover this congruency on their own. To accomplish this, we gave participants the paper under the guise that they had to write down their chosen number and put their initials next to it. During the first few trials, the experimenter briefly stepped out of the room to talk with the technician, which gave the participant time to examine the sheet and notice that the numbers matched. Much of what the participant learned about the success of the apparent mind reading occurred through overheard conversation between the experimenter and the technician (e.g., "Yup, got it again — let's move to the next trial"). Using a similar procedure, we were also able to convince participants that the machine was inserting thoughts into their head. Many participants reported unusual

experiences during the purported thought insertion, including heat, pulsations, and even hearing voices influencing their decisions. Combined, the various subtle layers and the implicit nature of the assumptions likely helped promote the effective deception (Olson et al., 2016).

In other study protocols, researchers could similarly attempt to lead participants to the specific assumptions that would strengthen the deception. When giving participants information, experimenters could replace explicitly stated information with hints that lead participants to draw the relevant conclusions. For example, researchers commonly need participants to believe that two related studies in the same experimental session are actually unrelated, in order to discreetly measure a correlation or the effects of an earlier manipulation (Wilson et al., 2010). Rather than emphasising this unrelatedness explicitly, the experimenter could ask participants after the first study, "Next you can do a study on attitudes or decision-making — which would you prefer?" In reality, participants would complete the same study (which would fit both descriptions); the participants only have the illusion of choice. This technique is known as *forcing*, in which the magician offers an ostensible choice while controlling the outcome (Olson et al., 2015). If asked in a casual way, the participant may assume that the choice of the upcoming study is inconsequential and the studies are unrelated.

Subtle deception may be more challenging to implement in online studies, given that textual content is more explicit than in-person communication. Accordingly, deception is often more effective in person than on a computer (e.g., Olson et al., 2015; Strandberg et al., 2020). Online studies requiring elaborate deception could include a social component, such as a video conference, chat box, or at least a pre-recorded video. In any case, although the guidelines presented here focus on in-person research, several can be adapted for online studies. Table 1 lists specific strategies to improve deception in both of these contexts.

2. Discussion

Applying deceptive principles from magic may benefit experimental protocols by reducing suspicion and improving the validity of conclusions. The proposed model serves as a first step towards making the undocumented folkways of deception research more explicit. This model can result in robust deception; in our thought insertion study (Olson et al., 2016), for example, there was surprisingly low suspicion among participants given the implausibility of a machine accurately reading and controlling their thoughts. We have since repeated the study in contexts ranging from rowdy high school tour groups (who huddled around the machine trying to feel its purported influence) to science documentary shows with a full camera crew in the MRI room. In these contexts, there were various holes in the deception: large audiences and camera equipment usually cannot be next to powerful MRI magnets. Despite these imperfections, we saw little suspicion among the participants, including students, engineers, and even neuroscience researchers. Being taught in class that accurate machine mind-reading is currently impossible also had little impact on suspicion rates when using many layers of deception (Ali et al., 2014). These various layers may thus provide insurance against potential holes or inconsistencies.

In magic, these holes can be quite large while still maintaining effective deception. Some mentalists will tell audiences explicitly that they are performing illusions and are feigning paranormal abilities, but audiences often walk away believing that they have observed supernatural feats. Across several studies, magicians have been explicitly introduced as performing tricks to mimic magical powers; still, much of the audience reported that the magician had psychic abilities (Benassi et al., 1980; Lesaffre et al., 2018; Mohr & Kuhn, 2020). With enough layers, magic can produce strong deception that is robust to even large imperfections.

Naturally, such robust deception should be followed by similarly elaborate debriefing. Institutional review boards generally find deception permissible only when participants are debriefed afterwards (Sommers & Miller, 2013). We recommend extensive in-person debriefing to explain and justify the various layers of deception (Miketta & Friese, 2019; Pascual-Leone et al., 2010), giving participants a "behind-the-scenes" view of the study. It may be particularly important to stress that being deceived says little about the participant; the procedure could be compared to a magic performance that fools almost everyone (Kuhn et al., 2008). For online studies, it may be worthwhile to assess understanding of the debriefing as part of the study procedure, in order to reduce the likelihood that participants skim or skip the debriefing text (Nielsen, 1997; Wang & Kitsis, 2013). Careful and extensive debriefing will help prevent participants from continuing to believe the cover story, which can occur when using elaborate deception (Mohr & Kuhn, 2020; Olson, Lifshitz, Raz, & Veissière, in review).

Our proposed model leads to several testable predictions. Procedures with more layers will deceive better than those with fewer layers. Leading participants to assume a proposition will result in less suspicion than stating it explicitly. Deceptive layers that are costly, such as those resulting in some embarrassment or inconvenience on behalf of the experimenter, will be more effective. Testing these predictions is of course complicated by participants under-reporting suspicion. Researchers could increase this reporting by assessing suspicion on a computer rather than in person or by giving an incentive for accurately guessing the research hypothesis (Blackhart et al., 2012). Or, perhaps an additional layer of deception could increase the accuracy of suspicion disclosures, such as having a confederate ask the participant about the study after it has ostensibly ended.

Nevertheless, our model has several limitations. Studies using many layers of deception will take more effort to plan and run. Experimenters will need more training and pilot testing may take longer. This effort may be worthwhile if it leads to more careful consideration of deceptive elements allowing for more consistency in protocols. Social psychology studies are less likely to replicate than those in other fields (Open Science Collaboration, 2015), but part of this discrepancy may be due to variations in the effectiveness of the deception across study sites (Galang, 2018). It is possible, then, that using more robust deception could improve reproducibility, justifying the additional effort.

3. Conclusion

Magicians have developed their time-tested tools of deception while performing for rowdy audiences and suspicious hecklers. Their robust deception techniques may be even more effective in the relatively subdued and credible research lab. Applying the principles of the Swiss cheese model with subtle yet elaborate layers of deception can improve the quality of experimental protocols and the validity of their resulting conclusions. In an unlikely collaboration, magicians seeking deception may be helpful to scientists seeking truth.

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