Expertise in magicians – testing the insight hypothesis

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Over the past two decades an abundance of research has examined the psychological mechanisms underpinning magic effects in order to gain new insights into human cognition. As part of this endeavour, it has been suggested that the experience of performing tricks in front of live audiences has given magicians' unique insights. The aim of the present paper was to examine the nature of this expertise and investigate the extent to which magicians understand non-magicians' beliefs about magic and the effectiveness of specific magic principles. In study 1 we describe the skills that magicians believe make them experts, and the type of feedback that magicians use to help evaluate their performance. In study 2 we assess magicians' beliefs about the popularity of different magic genres and laypeople's understanding of different principles of deception. In the final experiment we directly test the insight hypothesis by evaluating magician knowledge of how impressed participants would be with a particular effect. We argue that the art of conjuring provides a valuable domain to study a wide range of psychological principles, and that magicians' expertise can be used for empirical investigations. We do however question whether magicians truly understand the psychological mechanisms that underpin their illusions.

KEYWORDS: science of magic, expertise

EXPERTISE IN MAGICIANS – TESTING THE INSIGHT HYPOTHESIS

Introduction

Magic is an artform that relies on deception and misdirection to create events that seem impossible. Conjurers induce these magical experiences by exploiting psychological blindspots and biases. In the 1890's Alfred Binet (1894) investigated expertise in a wide range of domains to learn more about everyday cognitive processes. One group of experts that particularly caught his attention were magicians, and he conducted seminal empirical work examining the psychological mechanisms that underpin their deceptions. In recent years, there has been growing interest in examining the psychological mechanisms associated with these illusions to gain new insights into human cognition. The science of magic has now become an area of research in its own right (Cole & Kuhn, 2025; Kuhn et al., 2008; Rensink & Kuhn, 2015a, 2015b), and over the last 20 years more than 150 papers have been published in the field. The art of magic provides an opportunity to examine the ease with which the human mind can be manipulated and provides a new perspective to examine human cognition. For example, scientific assessment of specific magic principles have provided new insights into visual attention (Kuhn et al., 2014), perceptual illusions (Ekroll et al., 2017; Ekroll & Wagemans, 2016), volition (Pailhès & Kuhn, 2021; Alice Pailhès et al., 2020), and reasoning and problem solving (Thomas et al., 2018c) amongst others. Within the science of magic, it has been suggested that experience in performing tricks in front of live audiences has given magicians unique insights into the nature of human cognition (Macknik et al., 2008; Macknik et al., 2010; Rensink & Kuhn, 2015b; Thomas et al., 2015). We refer to this as the insight hypothesis and in the current article we critically evaluate the claim.

Magicians usually perform illusions in front of live audiences, who, in certain respects, provide instant feedback on their effectiveness. This allows magicians to adapt and perfect their deceptive methods. In effect, each performance acts as an informal experiment in which different procedures are evaluated (Kuhn et al., 2008). Knowledge about magic and deception is then shared through formal (e.g. journals, books, conventions) and informal networks (e.g. mentors; Nardi, 1988; Rissanen et al., 2014). One of the central premises of the science of magic has been the notion that this continuous testing and evaluation of magic provides magicians with "intuitive knowledge about the rules governing human cognition" (Thomas et al., 2015). Others have suggested that there are examples where the magician's knowledge "is superior to that of the neuroscientist" (Macknik, et al. 2008; p871), that "Neuroscientists are just beginning to catch up" (Martinez-Conde & Macknik, 2008), and "the magician's intuitive understanding of the spectator's mindset can surpass that of the cognitive scientist" (Otero-Millan et al., 2011).

There are certainly instances where magicians have valuable insights into their conjuring principles (Beth & Ekroll, 2014; Ekroll et al., 2016; Thomas et al., 2018a, 2018b; Tompkins et al., 2016), but these confirmatory papers do not necessarily imply that magicians have greater insights into human cognition than psychologists, nor do they imply that they are always correct. For example, one of the key principles in magic states that an illusion should never be repeated (on the same audience) using the same method. It is likely that this rule directly results from magicians' informal observations. Several studies do indeed support this notion. For example, misdirection principles that rely on inattentional blindness have shown that repeated exposure to the effect significantly increases detection (Kuhn & Tatler, 2005), and the same is true for deceptive principles that exploit false expectations (e.g., Vanishing ball illusion) (Kuhn & Land, 2006). However, effects that are based on amodal completion (Ekroll et al., 2018), anticipation (Cui et al., 2011) or ambiguity blindness (Pailhès et al., 2020) do not suffer if they are repeated.

In another assessment of magicians' knowledge of conjuring effects, Pailhès and Kuhn, (2020a) asked magicians to predict the likely success rate of the so-called placement force. Forcing is the phenomenon in which a magician, during a pick-an-item (e.g., card) routine, covertly forces an object of their choice onto the spectator. In a variant of this procedure, the magician influences the spectator's decision, which often relies on exploiting cognitive biases. For example, in a Placement force the magician places a card in a particular location (Kuhn et al., 2020; Pailhès & Kuhn, 2020b), which increases the chances of it being selected. Magicians were remarkably good at predicting the outcome of such a force. It is likely that their success was based on observing the chances of it

being effective. However, in other instances magicians' insights seem to falter. For example, Pailhès and Kuhn, (2020a) asked magicians to predict the factors that contribute to the success of a Criss Cross force (Pailhès & Kuhn, 2020a). Magicians rated the time delay between executing the deceptive movement and the participants picking the card to be the most important factor, and yet the empirical data revealed this to have no impact. In this instance, magicians' insight into the nature of the force was clearly wrong.

In the present article we examined the nature of magic expertise and the insight hypothesis more directly. In the first instance we evaluated the process by which magicians evaluate their illusions. In the second we examined magicians' insights about layperson familiarity with different forms of deception. In the final part, we directly examined and evaluated magicians' insights into rather specific forms of deception and magic principles.

Study 1 – Which attributes make an expert magician and how do magicians evaluate their performance?

One of the central claims of the science of magic is that feedback from live performances provides magicians with unique insights into how their effects work. However, what type of feedback do magicians obtain, and how is this feedback implemented in their practice? Unlike most other artforms, there are no formal institutions or structures though which magic can be learnt (Jones, 2011; Rappert, 2022; Rissanen et al., 2014). There are very few magic schools, and even though there are countless books that describe how to perform an individual magic trick, there are very few textbooks that use a systematic pedagogical approach to the teaching of magic. Instead, knowledge about how to perform tricks is disseminated through informal social networks, books, or lectures (Rissanen et al., 2014). The lack of formal educational institutions for magicians also means that very little is known about the type of skills that make expert magicians. Magic involves a wide range of expertise such as technical sleight of hand skills or theoretical knowledge about how to perform the effects. We examined the skills that magicians consider important by asking them to rate how important they felt it was for a magician to possess each of these skills.

The first objective of study 1 was to examine the type of feedback that magicians use to improve their performances. We were particularly interested in whether magicians utilized more systematic feedback principles, or whether this primarily relies on informal observations. Our second objective was to examine what magicians look for in a good magician, and to examine the type of competencies (e.g., sleight of hand, charisma, etc.) they value. Our third objective was to compare the responses provided by magicians to non-magicians and examine the extent to which their views on expertise match. To do so, we designed two questionnaires that were distributed amongst magicians and non-magicians.

Method
Participants
Magicians: Magicians were recruited by posting a link to the survey on social media groups only frequented by magicians and through magic society mailing lists. We also ran a workshop at a magic convention, where magicians were invited to take part. One hundred and ninety-seven magicians completed the survey (8 female, 175 male, 2 non-binary, 13 preferred not to say)[1]. Their average age was 46.8 (SD = 15.8) and they reported an average of 26.5 years of experience in performing magic (SD = 18.5).

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[1] Although our sample was heavily biased in terms of gender, this is typical for the magician population; Gygax, P., Thomas, C., Didierjean, A., & Kuhn, G. (2019). Are Women Perceived as Worse Magicians Than Men? Gender Bias When Evaluating Magic Tricks. *Social Psychological Bulletin*, *14*(3). https://doi.org/10.32872/spb.v14i3.33574

Non-magicians: Eighty-seven participants were recruited via the Prolific platform (42 Female, 39 Males, 1 non-binary, 5 preferred not to say) with a mean age of 28.9 (SD = 9.06). None of these participants reported any experience of performing magic.

Materials: We designed two separate surveys to be used for the magicians and non-magicians. The magicians' survey measured various aspects of magicians' beliefs about magic. Questions ranged from ethics of deception, and exposure to the skills that magicians value amongst other magicians. We will report selected data from this survey, across all of the studies. The first question examined how magicians gain feedback about their performance. They were asked to rate whether they were satisfied with the way they used feedback to improve their performance on a 5-point scale with the following labels: Strongly disagree (-2), Somewhat disagree (-1), Neither agree nor disagree (0), Somewhat agree (1), Strongly agree (+2). We also asked them to rate the frequency by which they used a wide range of feedback methods (see Figure 1) which ranged from: Never (1), Rarely (2), Sometimes (3), and Often (4), to Very often (5). We did not include this question in the non-magician survey.

The second question assessed what attributes people value in a good magician. Participants were given a 100-point scale (0 = not at all to 100 = very much) and asked to rate the extent to which they thought nine different attributes were important. These were people management skills, charisma, creativity, acting skills, psychological know-how, theoretical understanding of magic, and technical skills. This question was included in the survey for magicians and non-magicians.

Results

All analyses were conducted in Jamovi. Our first analysis focused on the type of feedback that magician utilize to improve their performance. Figure 1 shows the mean frequencies by which magicians claimed to be using different methods to evaluate their performance. The mean rating was +0.79 (SD = 1.05) indicating that the magicians were somewhat satisfied with the way they used feedback. A Friedman's test found a significant difference in the frequency by which magicians used different feedback methods, $x^2(8) = 792$, $p < .001$. We used Durbin-Conover pairwise comparisons as posthoc tests. Participants were significantly more likely to gain feedback by monitoring audience reactions than any other feedback measure (all ps. <.001). Participants were also significantly more likely to ask a non-magician than a magician for feedback (p = .001), significantly more likely to ask a magician than use the mirror (p <.001), and significantly more likely to use a mirror than film their performance without an audience (p <.001). However, there was no significant difference between filming the performance or asking a member of the audience (p = .65), or asking a member of the audience and filming with the audience (p = .14). However, participants were significantly less likely to use questionnaires or focus groups (both ps <.001), though there were no significant differences between the two (p=.24).
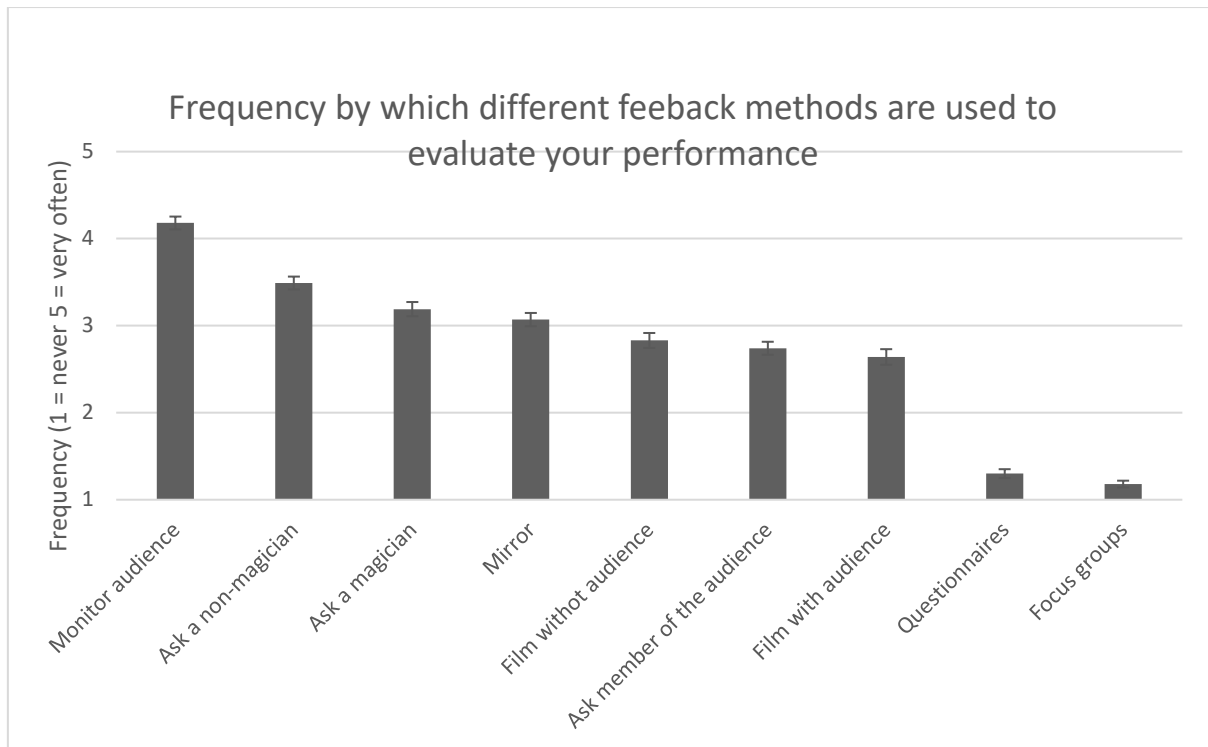
Figure 1. The mean frequency ratings of the different feedback methods that magicians stated they were using to evaluate their performance. Error bars denote standard errors.

Next, we examined the attributes that magicians value in a good magician. Figure 2 (black bars) shows the mean ratings for each of the nine attributes provided, in order of preference. A one way ANOVA found a significant main effect of attribute $F(8, 1400) = 63.6$, p <.001, $\eta^2 = 0.21$. We then ran Tukey post-hoc tests to examine the differences between the attributes. There was no significant difference between people management skills and charisma (p = .13), but people management skills were rated significantly higher than creativity (p <.001). There was no significant difference between creativity and acting (p = .30), no significant difference between acting and psychological know-how (p = .95), and psychological know-how and theoretical understanding of magic (p = .99), nor was there a significant difference between theoretical understanding and technical skills (p = .82). Technical skills were also rated no higher than humour (p = .82). However, humour was rated significantly higher than historical knowledge (p <.001).
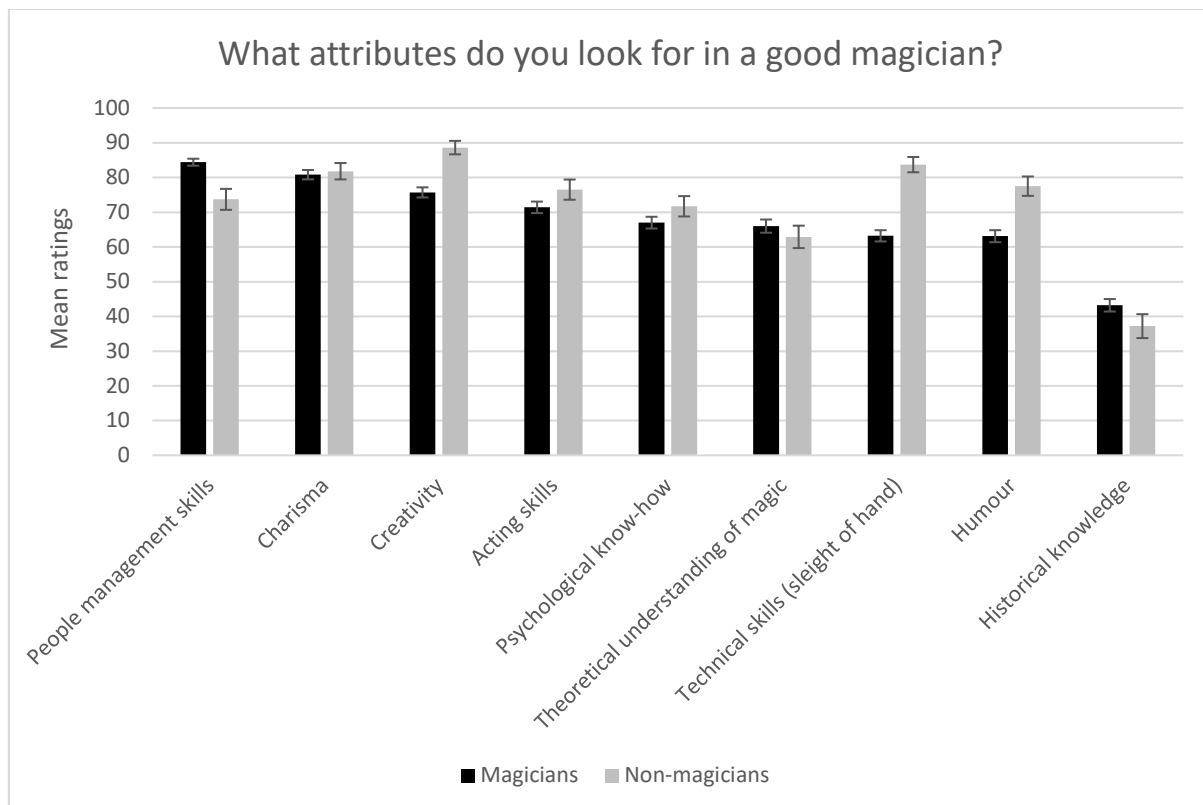
Figure 2. Attributes that magicians consider important in a good magician. Error bars denote standard errors.

People management skills were rated most highly and significantly higher than any of the other attributes, with the exception of charisma. Charisma was rated significantly more highly than all other attributes. Creativity was not significantly higher than acting skills, but significantly higher than all of the remaining attributes. Acting skills were not significantly higher than psychological knowledge, theoretical knowledge, technical skill, but significantly lower than humour. Humour scored significantly higher than historical knowledge. An ANOVA with group and skill as between participant factors found a significant main effect of group $F(8, 1992) = 6.40$, $p = 0.012$, $\eta^2 = 0.006$, a significant main effect of skill $F(8, 1992) = 82.2$, $p < .001$, $\eta^2 = .18$, and a significant interaction $F(8, 1992) = 13.9$, $p < .001$, $\eta^2 = 0.031$. We then compared the ratings provided by magicians and non-magicians. There were no significant differences between the ratings provided for theoretical, historical, and psychological knowledge, acting skills, or charisma (all ps. >.05). However, non-magicians rated technical skills [$t(266) = 7.1$, $p < .001$], humour [$t(266) = 4.45$, $p < .001$] and creativity [$t(270) = 4.97$, $p < .001$] significantly higher than the magicians and people management skill significantly lower [$t(270) = 4.31$, $p < 0.001$].

Overall, these results show that magicians tend to rely on informal monitoring of how an audience reacts, rather than implementing methods directly assessing views about their performances. Indeed, more formal forms of evaluation, such as questionnaires or focus groups are rare. The data also show that magicians rate people management skills most highly and significantly higher than any other attributes, with exception of charisma.

Much of the science of magic research has focused on magicians' technical skills, such as sleight of hand, and yet this competency was rated as less important. Likewise, magicians' psychological know-how was rated as less important than their people management skills, and creativity. Maybe less surprisingly, and possibly at the detriment to many magic historians, magicians rate historic knowledge as being least important. By asking non-magicians to reflect upon the same set of questions we were able to compare how magicians' values differ from the general population. For most of the attributes (theoretical, historical, and psychological knowledge, acting skills, and charisma), there were no significant differences between the ratings provided by magicians and

non-magicians. However, non-magicians rated technical skills, humour, and creativity significantly more highly than magicians, and people management skills lower. Humour was rated very desirable by the non-magicians which might suggest that people are interested in the entertainment value of the show as much as the magic itself.

Study 2 - How much do magicians know about their audience?

In the second experiment we examined the extent to which magicians know what non-magicians think about magic in general. We were interested in two questions about magic. The first one concerns people's preference for different types of magic. Magic is typically performed in a wide range of contexts, from an intimate close-up setting, to when it is performed on stage. There are also different magic genres that encapsulate different types of magic tricks, or styles in which magic is performed. There is no universally accepted categorization of magic, but there are some well-defined magic genres, which relate to the type of tricks that magicians perform, and the physical proximity between the performer and their audience. For example, mentalism deals with mind-reading effects. As the name suggests, card magic refers to tricks that are performed with a deck of playing cards, whilst comedy magic refers to magic tricks that typically emphasise the humorous value of the performance over the magic tricks themselves. Manipulation acts are magic performances that rely heavily on sleight-of-hand which are always performed on a stage. The physical proximity also has a big impact on the type of tricks that are performed. Close-up magic refers to illusions that are performed in close proximity between the audience and the performer, and the audience typically does not exceed 20 people. Parlour magic involves magic tricks that are performed in an informal setting, typically involving around 50 – 100 spectators. Stage magic is performed on a stage, and audiences can range from 100 to thousands of people. Within stage magic, magicians typically differentiate between tricks that are performed with relatively small props and those that involve large scale illusions which involve large apparatus.

Our second objective was to evaluate the extent to which magicians understand non-magicians' insights into different forms of deception. Magic relies on exploiting secret methods, and the community works hard to prevent the audience from discovering these. For example, magicians are often reluctant to use sleeves to hide small objects, simply because the general population is aware of the technique. In the second part of this survey, we examined how well magicians could predict non-magicians' knowledge of different forms of deception. We asked magicians to rate how familiar they thought lay audiences would be with a range of magic principles. We then asked a group of non-magicians the same question.

Method

The samples and materials for this study are described in study 1. We focused the analysis on two key questions. The first asked both magicians and non-magicians to rate the popularity of different magic genres on a 5-point scale which ranged from very unpopular to very popular. We converted these labels into a popularity score ranging from -2 to +2 and 0 representing a neutral rating. A positive score therefore represented a positive attitude towards that magic genre.

The second question focused on people's knowledge about different secret methods. Participants were presented with a wide range of magic procedures, and they were asked to rate how familiar they thought non-magicians were with these methods. The 5-point scale ranged from very unfamiliar to very familiar, and these verbal labels were converted to numerical values ranging from 1-5, with 5 representing very familiar.
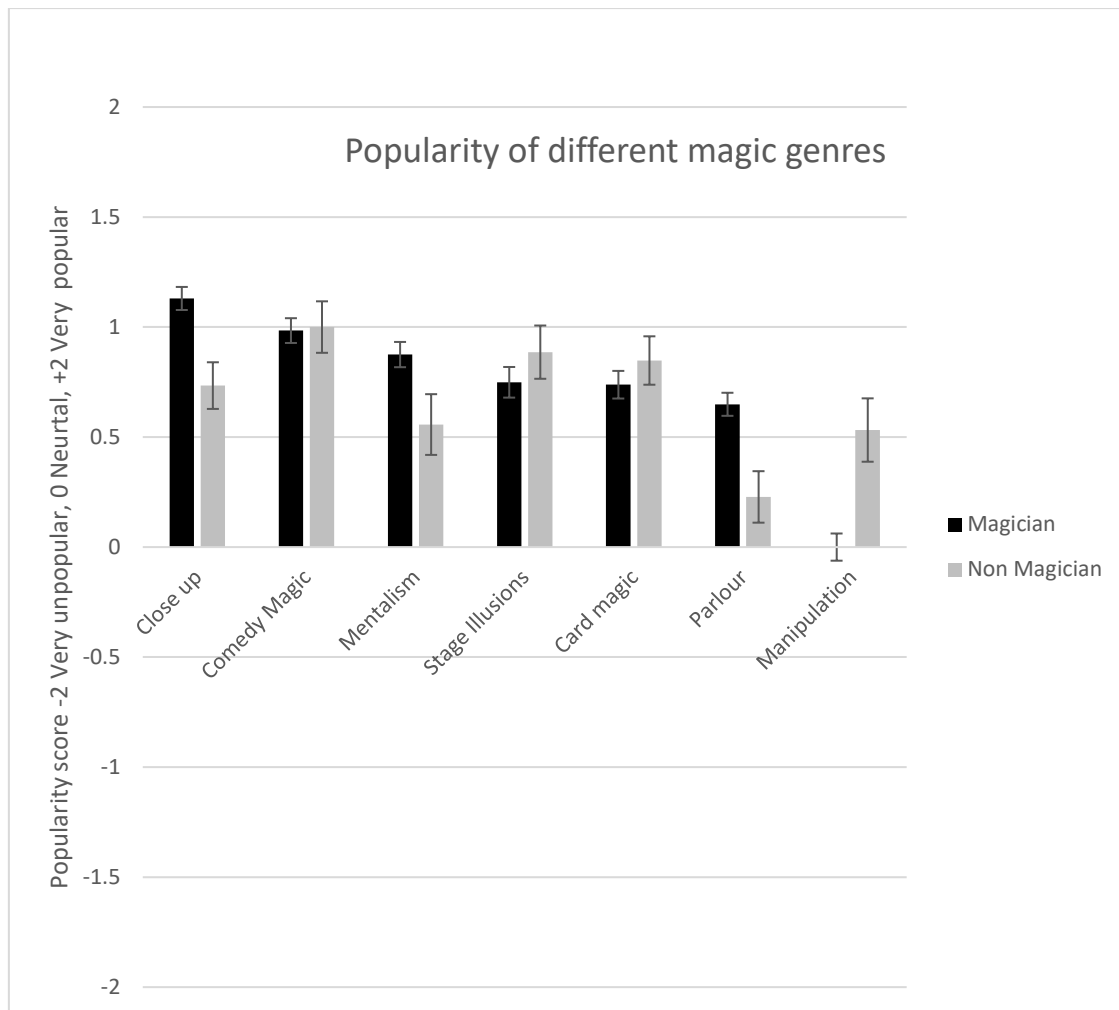
Results

Figure 3. Popularity of different magic genres. Error bars denote standard errors.

As Figure 3 shows, there was some agreement in the popularity in some domains – including comedy magic, card magic, stage illusions, mentalism. An ANOVA with group as the between participant variable and genre as the within participant factor found a significant main effect of genre $F(6, 1590) = 23.9$, $p <.001$, $\eta^2= .056$, but no significant main effect of group, $F(6, 265) = 0.45$, $p = .50$, $\eta^2= .001$. Crucially there was a significant genre by group interaction $F(6, 1590) = 6.82$, $p <.001$, $\eta^2= .025$. Magicians' and non-magicians' popularity ratings did not differ significantly for card magic, stage illusions, mentalism, and comedy. However, magicians rated mentalism, $[t(269) = 2.53, p = .012]$ and parlour magic $[t(269) = 3.81, p <.001]$ significantly higher than non-magicians and manipulation magic significantly lower, $t(269) = 3.99, p <.001$.

We then examined magicians' knowledge about layperson understanding of secret methods. Figure 4 shows the mean ratings provided by magicians and non-magicians. An ANOVA with group and secret method found a significant main effect of group $F(13, 263) = 7.98$, $p = .005$, $\eta^2 = .01$, indicating that magicians underestimated non-magicians' familiarity with magic methods. There was also a significant main effect of secret method, $F(13, 3419) = 66.6$, $p < .001$, $\eta^2= .13$. Moreover, there was a significant group by secret method interaction, $F(13, 3419) = 13.2$, $p <.001$, $\eta2 = .026$. We further analysed this interaction to examine the areas where magicians and non-magicians differed. Magicians significantly underestimated non-magicians' familiarity with invisible thread, $t(267) = 4.33$, $p < .002$, and memorized cards $(267) = 12.7$, $p <.001$. However, there was no significant difference between any of the other methods (all ps > .1).
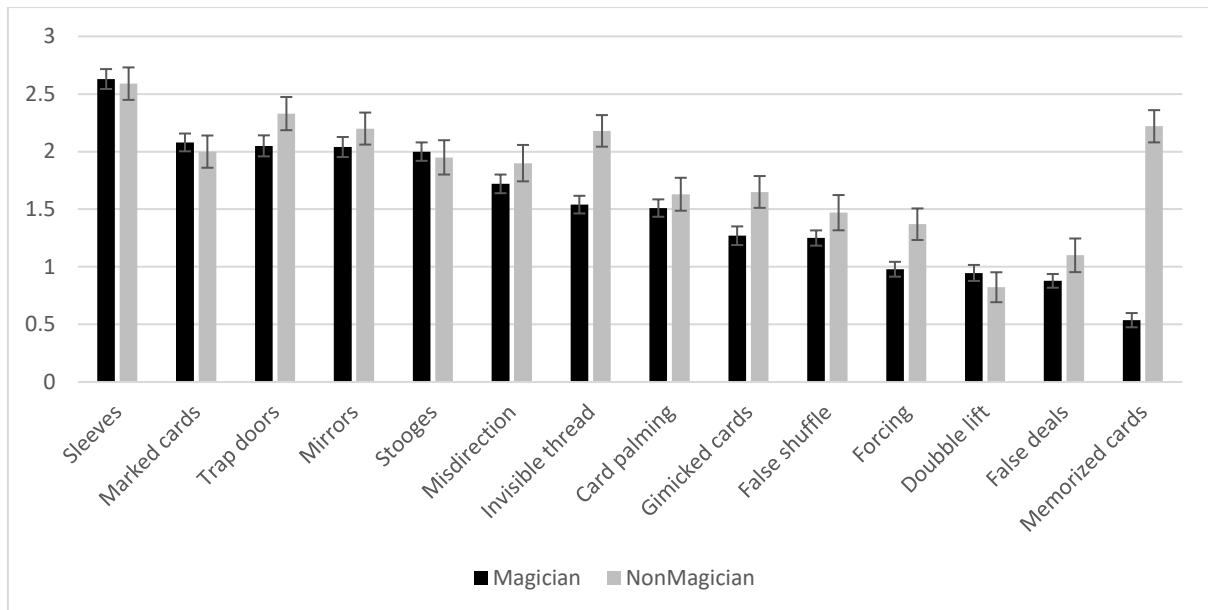
Figure 4. Layperson knowledge of magic methods. Error bars denote standard errors.

In sum, the data from study 2 reveal that magicians and non-magicians rate all magic genres, besides manipulation, as positive. However, magicians overestimated the popularity of close-up, parlour magic and mentalism, and underestimated people's enjoyment of manipulation acts. With respect to knowledge of magic secrets, magicians have relatively good insight into people's familiarity with different methods. There were however some exceptions. Non-magicians are more familiar with invisible threads and memorized cards. It is likely that magicians and non-magician considered memorized cards to refer to a different principle. It should also be noted that our survey did not assess whether participants fully understood the principles that they were being asked to judge. It is therefore possible that some people may think that they know how the principle works, but they do not fully understand it.

Study 3
The strong version of the insight hypothesis states that "magician's intuitive understanding of the spectator's mindset can surpass that of the cognitive scientist" (Otero-Millan et al., 2011). In our final experiment we examined whether magicians could accurately predict the impact that the probability by which a magic trick could be achieved by chance would have on how impressed participants are by the illusion. In a previous study, we (Kuhn et al., 2023) asked participants to rate how impressed they were by a magic trick in which the magician correctly identified a spectator's freely selected number. Participants were asked to watch a video clip in which the magician performed an effect whereby the spectator (a confederate) was asked to think of a number that was restricted to different number ranges. The range varied from 1–4, 1-10, 1-100, 1-1,000, 1-10,000 or no restriction (any). Restricting the number range in this way varied the probability by which this trick could potentially be performed by chance. It is common practice within magic to ensure that a trick appears unlikely to ever have been achieved by chance, and we would expect magicians to have some insight into how such probabilities affect people's perception of the trick. Rather intriguingly, these number ranges had no significant impact on how much participants enjoyed the effect. There has been some controversy within the magic literature as to whether the probability by which such mind reading tricks can be performed by chance has an impact on how people experience the effects (Kuhn et al., 2023). This effect therefore offers a good opportunity to directly test the insight hypothesis. If magicians do indeed have particular insights into the psychological mechanisms that underpin their illusions, they should be able to predict how impressed participants are by an effect.

Methods
The samples for the survey were identical to the magicians' survey reported in the previous studies. One of these questions asked magicians to predict participant reaction in an imaginary magic trick. They were asked to imagine an illusion in which the spectator is asked to think of a number, and

the magician uses their "mind reading" ability to discover this. In different versions of the effect, the magician changed the range of numbers from which the spectator can choose a number. They were then asked to rate (scale from 0 – 100) how impressed the spectator will be where the number was chosen between 1–4, 1–10, 1-100, 1-1,000, 1-10,000 or any number.

Results:

Figure 5 shows the mean ratings provides by the magicians plotted against the means reported by Kuhn et al. (2023). A one way ANOVA found a significant main effect of probability framing, $F(5, 180) = 621$, $p < .001$, and Tukey's post-hoc tests revealed a significant increase in the ratings as the probability of the trick succeeding by chance increased (all $ps < .001$). As is evident from the figure, this prediction does not match the data reported in the previous study. We ran a between participant t-test to examine the differences between the magicians' estimates and the true rating provided by non-magicians as they watched the tricks. Magicians significantly underestimated how impressed non-magicians were in the 1-4 condition, $t(252) = 11.8$, $p < .001$, the 1-10 condition, $t(265) = 5.60$, $p < .001$, but not in the 1-100 condition, $t(252) = 0.281$, $p = .78$. However, they overestimated how impressed non- magicians would be by the 1-1,000 probability, $t(182252) = 4.63$, $p < .001$, the 1-10,000, $t(252) = 6.05$, $p < .001$, and the any condition $t(252) = 10.5$, $p < .001$.
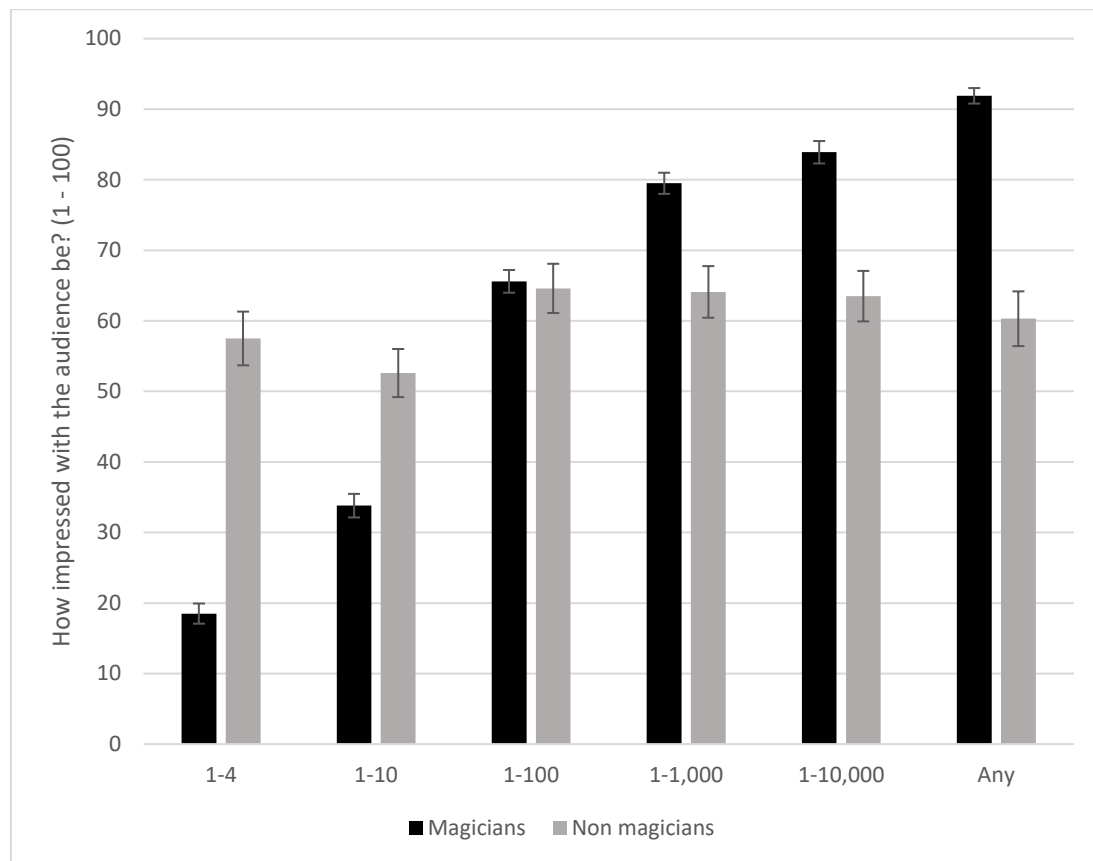

Figure 5. Results from study 3.

Overall, these results reveal that magicians did not correctly predict how impressed participants would be by the effect. Results have shown that the degree to which participants are impressed by an effect barely increased as the probability of that effect occurring by chance vastly reduced. This does not support the insight hypothesis.

General Discussion

In three studies we examined various aspects of expertise in magicians. Specifically, we assessed whether illusionists have particular insight into cognition, a hypothesis that has been suggested by a number of authors within the science of magic. Study 1 examined the type of feedback magicians utilize to help improve their performances and the type of competencies they value in other magicians. Our data reveal that most magicians rely on informal assessment in the form of how audiences react. We also found that magicians rate people management skills and charisma as the most important attributes. In study 2 we assessed what magicians know about the magic preferences of laypeople and the extent to which magicians understand non-magicians' insights into different forms of deception. We found that although magicians do have a good idea of what laypeople like, they do overestimate the popularity of close-up magic. Magicians' predictions of layperson knowledge of methods were relatively accurate with the exception that they tended to underestimate knowledge of invisible strings and memorized playing cards. However, it is likely that magicians and non-magician considered memorized cards to refer to a different principle. Within the magic community, the concept of memorized playing cards refers to the skill of knowing the order of an entire deck of playing cards, which enables them to perform a specific set of tricks. We think it is unlikely that non-magicians are aware of this principle, and that they may have different memory principles in mind, such as counting cards in a casino.

In study 3 we examined whether magicians could accurately predict how impressed participants would be with an illusion whose success is seemingly based on probabilities. Results showed that magicians' predictions were not supported.

The art of conjuring is clearly proficient at manipulating people's experience. The fact that magic effects can deceive is testimony to their understanding of this craft. However, being able to perform tricks does not mean that magicians fully understand how they work, nor does this necessarily give them superior insights into the cognitive mechanisms that underpin these effects. This is most clearly seen in the present study 3. Magicians were not able to predict how impressed participants would be with an illusion. This, we suggest, is because the magicians did not appreciate the method by which participants think the effect works. That is, participants think it is based on a different mechanism than what the magicians think they do. How impressed magicians themselves are with the effect is clearly based on probability; as the likelihood of guessing the correct number decreases, magicians believe that spectators will be more impressed. This suggests that magicians believe that spectators think that probability is involved. However, the fact that probability manipulations did not affect participant impression of the effect refutes this. In other words, for the spectator, the method is not concerned with probability; some other technique must be employed. A recent study by Wincza and Kuhn (2025) has shown that magicians also failed to appreciate the impact that magic that takes place in the spectator's hand has on people's experience of the effect.

Overall, we reject the notion that magicians have particular insight into cognition. This does not however mean that the art of conjuring cannot contribute to the understanding of human cognition. Magicians are of course expert in manipulating perception and behaviour, and have developed a number of novel methods that when studied empirically can provide psychologist valuable insights into a wide range of cognitive processes.

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