



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

A particular kind of wonder

Citation for published version:

Lamont, P 2017, 'A particular kind of wonder: the experience of magic past and present' Review of General Psychology, vol. 21, no. 1, pp. 1- 8. DOI: 10.1037/gpr0000095

Digital Object Identifier (DOI):

[10.1037/gpr0000095](https://doi.org/10.1037/gpr0000095)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Review of General Psychology

Publisher Rights Statement:

This article may not exactly replicate the final version published in the APA journal. It is not the copy of record

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



A particular kind of wonder

A particular kind of wonder: the experience of magic past and present

Abstract

Wonder may be an important emotion, but the term ‘wonder’ is remarkably ambiguous. For centuries, in psychological discourse, it has been defined as a variety of things. In an attempt to be more focused, and given the growing scientific interest in magic, this article describes a particular kind of wonder: the response to a magic trick. It first provides a historical perspective by considering continuity and change over time in this experience, and argues that, in certain respects, this particular kind of wonder has changed. It then describes in detail the experience of magic, considers the extent to which it might be considered acquired rather than innate, and how it relates to other emotions, such as surprise. In the process, it discusses the role of belief, and offers some suggestions for future research. It concludes by noting the importance of context and meaning in shaping the nature of the experience, and argues for the value of both experimental and historical research in the attempt to understand such experiences.

A particular kind of wonder

Introduction

Richard Dawkins (1998) has described ‘wonder’ as the origin of scientific enquiry, and Robert Fuller (2006) has claimed that ‘wonder’ is a principal source of spirituality. In doing so, the latter refers to Socrates’ and Descartes’ oft-cited descriptions of ‘wonder’ as, respectively, the beginning of philosophy and the first of the passions (Fuller, 2006, 1, 9). If ‘wonder’ is indeed the source of science and religion, thinking and feeling, then no wonder that Jesse Prinz has suggested it might be humanity’s most important emotion (Prinz, 2013).

However, when we speak of ‘wonder’, we speak of many things. We can wonder at the beauty of a sunset, or wonder why the train is late. We can experience awe, dismay, admiration, surprise or curiosity, and we can think of them all as kinds of ‘wonder’. Socrates’ ‘wonder’ (translated from ‘thaumazein’) was bewilderment provoked by seemingly impossible contradictions, followed by curiosity (Plato, 1921, p. 155). On the other hand, Descartes’ ‘wonder’ (translated from ‘admiration’), was the response to a novel or unexpected object, which is dispelled by curiosity (Descartes, 1989, p. 52; Descartes, 2001, p. 263). And, since the emergence of the modern view of ‘emotion’, ‘wonder’ has been defined in various ways, depending on how scholars have viewed the emotions.

When Thomas Brown distinguished between ‘astonishment’ and ‘wonder’, this was part of his larger attempt to separate emotion from thought (Brown, 1820, pp. 303-5). Charles Bell made a similar distinction, but did so using different definitions, based

A particular kind of wonder

on his view that emotions should be distinguished according to facial expressions (Bell, 1806, pp. 142-3). Darwin took such an approach, but noted that the facial expression of ‘astonishment’ was occasionally recognized as terror, horror, woe, pain or disgust (Darwin, 1872, p. 279). Meanwhile, Alexander Bain, who distinguished between the emotions using both physical and mental criteria, described ‘astonishment’ (which he equated with ‘wonder’) in significantly more positive terms, regarding its characteristic feature as ‘an elation of tone’ (Bain, 1865, 45-7).

Psychologists continued to define wonder in a variety of ways and, in doing so, placed it in different relationships to surprise, awe and curiosity. For example, Mercier (1888) placed wonder in one category and the latter three in another (pp. 352-3, 361). McDougall (1908), on the other hand, defined wonder as a primary emotion that accompanied the instinct of curiosity. More recently, wonder has been defined in a similar way to ‘surprise’ (i.e. as a response to the unexpected) (Frijda, 1986), and has been discussed in the sense of ‘awe’ (Haidt & Keltner, 2004). In this latter sense, its status as an emotion has been questioned (Lazarus & Lazarus, 1986, pp. 129-36). On the other hand, Ekman & Cordora (2011), who define ‘wonder’ in contrast with ‘awe’, expect that wonder is an emotion for which evidence of universality will be found.

The variety of definitions of ‘wonder’ is one example of how we have defined the emotions in different ways, in line with particular assumptions about psychological phenomena (Averill, 1990; Dixon, 2003; Gergen, 1995; Russell, 2012). In the process of using different definitions, we have been discussing different things (Danziger, 1997; Leary, 1990). If, on the other hand, we treat emotions as responses to particular

A particular kind of wonder

situations, then we might benefit from examining responses to particular causes of ‘wonder’ (cf. Harre, 1986; Harre and Parrot, 1996; Kagan, 2010). With this in mind, this article examines what might be considered to be a particular kind of wonder.

The particular kind of wonder in question is the response to a magic trick. In addition to being both historically and culturally ubiquitous (Clarke, 1983; Kirby, 1974; Taylor, 1985), magic tricks are amenable to experimental enquiry. Indeed, they are particularly topical, given recent interest in a ‘science of magic’. While psychologists have studied magic for over a century, interest has risen significantly in recent years, with a growing number of experimental studies attempting to provide a more scientific understanding of magic, and exploiting conjuring techniques in order to examine more general psychological processes (for summaries of this recent work, see: Kuhn, Olson & Raz, 2016; Rensink & Kuhn, 2015a; Thomas, Didierjean, Maquestiaux & Gygax, 2015). In the process, while there has been disagreement over the value of constructing a scientific theory of magic, nobody has doubted the potential of magic being used to shed light on psychological processes (Kuhn, Amlani & Rensink, 2008; Lamont, 2015; Lamont & Henderson, 2010; Rensink & Kuhn, 2015b). Some have examined responses to magic tricks in an attempt to identify neural correlates of the experience of magic (Danek, Fraps, Müller, Grothe & Öllinger, 2014; Parris, Kuhn, Mizon, Benattayallah & Hodgson, 2009), or to understand the phenomenology of discovering how a magic trick is done (Danek, Öllinger, Fraps, Grothe & Flanagan, 2015). Indeed, the ‘experience of wonder’ now appears to be the central focus of a ‘science of magic’ (Rensink & Kuhn, 2015a).

A particular kind of wonder

This then begs the question: what is this experience? After all, ‘wonder’ can be many things. This article, then, examines this particular kind of wonder. It begins by providing a brief historical perspective of how magic has been viewed, and considers continuity and change in the experience over time. It then describes the experience of magic in detail, considers the extent to which it might be considered acquired rather than innate, and how it relates to other emotions, such as ‘surprise’. In doing so, it discusses the role of belief, and offers some suggestions for future research.

Continuity and change in the experience of magic

The fact that psychological thinkers have defined ‘wonder’ in a variety of ways is not surprising to historians. Historians of emotion have described various changes in the meanings of emotion words, and in norms of emotional behavior. In doing so, they have revealed how our understanding of certain feelings is bound up with the wider social context, which shapes not only the meanings of the words we use, but also what counts as an appropriate expression of a particular feeling at any given time.

‘Emotionologies’ (Stearns and Stearns, 1988) may change, and this may encourage (or discourage) particular kinds of emotional displays. In the process, the frequency, duration and, perhaps, the valence of certain emotions may be affected. The same might be said to be the case within different ‘emotional regimes’ (Reddy, 2001) or ‘emotional communities’ (Rosenwein, 2002).

Nevertheless, to what extent we can say that emotions change over time remains a problematic question. Emotion terms may come and go, but the feelings they describe

A particular kind of wonder

may not. Acedia, once a familiar condition, may be (by definition) different from 'depression' (LaMothe, 2007), but the feeling (as described in the past) has not necessarily gone away (MacQuarrie, 2013). In certain times and places, anger may have become more restrained (Stearns and Stearns, 1986), shame may have been (to some extent) replaced with guilt (Demos, 1988), and grief may have become more private (Stearns & Knapp, 1996). Over time, such emotions might be described differently, regarded by contemporaries as more or less desirable, and displayed in a variety of forms. However, historians have naturally struggled to access the subjective experience at the heart of the matter.

In the case of wonder, for example, Daston and Park (1998) have shown how the meaning of 'wonder' and 'curiosity' changed over time. Between the medieval period and the mid-eighteenth century, scholars wrote of these in a variety of ways, as part of wider moral, religious, philosophical and scientific debates. Within this complex process, however, Daston and Park identify a general shift in the meaning of the two terms, as wonder became considered increasingly vulgar, and curiosity became increasingly revered. Their work focuses on scholarly texts, which do not necessarily reflect wider views, but so far as it reflects a shift in understanding, this might be seen as a change in 'wonder', or it might be seen as a shift in preference for one kind of wonder rather than another. However, this would presumably depend on what, precisely, people were wondering at, and what they were being curious about. After all, in these scholarly texts, the status of either feeling was linked to particular objects of wonder and curiosity.

A particular kind of wonder

Historians have also examined a wide variety of objects of wonder. These include monsters and panoramas, automata and the occult, cabinets of curiosities and tales of foreign travel (Benedict, 2001; Bynum, 1997; Evans & Marr, 2006; Fisher, 1998; Fuller, 2006; Greenblatt, 1991; Stafford, 1994). These have been discussed as objects of 'wonder' by treating 'wonder' in the broadest sense, allowing all manner of experiences to be considered, whether in the context of entertainment, art, science or spirituality. This is admirably inclusive, but it does have implications when we try to say something meaningful about the experience of 'wonder'. Indeed, as Evans and Marr (2006) point out, some scholars have regarded ambiguity as a defining feature of wonder (p. 2). This, perhaps, is not surprising, if wonder is defined in such a broad way. If wonder is so many things, then we might say so many things about it. However, an examination of particular objects of wonder, such as magic tricks, allows for a more focused analysis of particular experiences.

As it happens, both Augustine and Roger Bacon wrote briefly about magic tricks. This matters because these two scholars are examples of the shifting meanings of the terms 'wonder' and 'curiosity'. For Augustine, wonder was a positive feeling, while curiosity was vulgar and aimless. Bacon, on the other hand, associated wonder with ignorance: it was, for him, a lack of curiosity, which hampered enquiry by dulling the senses (Daston & Park, 1998, p. 112). In other words, they represent a shift in the relative status of wonder and curiosity. If we look at what they wrote about magic tricks, however, we see greater continuity. For Augustine, magic tricks were a curiosity, in which people delight in the trickery, and in this fascination with deception, they are distracted from the truth (Taillefer, 2015, p. 85). For Bacon, magic tricks provoked wonder by using deception to disguise reality (Bacon, 1923, p. 15).

A particular kind of wonder

For both, magic tricks were forms of deceit, which prevented the observer from seeing things as they really were. In short, what Augustine regarded as a distracting curiosity was, for Bacon, a distracting wonder. While they may have had different views about the general value of wonder versus curiosity, they shared a similar view of the particular feeling provoked by magic tricks.

Indeed, in terms of these particular objects of wonder, there has been a longstanding continuity in how the feeling that they provoke has been understood. The earliest known references, which appear in ancient Greece, suggest an understanding that magic tricks provoked the experience of a seemingly impossible event, but one that relied on trickery. For example, both Plato and Seneca the Younger compared a magic trick to a paradox, which relied on deception (Plato, 1921, p. 331; Seneca, 1917, p. 295), and Alciphron described how a fictional rustic, Napeus, was made ‘almost speechless with astonishment’ by a trick that he (Napeus) assumed was based on sleight of hand (Alciphron, 1949, pp. 111-12). They viewed magic tricks, as Augustine and Bacon did, as a form of deception, an awareness that can be found throughout the early modern period (Lamont, 2017). In other words, whatever other kinds of wonders may have been considered real at any given time, there has been a longstanding frame through which our pre- and early modern ancestors have been able to experience magic tricks as seemingly impossible illusions.

In the nineteenth century, this view was a common theme in the discourse of ‘modern magic’ (During, 2002), which attracted the attention of early psychologists, such as Jastrow, Dessoir and Binet (Hyman, 1989). Their interest in magic was as a form of deception, and part of a more general ‘psychology of error’ within early scientific

A particular kind of wonder

psychology, in which, by providing psychological explanations for why people held erroneous beliefs, they were able to demonstrate the value of scientific Psychology (Lamont, 2013, p. 181ff.). In the process, they attempted to translate what magicians had written into psychological terminology, and conducted some experiments with magicians that purported to provide greater understanding of how magic worked (Binet, 1894; Dessoir, 1893; Jastrow, 1896, 1897; Triplett, 1900). The emotional reaction to magic tricks, which was not in line with their wider aims, was not of particular interest.

However, so far as they described the experience of magic, it was as the product of the conjuror directing the thoughts of the audience, so that the latter experienced an effect that they knew to be impossible, yet understood was not real. It resulted, in the words of Dessoir (1893), ‘from this logical contradiction of two simultaneous ideas’, which he called the ‘consciousness of illusion’ (p. 16). Binet (1894) called it ‘astonishment’ (p. 557) and Jastrow (1897) called it ‘bewilderment’ (p. 851). While they used different labels, however, they defined the experience in similar ways to their ancestors and, of course, in a way that is familiar to us today (i.e. as a response to an event that we consider impossible, though we understand it to be an illusion). In other words, the labels may have changed, and other objects of wonder may have provoked different feelings, but this particular view of this kind of wonder seems to have been around for a very long time.

Nevertheless, one can identify certain changes over time in terms of the nature of the experience. After all, since it depends on the event seeming impossible, despite being viewed as an illusion, it involves the observer considering - *as s/he is observing the*

A particular kind of wonder

trick - how it might be done. Thus, the experience is intrinsically bound up with whatever possibilities are in the mind of the observer. These have varied in different contexts, of course, but there are at least two general ways in which the response to magic tricks might be seen to have changed over time, in terms of what has been in the mind of observers as they watch.

First, there has been a significant increase in the possible methods that can be considered. Since the late sixteenth century, books have been published that reveal how magic tricks are done (e.g. Scot, 1584; Prevost, 1584/1988; R[id], 1612). These increased in quantity in the eighteenth century, and significantly in both quantity and quality in the nineteenth century (Scott, 1976). By then, popular magic books were including sufficiently detailed descriptions and illustrations for a lay reader to recognize the use of such methods (Hoffman, 1876; Sachs, 1877, Hopkins, 1898). The public was made increasingly aware that things might secretly go up sleeves or down trapdoors, be suspended from wires or concealed by mirrors. The trend continued throughout the twentieth century, as methods were increasingly exposed on television and, later, the internet. Regardless of whether or not they were correct, audiences could now, as they were watching a magic trick, imagine a greater number of hidden possibilities.

Second, the experience has increasingly involved the awareness that not only one's eyes but also one's thoughts are being manipulated. Before the nineteenth century, magicians were described, almost without exception, as performing their feats via sleight of hand. They were known as 'jugglers', whose hands were 'quicker than the eye', the manual basis of conjuring being assumed in the term 'legerdemain', and

A particular kind of wonder

later reinforced in the early nineteenth century term ‘prestidigitateur’ (Clarke, 1983, p. 123). By the early nineteenth century, no more had been revealed about how conjurers camouflaged their methods than that they used fast movements and trite patter to distract the attention of the audience (Beckmann, 1814, p. 264; Dean, 1817; Pinchbeck, 1805, p. 58). For those who watched magic with this in mind, the experience would have been one of knowing that the magician was doing something with his hands, but not being able to see what it was.

This view, of course, has not gone away. However, a more intimate experience became possible during the nineteenth century, as magic tricks were increasingly revealed to be about diverting the mind as well as the eye. In best-selling books by magicians, and in scientific and popular articles by psychologists, the public were informed that the experience of magic was the result of controlling not only where the audience looked, but also what they thought was going on at any given moment. Magic, it was now revealed, depended less on the concealment of rapid movements than on the misdirection of minds (Dessoir, 1893, p. 15; Hoffmann, 1876, pp. 3-5, 505; Jastrow, 1897, p. 851; Robert-Houdin, 1878, p. 33-35; Sachs, 1877, p. 40; Triplett, 1900, p. 487). This emerging ‘psychological’ view of the experience of magic was accompanied by a remarkable rise in the popularity of mindreading as entertainment, not to mention the deliberately public debunking of ‘psychic’ mindreading by scientific psychologists (Coon 1992; Lamont, 2013; Luckhurst, 2002). In their constant attempts to boost box-office, every significant stage conjuror of this period included mind-reading tricks as part of their show (Clarke, 1983). In the process, the Victorian public was able to experience magic in a more intimate way: as

A particular kind of wonder

a process that involved an awareness that not only their eyes, but also their thoughts, were being manipulated.

Since then, the psychological nature of magic has become increasingly explicit, with more psychologists writing on the topic, a significant rise of ‘mentalists’ who perform mind-reading and ‘psychological illusions’, and a continuing growth in the exposure of methods that has led to magic increasingly being performed on the assumption that the audience suspects particular methods might be in play (Lamont and Wiseman, 1999). We continue to experience a kind of wonder, in response to a seemingly impossible event that we understand to be an illusion, but the process through which this is achieved now involves a greater number of possibilities going through our heads, and a greater awareness that the magician is attempting to misdirect not only our eyes, but also our thoughts. In the case of prolonged effects, such as levitations, this awareness may be present as the magical effect itself (i.e. the moment of seeming impossibility) is taking place.¹ In that sense, one might say that the experience of magic is not quite the same as it used to be.

¹ A classic example, which would come to exemplify how conjurors misdirected their audiences, is Robert-Houdin’s ‘ethereal suspension’, in which he suspended his son in the air, and claimed that this was due to the mysterious powers of ether. While some of the audience might have actually believed this, contemporary reviews, when they referred to ether, were often accompanied by skeptical remarks (Fechner, 2003, I, pp. 394-6; “The Drama”, 1848; “Robert Houdin’s Soirees Fantastiques”, 1848). Those who viewed this as an illusion, rather than as the result of ether, had to consider the ether ‘explanation’, and then reject it. In doing so, they would have been aware that the conjuror was attempting to mislead their thoughts (which, of course, is precisely what he was attempting to do). An awareness of this, along

Understanding the experience of magic

The response to a magic trick is the response to a seemingly impossible event. It is an event that, on the one hand, one considers to be impossible but, on the other hand, one is convinced takes place. It is this juxtaposition between ‘x cannot happen’ and ‘x happens’ that provokes the experience of magic (Lamont, 2013, p. 44). At the same time, however, this experience is understood to be an illusion. Since at least ancient Greece, and throughout the early modern period, whatever magical beliefs might have been available, audiences have been able to experience a magic trick as an illusion. Like the emotions one feels when watching a movie (or, one might say, participating in a psychology experiment), it is experienced in a context that one knows to be artificial. The experience of magic, then, is a response to an event that: a. one is convinced cannot happen; b. one is convinced does happen; c. one understands to be an illusion. It is, then, a particular emotional experience that is bound up with certain beliefs. How might it be understood?

First, the experience depends on learned beliefs about what is possible. There is, of course, some evidence that young infants can distinguish between ‘impossible’ and ‘possible’ events. In their well-known ‘violation of expectation’ experiments, for example, Baillargeon and colleagues used visual stimuli, which they described as ‘possible’ and ‘impossible’, and which appeared to show that 5-month-old infants

with a consideration of other ways in which it might be done, would have been present as they were observing the boy (seemingly) suspended in the air.

A particular kind of wonder

already recognize the difference between the two (Baillargeon, 1993). However, what appeared to be ‘impossible’ to the experimenters was not necessarily ‘impossible’ to the infants. Some have argued that they may have been responding to the novelty of the sequence of events, rather than to a violation of a physical principle (Borgatz, 2000; Haith, 1998). Other evidence suggests that infants’ responses to such events can vary. According to Camras et al (2002), for example, when faced with novel, unexpected or impossible events, 11-month-old infants do not consistently display prototypical facial expressions of surprise. Such findings suggest an early emergence of the ability to recognize ‘impossible’ events, but not necessarily that it is innate.

Furthermore, while there may be some ‘core knowledge’ about the physical world prior to learning (Stahl & Feigenson, 2015), the experience of magic depends on beliefs about the properties of particular things in particular contexts. At any age, the line between possible and impossible is far from self-evident, when applied to events concerning specific objects in particular conditions (Harris, 1994; Lamont, 2013; Phelps and Woolley, 1994; Subbotsky, 2001; Subbotsky, 2004; Wiseman, Greening & Smith, 2003). After all, we do not react to a balloon floating in the air as we do to a person floating in the air, because we understand that the former is possible, and that the latter is not. We do not react in the same way to everything that transforms, appears and disappears: we understand that ice cubes melt, and that lights can be switched on and off. We understand that most solid objects cannot penetrate other solid objects, even if some can (such as a dart in a dartboard, or a hot knife through butter). We understand that certain objects in certain circumstances cannot float in the air, even though some can (such as a hovercraft, or an astronaut in zero gravity). Thus, while the capacity to experience ‘impossible’ events may be innate, the

A particular kind of wonder

particular beliefs, on which the experience of magic depends, need to be learned.

Second, the experience is not adequately described as ‘surprise’. Throughout the literature, ‘surprise’ is defined as a response to a violation of expectation. This unexpectedness is seen as fundamental to the structure and function of the emotional experience (e.g. Lorini & Castelfranchi, 2006; Meyer, Reisenzein & Schützwohl, 1997; Ortony & Partridge, 1987). However, there are different kinds of unexpectedness. Scherer et al (2004), for example, suggested a distinction between ‘surprise’ and ‘stupefaction’. The authors argued that, while ‘surprise’ involves an appraisal of a discrepancy based on a set of expectations, ‘stupefaction’ is a response to something beyond ‘any established or imaginable set of expectations, and in which there are no schemata available for appraisal’ (p. 400). ‘Stupefaction’ might be seen as a response to an exceptionally ‘novel’ or ‘unexpected’ event. However, by definition, it is not a response to a violation of existing schemata.

The experience of magic is a response to a violation of existing schemata, but it is not a straightforward case of a violation of expectation. Indeed, as it happens, there is evidence from neuro-imaging of a difference between responses to unexpected events and responses to magic tricks (Danek et al, 2014; Parris et al, 2009). However, the very idea that there is a difference between responses to surprising and seemingly impossible events may seem, well, surprising. After all, if an event is considered impossible, then it should be a violation of expectation. Nevertheless, in important respects, the magical experience that occurs is not unexpected.

A particular kind of wonder

For one thing, it typically occurs in a context in which one expects to see *something* that is seemingly impossible. Furthermore, the audience often anticipates the *particular* magical effect that occurs. Magic effects are very often predictable: when a card is chosen, it is expected that the magician will find it; when a box is shown empty, it is anticipated that something will shortly appear inside it; when a rope is cut in two, one can confidently predict that it will be restored to one piece. It is essential for the magician to convey relevant information about the conditions - ‘there is *no way* the card can be known’, ‘the box is *definitely* empty’, ‘the rope *is* in two pieces’ - in order for the subsequent effect to be regarded as impossible. In doing so, the audience may anticipate the effect, yet nevertheless be astonished by it happening. Indeed, according to conjuring theory, the effect that occurs is regularly expected (Ortiz, 1994, p. 183). What matters is that, however predictable the effect, it is nevertheless regarded as impossible in the circumstances.

How, then, can one expect an event to happen, while simultaneously believing it to be impossible? One answer would be to appeal to the notion of a ‘willing suspension of disbelief’ (e.g. During, 2002). After all, magic tricks typically take place in some kind of theatrical or entertainment context, and such a context is also associated with a ‘willing suspension of disbelief’, in which an audience watches a theatrical performance while temporarily believing in the characters and plot. While this may be true for theatre, however, it is not the case for magic. On the contrary, a willing suspension of disbelief would ruin the experience of magic (Lamont, 2013, pp. 44-46; Ortiz, 1994, pp. 25-6; Swiss, 2002, p. 21). To take a classic example, if Peter Pan flies above the stage, and you ignore the wires, then that is a willing suspension of disbelief. If David Copperfield flies above the stage, however, then you do not ignore

A particular kind of wonder

the wires. You look for the wires, but do not see any: that is magic. Unless the possibility of wires is excluded, the effect fails, which is precisely why a hoop is invariably passed around the floating person. The experience of magic depends on the belief then and there (not willingly suspended disbelief, but real-time conviction) that the effect cannot happen.

Recently, Leddington (2016) has also rejected the view that the experience of magic involves a 'willing suspension of disbelief'. He has proposed instead that the experience is a 'belief-discordant alief that an impossible event is happening'. His view that there is a conflict between an alief and a belief is based on rejecting the view that magic involves a conflict of beliefs. As he notes, audiences do not both believe and disbelieve that David Copperfield is flying (p. 257). However, the conflict of beliefs is not between 'he is flying' and 'he is not'; rather, it is a conflict between the belief that 'he is in the air' and the belief that 'he has no support'. The appearance that he is 'flying' may be understood to be an illusion, but there is observable evidence that 'he is in the air' yet 'he has no support', which seems impossible.

There is, then, an alternative way to understand the conflict of beliefs, and of expectations. The expectation that the effect will happen is based on the belief that one is observing an illusion. Thus, since it is not really happening, it is not really impossible; indeed, it is the whole point of the performance. Nevertheless, the experience depends on the belief that something seemingly impossible does happen. It does not depend on the belief that an object really 'disappears' (or 'transforms' into something else). It depends on the conviction that the object is now there, and now it is not (or that object x is now there, and now object y is there). In most cases, the

A particular kind of wonder

belief that the object is now there is based on memory (since, in most cases, the object that is about to vanish is momentarily concealed from view). The belief that the object is now gone, however, is based on direct perception (of the absence of the object) (Smith, Dignum & Sonenberg, 2016). The experience depends on the contradiction between these two beliefs, but these beliefs are based on different psychological processes.

The clash of expectations may be similar. The audience may expect that the object is about to ‘disappear’ (i.e. that, in a moment, it will not be there), because they understand that it is an illusion, but they cannot understand how, in the present conditions, it can be there one moment, and gone the next. The expectation that *x will* disappear, then, is based on an awareness of the wider context (that they are watching an illusion). The belief that *x cannot* disappear, however, is based on an awareness of the observable conditions (that, in these conditions, there is no imaginable way that it could disappear). The experience may involve both expectations because they are the result of different modes of processing, each concerned with a particular representational context.

Third, this suggests that this experience may provide insights into the relationships between such processes. In doing so, however, it should be noted that there is more than one kind of magic effect, and that different effects may depend on different modes of processing. As noted above, many magic tricks produce a contradiction between a recent memory of a state of affairs and a perception of a different state of affairs. There are also many tricks (such as those in which a card is remembered, and later the magician reveals the name of the card), which create a belief that information

A particular kind of wonder

x cannot be known (based on logical reasoning about what has apparently happened) being followed by a perception that information x is known. In this case, there is also often an expectation that this will happen. However, some tricks produce the effect of an instantaneous change of an object, where the perception of x is immediately followed by the perception of y. In this case, one might expect 'surprise' in response to the sudden change. Other magical experiences, on the other hand, are prolonged, such as in the case of levitation, where an ongoing perception of x is accompanied by a logical reasoning that it cannot be. In this case, there may be an expectation of the event immediately prior to it happening, but the experience continues as a contradiction between what is being perceived (e.g. 'he is in the air') and what is thought possible (e.g. 'but he has no support'). Thus, there may be different kinds of responses to magic tricks, which involve particular clashes of beliefs and expectations, each being based on different psychological processes.

In terms of experimental studies, there are many possibilities. Tricks that involve a delay between the perception of x and the perception of y might explore the role of memory, by manipulating the length of the delay. Prolonged moments, such as levitation, would allow for participants to provide a form of feedback *during* the moment of seeming impossibility. In other cases, expectations could be manipulated by varying whether or not participants are aware that they are watching a magic trick, or are told precisely what is about to happen. In doing so, of course, one would need to bear in mind that even within a certain kind of effect (for example, a transformation), particular examples (for example, a vase becoming a rose, or a rose becoming a vase) may provoke different responses (Griffiths, 2015). To date, magic tricks have been used to explore a variety of cognitive processes. However, there is

A particular kind of wonder

ample scope to investigate further the emotional experience itself, and how it relates to different modes of processing.

Discussion

The experience of magic has been defined as the response to a seemingly impossible event that one understands to be an illusion. This experience, defined as such, has been around for millennia, and might be considered a particular kind of wonder. In certain respects, the experience has changed, as a result of a general rise in awareness of the kinds of techniques that magicians use. It has also taken a variety of forms, as a result of different effects and their dependence on various psychological processes. These can be seen as versions of this particular kind of wonder, any of which is a response to a particular event in a particular situation.

There are, of course, other kinds of wonder, which can be provoked by different events, such as the beauty of a sunset, or a train that is unexpectedly late. These are clearly not the same as the kind of wonder that is being discussed here. One might, therefore, prefer the term ‘astonishment’ to refer to the experience of magic, providing that its relationship to ‘surprise’ (specifically, unexpectedness) is borne in mind. Whatever term is used, however, a more precise meaning of the experience can be gleaned from considering the kinds of events that provoke it. At the same time, the nature of the experience will be shaped not only by the event itself but also by context and meaning.

A particular kind of wonder

Consider, for example, the response to a seemingly impossible event that one does *not* understand to be an illusion. After all, for at least as long as magic tricks have been performed, there have been reports of various miraculous phenomena. Such events have been attributed to gods, priests, mediums and psychics. Depending on the individual and the cultural context, a ‘miracle’ might be experienced in a wide variety of ways, though in any given case, one might use the terms ‘wonder’ or ‘astonishment’. How, then, does this compare to the experience of magic?

On the one hand, the visual anomaly may be similar to that of a magic trick – for example, an object might appear from nowhere, transform into something else, or float in the air. On the other hand, a ‘miracle’ is not viewed as an illusion, but as a manifestation of the supernatural. One could not view such an event as a ‘miracle’ without quite different associations coming to mind, which relate to significantly deeper matters than what is being observed. This is the kind of wonder that Fuller (2006) has in mind when he argues that ‘the emotion of wonder elicits belief in the existence of a more-than-physical reality’ (p. 1). It is the kind of wonder that might be provoked by seeing a Marian apparition, perhaps, but not by seeing a stage magician make a rabbit appear from a hat. This is not just a matter of seeming impossibility, then, but of context and meaning.

Thus, seemingly impossible events might provoke different kinds of wonder, but a meaningful distinction can be made between those that are understood to be illusions and those that are viewed as supernatural. In practice, such a distinction can be fuzzy, since ‘illusion’ and ‘supernatural’ are not the only available frames. For example, in recent years, there has been a significant rise in ‘psychological illusions’, which are

A particular kind of wonder

presented as if they are the result of ‘real’ psychological abilities. Nevertheless, it remains the case that there has been a remarkably longstanding and widespread kind of wonder provoked by seemingly impossible events that are understood to be illusions, because they have been performed in a social context in which this meaning has been made explicit. In such a context, where the audience understands that it is an illusion, the implications of the seemingly impossible event are limited, and do not elicit deeper thoughts and feelings of a spiritual nature. The experience of magic, then, might be seen as a form of astonishment that is bounded.

This article has provided nothing more than a general survey across many centuries, and within somewhat limited geographical boundaries. The story, no doubt, is more complex. After all, what counts as ‘impossible’ depends on what, at any given time and place, one considers to be possible. Thus, magicians typically experience magic differently, because what may seem impossible to many does not seem so impossible to them (Danek et al, 2015). Nevertheless, magicians can still experience magic if, perhaps because they are not familiar with the particular method being used, they consider the effect to be impossible. What matters is that, regardless of the observer’s general beliefs about what is possible, the effect that occurs is, *at that moment*, thought to be impossible.

Finally, while the experience happens in a particular moment, historical perspective remains essential to understanding how it comes about. After all, technological advances have made possible things that our ancestors would have considered magical, but that we now take for granted. Yet magicians have continued to astonish us, often by performing tricks that have been performed for centuries. They have

A particular kind of wonder

succeeded in this by constantly developing new physical and psychological methods, so that even traditional effects continue to seem impossible. In doing so, they have had to engage with public knowledge of certain methods (for example, by rolling up the sleeves, by having props inspected by the audience, or by passing a hoop around a floating person in order to ‘prove’ that s/he is not suspended by wires). They have also had to engage with public awareness of what is technologically possible, most obviously when magic came to be performed on radio, television and the internet.

The experience of magic, then, depends on a constantly changing interaction between magicians and the public, in which the techniques of the former are based on the assumptions of the latter. In other words, while the experience of magic is clearly a mental phenomenon, it is also a social phenomenon, which needs to be understood as part of a complex form of interaction between humans who share particular assumptions within a specific socio-historical context. Thus, both experimental and historical research is needed if we are to understand better this particular kind of wonder.

REFERENCES

- Alciphron (1949). *The letters of Alciphron, Aelian and Philostratus, with an English translation by Allen Rogers Benner and Francis H. Fobes*. London, UK: Heinemann.
- Averill, J. R. (1990). Inner feelings, works of the flesh, the beast within, diseases of the mind, driving force, and putting on a show: six metaphors of emotion and their

A particular kind of wonder

theoretical extensions. In D. E. Leary, (ed.), *Metaphors in the history of psychology* (pp. 104-132). Cambridge University Press.

Bacon, Roger (1923). *On the nullity of magic*. New York, NY: AMS.

Baillargeon, R. (1993). The object concept revisited: new directions in the investigation of infants' physical knowledge. In C. Granrud, (ed.), *Visual perception and cognition* (pp. 265-315). Hillsdale, NJ: Erlbaum.

Bain, A. (1865). *The emotions and the will*. 2nd edition. London, UK: Longmans, Green and Co.

Beckmann, J. (1814). *A history of inventions and discoveries, translated from the German by William Johnston*. Second edition, vol. III. London, UK: Longman et al.

Bell, C. (1806). *Essays on the anatomy of expression in painting*. London, UK: Longman, Hurst, Rees and Orme.

Benedict, B. (2001). *Curiosity: a cultural history of modern inquiry*. Chicago, IL: University of Chicago Press.

Binet, A. (1894). Psychology of prestidigitation. *Annual Report of the Board of Regents of the Smithsonian Institution*. Washington GPO, 555-571.

Bogartz, R. (2000). Object permanence in infants. *Infancy*, 1, 387-388.

Brown, T. (1820). *Lectures on the philosophy of the human mind*. Vol I. Edinburgh, UK: W. and C. Tait.

Butterworth, P. (2005). *Magic on the early English stage*. Cambridge, UK: Cambridge University Press.

Bynum, C. W. (1997). Wonder. *American Historical Review*, 102, 1-26.

Camras, L, Meng, Z., Ujiie, T., Dharamsi, S., Miyake, K, Oster, H., ... Campos, J. (2002). Observing emotion in infants: facial expression, body behavior, and rater judgments of responses to an expectancy-violating event. *Emotion*, 2(2), 179-193.

A particular kind of wonder

- Clarke, S. (1983). *Annals of conjuring*. New York: Magico Magazine.
- Coon, D. (1992). Testing the limits of sense and science: American experimental psychologists combat Spiritualism. *American Psychologist*, 47, 143-151.
- Danek, A, Fraps, T, Müller, A. von, Grothe, B. & Öllinger, M. (2014). It's a kind of magic – what self-reports can reveal about the phenomenology of problem solving. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2014.01408.
- Danek, A, Öllinger, M., Fraps, T, Grothe, B. & Flanagin, V. L. (2015). An fMRI investigation of expectation violation in magic tricks. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2015.00084.
- Danziger, K. (1997). *Naming the mind: how psychology found its language*. London, UK: Sage Publications.
- Darwin, C. (1872). *The expression of the emotions in man and animals*. London, UK: John Murray.
- Daston, L. & Park, K. (1998). *Wonders and the Order of Nature, 1150-1750*. New York, NY: Zone Books.
- Dawkins, R. (1998). *Unweaving the rainbow: science, delusion and the appetite for wonder*. Boston, MA: Houghton Mifflin Co.
- Dean, H. (1817). *Hocus Pocus, or the Whole Art of Legerdemain in Perfection*. Eighteenth edition. Boston, MA: Monroe and Francis.
- Demos, J. (1996). Shame and guilt in early New England. In R. Harré & W.G. Parrott (Eds.), *The Emotions: Social, Cultural and Biological Dimensions* (pp. 74-88). London, UK: Sage Publications Ltd.
- Descartes, R. (1989). *The Passions of the Soul*. Indianapolis, IN: Hackett Publishing Company.

A particular kind of wonder

- Descartes, R. (2001). *Discourse on method, optics, geometry and meteorology*. Revised edition. Translated with introduction by Paul J. Olscamp. Indianapolis, IN: Hackett Publishing Company.
- Dessoir, M. (1893). The psychology of legerdemain. *The Open Court*, 12, 3599-3606.
- Dixon, T. (2003). *From passions to emotions: the creation of a secular psychological category*. Cambridge, UK: Cambridge University Press.
- “The Drama”, Bell’s Life in London and Sporting Chronicle [London, England] 7 May 1848: n.p. *19th Century UK Periodicals*. Web. 30 Mar. 2015.
- During, S. (2002). *Modern Enchantments: the Cultural Power of Secular Magic*. Cambridge, Mass.: Harvard University Press.
- Ekman, P. & Cordaro, D. (2011). What is meant by calling emotions basic? *Emotion Review*, 3(4), 364-370.
- Frijda, N. H. (1986). *The emotions*. New York: Cambridge University Press.
- Fuller, R. (2006). *Wonder: from emotion to spirituality*. Chapel Hill, NC: The University of North Carolina Press.
- Gergen, K. (1995). Metaphor and monophony in the 20th century psychology of emotions, *History of the Human Sciences*, 8, 1-23.
- Haidt, J., & Keltner, D. (2004). Appreciation of beauty and excellent (Awe, Wonder, Elevation). In C. Peterson & M. E. P. Seligman (Eds.), *Character Strengths and Virtues* (pp. 537-551). New York: Oxford University Press.
- Evans, R. & Marr, A. (2006). *Curiosity and Wonder from the Renaissance to the Enlightenment*. Aldershot, UK: Ashgate Publishing company.
- Fisher, P. (1998). *Wonder, the rainbow and the aesthetics of rare experience*. Cambridge, MA: Harvard University Press.

A particular kind of wonder

- Fuller, R. (2006). *Wonder: from emotion to spirituality*. Chapel Hill, NC: The University of North Carolina Press.
- Greenblatt, S. (1991). *Marvelous possessions: the wonder of the New World*. Chicago, IL: University of Chicago Press.
- Griffiths, T. L. (2015). Revealing ontological commitments by magic. *Cognition*, 136, 43-48. doi: 10.1016/j.cognition.2014.10.019
- Harré, R. (1986). *The social construction of emotions*. Oxford, UK: Blackwell.
- Harré, R. & Parrott, W.G. (Eds.), *The Emotions: Social, Cultural and Biological Dimensions*. London, UK: Sage Publications Ltd.
- Haith, M. (1998). Who put the cog in infant cognition? Is rich interpretation too costly? *Infant behavior and development*, 21, 167-179.
- Harré, R. (1986). *The social construction of emotions*. Oxford: Blackwell.
- Harré, R. & Parrot, W. G. (1996). *The emotions: social, cultural and biological dimensions*. Thousand oaks, CA: Sage.
- Harris, P. L. (1994). Unexpected, impossible and magical events: Children's reactions to causal violations. *British Journal of Developmental Psychology*, 12, 1-7.
- Hoffmann, Prof. (1876). *Modern Magic*. London: George Routledge and Sons.
- Hopkins, Albert (1898). *Magic: stage illusions and scientific diversions, including trick photography*. New York: Munn & Co.
- Hyman, R. (1989). The psychology of deception. *Annual Review of Psychology*, 40, 133-154.
- Jastrow, J. (1896). Psychological notes upon sleight-of-hand experts. *Science*, 3, 685-689.
- Jastrow, J. (1897). Magic stage illusions and scientific diversions, including trick photography [book review]. *Science*, 6(153), 850-851.

A particular kind of wonder

- Kagan, J. (2010). Once more into the breach. *Emotion Review*, 2(2), 91-99.
- Kirby, E. T. (1974). The shamanistic origins of popular entertainment. *The Drama Review*, 18(1), 5-15.
- Kuhn, G., Amlani, A. and Rensink, R. (2008). Towards a science of magic. *Trends in Cognitive Science*, 12, 349–354.
- Kuhn, G., Olson, J. and Raz, A. (2016). Editorial: The psychology of magic and the magic of psychology. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2016.01358.
- Lamont, P. & Wiseman, R. (1999). *Magic in Theory: an introduction to the theoretical and psychological elements of conjuring*. Hatfield: University of Hertfordshire Press.
- Lamont, P. (2013). *Extraordinary beliefs: a historical approach to a psychological problem*. Cambridge: Cambridge University Press.
- Lamont, P. (2017, in press). Modern magic, the illusion of transformation, and how it was done. *Journal of Social History*.
- Lamont, P. (2015). Problems with the mapping of magic tricks. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2015.00855.
- Lamont, P., Henderson, J. M., & Smith, T. (2010). Where science and magic meet: the illusion of a 'science of magic'. *Review of General Psychology*, 14(1), 16-21.
- LaMothe, R. (2007). An analysis of acedia. *Pastoral Psychology*, 56, 15-30.
- Lazarus, R. & Lazarus, B. (1994). *Passion and reason: making sense of our emotions*. New York, NY: OUP.
- Leary, D. E., (ed.). (1990) *Metaphors in the history of psychology*. Cambridge University Press.
- Leddington, J. (2016). The experience of magic. *The Journal of Aesthetics and Art Criticism*, 74(3), 253-264

A particular kind of wonder

- Lorini, E. and Castelfranchi, C. (2006). The cognitive structure of surprise: looking for basic principles. *Topoi*, 26, 133-49 doi 10.1007/s11245-006-9000-x.
- Luckhurst, R. (2001). *The invention of telepathy*. Oxford, UK: Oxford University Press.
- MacQuarrie, (2012). *Acedia: the darkness within (and the darkness of climate change)*. Bloomington, IN: Authorhouse.
- Maxwell-Stuart, P. G. (1999). *The occult in early modern Europe: a documentary history*. New York, NY: St. Martin's Press.
- McDougall, W. (1908). *Introduction to social psychology*. London, UK: Methuen.
- Mercier, C. A. (1888). *The nervous system and the mind*. London, UK: Macmillan and Co.
- Meyer W., Reisenzein R, Schützwohl, A. (1997). Towards a process analysis of emotions: the case of surprise. *Motivation and Emotion*, 21(3), 251–274.
- Ortiz, D. (1994). *Strong magic: creative showmanship for the close-up magician*. Silver Spring, MD: Kaufman & Greenberg.
- Ortony, A. & Partridge, D. (1987). Surprisingness and expectation failure: what's the difference? Proceedings of the tenth international joint conference on artificial intelligence (IJCAI), Milan (Italy). Morgan Kaufmann Publishers Inc., pp. 106–108.
- Parris, B. A., Kuhn, G., Mizon, G. A., Benattayallah, A., & Hodgson, T. L. (2009). Imaging the impossible: An fMRI study of impossible causal relationships in magic tricks. *NeuroImage*, 45(3), 1033-1039.
- Phelps, K. E. & Woolley, J. D. (1994). The form and function of young children's magical beliefs. *Developmental Psychology*, 30, 385-394.
- Plato (1921). *Theaetetus. Sophist. With an English translation by Harold North Fowler*. Cambridge, MA: Harvard University Press.

A particular kind of wonder

- Plato (1974). *The Republic*. Translated with an introduction by Desmond Lee. 2nd edition. Harmondsworth: Penguin Books.
- Prevost, J. (1988). *Clever and pleasant inventions. Part one*. Seattle, WA: Hermetic Press (originally published in 1584 as *La premier partie des subtiles et plaisant inventions*)
- Prinz, J. (2013). How wonder works. *Aeon magazine*.
<http://aeon.co/magazine/psychology/why-wonder-is-the-most-human-of-all-emotions/>.
- Reddy, W. (2001). *The navigation of feeling: a framework for the history of emotions*. Cambridge, UK: Cambridge University Press.
- Rensink, R. & Kuhn, G. (2015). A framework for using magic to study the mind. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2014.01508
- Rensink, R. & Kuhn, G. (2015). The possibility of a science of magic. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2015.01576.
- R[id], S. (1612). *The art of juggling, or legerdemaine* (London)
- Robert-Houdin, J. E. (1878). *The secrets of conjuring and magic*. Translated by Professor Hoffmann. London, UK: Routledge.
- “Robert Houdin’s Soirees Fantastiques.” Morning Chronicle [London, England] 2 June 1848: n.p. *19th Century British Newspapers*. Web. 30 Mar. 2015.
- Rosenwein, B. (2002). Worrying about emotions in history. *American Historical Review*, 107(3), 821-845.
- Russell, J. (2012). Introduction to special edition: on defining emotion. *Emotion Review*, 4(4), 337.
- Scherer, K., Zentner, M. & Stern, D. (2004). Beyond surprise: the puzzle of infants’ expressive reactions to expectancy violation. *Emotion*, 4(4), 389-402.

A particular kind of wonder

- Scot, R. (1584). *The discoverie of witchcraft* (London).
- Seneca, L. A. (1917). *Moral epistles. Translated by Richard M. Gummere. The Loeb Classical Library. 3 vols. Volume I.* Cambridge, MA: Harvard University Press.
- Smith, W., Dignum, F. and Sonenberg, S. (2016). The construction of impossibility: a logic-based analysis of the narrative structure of conjuring tricks. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2016.007.
- Stahl, A. E. & Feigenson, L. (2015). Observing the unexpected enhances infants' learning and exploration. *Science*, 348, 91-94.
- Subbotsky, E. (2001). Causal explanations of events by children and adults: Can alternative causal modes coexist in one mind? *British Journal of Developmental Psychology*, 19, 23-45.
- Subbotsky, E. (2004). Magical thinking in judgments of causation: Can anomalous phenomena affect ontological causal beliefs in children and adults? *British Journal of Developmental Psychology*, 22, 123-152.
- Swiss, J. (2002). *Shattering illusions*. Seattle: Hermetic Press, Inc.
- Taylor, R. (1985). *The death and resurrection show: from shaman to superstar*. London: Anthony Blond.
- Thomas, C., Didierjean, A., Maquestiaux, F., & Gygax, P. (2015). Does Magic Offer a Cryptozoology Ground for Psychology? *Review of General Psychology*, 19, 117-128.
- Wiseman, R., Greening, E., & Smith, M. (2003). Belief in the paranormal and suggestion in the séance room. *British Journal of Psychology*, 94, 285-297.