

Malinowski's magic and Skinner's superstition

Reconciling explanations of magical practices

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The cognitive science of religion draws upon a broad range of scientific authorities, a point readily made by considering the classic research that the papers in this volume connect to the modern approach to the scientific study of religion. Within that range, it is hard to think of two researchers whose work is more dissimilar than Bronisław Malinowski and B. F. Skinner. Malinowski's anthropological work involved the long-term observation of complex human societies whereas Skinner focused on particular behaviours of individual animals. Malinowski studied people in the natural environment, Skinner relied upon tightly controlled, artificial conditions. Malinowski described his conclusions in elegant prose that ventured broad theories concerning human belief-systems, Skinner eschewed belief talk and aimed for precise theories that were tied tightly to data. Given such differences, the comparison between these two scientific greats could well be used as an antidote against naive views of a monolithic scientific method. The real challenge is how to bring them together, however. This is the kind of problem that researchers engaged in the cognitive science of religion run into constantly due to the highly interdisciplinary character of this field. Looking at how the work of Skinner and Malinowski can be combined usefully provides, therefore, a worthwhile case highlighting the issues that current scientific research into religion has to find ways of dealing with. Of course, the particular approach pursued here is specific to one researcher and would not be accepted by others in its details.

Rather than trying to grasp the impact of the total oeuvre produced by Skinner and Malinowski, the focus is going to be on a pair of particularly influential examples from their work. In Malinowski's case this means his famous comparison between the plethora of magical rituals connected to open-sea fishing and their relative lack in the case of fishing within atolls. In

Skinner's case the spotlight is on experimentation into "superstition" in the pigeon. These two examples and the conclusions drawn from them have led to a pair of differing approaches to an issue that is of central significance for the cognitive science of religion: how to explain the human propensity for magical practices. On the one hand there is the motivational explanation which claims that such practices give peace of mind by providing us with the illusion of control where no control can be had. On the other there is the cognitive explanation, according to which such beliefs are not necessarily functional in themselves but are the by-product of cognitive processes that are functional. *Prima facie*, these accounts are directly opposed to each other, with the cognitive science of religion generally opting for the cognitive account. The difficulty becomes apparent, however, once it is realized that it is not necessarily possible to distinguish between them on the basis of such simple psychological experiments as have been carried out with the aim of providing evidence for those accounts. Ultimately, the reason for the problem is that the motivational and the cognitive stories are not mutually incompatible. Indeed, they may inform each other. To show that this is the case, however, requires an approach from an evolutionary vantage point. Armed with the distinctions made available by evolutionary theory, it is possible to see how the motivational and the cognitive accounts can be combined and what this entails for our understanding of magical practices.

Malinowski's magic

The difference between the traditions of the Trobriand Islanders who fish in the lagoon and those who fish the open sea is probably the single best-known example from Malinowski's work:

While in the villages on the inner lagoon fishing is done in an easy and absolutely reliable manner by the method of poisoning, yielding abundant results without danger and uncertainty, there are on the shores of the open sea dangerous modes of fishing and also certain types in which the yield greatly varies according to whether shoals of fish appear beforehand or not. It is most significant that in the lagoon fishing, where man can rely completely upon his knowledge and skill, magic does not exist, while in the open-sea fishing, full of danger and uncertainty, there is extensive magical ritual to secure safety and good results. (Malinowski 1992: [page:?])

Malinowski's original reason for bringing up this distinction was to provide evidence for his claim that people turn to magic and superstition when facing

dangerous circumstances that are beyond their control. While his example could not be considered by today's empirical science as much more than an anecdote, it was backed by long-term observations, and the connection between susceptibility to supernatural beliefs and adverse conditions has subsequently been borne out by voluminous research across a range of different disciplines.

One example of this research that is something of a classic reference in itself is the 1979 study by Felson and Gmelch in which the authors explicitly sought to provide quantitative empirical evidence for Malinowski's claim (Felson & Gmelch 1979). Examining US and Irish students, they found that activities that involved high levels of uncertainty and anxiety were more likely also to involve the use of magic. So, for example, students were more likely to report the use of magic in connection with gambling, an activity that was deemed uncertain in its results, compared to face-to-face interaction, which was deemed to be much less uncertain. This result was in basic agreement with Malinowski's main contention as well as with an earlier qualitative study by Gmelch in which he showed that on the baseball field it is primarily the activities that are highly unpredictable in their results, such as pitching and hitting, that attract magical practices (Gmelch 2012).

More recent examples are provided by two interesting studies on the connection between stress and superstitious beliefs that were carried out by Giora Keinan. In a study conducted during the missile attacks upon Israel during the 1991 war in Kuwait, Keinan found that people who lived in cities that were targeted by Iraqi missiles were significantly more likely to espouse belief in the efficacy of magical practices (Keinan 1994). Keinan's second study involved a different type of stress in that Keinan interviewed students at various times during the university year and found that they were more likely to engage in the superstitious practice of knocking on wood when facing exams (Keinan 2002).

A very different kind of evidence for Malinowski's claim was inspected by Padgett and Jorgenson, who examined the number of articles on astrology and similar topics published in Germany in the period between the world wars, and found that the level of economic threat predicted changes in the number of those articles (Padgett & Jorgenson 1982). There are also many examples of research that could be used to show the relevance of Malinowski's thesis to religious belief in particular. Norenzayan and Hansen found that mortality salience (one possible source of stress) led to increased espousal of religious beliefs (Norenzayan & Hansen 2006). Tom Rees showed that, when comparing nations, increased income inequality is an important determinant of religiosity, income inequality also being closely connected to personal insecurity (Rees 2009). Finally, Gregory Paul compared a range of indicators of dysfunctional psychosociological conditions across a number of countries and

found religiosity to be strongly negatively correlated with improved social conditions (Paul 2009).

When faced with such a large variety of studies it must be asked what evidence there is that the results obtained are all due to the same phenomenon. The studies consider many different variables and do so in a plethora of different contexts. Some of the studies looked at long-term social indicators while others examined the immediate reactions of individuals to particular stimuli. Some connected magic to threat (real or perceived) while others talked in terms of loss of control. This is, of course, the same basic problem as the one mentioned earlier in the context of combining the work of Malinowski and Skinner. One way of dealing with this problem is to propose a causal mechanism which would explain some or all of the results obtained and then to test whether this hypothesis is correct. Indeed, Malinowski himself proposed an explanation for why the propensity to believe in supernatural claims might be increased by negative conditions. Man, engaged in a series of practical activities, comes to a gap; the hunter is disappointed by his quarry, the sailor misses propitious winds, the canoe builder has to deal with some material of which he is never certain that it will stand the strain, or the healthy person suddenly feels his strength failing... Whether he be savage or civilized, whether in possession of magic or entirely ignorant of its existence, passive inaction, the only thing dictated by reason, is the last thing in which he can acquiesce. His nervous system and his whole organism drive him to some substitute activity. (Malinowski 1992: [page:2])

Malinowski's hypothesis, that people engage in magical practices in order to reduce the anxiety they feel in situations that are beyond their control, has been highly influential, with many researchers seeking to explain the connection between magic and misfortune in much the same terms. What is essential is that Malinowski's account appears to have a motivational element since the point of magical practices is supposed to be to avoid anxiety.

This motivational explanation of magical practices is sometimes spelled out in terms of secondary control. The concept of secondary control (Rothbaum *et al.* 1982) has proved both popular and problematic (Morling & Evered 2006). One of the ways it can be understood is as distinguishing between primary control, which involves actual control of circumstances, with secondary control, which merely involves maintaining the illusion of real control (Case *et al.* 2004), a use of the word "control" that is analogous to that of the word "diamond" in the phrase "cubic zirconia diamond". In this context

Malinowski's explanation is interpreted as meaning that the function of magical practices is to allow people to maintain secondary control, that is, the illusion of control, in circumstances that they actually have no control over, that is, no primary control. As per Malinowski's claim, this is understood to help reduce anxiety, which is considered a desirable end.

A recent and influential study that avoids the confusing terminology of secondary control nonetheless formulates something like Malinowski's motivational explanation of magic when it claims that "a lack of control provokes seeing and seeking patterns because pattern perception is a compensatory mechanism designed to restore feelings of control" (Whitson & Galinsky 2008: [page?]). This, according to the authors, leads people to accept illusory patterns in situations in which they find themselves unable to control their circumstances. Crucially, according to the motivational explanation, magical practices do not have the aim of actually controlling the situation but merely of changing how we feel about it.

Skinner's superstition

The cognitive explanation for supernatural beliefs and practices that expands upon B. F. Skinner's famous study into "superstition" in the pigeon (Skinner 1948) appears, at least initially, to be very different. In his study, Skinner argued that pigeons are subject to coincidental operant conditioning which leads to superstitious behaviour. This was because when presented with food at regular, short intervals that were independent of their behaviour, the pigeons that Skinner studied nonetheless developed patterns of repetitive behaviour akin to those in the studies where their behaviour did affect whether food was presented to them. So, for example, one of the pigeons in the "superstition" study repeatedly pecked at a corner of his cage while another turned in circles in between each appearance of the container holding the food. Skinner made explicit the comparison with human behaviour:

The experiment might be said to demonstrate a sort of superstition. The bird behaves as if there were a causal relation between its behavior and the presentation of food, although such a relation is lacking. There are many analogies in human behavior. Rituals for changing one's luck at cards are good examples. A few accidental connections between a ritual and favorable consequences suffice to set up and maintain the behavior in spite of many unreinforced instances. The bowler who has released a ball down the alley but continues to behave as if he were controlling it by twisting and turning his arm and shoulder is another case in point. These behav-

iors have, of course, no real effect upon one's luck or upon a ball half way down an alley, just as in the present case the food would appear as often if the pigeon did nothing – or, more strictly speaking, did something else. (Skinner 1948: [page?])

Skinner's interpretation has been critiqued since his time (Timberlake & Lucas 1985). However, experiments very similar to Skinner's have been run on humans and seem to indicate that we are subject to something like the mechanism Skinner proposed. In one such study, children who were collecting marbles in order to win a prize were observed to develop distinctive behaviour that was very similar to that of Skinner's pigeons, including making faces or touching parts of the mechanism that dispensed the marbles (Wagner & Morris 1987). Other studies showed similar effects among adults (Ono 1987; Vyse 1991; Heltzer & Vyse 1994). In one particularly striking case, a participant who had been presented with a choice of three switches and told to maximize the number of points obtained as measured by a counter ended up touching various parts of the room the experiment was taking place in as well as jumping up and down until exhausted (Ono 1987). All this happened even though the points were awarded on a schedule that was totally independent of anything the subject did.

Unlike Malinowski, Skinner made no effort to determine whether there was any connection between magical practices and anxiety. Even so, the pigeons in his study were likely to be quite stressed as it was customary to starve them before conducting behavioural studies in order for food to be effective at motivating their behaviour. Given Skinner's behaviourist methodological assumptions, it is hardly surprising that his explanation is not in terms of the pigeons seeking to satisfy some inner need but, rather, in terms of a coincidental co-occurrence of events leading to what we would call an illusory causal connection. Indeed, his explanation has been compared to the problem of induction in that it involves the question of how to distinguish coincidental co-occurrence from real causal connections. Since such connections are not directly perceived, all we have to go on are our experiences of temporal contiguity, as Hume pointed out.

Managing errors

We appear to be faced with a choice between two seemingly contradictory explanations for the existence of magical practices. Malinowski's anxiety-reduction explanation might be compared to the peril-sensitive sunglasses from *The Hitchhiker's Guide to the Galaxy*, written by Douglas Adams. These were meant to help their wearer maintain a relaxed attitude by going com-

pletely dark at the first sign of danger. Somewhat less radically, according to the motivational explanation magical practices serve to reduce anxiety by giving people something to do in order that they may maintain the illusion that they are in control of a situation. On Skinner's account, magical practices should be understood as real but misdirected efforts to affect the situation, the cause of their appearance lying in the limited epistemic access we have to our environment.

To see that these explanations are not necessarily in conflict with each other it is necessary to show the relevance of perceived threat to Skinner's explanation and then to show that Skinner and Malinowski are potentially looking at the same thing but from different directions. The relevance of perceived threat becomes clear if we consider whether the kinds of errors Skinner pointed out are not actually indicative of something more than mere random error. This is the line originally pursued by Peter Killeen, who demonstrated a couple of vital points with a methodologically ingenious experiment (Killeen 1978). First, Killeen showed that pigeons were often able to distinguish coincidental co-occurrence from causal connection. Second, he then showed that as pay-offs were altered the pigeons changed their behaviour in a way that sometimes led to more errors but resulted in greater overall payoffs. In effect, the birds appeared to react to changes in payoffs by biasing their reaction in such a way as to make relatively few of the more costly mistakes.

The general point Killeen is making has been called "the smoke detector principle" (Nesse 2001: [page?]). A smoke detector is purposefully made highly sensitive in order to ensure that it goes off when there is a fire. After all, the potential cost of it failing to raise the alarm in that situation is very serious. The cost of this sensitivity, however, is that the detector sometimes goes off when there is no danger. Such instances are annoying but accepted given how much worse it would be not to be alerted of a fire. How sensitive the detector should be will depend on an assessment of the cost and likelihood of a fire as opposed to the cost and likelihood of false alarms. So, in areas where fires are more likely and potentially more costly, it will be desirable to have smoke detectors that are particularly sensitive.

Killeen's idea can be used to explain Malinowski's observation that magic thrives where danger threatens. In a dangerous environment the costs of failing to identify a causal connection are potentially particularly high. If pigeons (and humans) are able to flexibly alter how they bias their search for causal connections, it will make sense in dangerous environments to accept a greater number of illusory causal connections as the price of not missing any real ones. As Killeen observes:

For humans, when the stakes are high (for example, rain after a lengthy drought) or the response cost low (for example, carrying

a charm) superstitions are understandable, often having as much the character of “playing a long shot” as of being duped by a coincidence of nature. (Killeen 1978: [page?])

The point raised by Killeen has been developed in a couple of ways. First, a number of researchers have been able to show using computer models that something like superstitious behaviour is a necessary by-product of adaptive learning strategies (Beck & Forstmeier 2007; Foster & Kokko 2008; Abbott & Sherratt 2011). Second, it has been turned into a general theory that examines the significance of cost asymmetries between different kinds of errors. Error management theory (Haselton & Buss 2000), as it is called, frames the issues in explicitly evolutionary terms, arguing that persistent cost asymmetries will lead to the appearance of appropriately biased decision-making processes:

Whenever there exists a recurrent cost asymmetry between two types of errors over evolutionary time, selection will fashion mechanisms biased toward committing errors that are less costly in reproductive currency. (Haselton & Nettle 2006: [page?])

Error management theory is able to integrate the explanation of a number of different human behaviours. Superstition is one of the phenomena that Haselton and Nettle consider, but the way in which they do so is less than clear. Describing superstitious beliefs in terms of the lack-of-control paradigm, Haselton and Nettle appear to be thinking in terms of the anxiety-reduction explanation. Connecting feelings of lack of control to depression, they point out that magical practices offer the illusion of control and conclude that such practices may serve to ameliorate depression. Having done so, however, they go on to make what is essentially the Killeen argument:

In the ancestral environment, accurate information about the true contingencies between people's behavior and events around them, such as the movements of game animals, would have been scarce. As long as the cost of performing the superstitious behaviors was low relative to the benefit of actually controlling events, EMT [error management theory] would predict cognitive mechanisms biased toward superstition and the illusion of control to evolve. (*Ibid.*: [page?])

Before moving on to clarify the relationship between the motivational and the cognitive explanations in general and ultimately considering the particular points Haselton and Nettle make, it is important to see that one of the main

explanatory mechanisms proposed within the cognitive science of religion appears to be a special case of the cognitive explanation.

One of the earliest texts considered to fall within the cognitive science of religion is Stewart Guthrie's *Faces in the Clouds*. In it, Guthrie considers the significance of anthropomorphisms within religions (Guthrie 1993). One of the ideas Guthrie proposes has come to be known as the hyperactive agency detection device. As Guthrie points out, people appear to have a strong tendency to over-attribute events and states of affairs to the actions of intentional agents. The stereotypical example is the sound of moving bushes being misattributed to the presence of a predator. Such a bias toward agent-based causation would have been adaptive given that the failure to spot an agent, such as a hidden predator, would be far more costly than imagining one to be present where there was none (J. L. Barrett 2000). As a by-product, the hypersensitivity of this mental device is argued to be a cause for the appearance and plausibility of supernatural concepts.

The analogy with the scenario proposed by error management theory ought to be obvious. The main difference is that Haselton and his colleagues are only proposing a general principle that is likely to act as a selective pressure upon cognitive mechanisms while Guthrie and the other researchers such as Justin Barrett who have followed in his footsteps are proposing an actual mental mechanism. This explains why the Guthrie explanation is more specific: the mental mechanism that is shaped by overall selective pressure need not respond to all aspects of that pressure.

Evolution and function

The question of the relation between the motivational and the cognitive explanations remains. In the case of the motivational explanation the ultimate function of magical practices is to be identified with something internal to the practitioner: their peace-of-mind, assuaged by the illusion of control. With the cognitive explanation the internal emotional state of the practitioner is not the issue. Instead, magical practices represent a failed effort to obtain actual control. Yet, the two explanations are not actually so opposed as they might seem.

Part of the problem is the question of what can be taken as a function of any particular behaviour. It seems as though the tendency within psychology has often been to relate functions to personal well-being. This fits in well with the therapeutic role that psychology plays: if the aim is to maintain or restore the personal psychological well-being of patients, then psychological mechanisms will be thought of and evaluated in terms of what they can contribute to making that possible. The anxiety-reduction function of magical practices appears to fit into this picture of what a function of a psychological

mechanism might be. Certainly, it appears that Whitson and Galinsky have something like this in mind when, as has already been noted, they claim that “pattern perception is a compensatory mechanism designed to restore feelings of control”. This way of talking may feel fundamentally misleading for someone who is not approaching the phenomena with therapeutic intentions but rather with the mere desire to understand them. After all, it would seem clear that people perceive patterns not because it makes them feel better but because it allows them to interact successfully with their environment. Thinking otherwise would seem to be particularly parochial. However, function is difficult to ground when one lacks therapeutic intent. One is left with many “is”s but without any “ought”s.

The evolutionary perspective solves this problem but at the price of putting forward a notion of function that is, at times, quite alien to the way we normally think. One need only consider as an example the gene's eye-view put forward by Dawkins, which holds that humans are only machines which genes use to make more copies of themselves (Dawkins 1976). In the context we are looking at, it has to be realized immediately that from an evolutionary point of view, the peace of mind of the practitioner cannot be what any behaviour is for. Evolution does not care for human feelings, as if that needed to be said. Indeed, the relationship is the very opposite; it is emotions that exist to serve evolutionary ends. This does not mean, however, that any explanation that depends upon a notion of function derived from considerations of evolutionary adaptation will have to remain silent on emotions. Far from it.

As we have seen, error management theory is able to show that evolutionary pressures will tend to favour decision-making processes that are biased in ways that tend to minimize the overall cost of the errors the organism makes, rather than their number. However, the general theory does not say how this is achieved by mental mechanisms. One mechanism that has been proposed is the hyperactive agency detection device. It is quite plausible, nonetheless, that emotions such as anxiety can play a role in biasing human decision-making processes in adaptive ways.

While emotions and reason had been thought of as contradictory forces for centuries, such an attitude makes no sense when one looks at humans from an evolutionary point of view. In that context, the idea that emotions are useless and dangerous begs the question of why then they evolved. Indeed, much recent research within psychology has shown that emotions have a vital role to play within broadly understood cognition (Brun *et al.* 2008; Evans & Cruse 2004; de Sousa 1990). Antonio Damasio's somatic markers view holds that emotions serve to direct decision-making by biasing our cognitive processes (Damasio 1995). Negative emotions, such as anxiety, serve as warnings to indicate issues that must be dealt with or outcomes that must be avoided. If magical practices are thought to have some probability of helping to avoid

unwelcome outcomes, it should not be surprising that engaging in them will reduce anxiety, therefore. And, at one level of understanding it might even be said that the function of the practices is to reduce anxiety. However, anxiety itself has the function of directing our behaviour, a function that has largely been shaped by evolutionary forces in such a way as to motivate us to engage in behaviour that is generally adaptive. So, stopping the analysis at the point of the emotional impact of magical practices, while natural from a therapeutic outlook, can only serve an incomplete understanding of the phenomenon of magic from an evolutionary point of view.

It might seem that it is the cognitive explanation that ends up looking superior. After all, the cognitive role of the emotions suggests that the motivational story has to become a part of the cognitive one. That, however, would also be something of a misunderstanding. A lot of cognitive science of religion, just like a lot of cognitive science in general, has traditionally failed to take into consideration the cognitive role of emotions. But this is basically the same shortcoming as that faced by the motivational explanation. This by no means entails that either view is not useful. Rather, it shows that both are partial and in need of combining.

To combine them, however, it is necessary to look at them from an evolutionary point of view. This is partly, as has already been shown, because of the solid concept of function that evolutionary theory makes available. However, it is also because of the rich variety of questions that can and should be asked about the evolution of any kind of behaviour. Niko Tinbergen's four questions are one way of thinking about this cornucopia of interrelated issues (Tinbergen 1963). From this point of view, it can be seen that the motivational explanation of magical practices appears to be primarily aimed at the question of the mechanism that produces these practices. The cognitive explanation, perhaps counterintuitively, is mostly aimed at the question of (evolutionary) function. Even when these explanations are combined, this still leaves two fascinating questions completely unanswered: the question of how the behaviour develops as well as the history of how it evolved. This suggests further directions in which the account could potentially develop.

Conclusions

It is now necessary to see how the motivational and cognitive explanations can work together, what further insights can be gained from combining them in the case of explaining magical practices, and what implications this has for further research in the area. This can be done by considering again Haselton and Nettle's two examples of how error management theory could be used to explain superstitions. It has to be said, first of all, that it is clear that they have

not considered that the cognitive and the motivational sides of the story need to be combined when explaining magical practices. Instead, they have merely provided examples that fit each of the two explanations. We can do a bit better.

Recognizing the cognitive role of emotions leads to the idea that magical practices also need to be considered within the context of the broader question of how anxiety helps to motivate and direct effective decision-making processes, such as deciding on the basis of which potential causal connections to act. This broad and highly significant line of empirical inquiry ought to provide a potentially worthwhile line of investigation for future research within the cognitive science of religion.

At the same time, the connection between magical practices and depression suggest a very focused line of inquiry. First of all, it must be said that current research suggests that, in so far as religious people tend to be happier than those without strong religious commitments, this seems to have much more to do with the greater level of social support that religious individuals obtain from their faith communities, rather than with their beliefs or supernatural practices themselves. Second, within the context of the cognitive role of emotions, the idea that magical practices may provide an illusion of control that helps to avoid learned helplessness and depression gains a new viability. In a number of cases, mental mechanisms that act as warnings and are therefore adaptive can be damaging if they operate for too long. Stress, for example, works well in motivating and directing behaviour when it is short-term but it is unhealthy when it is long-term. In such cases, it makes sense for further mechanisms to develop that over-ride the basic alarm mechanism in order to avoid harm to the individual. It makes for an interesting empirical question, whether magical practices have come to play that role with long-term anxiety. However, given that such practices would already be a by-product, they would be ready to hand, so to speak, making their recruitment plausible though far from necessary.

An evolutionary point of view, such as is the basis of the cognitive science of religion, allows us to bring together a lot of existing research in ways that are highly informative and which lead to further research questions. In the case of the research carried out by Skinner and Malinowski, it is the grounding of function in evolutionary adaptation as well as the multiplicity of interconnected evolutionary questions that makes possible the kind of analysis which results in an enlightening synthesis. Apart from revealing interesting new issues for the cognitive science of religion to pursue, this also reveals something of a lacuna in the field in so far as much of that research does not properly take into account the cognitive role of emotions.