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# "Superstition" in the Collegiate Baseball Player

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An investigation of superstitious activity among collegiate baseball players ($n$ = 83) was conducted over the course of three full seasons. A major feature of the investigation was a distinction between behaviors mediated by a conscious belief, and behaviors (presumably nonmediated) established through simple contiguity. Additionally, the baseball players were compared to nonathletes ($n$ = 348) on a variety of traditional indicators of superstitious belief, but the comparison yielded few significant differences. Although the investigation showed that the ballplayers engaged in a high level of superstitious activity, it was concluded that such activity is unremarkable, if not understandable.

When Skinner (1948) put pigeons in a cage and delivered food at regular intervals independent of their behavior, they developed a wide variety of bizarre behaviors such as hopping around on one foot (cf., Staddon & Simmelhag, 1971; Staddon, 1992). Skinner labeled the behaviors as superstitious and wrote "The bird behaves as if there were a causal relation between its behavior and the presentation of food, although such a relation is lacking" (p. 171).

Jahoda (1969) and Womack (1981) discussed the complex and thorny issues inherent in the concept of superstition, and in an attempt to obviate them, superstition will be interpreted in two specific ways. First, it will mean performing a behavior like those seen in Skinner's (1948) pigeons and, consequently, will be labeled as pigeon-type or coincidental superstition. Second, superstition also will mean believing in a causal link between a behavior and influencing events despite the lack of any supporting scientific evidence. The second interpretation applies to behaviors that will be labeled as human-type, or causal superstition, which generally represents the conception of superstition in athletes embraced by a number of investigators such as Gmelch (1971, 1972), Lobmeyer and Wasserman (1985), and Neil (1975, 1980).

The key distinction between a superstitious behavior labeled as either "coincidental" or "causal" is that the latter is explicitly associated with a conscious belief, whereas in the former the existence of such a belief is ambiguous. This distinction was precisely Jahoda's (1969) point when he criticized Skinner (1948) for failing to

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distinguish between behavior induced by the accidental sequence of response and reinforcement, and a belief in which a causal connection exists. Jahoda also accused Skinner of being anthropocentric by implying the pigeons possessed a causal belief. Surprisingly, a perusal of the research on superstition in athletes showed that the investigators not only ignored Jahoda's distinction, but they also treated all the behaviors as examples of causal superstition. This may be a serious oversight in understanding the etiology and maintenance of superstition in athletes. The present study corrected this oversight by examining behaviors that might be a rich source of coincidental superstition: It examined the ritualistic movements a batter makes while hitting.

Batting rituals would appear to be setup in a straightforward way: A player shrugs his shoulders or touches his cap just prior to hitting successfully. It is likely the player will repeat one of these behaviors the next time he bats. But it is unknown whether the batter repeats the behavior because he remembers it, or whether he is unaware of it and hence represents an example of what Adams (1987) described as learning without awareness.

A ritual in sport is usually defined as a conscious activity involving heightened arousal with focused attention that provides a way of coping with a high-stress situation (Crews & Boutcher, 1984; Weinberg & Gould, 1981; Womack, 1981). It may be either entirely mental, or it may be a series of movements mediated by particular thoughts and feelings. A ritual, therefore, is a conscious device helping an athlete to perform well. But can some rituals be viewed as superstitious behavior? For example, a player believes that ritualistically wearing the same, unwashed socks will enhance his performance. The difficulty here is that the player's belief, perhaps through the efficacy of the placebo effect, may actually enhance performance; and because performance is enhanced, an observer would be reluctant to classify the behavior as superstitious. Hence, the earlier definition of causal superstition must be modified to account for the possible enhancing effect of a player's belief. If a belief about a behavior could enhance performance, that behavior should not be classified as a causal superstition. Also, in the present study, the usual view of a ritual that incorporates a conscious belief is expanded to include behaviors presumably lacking conscious awareness. That is, a ritual will be viewed as possibly including coincidental superstitions.

Some examples of causal superstitions seen among baseball players are: A player avoiding the chalk foul lines in the belief that stepping on them brings bad luck; a player engaging in "rally cap" behavior—the baseball cap is worn sideways (or upside down, or inside out, or backwards, or folded in half, or not worn at all but waved back and forth in an upside down position) in an attempt to launch a scoring rally; and finally, a player who insists on following the same route to the ball park, or eating the same pregame meal or, in general, obsessively and rigidly repeating some activity he performed prior to his last success. These behaviors may be described as examples of Tolman's "expectation sets" (1932). That is, certain items, such as articles of clothing or meals, serve as the sign in Tolman's conception of sign gestalts: In the presence of such signs, the individual expects certain outcomes. Another interpretation of obsessive behavior is to view it as an example of the cognitive strategy labeled: "Win stay-lose shift" (Olton, 1981)—as long as you are winning, stay with your current behavior, but as soon as you lose, shift to another behavior.

Investigations of causal superstitions, like those of Gmelch (1971, 1977) who studied baseball players, and Buhrmann and Zaugg (1981) who studied

basketball players, were typical of most investigations in that the players were not questioned about their beliefs. This is a serious omission in understanding superstition in athletes. Consequently, an important part of the present study was to extensively interview the players about their beliefs.

Womack (1981) did interview baseball players about their beliefs, but her study was anecdotal with no empirical analyses. Conspicuously absent, for example, were simple frequency counts of instances of superstitious behaviors and the percentage of athletes who engaged in them. Also, scant attention was given to the timing and specific conditions associated with the expression of superstition. For example, are there certain times and conditions more likely to give rise to superstitious behaviors? Gmelch (1971, 1972) addressed this question but only to selected behaviors associated with some aspects of hitting and fielding. An important part of the present study, therefore, was to empirically investigate a broad range of superstitious behavior.

Another important part of the present study that is lacking in all other studies is a comparison in superstitious beliefs between baseball players and nonathletes. During the 1994 College World Series, Jeff Torborg, the television announcer and former major league player and coach, said that the players are the most superstitious people in the world. The image of baseball players as being superstitious is a cultural icon, but do they actually deserve this reputation? A comparison of their beliefs to those of nonathletes would help to answer this question, but because nonathletes obviously have little occasion to engage in behaviors like avoiding chalk foul lines, the comparison must turn to other, more traditional indicators of superstitious belief.

Traditionally, investigations of superstition both in the United States and Europe have assessed via an interview or questionnaire the degree to which people believe in certain controversial topics (Frazier, 1987; Jahoda, 1969; Miller, 1986). These topics include: astrology; extrasensory perception (ESP); magic; lucky number or charm; Tarot cards or the I Ching (the Chinese book of changes alleged to predict the future); and, experiencing an event not explainable by science. It is taken as axiomatic that the more you believe in the above topics, the more superstitious you are.

The purpose of the present investigation therefore is fourfold: First, to determine the extent of coincidental superstition involved in batting rituals; second, to extensively question the athletes about their causal beliefs; third, to empirically analyze a broad range of superstitious behaviors; and fourth, to compare the beliefs of baseball players to those of nonathletes on a variety of traditional indicators of superstition.

## Method

### *Participants*

A large undergraduate sample ($n = 348$) and the entire University of Hawaii baseball team over the course of three seasons ($n = 83$) participated in the study. The undergraduates were recruited from classes in psychology and education, whereas the baseball players participated as part of an ongoing research program.

### *Materials and Procedure*

***Videotaping.*** Two assistants videotaped the players batting during actual games. In conjunction with the author, a checklist of distinct batting movements

was established. Each of the assistants and the author viewed the tapes independently and compiled a list of the movements each player made while batting. Only those movements that appeared on all three independent lists were considered to be sufficiently unambiguous to be on the final checklist. For example, players movements such as: touching various parts of their body (or clothing); gripping the bat in many different ways; stepping in and out of the batter's box while taking practice swings or refastening their batting gloves or touching the ground or plate with the bat; scrapping the ground in various ways with their feet; and, stretching or flexing different parts of their body. The checklist contained a total of 33 distinct and different movements. The two assistants viewed the videotapes separately and, using the checklist, recorded whether a player made a particular movement while batting and the number of times he did so. The degree of interobserver reliability was 0.68 as measured by Cohen's Kappa statistic (Suen & Ary, 1989).

***Interviews.*** After the assistants scored the videotapes of the players batting, the author interviewed each player and asked him to describe his batting movements. He was asked to state all the movements he made and the number of times he made each movement. He also was asked to describe his thoughts while batting. After the interview, the author sat with each player as he watched the videotape of himself batting. The purpose in viewing the videotapes was to resolve any discrepancies between the players' estimates of their movements while batting and their actual movements as recorded on tape.

As a measure of causal superstition, the author sat in the dugout (both at home and on road trips) and recorded in a notebook all those instances of behavior that implied a belief in a causal link between that behavior and influencing events. These records provided the raw data for empirical analysis. Also, the players exhibiting the behaviors were extensively questioned by the author, either on the spot or later, on their causal beliefs and their responses were recorded in a notebook.

***Questionnaire.*** To measure the degree (and intensity) of the subjects' belief in traditional indicators of superstition, the Superstitious Belief Questionnaire (SBQ) was specifically constructed for the present study (Appendix). The great majority of the questions were taken directly (unchanged) from national surveys conducted in the United States and Europe over many years (Frazier, 1987; Miller, 1986; Jahoda, 1969). Question 9 on the SBQ is of unknown reliability, but all the remaining questions (those answered with a yes or no, and hence assigned a one or zero) were examined in a test-retest situation. Using 18 subjects, a reliability coefficient of .92 was achieved. The SBQ yielded two scores for each subject: A simple yes or no to believing in each topic, and a rating of the intensity of belief on a 10-point Likert-type scale of 1 to 10, with 10 being the strongest and 1 the weakest. All subjects answered the SBQ anonymously.

## Results

The findings of the investigation of batting rituals will be presented first, followed by the investigation of causal superstition, and finally, the responses to the Superstitious Behavior Questionnaire will be presented.

## *Batting Rituals*

Analysis of the videotapes of the players batting was scored using a checklist of 33 distinct and different movements. Giving each distinct movement a count of 1, the average number of movements players made during a single time at bat was 82.6 ($SD = 20.5$). After adjusting for the number of pitches each batter faced, the fewest number of movements a player made in a single at-bat was 51 and the largest was 109. Despite the variation in the kinds and number of movements from player to player, most showed a common characteristic: Just prior to the pitcher releasing the ball, the player momentarily ceased moving and "froze" before continuing his swing.

Interviewing the players while they watched a videotape of themselves batting revealed a uniform outcome: They were surprised not only at the sheer number of moves they made but also that they even made certain movements. When the players were asked (prior to watching the videotape) to describe the different kinds of moves they made and the number of times they executed each movement, they correctly identified 78.3% of the kinds of movements they made, but their estimates of the number of times they made each movement were off by a factor of four: The player's own estimates were only 25.4% of what they actually did while batting.

When the players were asked about a causal link between those movements they correctly identified (78.3%) and hitting successfully, all the players said there was a strong connection but it had nothing to do with superstition. Rather, they said such movements like taking practice swings "got them in the groove" and helped them to focus and concentrate. Further, they said if they didn't make the movements, they would have failed. When asked about a causal link between their unconscious movements (21.7%) and hitting successfully, the great majority of the players said they didn't know if one existed, but it's possible there could be one.

During the interviews, the players were asked to describe their thoughts while batting. All the players said they tried to not think and to "clear" their mind. At most, they would tell themselves to relax and take a deep breath. The players said there is simply not enough time to think (the ball is going so fast it takes less than half a second to travel the distance between the pitcher's hand and home plate.) The players said if you "tried to do something, you'd probably screw up; you gotta be mindless, on automatic pilot up there." Frequently, players would actually shout "Don't Think!" to their teammates as they stepped up to the plate to bat.

## *Causal Superstition*

Although 73.2% of the players described themselves as superstitious (on the SBQ), only 16.3% of them always engaged in behaviors that implied a belief in a causal link between certain behaviors and influencing events. Slightly more than 8% of the players never participated in these behaviors. The majority (62%) of the 16.3% of the players who always engaged in superstitious behaviors played only part time and were used as pinch runners, pinch hitters, or as substitutes for injured players. The remaining players, even those who did not describe themselves as superstitious, engaged in these behaviors on an aperiodic basis but their participation was not random. They performed them only when the team was losing or the outcome was in question late in the game. When the team was comfortably in the

lead, instances of superstitious behavior dropped markedly. However, even in this condition, players continued to engage in many ritualistic behaviors, such as avoiding the chalk foul lines.

When the players were asked if they believed in a causal link between their superstitious behaviors and influencing events, all of them denied that any linkage existed. When asked why they persisted in these behaviors despite denying a causal connection, they responded by saying one or more of the following phrases: "It can't hurt;" "You never can tell;" or, "You don't want to make a mistake." When asked what the last phrase meant, they said if you didn't perform the behaviors and subsequently lost the game, "you would have made a mistake." The paradox in denying a causal connection while continuing to behave as if one existed was obvious to the players; most of them laughed nervously and uncomfortably while admitting their inconsistency, and yet reasserted their view that none existed. Finally, when asked to speculate or venture some hypothesis—no matter how farfetched—about how certain behaviors could influence events, the players reiterated their denial of belief in a causal connection and said that if one did exist, they had no idea how it worked and had no interest in trying to understand it.

### *Questionnaire*

The questionnaires were coded with the dependent measures being a simple yes or no to each question along with an intensity rating ranging from 1 (weakest) to 10 (strongest).

As expected, analysis found no significant demographic differences between the baseball players and nonathletes. The analysis also showed that the baseball players differed significantly from nonplayers in only two instances: First, the baseball players labeled themselves as more superstitious (73.2% vs. 52.5%, chi-square = 7.51, $df = 1, p < .01$ ), while the intensity of their belief was higher (6.47 vs. 5.05, chi-square = 18.04, $df = 9$, $p < .05$; and second, more baseball players than nonplayers (32.9% vs. 20.3%, chi-square = 4.65, $df = 1, p < .05$) possessed a lucky charm or object. On the issue of believing in astrology, ESP, Tarot cards, the I Ching, magic, and an event not explainable by science, the baseball players scored lower than nonplayers but the differences were *not* significant. Only on the topic of having a lucky number did the athletes score higher than nonathletes but the difference was *not* significant. The differences also proved to be nonsignificant on the topics of exposure to superstitious tales as children and having parents who were superstitious.

## Discussion

The assertion that many athletes are superstitious is indisputable and tantamount to a cliché. However, a perusal of studies of superstition in athletes showed that the investigators did not follow Jahoda's (1969) suggestion to distinguish between behaviors explicitly linked to a causal belief and those that did not. The present study corrected this oversight and investigated the beliefs the athletes held about their behaviors. Those behaviors and presumed beliefs associated with batting, labeled as batting superstitions, will be discussed first. The word "presumed" is used because it was unknown whether the athletes were aware of all their batting movements. Those activities under conscious control that are part of a player's batting ritual will not be viewed as superstition. Next, those behaviors

unambiguously connected to conscious belief and labeled as causal superstitions will be discussed.

### *Batting Superstitions*

An examination of batting rituals showed the players were not conscious of 21.7% of the kinds of movements they made. In contrast, basketball players have conscious, set routines they feel they must perform prior to successfully shooting a free throw (Lobmeyer & Wassermann, 1985). That the baseball players were not conscious of some of their batting moves is evidence these moves are like those of Skinner's (1948) pigeons. Apparently, the moves were occasioned by the accidental sequence of response and reinforcement and obviously do not include a belief in a causal connection. However, the characteristic of a lack of conscious awareness applies most appropriately, not to the kinds of batting movements, but to the number of times they made each movement. It was observed that the players grossly underestimated the number of times they made each movement; their estimates were off by a factor of four.

A contributing factor to the players being unaware of some of their batting movements may be the state of relaxed mindlessness they not only sought while batting, but were regularly trained to adopt by their coaches. Being in a mindless state would make it difficult to know and monitor one's movements while batting.

It remains for future research to determine how batting movements are established and maintained. To claim they were occasioned in the same way as Skinner's (1948) pigeons would be questionable because the available experimental evidence casts considerable doubt on this possibility (Ono, 1987). Because the players were neither completely aware or unaware of some of the movements they made while batting, it is difficult to classify them. Certainly, any attempt to partition them via the simple dichotomy of superstitions that are either coincidental or causal is not supported by the findings of this investigation. Batting movements are apparently an unusual blend of behaviors, most of them (78.3%) mediated by conscious awareness but some are not mediated. Perhaps a fruitful line of inquiry would be to investigate the possibility of perceptual and motor "automaticity" in batting movements. That is, as Schneider and Shiffrin (1977) suggest, performance in perceptual learning passes from controlled processing (slow, serial, and requiring attention) to automatic processing (fast, parallel, and requiring no attention) (cf. Adams, 1987).

Despite the uncertainty in the etiology, structure, and maintenance of batting rituals, there is little dispute that they serve a useful and important purpose. Rituals may help to calm a player who is trying to accomplish something that is both difficult and dangerous. Batting is patently difficult because a batter who fails to hit successfully fewer than seven out of 10 attempts (and hence fails almost 70% of the time) is considered to be an outstanding hitter. Analysis of the physics of baseball by Adair (1990) and an analysis of the saccadic eye movements required in batting by Bahill and Laritz (1984) and Bahill and Stark (1979) strongly support the claim of Ted Williams (1970) that batting is the most difficult feat in all of sports. Batting is dangerous because when the pitched ball crosses the plate, it packs enough power (one-sixth of one horsepower-second) to lift a 100 pound weight almost 1 foot off the ground (Adair, 1990). Being hit by the ball is not only painful but has caused serious injuries such as shattered hands and faces, ended some playing careers, and, in a celebrated case, killed (Sowell, 1991).

Given the fact that batting is both dangerous and difficult, it is perhaps not surprising that players engage in superstition. This is the argument Gmelch (1971) used when he compared success in fielding to success in batting. That is, Gmelch hypothesized that activities with a high failure rate would be more strongly associated with superstitious behaviors than activities with a low failure rate. In Gmelch's view, superstition is an anxiety-reducing mechanism closely allied with difficult and uncertain activities. He found few superstitions associated with fielding, an activity filled with success (typically 98+%), but many superstitions associated with batting, an activity filled with considerably less success (typically less than 30%). It could be argued that the very nature of batting is perhaps ideally suited to the ready establishment of rituals. Batting consists of many, repeated trials in which movements by the batter are immediately followed by the arrival of the pitch and subsequent success or failure. As Tolman (1932) and Montpellier (1933) showed long ago, responses spatially or temporally near the reinforcement are learned more quickly than responses remote from the reinforcement.

During the interviews, the players were extremely reluctant to discuss their batting and prebatting rituals. Perhaps, the reluctance to talk about them was motivated by the belief Womack (1981) unearthed when she interviewed Ron Cey, the third baseman for the Los Angeles Dodgers. Cey said to talk about these behaviors would render them useless. When the players were asked whether a discussion of prebatting routines would rob them of their effectiveness, all the players who admitted to being superstitious answered affirmatively. None of these players would divulge their prebatting routines. It was only after they graduated and their playing careers came to an end would they discuss them. A recently graduated ex-player, whose playing number was a multiple of the number 3, described a minuscule portion of his elaborate prebatting ritual. In multiples of three, he would grip the bat in various ways, tap the bat against many objects in the dugout, and swing the bat in various ways as he approached the plate. Even though the players were not aware of some of their batting movements, they were obviously well-aware of their prebatting movements.

## *Causal Superstitions*

Turning to the issue of a belief in a causal connection between certain behaviors and influencing events, the author was presented with the paradox of rational individuals (university students) explicitly and repeatedly denying any such belief, yet continuing to behave as if there was one. Although it is logically absurd to deny causality and yet behave as if a connection existed, there may be a simple explanation. All the baseball players are highly competitive and the strong desire to win transforms the game into a stressful, uncertain event. Faced with stress and uncertainty, the players may suppress their normal judgment and logic in an attempt to gain *control* over the desired goal of being successful and winning the game. This is the basic argument investigators like Gmelch (1971), Womack (1981), and VanGinkel (1990) advanced when they quoted Malinowski (1954):

> . . . we find magic whenever the elements of chance and accident, and the emotional play between hope and fear, have a wide and extensive range. We do not find magic whenever the pursuit is certain, reliable, and well under *control* of rational methods. (p.116, italics added)

Milton (1994) said anthropologists have long observed that important activities with uncertain outcomes are invariably surrounded with magical practices. Because the players view the activities of batting and winning the game as important and uncertain, we would expect them to be surrounded with superstition and magical practices. Such practices offer the seductive possibility of control over events seemingly out of our control.

The claim that ballplayers act similarly to other individuals is strongly reinforced by the findings of the SBQ. Analysis of the data showed that but for two categories (self-rating as superstitious and belief in a lucky charm or object), the baseball players were indistinguishable from nonathletes. This is not surprising as there is no a priori reason to suggest that ballplayers would believe more strongly than other undergraduates in traditional indicators of superstitious belief. The players are recruited from around the nation and aside from their expertise as athletes, they are similar to other university undergraduates. The lack of any significant demographic differences between the players and other undergraduates supports this view.

The finding that baseball players rate themselves as highly superstitious may be another example of the self-fulfilling prophecy: Because all sectors of society (the media, the fans, and present and former players) describe them as being highly superstitious, the players may simply assume the description to be true and act accordingly. However, the author noted that during almost every game, one or more of the players would comment that luck (or fate, or kismet, or karma) plays a deciding role in who wins. When asked about this, the players admitted that skill and ability were certainly important, but since most of the time the two competing teams are approximately evenly matched, the final outcome was largely determined by luck. This is important because, from the viewpoint of the players, the desired goal of being successful and winning the game resides in the intangible and unpredictable domain of luck; a domain they perceive as being divorced from rationality and normal causality. Faced with irrationality and abnormal causality, the players turn to superstition and magical thinking as their only "logical" alternative.

Collegiate ballplayers have had nearly a lifetime of experience in coping with the vagaries of luck: All of them began their careers early, at around 5 or 6 years of age, and continued to play successfully at every increasing level of difficulty. Given this extensive experience, it is possible one of the reasons ballplayers engage in so much superstition is because they have had, and continue to have, myriad opportunities to do so. The fact that the large majority (63%) of the players who always engaged in superstition were either part-time or injured players and, hence, had ample opportunity to engage in superstition, supports this possibility. Also, another reason ballplayers engage in so much superstition is because baseball has a rich and public history of superstition. Baseball has shown a receptive, if not an openly supportive, tradition of superstition.

A significant finding from the SBQ was that ballplayers had a higher incidence of possessing a lucky object or charm. Upon investigation, these objects often turned out to be large (if not gaudy) gold numerals of their playing number worn (with a thick gold chain) around the neck. The few players who didn't indicate their playing number mentioned a religious medal. What is unusual is that the players thought of their gold playing number not as a number but as a lucky object or charm. When the players said they had a lucky number, it was one of the usual

numbers (either 7 or 11) widely reported as being lucky by the general population (Frazier, 1987; Jahoda, 1969).

An important finding of the present study was that the players' engagement in superstitious behavior was markedly asymmetric with respect to the score of the game. If a team was comfortably in the lead late in the game, displays of superstitious behavior were greatly reduced. It's as if in being comfortably ahead, there is no threat of losing and, in lacking a threat, there is no need to appeal to luck. But if a team was behind, or the outcome was in question, the players burst forth in displays of superstitious behavior. Of course, the reason the players who described themselves as nonsuperstitious displayed these behaviors at such times might be due to strong peer pressure and team loyalty. A player who did not display these behaviors when his team was losing might be viewed as disloyal and uncaring by his teammates.

The superstitious behaviors of ballplayers are not unusual: Placed in similar circumstances and given similar experiences, most people would act no differently. Although many baseball players are highly superstitious, do they deserve their reputation of being the most superstitious people in the world? In light of the present investigation, the answer to this question is a strong no. A perusal of the anthropological and psychological literature revealed a myriad of examples of people in widely disparate environments routinely engaging in superstitious behaviors (cf. Gibbs, 1994; Padgett & Jorgenson, 1982; Randi, 1993). To view baseball players as uniquely different from other individuals, and consequently as the greatest practitioners of superstitious activity, is to exhibit a striking lack of appreciation of the vast panoply of human experiences. Even a casual consideration of the experiences and history of baseball players leads to the conclusion that their superstitious activity is unremarkable, if not entirely understandable.

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# Appendix

## *Belief Questionnaire*

Instructions: Answer all questions and indicate the strength of your belief by picking a number from 1 (very weak) to 10 (very strong)

Age__ Sex__ Ethnicity _____ Parents income range_____
Frequency of attendance at

Religious affiliation_____ Religious service _____

_____

1. Do you have a lucky number? Yes__ No__ If yes, what is it?_____
2. Do you have a lucky object or charm? Yes__ No __ If yes, what is it?
   _____
3. Do you believe in a connection between the stars and human fate? Yes __ No __
   Indicate strength of belief (from 1 to 10): _____
4. Do you believe in ESP? Yes __ No __
   Indicate strength of belief (from 1 to 10 ): _____
   If you believe in ESP briefly describe what you believe:
   _____
5. Have you ever experienced an event *not* explainable by science? Yes __ No __
   If yes, please describe briefly: _____
   _____
6. Do you believe in an afterlife? Yes __ No __ Indicate strength of belief (from 1 to 10): ___.
7. Do you believe in Tarot cards? Yes __ No __ Indicate strength of belief (from 1 to 10): ___.
8. Do you believe in the I Ching? Yes __ No __ Indicate strength of belief (from 1 to 10): ___.
9. Indicate which mathematics and science courses you have taken in high school and college:
   Mathematics: _____
   Science: _____
10. Are you superstitious? Yes __ No __ Indicate strength of self-rating (from 1 to 10): ___.

11. When you were a young child did your parents (or siblings, or caretakers, etc.) tell you about superstitions? Yes __ No __
12. Are your parents superstitious? Yes __ No __ Indicate your estimate of the strength of their belief (from 1 to 10): ___
13. Do you believe in magic? Yes __ No __ Indicate strength of belief (from 1 to 10): __ If yes, briefly describe what you believe:

_____

_____

_____