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work together. However, this decision was not taken without reservations. Several months elapsed between the time the work with Tim ceased and his admission of being a magician. During this period I still had doubts as to whether Tim might have possessed genuine PK ability and had only resorted to fraud out of frustration at not being able to produce PK under controlled conditions.

With hindsight, these doubts seem surprising, given that I had discovered obviously fraudulent activity, had other evidence suggesting fraudulent behavior, and had no strong positive results. Why had I been willing to give Tim's PK ability the benefit of the doubt when the evidence was against doing so? In considering this question I discovered two aspects of my relationship with Tim that may have contributed to my apparent reluctance to recognize that Tim's claims were false. Firstly, I was biased towards liking Tim, both initially and as our relationship developed. Secondly, I was biased towards believing him. The factors that gave rise to these feelings are inherent in many experimental situations and thus may be of interest to other researchers.

In parapsychology it is generally regarded as advantageous to have a friendly and open rapport with one's subject(s). We want our subjects to feel comfortable, which includes wanting them to like us to some degree. If we perceive that we have been successful in this pursuit it seems a natural facet of human nature that we will, in turn, like them. This may be particularly true in macro-PK work, where a subject and researcher may work closely together for a relatively lengthy time. Researchers thus may feel that they have come to know their subjects well, and a genuine friendship may develop. Having a good rapport with subjects may be quite beneficial. A good researcher/subject relationship will not only make any investigation more pleasant for all concerned, but it may also be helpful in eliciting psi. But this should not blind researchers to the possibility that they may be more trusting of subjects whom they like or feel they know well than of other subjects.

Another facet of liking our subjects involves the fact that we need them. In most cases subjects will travel to research centers and give their time for little, if any, compensation. Thus, they are helping us with our work and we are indebted to them for doing so. In Tim's case, he devoted a great deal of his time to working with us and also had a relatively long journey to and from our lab. These things, particularly when combined with his very cooperative and friendly manner, may well have biased me towards liking him. This, in turn, may have colored my perspective in viewing his claims.

It is also possible that I was biased towards believing Tim. We are all familiar with the difficulties arising from the so-called "elusive nature of psi." In short, we cannot study a phenomenon unless we can first produce it. Thus, Tim's claims that he could produce macro-PK at will suggested exciting possibilities. I wanted his claims to be true, and this desire may have influenced my evaluation of his performance.

Fortunately, any biases that may have arisen from liking and believing my subject did not lead to any obvious errors in judgment --in this case. The criterion of accepting only evidence produced under thoroughly controlled conditions was used in all the work with Tim. Strict adherence to this criterion did not allow any judgmental errors caused by personal biases to arise. However, as researchers we should be aware of the possible occurrence of these biases to ensure that they are not allowed to influence our findings.

An unfortunate reality which parapsychological researchers must never forget is that we work in an area that will continue to attract those intent upon deception. Not only must we protect against fraudulent and/or misleading activity on our subjects' part, but also we must recognize that unintentionally we may contribute to our own deception. Only if we are aware of and guard against these factors will our field be able to advance unembarrassed by deceptions others may try to perpetrate.

FACTORS AFFECTING JUDGMENTS ABOUT THE OCCURRENCE OF PSI IN SPONTANEOUS SETTINGS

Caroline Dow (Dept. of Psychology, University of Edinburgh, 7 George Square, Edinburgh EH8 9JZ, Scotland)

This paper describes three areas of research in social and cognitive psychology concerning errors in everyday human judgment and decision making which may be relevant to the study of errors in decisions about the operation of psi in spontaneous settings. At their most general level, these decisions either take the form "psi has occurred" or, alternatively, "psi has not occurred." When somebody decides "I have witnessed psi" when in fact there is a normal explanation for their experience, we may call this a "false positive." Conversely, the conclusion "I have not witnessed psi" when in fact psi was in operation may be called a "false negative."

Attribution Theory: Objective Data Vs. Subjective Theories

Attribution theory studies how people decide what caused an event that they witnessed. It has often been described as the study of the causal explanations of the layperson. In fact, there

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is no single attribution theory but rather a disparate collection of theories. These traditional or classical theories in turn stimulated a vast amount of research, which dominated social psychology in the 1970s. One of the traditional theories, developed by Kelley (Nebraska Symposium on Motivation, 1967, 192-238), suggested that individuals rationally make use of objective information available to them when making judgments and inferences about their environment. In other words, attributions are data driven. Researchers have confirmed that individuals do indeed make causal attributions in this way, but only in certain very stylized situations where the objective information is presented to them in a clear-cut form. In more realistic settings, however, people have to extract data from a complex and continuous stream of information, and in these circumstances attributions are found to be theory driven rather than data driven. That is, when making judgments and inferences about their everyday environment, people tend to rely on their subjective beliefs about how the world works rather than on any objective information available to them on how the world actually works.

Research testing Kelley's ideas in realistic settings finds that people are generally unable to detect information about the covariation or correlation of events in their environment and do not make use of available base-rate information.

Concerning the detection of covariation information it has consistently been found that: individuals will see a covariation where there is none if they expect or believe two factors to correlate; individuals will not detect an unexpected but true covariation unless that covariation is extremely strong and there is no "distracting" information also at hand.

The situation is similar with base-rate information concerning the frequency of occurrence of any event or entity in some relevant population or some specific evidence about the event or entity currently under consideration. The findings of research based on attribution theory which examines people's utilization of base-rate information parallel those outlined above. That is, when making predictions or estimating probabilities, people tend not to make use of objective base-rate information. Instead, they rely on their intuitive predictions for the single "target" case with which they are particularly concerned.

Research in this field is useful in that it not only highlights people's inferential weaknesses but in some cases also suggests remedial measures. For example, S.M. Kassin (J. Personality and Social Psychology, 1979, 1966-1981) reviews measures proposed to increase individuals' utilization of base-rate information.

The Effects of Focus of Attention and Salience on Causal Attributions

This research, a spin-off from the early work in attribution theory, has found that actors and observers consistently differ in their explanations for the actor's behavior in that actors tend to say that the situation caused their behavior while observers say that something about the disposition of the actor caused that same behavior.

For parapsychologists, it is interesting to note the proposed explanation for the actor-observer effect: that causality will generally be attributed to the most salient feature of a person's environment. For actors, their attention is focused on the surrounding situation, while observers have their attention focused on the actor. Researchers have found that it is possible to reverse the usual actor-observer pattern of attributions by reversing actors' and observers' focus of attention. As Taylor and Fiske (Advances in Experimental Social Psychology, 1978, 249-288) note, these findings suggest that it is possible to alter perceptions of causality by altering an individual's focus of attention by manipulating which aspects of the environment are salient to that person. Perhaps this is another mechanism through which individuals may reach mistaken conclusions about the operation of psi in spontaneous settings.

The Cognition-Motivation Debate

A third area of psychological research which may be relevant to the examination of false-positive and false-negative conclusions about the occurrence of psi concerns the question of what causes people's judgmental errors. Generally, researchers fall into two schools of opinion on this subject: that judgmental errors derive from the individual's drives, needs, desires--motivations, in other words--or that errors result from the use of generally adaptive information-processing strategies.

Proposed motivational influences. Researchers taking this line are concerned with the possible psychological functions of attributions. Firstly, it has been suggested that people are motivated to explain their environment in ways that protect or enhance their self-esteem. Secondly, to take account of the social context of many judgments, it has been suggested that people's declarations of what caused an event may be made with the aim of presenting a creditable face to observers--that is, attributions serve a self-presentation function. A third proposed motivational influence on attributions is the need for effective control over the environment, where people attribute the causes of events in their environment to controllable factors, hence satisfying their need to have a sense of control over their circumstances.

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Proposed information-processing influences. The alternative side to this debate suggests that errors are caused by generally adaptive information-processing styles and short-cuts. This research has spread from the attributional field into that of human judgment and decision making in the more general sense. Researchers have pointed out many weaknesses in human cognition, but this paper describes only three which have been highlighted by D. Kahneman and A. Tversky (Psychological Review, 1973, 237-251). This is because these three information-processing factors may represent the more general processes that underlie many more specific cognitive errors.

Kahneman and Tversky suggest that people habitually use certain cognitive short-cuts to make their decisions and judgments quickly and effectively. Generally these strategies, or heuristics, are effective, but their use may also lead to errors. The first of these heuristics is termed judgment by availability, where people's judgments about the relative frequency of objects or the likelihood of events may be influenced by the relative availability of these objects or events, availability referring to the accessibility of items in perception, memory, or imagination. The second heuristic is termed judgment by representativeness or similarity, where an individual's judgment of the probability that two events are related depends very much on the degree to which these events have features that are similar to each other. The final information-processing strategy which can lead to errors is judgment by anchoring and adjustment. Here, individuals are said to make judgments by starting with an initial value or position which is then insufficiently adjusted to account for new incoming information--this is one way in which erroneous beliefs may be maintained even in the face of disconfirming information.

Conclusions

This paper describes three areas of cognitive social psychological research that bear on the question of errors in everyday human judgment and inference and consequently on the examination of errors in conclusions about the occurrence of psi in spontaneous settings. The research described does not as yet form any coherent theory of human error and indeed, may not be new to parapsychologists. However, this paper is intended to serve three functions: (1) to integrate some findings of relevance to parapsychology and present them in a way that shows their context within psychological research on human judgmental error; (2) to inform or remind parapsychologists of the various ways in which false-positive or false-negative conclusions about the occurrence of psi may be reached, which may help in eventually identifying mistaken conclusions about the operation of psi and consequently enhancing the quality of data on the occurrence of psi; and (3) to stress that while there is some emphasis in parapsychology on mistaken

conclusions that psi has occurred, psychological research on human error logically cuts both ways, and can aid in the identification of false-positive and false-negative conclusions about the occurrence of psi.

ANOMALOUS HUMAN-COMPUTER INTERACTION (AHCI): TOWARDS AN UNDERSTANDING OF WHAT CONSTITUTES AN ANOMALY (OR, HOW TO MAKE FRIENDS AND INFLUENCE COMPUTERS)

K. Morgan (Dept. of Psychology, University of Edinburgh, 7 George Square, Edinburgh EH8 9JZ, Scotland)

This paper is an attempt to clarify in what manner a genuine anomaly can be distinguished from an incident explicable by known physical means. It also tries to exemplify the various methods that could be used to simulate an anomalous human-computer interaction (AHCI). This paper does not dwell in any more than a superficial manner upon the psychology involved in manipulating observers which would allow the described physical strategies to be carried out. That would demand a paper in its own right.

Part of the research being carried out at the Koestler Chair and other institutions is the investigation of anomalous human-computer interaction. As with any area of parapsychological research there always exists the danger of the researcher mistaking a normally explicable phenomenon as an anomaly. This paper was written to help people who are confronted by an unusual happening on a computer to evaluate the situation and to be aware of the possibility of there being normal methods of simulating almost any anomaly.

The various categories into which both simulated and genuine anomalies could fall can be separated into the following:

(1) Human. The majority of so-called anomalies might be found to be caused by the users' ignorance of their own computer system or aspects of it. This, coupled with the human trait of forcing unconnected events into meaningful patterns, might explain many anomalies.

(2) Software Anomaly. The methods of achieving the simulation of a software (nonhardware-based) anomaly can be broken down into the following categories:

(a) Replacement of the target program. The target program or process is exchanged for an amended version that contains the extra "feature" that will become the "anomaly."

Approved For Release 2000/08/15 : CIA-RDP96-00792R000701040006-0