

standing can be achieved in many other areas through use of these human judgment techniques.

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The Social Psychologist as Troll

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Once on a time there were three billy goats who were to go up to the hillside to make themselves fat, and the name of all three was "Gruff."

So starts the well-known folk tale (Asbjörnsen & Moe, 1957) of the Great Ugly Troll who kept threatening to devour successively larger and fatter Billy Goats as they crossed his bridge. However, each goat managed to convince the Troll that deferred gratification held greater rewards than immediate consumption.

"Oh, no! pray don't take me. I'm too little, that I am," said the Billy Goat. "Wait a bit till the second Billy Goat Gruff comes. He's much bigger."

"Well, be off with you," said the Troll.

And he waited for a bigger Billy Goat.

In attempting to create a framework in which to place the chapters presented in this volume, it occurred to me that over the past two decades, social psychology has been behaving a bit like our Troll, waiting to dispatch increasingly formidable problems but readily convinced that the next problem, the really big one, was the one to aim for and thus letting the present one slip away.

What does it mean to imply that the early problems were the easy ones? Let me give a few examples. Some of the most famous social psychological investigations of the 1950s were Asch's studies of group pressures toward conformity in decision making (Asch, 1956). What decision faced the subject? He had to decide which of three lines was the longest. Recall that Asch varied many things in his studies, such as the discriminability of the lines, the unanimity of the other "judges" (actually stooges giving the wrong answers), but the basic decision remained the same. What were the consequences of this decision for the decision maker or for others? Precisely nil. Other studies of the time had a similarly minor effect on the subsequent fate of the decision maker. For example, a major effort in social psychology was directed toward the study of

attitudes. Almost everything that social psychology discovered about attitudes came from choice situations in which the decision maker had to decide which of several statements best fitted his own view of the world.

Now consider the decisions facing the various subjects studied in the papers presented here. Staelin and Payne (Chapter 12) describe real consumers deciding how to spend their money on real products, products with which they must live after they make their choice. Shanteau and Nagy (Chapter 14) describe college students attempting to decide with whom to try to get a date. They report that their subjects took the game quite seriously, not surprisingly, as dating choices loom so large in the life of college students. Berl, Lewis, and Morrison (Chapter 13) report on data collected during what was probably the most important decision yet made in the life of their subjects: college choice. And Slovic, Fischhoff, and Lichtenstein (Chapter 11) describe some of the difficulties that face those attempting to make profoundly important decisions involving such public policy issues as nuclear energy development, disaster insurance, and auto-safety standards. (Other chapters in this volume continue the list of important and tough problems, e.g., Dawes on clinical judgement and Carroll and Payne on parole decisions, but I shall confine my specific comments to the four chapters in this section of the book.)

What are some of the characteristics of these problems that make them much harder—for both the decision maker and the social psychologist—than the kinds of problems studied earlier? What makes them bigger Billy Goats? I shall attempt to sketch an answer along three dimensions: the processing requirements of the tasks, the analytic tools used by the social psychologist to understand the phenomena, and the consequences of the decision for the decision maker.

PROCESSING REQUIREMENTS

Current cognitive theories of human problem solving place much of the explanation for the problem solver's behavior on the characteristics of the task environment. The more complex that environment is, then the more complex must be the behavior of the problem solver. For example, if the task environment includes as one of its central elements other complex problem solvers—e.g., humans—then the problem increases greatly in complexity. We have several ways to model the behavior of humans in these kinds of complex situations. If the other complex entity in the decision maker's task behaves with any regularity at all, then we can invoke probabilistic models. If the other entity is also directly involved in the decision, then we can utilize the tools of game theory. However, these are the analyst's tools, not those utilized by the decision maker. Indeed, the main point of the chapter by Slovic and co-workers (and Dawes', too) is that humans are unable to correctly utilize these tools in dealing with complex problems.

What do they do? Slovic and associates say they use a variety of heuristics: availability, representativeness, hindsight, coherence, justification. Citing their own work, and that of others, they demonstrate some of the remarkably incorrect ways that people go about making decisions. Unfortunately, we do not yet know much about how these heuristics are supposed to combine or interact. It is still hard to decide, a priori, whether people are going to over- or underadjust to sample information. Similarly, we do not know whether they use "anchoring and adjustment" as Lichtenstein and Slovic (1971, 1973) have found, or whether they become conservative Bayesians, as Edwards (1968) appears to consistently find. Does the gambler's fallacy prevail, after a flood, so that people, believing that the worst is unlikely to recur in the immediate future, return to the flood plain? Or do they invoke availability, and, conjuring up a flood equivalent to the one that has just receded, take to the hills?

The difficulty here is that these heuristics do not appear to be the same kind of thing as the heuristics found in other studies of problem solving. Simon (1957) proposed satisficing as one such heuristic in decision-making tasks, and Newell and Simon (1972) listed such things as means-end analysis, depth-first search, and factorization as strategies subjects used to deal with their limited capacity. However, the heuristics of Slovic and others in his lab seem more like labels for paradigms intentionally concocted to elicit maladaptive behavior. They do not seem like shortcuts with a reasonably high probability of success. Instead, they are "cognitive illusions" similar to perceptual illusions; compelling even when we know of their existence and can explain their source. Furthermore, with respect to the cases where there is an optimal statistical procedure for reaching a decision, there is no a priori reason to expect people to know it. As one of my students (Henrion, 1975) commented in his written reaction to this symposium:

It seems somewhat ingenuous to find people's ignorance of these laws at all surprising.¹ Quite the contrary, it should be more surprising if it were found that people had a precise intuitive grasp of a body of mathematics which was only formally developed in recent centuries and whose principles are only communicated with difficulty at institutions of higher learning. [p. 9]

How does a high-school senior choose a college? This task also places great demands on the processor, but not at all in the way that Berl, Lewis, and Morrison (Chapter 13) characterize it. Their focus is on "nonroutine" decision making, but their analysis, based on which of several models is the best, tells us nothing about why nonroutine decisions should differ from routine ones. Is limited capacity really a problem here? After all, their subjects had over 30

¹Perhaps "ingenuous" is too strong. I believe that Slovic and his colleagues at Oregon are truly puzzled by human stupidity. It probably derives from their observation that many of the world's people choose to live in places other than Oregon, a fact that Oregonians seem at a loss to explain.

weeks to compute some decision function. I believe that the difficulty of this decision—and I do not deny its difficulty—lies at a higher level, in the choice of a decision rule. This seems to be the most important characteristic of nonroutine problems: We do not know which programs to invoke to solve them. In some cases the problem then becomes the construction of a solution procedure. In the college choice case, that does not appear problematic. Indeed, the high-school students probably could have been taught about each of the models considered by the authors, and they could have been trained in how to crank alternative colleges through several different decision models. However, there is no obvious way to decide which of those models apply to the data. That is, there is no higher level decision rule about how to choose decision rules. Although Berl and co-workers are reluctant to accept their own results, it appears that in the end their subjects chose the conceptually simplest model—linear additive—and used that to make their choices.

One of the initial requirements for a problem solver is the creation of a problem representation. Once constructed, this representation profoundly affects subsequent performance. The creation of a problem representation is itself a major subproblem to be solved in many decision situations. Cognitive psychologists have been studying this aspect of problem solving for many years (remember functional fixedness [Duncker, 1945]?) recently utilizing some sophisticated approaches (Simon & Hayes, 1975). The chapters in this volume show that social psychologists have begun to directly address this issue, but in other guises. For example, Shanteau and Nagy (Chapter 14) have added to our knowledge of problem representations in their dating study. The only difference between what they call integration functions and inference functions is that in one case the experimenter gets further into the act by explicitly defining probabilities of rejection, whereas in the other it is the subject who makes such estimates (“inference” seems an inappropriate term). Similarly, Slovic’s discussion of anchoring and adjustment, and the inequivalence of preference vs. bidding, are examples of the effect of initial representation on problem-solving performance.

ANALYTIC TOOLS

We know little about the weaponry of the Troll in our tale. In fact, all we know about him is that he had “eyes as big as saucers and a nose as long as a poker.” Not really very potent, but then neither were the tools of the early social psychologists. However, in the past several years we have seen a progression of increasingly sophisticated and powerful analytic tools in the use of social psychologists. Multivariate statistical analysis and game-theoretic approaches have become widespread in the attempt to build models that capture the complexity of the phenomena under investigation. In the chapters in this volume, we see the beginnings of the utilization of perhaps the most powerful

and complex technology yet developed in the behavioral sciences: the use of what can be broadly classified as an “information-processing approach.”

There are many variants of this approach in the area of cognitive psychology, but they all share some common characteristics. First, they postulate a basic system architecture for the human information processor, or at least the part of it under investigation. This architecture is constrained by the parameter estimates obtained from the experimental labs concerned with basic processes. Next, in dealing with any task environment, they attempt to explicitly account for the internal task representation with which the problem solver must deal. In some cases, this representation is the sole focus of investigation, e.g., in studies of semantic memory (Anderson & Bower, 1973; Bobrow & Collins, 1975; Norman, Rumelhart, & Group, 1975). As noted above, this task representation can often be the major determinant of behavior. Then, the theories of performance in any task domain are stated. Because these theories are typically rule systems, the implications of which require many inferential steps, the models are stated in a formal language that can be interpreted by a computer program, in order to precisely set forth the predictions of the model.

If social psychology is to benefit as much from this paradigm as cognitive psychology has, it must do more than import the information-processing terminology and metaphor. It must also import, and creatively adapt to its needs, the powerful technology to which it often just alludes.

CONSEQUENCES OF DECIDING

What happens after the decision? In particular, what happens to the people and the things with which the decision maker is subsequently to interact? This is the third factor that I think justifies the view that social psychology is currently concerned about much harder problems than those studied in the past.

No Consequences

It is hard to imagine that Asch’s subjects ever encountered any consequences subsequent to their decisions. Similarly, for all of its purported predictive validity with respect to actual behavior, the immense amount of attitude testing that obsessed social psychology for many years had no immediate or obvious interactional consequence for the decision maker.

Consequences for Others

Many decisions made by one person have direct and intentional consequences for others, but not for the decision maker. The best example in this book is the parole decision, but many personnel, clinical, and admissions decisions have this property. The decision maker in these kinds of situations is attempting to make

some kind of optimal allocation of people to situations, but he need not involve himself in the consequences of the decision. Although the alternatives being considered are extremely complex and dynamic systems, they may for purposes of the decision be considered in the same way as any complex object. The important point is not whether decisions are "about people," as Shanteau and Nagy describe their focus, but whether the decisions are about future interaction with those people.

Consequences for the Decision Maker

When I choose a date, I must live with the consequences of that choice. When I buy a car, or a house, or a box of rice, I must deal with what I have chosen. When I choose a college, I must go there. The bearing of consequence is a fundamental aspect of many of the problems now being studied by social psychologists and it gives the problems a character that is completely lacking from simpler situations.

The public policy issues addressed by Slovic provide the best example of the subsequent consequences of decision making for the decision maker. The issues at stake are so pervasive that no one can escape their consequences, whether for good or evil. The policy makers must ultimately lie in the bed they make. If nuclear power can harm us, it can harm them; if regulatory agencies waste our money, they waste theirs also. If price controls help or hurt us, they help or hurt them as well.

Slovic and associates present an alarmingly lucid summary of the kinds of decisions that policy makers are being asked to explicitly make. It may have escaped the reader's notice, but the closing sections of their chapter ask: "What are the cognitive processes whereby a person decides the value of a human life, either his own or others'?" Clearly, such decisions have always been made in less explicit forms, but now social psychology is beginning to investigate precisely how. What question could be more central to the survival of the human race?

CONCLUSION

As the research in this volume attests, the Great Troll of social psychology now stands ready to deftly dispatch the Biggest Billy Goat of All: "Real Problems." He is armed with an array of formidable tools, ranging from multivariate statistical analysis to computer simulation. Being no great friend of Billy Goats, I admit that I am on the side of the Troll (although my children may be horrified to discover my true allegiance). However, I must remind the reader of two things about our tale. First of all, the Troll let the little ones get away in his lust for the big payoff. That was a shame, for the little goats would have been easily conquered. Instead they got off scot free, and to what avail? The story, as you

may recall, ends like this (Asbjörnsen & Moe, 1957):

"Now, I'm coming to gobble you up!" roared the Troll [to the biggest Billy Goat of all.]

"Well, come along!" [said Big Bill.] "I've got two spears,
And I'll poke your eyeballs out at your ears.

I've got besides two great big stones,
And I'll crush you to bits, body and bones." [p. 25]

That is what the Billy Goat said, and that was what he did. He finished off the Troll, and tossed him into the river. Of course, that was just a fable.

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