Responsibility for accidents: an information-processing analysis.

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Responsibility For Accidents:
An Information-Processing Analysis

A Thesis
By
Daniel P. Blyth

Submitted to the Graduate School of the
University of Massachusetts in
partial fulfillment of the requirements for the degree of

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Responsibility For Accidents:
An Information-Processing Analysis

A Thesis

By

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Abstract

To explain attributions of responsibility for accidents, an information processing model was proposed as an alternative to the "defensive hypothesis". According to this alternative model, the predictability of harmful consequences and not the severity of obtained outcomes is the single most important determinant of the extent of attributed responsibility. To simultaneously test the predictions of both the defensive hypothesis and the information processing model, subjects read brief accounts of situations in which the prior probability of an accident and the severity of obtained consequences was orthogonally varied. Subjects were then asked to assign responsibility to the actors described in each story. Results were consistent with the predictions of the alternative model but showed no support for the defensive hypothesis. These data suggest that the information processing approach, which emphasizes the estimated prior predictability of harm, provides an interpretive framework for analyzing attributional judgments without relying on defensive interpretations.
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The general theory behind the attribution of responsibility to other people for their behaviors and outcomes has evolved from Heider's (1958) "naive analysis of action" which describes the process by which individuals infer causality for events. According to this analysis, the average man acts like an amateur scientist to test the plausibility of various causal explanations for events. While this process is orderly and "scientific" (Kelley, 1967), it alone cannot predict the attributions made to others. The more fundamental determinant of assignments of responsibility, according to Heider, is the particular interpretation of the term "responsibility" the observer chooses to adopt.

Heider (1958, Chapter 4) suggested that there are five distinct ways of interpreting responsibility. The first three of these ways involve unintentional outcomes, while the last two pertain to intentional consequences. At the most primitive level (Association), a person is held responsible for any action that is merely connected with him. At the second level (Commission), the person is viewed as responsible for any action he causes, even though he could not have foreseen the consequences of his actions. At the third level (Foreseeability), one is held responsible only for those consequences he should have foreseen. At the fourth level (Intentionality), a person is responsible only for those effects he foresaw and intended. At the
final level (Justification), a person is excused from responsibility even for consequences he intended if the circumstances were such that anyone would have acted as he did. Heider suggests there is a developmental progression through these five levels from primitive attributions which ignore intentions to more differentiated attributions which take into account several factors in the situation, including the intentions of the actor. These levels were thought to correspond, in part, to Piaget's stages of moral development; nevertheless, Heider recognized that even mature adults often make primitive attributions. To account for these, he suggested that the selection of a causal attribution can be influenced by motivational biases of the observer.

Recently, considerable interest has been directed to the motivational biases in attributions to which Heider referred. Level 2 (Commission) and Level 3 (Foreseeability) have been the focal point of this interest because the specification of levels of attributions makes it clear that assignments of responsibility are very dependent upon the extent to which the actor is viewed as having foreseen, or having the ability to foresee, the consequences of his action. From these empirical investigations the theory of defensive attribution has emerged as one of the most influential explanations of the process by which assignments of responsibility are made.
Walster's 1966 experiment was the first and the most influential of many attempts to test the assumption that attributions of responsibility are affected by observers' self-interests. Walster hypothesized that the need to assign responsibility for an accident increases with its severity. In her study, subjects were presented with the description of an accident in which a person's unattended car rolls down a hill because of a mechanical failure of the brakes. Subjects were asked to indicate the extent to which the car's owner was responsible for the accident. Consistent with her predictions, Walster found that more personal responsibility was attributed as the accidental consequences of the mishap became more serious. Walster interpreted this finding as evidencing a motivated bias in attributions. According to this interpretation, the realization that chance happenings can occur over which one has no control is threatening. Consequently, a person will protect himself from acknowledging that he too could be involved in such an unfortunate event by attributing more personal responsibility to the actor in a serious accident.

Other researchers (McKillip, 1972; Shaver, 1970a, 1970b; Shaver and Carroll, 1970) have extended the defensive hypothesis to suggest that attributed responsibility is affected by the relevance of the situation and the similarity between actor and observer. According to their reasoning, the observer's need to deny that he too could be
held responsible for a similar accident is achieved by assigning less responsibility to actors in relevant situations as outcomes become more serious. This tendency is enhanced when the perpetrator is similar to the observer.

Reported results, however, have not provided unequivocal support for this defensive interpretation. In Walster's original study, the obtained difference between attributions of responsibility when the accident resulted in mild damage to the car and when bystanders were severely injured by the rolling car was not significant for female subjects. Furthermore, assignments of responsibility were similar when the car was destroyed (moderate consequence) and when bystanders were injured (a relatively more severe consequence). The other investigations of motivated biases in attributions have also not supported the defensive interpretation, and replications of Walster's study have generally failed to show consistent effects of severity on attributions of responsibility (Crinklaw and Vidmar, 1971; Shaver, 1970a, 1970b; Shaw and Skolnick, 1971; Stokols and Schopler, 1973; Walster, 1967).

Methodological Inconsistencies in Previous Research

The inconsistent and often conflicting results may reflect methodological inconsistencies which obscure the relationship between attributed responsibility and outcome severity. Medway and Lowe (1975), for example, suggest that the unsuc-
cessful replications of Walster's results may have been due in part to the absence of theoretical prerequisites necessary for the occurrence of defensive attributions. Because several of the above studies manipulated improbable outcomes in atypical circumstances, the criterion of high subject involvement (Heider, 1958; Jones and Davis, 1965) may not have been satisfied. Citing some empirical evidence (Shaver, 1970a; Chaikin and Darley, 1973) suggesting that identification or perceived similarity with the harm-doer reduces blaming responses from observers, Ross and DiTecco (1975) argue that inconsistencies in empathy inducing instructions or perceived similarity manipulations may also account for some of the conflicting results. Similarly, Vidmar and Crinklaw (1974) contend that many of the experiments on attribution of responsibility operationally created "inferential sets" (Jones and Thibaut, 1958) which were inappropriate in tests of defensive attributions.

Fishbein and Ajzen (1973) have suggested that the conflicting results in these studies may be due to subjects' uncertainty about the response required of them. According to Fishbein and Ajzen, two dimensions or factors underlie Heider's levels of responsibility. The first factor is the developmental or response level of the observer. The second is the behavioral context in which the action occurs. Assignment of responsibility is a joint function of both
these factors such that when the response level of the judgment is specified (as it is by the judge in jury trials) the observer must examine the behavioral context in order to attribute responsibility. Alternatively, when the contextual level is specified, the response level is determined solely by the observer (Shaw and Reitan, 1969; Shaw and Sulzer, 1964). Fishbein and Ajzen (1973) argue that the inconclusive results of most studies dealing with the attribution of responsibility are not surprising since neither the response level nor the contextual level of the judgments has been specified for the subjects. Because subjects are given no instructions, their decisions about responsibility may involve any of the five response levels and unpredictable results between studies are to be expected.

Fishbein and Ajzen's criticisms point out again the ambiguity of dependent measures of responsibility. In his analysis, Heider emphasized that perceptions of responsibility were fundamentally moral judgments. Many of the attribution studies used dependent measures which could be interpreted as indices of legal responsibility (Crinklaw and Vidmar, 1971; Shaver, 1970a, 1970b; Walster, 1966). While laws supposedly reflect moral codes, legal responsibility and moral responsibility are not always equivalent. In empirical investigations it is necessary to ensure that dependent measures reflect subjects' judgments of the actor's moral responsibility and not simply their knowledge of legal
sanctions. For example, in Walster's (1966) original study subjects were presented with a taped description of a stimulus person and of the accident which involved his car. The car rolled down a hill because the brake cable broke. Walster's prediction, partially confirmed by the obtained results, was that subjects would attribute more responsibility when the consequences of the accident were serious rather than minor, even though the car's owner had no control over the severity of the accident. Walster interpreted these findings as evidence for ego-motivated biases in the attribution process.

However, the same finding is explainable by assuming that subjects understand that legal liability, and compensation demanded for negligent conduct, increases as the extent of the damage incurred increases. Both morally and legally one is responsible for any consequences which accrue because of his irresponsible act. In Walster's study, subjects perhaps judged the stimulus person negligent for operating a vehicle with defective brakes. He is therefore responsible for any consequences which occur because of defective brakes. Legal compensation, but not necessarily moral responsibility, increase with the severity of the accident. A confounding of moral culpability and legal liability in measures of responsibility is illustrated by other findings reported by Walster (1966). Although "responsibility" increased with severity, greater
carelessness of behavior prior to the accident was not attributed to the stimulus person as the outcome of the accident became more serious. Thus, the failure to employ dependent measures which precisely distinguish moral from legal definitions of responsibility may be another problem which accounts for some of the discrepancies in reported results. Moreover, since the positive relationship between severity of consequences and attributed responsibility is predicted both by legal codes and by the defensive hypothesis, empirical findings in accordance with Walster's interpretation may be open to alternative explanations. Such findings may simply reflect, if imprecise measures are employed, subjects' knowledge of legal norms, rather than a defensive reaction on their part.

While it may be that inconsistent results may reflect methodological inconsistencies, the conflicting results also tend to cast doubt upon the validity of the defensive hypothesis itself. The model proposed here rests upon the assumption that observers are fairly rational processors of available information and that their attributions of personal responsibility are not systematically distorted by motivational or emotional biases.

A Rational Model of Attributions of Responsibility

Heider (1958) defined attributions of responsibility as moral judgments. If a person is to be evaluated as morally good or bad, his behavior must be assessed against
some standard of conduct. The standards which dictate appropriate behaviors in situations have, according to Heider, two characteristics: Different people should perceive the same demands in a given situation, and, demands should manifest themselves across situations. These two characteristics of moral standards, consensual validity and cross-situational consistency, represent the major criteria for any external or "objective" attribution (Heider, 1958; Kelley, 1971). It is not surprising, therefore, that moral standards often take on the quality of objective reality rather than simply subjective perceptions on the part of observers.

The consistency manifested in moral judgments (most adults can agree whether an action in a particular situation is morally correct) suggests that there are situational parameters which are taken into account by observers to guide their judgments. The defensive interpretation implies that the important parameters are a) the severity of obtained consequences, b) the relevance of the situation, and, c) the perceived similarity between actor and observer. In contrast, the model proposed here argues that quite different parameters are important. According to this formulation, the assignment of responsibility to a harmdoer is the result of a chain of rational judgments which begins with a consideration of the behavior itself, and is largely independent of the severity of any consequences which actually ensues because of that behavior.
Judging a person as "responsible" for an accident means that he has behaved "irresponsibly". That is, the necessary condition for the attribution of personal "responsibility" to an actor is the attribution of "irresponsibility" to his action. Furthermore, acts can be judged as responsible or irresponsible regardless of or prior to their actual outcomes. For example, most observers would probably agree that driving at night without headlights is an irresponsible act. Their judgments about this act do not depend upon or necessitate the observation of a subsequent accident. This ability to judge acts, independent of their consequences, suggests that there are parameters of the behavior, in the context in which it occurs, which define its responsibility or irresponsibility. According to the reasoning proposed here, these same parameters, in turn, greatly influence the extent of personal responsibility assigned to an actor. Whereas the defensive hypothesis supposes that the predominant contributor to attributional judgments of this kind is the severity of obtained outcomes, this model argues that outcome severity itself plays a negligible part in the ascription of moral responsibility.

An Expected-Value Analysis of Behaviors

Any action may be viewed as having a number of foreseeable consequences, each of which has a probability of
occurrence and a valence or value (cf., Edwards, 1954).
The irresponsibility of an action can be defined and calculated as the total expected value of the anticipated outcomes associated with that act. With respect to accidental outcomes, the specific concern of this study, an action has a probability of leading to an accident (negatively valued consequence), as well as a probability of producing intended outcomes (positively valued consequences).

In other words, an action has a probability of the occurrence of an accident, \( p(a) \), and a probability of its non-occurrence, \( p(\bar{a}) \). The valence or value (\( v \)) of the accident is defined by the probabilities and valences of subsequent outcomes which are contingent upon the occurrence of the accident. For example, the expected value of building a house near a river involves an initial estimate of the probability that the river will flood. The valence of that accident is defined by the probabilities and severities of the outcomes which may occur if the river floods (e.g., the destruction of the house and/or injury to the family).

The irresponsibility and general evaluation of the behavior can thus be defined as follows:

Total expected-value of a behavior = \( p(a) \ v(a) + p(\bar{a}) \ v(\bar{a}) \)

where:

\[ p(a) = \text{probability of the accident, as anticipated by an observer} \]
\[ p(\bar{a}) = \text{probability that no accident will occur} \]
\[ v(a) = \text{value of the accident, as anticipated by an observer} \]

\[ v(\bar{a}) = \text{value of the non-occurrence of the accident} \]

The value of the accident, \( v(a) \), can be further defined in terms of the probabilities and valences of consequences which are contingent upon the occurrence of the accident:

\[
v(a) = \sum_{i=1}^{n} p(O_i) v(o_i)
\]

where:

\[ p(O_i) = \text{probability of the contingent outcomes} \]
\[ v(o_i) = \text{valence or severity of those outcomes} \]

Similarly, the value of the non-occurrence of the accident can be specified in terms of the probabilities and values of the intended positive outcomes which are anticipated from the behavior.

According to this model, the first judgment in the attribution process is about the irresponsibility of the act itself, where irresponsibility can be defined in expected-value terms. The expected-value formula suggests that an actor will be held morally responsible for his conduct if the expected-value of the occurrence of an accident is greater than the expected-value of its non-occurrence; i.e., when the total expected-value of the behavior is negative. Since the formula uses expected likelihoods, it implies
that an actor will be excused from responsibility if the outcomes produced by his act were, from the observer's point of view, truly accidental; i.e., could not have reasonably been foreseen. For the same reason, the model conforms to the common observation that responsibility can be assigned or excused regardless of the actual outcomes which occur. Since the probability of the accident is of central importance in the evaluations of behaviors, an actor may be judged to have behaved irresponsibly when his action had a high prior probability of producing negative effects even if the actual consequences of that behavior were positive.

Probabilistic Bias in Attributional Judgments

Since, according to this model, judgments of moral responsibility are based, in part, on probability judgments, the attribution process may be influenced by the biases found to be associated with probability judgments. One such bias which seems to be particularly relevant for attributions of responsibility was reported by Fischhoff (1975). His results show that knowledge that a specific outcome has already occurred increases the postdicted likelihood of that outcome. Fischhoff refers to this tendency to perceive reported outcomes as having been more inevitable as "creeping determinism" (p. 288). Perhaps creeping determinism plays a part in assignments of responsibility. If events which occur are perceived, a posteriori,
to have been more likely simply because they occurred, more responsibility may be attributed to an actor because, retrospectively, he should have foreseen the likelihood of the accident. In terms of this discussion, hindsight may mediate the assignment of responsibility by revising prior odds of occurrences of events. For example, if an accident is known to have occurred, the prior probability of the accident may be postdictively increased as the prior probability of the accident's non-occurrence is decreased. From the expected-value formula it can be seen that such revisions in probabilities decrease the total expected-value of the behavior and may thereby mediate the extent of attributed responsibility. It should be noted that while this tendency to regard actual outcomes as more inevitable once they have occurred represents a bias in the attribution process, it is a probabilistic, rather than an ego-motivated or defensive, bias.

**Effect of Severity of Obtained Consequences**

It is important to note that the parameters included in the expected-value analysis refer to potential, rather than actual, events. This information processing model argues that the extent of personal responsibility assigned to an actor is determined primarily by the extent to which his act was judged irresponsible. The model also assumes that a judgment of an act's irresponsibility can be made on
the basis of the potential outcomes of the behavior, as anticipated by an observer, and does not depend upon whatever outcomes actually occur. For this reason, the proposed model, in contrast to the defensive hypothesis, suggests that the severity of actually obtained consequences does not appreciably influence the attribution of responsibility. However, if the creeping determinism effect occurs, the severity of obtained consequences may indirectly influence the extent of personal culpability assigned to the actor.

Consider the simplest case in which an accident can produce either of two mutually exclusive outcomes, one mild and the other severe. Knowing that the accident occurred and resulted in one of the two outcomes may lead to retrospective increases in both the probability of the accident and the probability of the obtained outcome. Since the revised probability estimate is weighted by a severity/value factor, and since the severity of the serious consequence is, by definition, greater (more negative) than that of the mild outcome, the expected value of behaviors which result in severe consequences may be lower than the expected value of acts which produce mild outcomes. Because, according to this analysis, the extent of attributed personal responsibility is based, in part, on the expected value of the behavior, more responsibility may therefore be assigned to actors whose behavior produces serious
consequences. While this information processing model, like the defensive hypothesis, might therefore predict greater responsibility assigned for severe than for mild consequences, the reasoning behind the prediction is fundamentally different in the two models. This analysis suggests that the severity effect obtains because of revisions in the probabilities of outcomes and not because of the severity, per se, of those outcomes. The severity effect, therefore, need not be interpreted as a manifestation of observers' defensive tendencies.

Summary

A summary of the main points and predictions of this alternative model may be helpful. The attribution of personal responsibility to an actor is postulated to begin with and thus to correlate with the attribution of irresponsibility to his action. Personal responsibility; i.e., moral culpability, is attributed to actors who engage in irresponsible acts. Judgments about the irresponsibility of one's behavior may be part of a general subjective evaluation of the action in the context in which it occurs, but they can be defined in expected-value terms. According to an expected-value analysis, an act is irresponsible if the expected value of the occurrence of an accident, given the behavior, is greater than the expected value of its non-occurrence. Thus, both the general evaluation of the act
and the extent to which it is deemed irresponsible are predicted to correlate with its expected value.

The attribution of irresponsibility to an act and the attribution of responsibility to an actor are assumed to be related because both are predicted to be influenced by the same parameter, the probability that the actor's conduct will lead to or produce an accident.

The defensive hypothesis predicts that the severity of obtained consequences significantly affects the extent of attributed responsibility to actors. In contrast, this model predicts that severity of actual outcomes influences neither the attributions made to acts nor to actors except indirectly when the creeping determinism effect produces postdictive increases in the probabilities of obtained consequences.

A secondary interest of this study concerns Fischhoff's notion of "creeping determinism". His findings suggest that observer's knowledge that an accident has already occurred will increase the postdicted likelihood of the occurrence of the accident as well as the likelihood of the contingent outcome which ensues. If this retrospective revision in probabilities were to obtain, it would decrease the total expected value of the actor's behavior and, in turn, would result in more attributed personal responsibility. To test this prediction, some subjects were informed of the occurrence of the accident while others knew only that a
potential accident could occur, and their respective attributions were compared.

In the present experiment subjects read a brief account of a situation in which an accident could potentially occur. The prior probability of the accident (Low or High), outcome knowledge (Informed or Uninformed about whether the potential accident actually occurred), and outcome severity (Mild or Severe) were experimentally varied. Thus the design was a $2 \times 2 \times 2$ factorial. After reading the stories subjects were asked to answer a series of questions designed to measure their assessment of the action itself, the probabilities and valences of outcomes associated with that action, and the extent to which they felt that the perpetrator was or would be responsible for the accident.

**METHOD**

**Stimulus Materials**

The principal components of the proposed model of the attribution of responsibility are the probabilities and valences of outcomes associated with the actor's behavior. Pilot subjects were used to generate estimates of these parameters.

Five stories in which an accident could potentially occur were presented to pilot subjects. There were two versions of each story. The versions differed in that the
circumstances in which the behavior occurs was varied. In one version the actor's behavior was relatively likely to lead to an accident. In the other, the situational factors were such that the same behavior was less likely to result in an accident. In both versions the descriptions specified two consequences which could result from the potential accident, one of relatively mild severity (property damage or slight injury), the other of a more serious nature (serious injury or death). The task of the pilot subjects was to estimate the probabilities and valences of the outcomes associated with the actor's behavior in each situation. Subjects were asked first to estimate the probability that an accident would occur in the situation and, secondly, to estimate the probabilities of both the outcomes of the accident. Lastly, they were asked to estimate the likelihood that the accident would not occur. These measures established the normative prior probabilities of the events depicted in the stories. In order to determine the valence of those events, subjects rated the desirability of each of the probable outcomes in the situation. To ensure that obtained results would not be specific to the details of a particular story, four different pairs of stories were then selected from the pretest pool. The four stories chosen were those in which a clear difference was perceived between the two versions in the likelihood of an accident.
Subjects

A total of 120 subjects participated in the actual experiment. The subjects were undergraduates enrolled in introductory psychology courses who participated in the study as part of their course requirements.

Procedure

Subjects first were randomly assigned to one of two experimental conditions. In one condition (Low probability), subjects read descriptions of situations in which the prior probability of an accident was judged (by pilot subjects) to be low. Other subjects (High probability) read the other version of the same story in which the prior probability of the accident was relatively high. One low probability story, for example, presented subjects with the following information:

The state of Colorado voted to build a dam on the Platte river in order to store more water for the growing city of Denver. Before the dam was completed, William Smith and his family decided to build a house on land they owned near the banks of the Platte river, downstream of the proposed dam site. Mr. Smith knew that if the river flooded before the dam was completed, it could ruin the house and endanger the lives of Mr. and Mrs. Smith and their
three children. On the other hand, Mr. Smith also knew that the Platte had never flooded before and that spring rainfall was, on the average, decreasing every year so it seemed highly unlikely that the river would flood again before the dam was built. With this in mind, he went ahead and built the house.

In contrast, the high probability version of the story reads as follows:

The state of Colorado voted to build a dam on the Platte river in order to store more water for the growing city of Denver. Before the dam was completed, William Smith and his family decided to build a house on land they owned near the banks of the Platte river, downstream of the proposed dam site. Mr. Smith knew that the Platte river had flooded three times during the past eight years because of heavy spring rains and melting snow. If the river flooded again before the dam was completed, it could ruin the house and endanger the lives of Mr. and Mrs. Smith and their three children. Mr. Smith also knew that the spring rainfall was, on the average, decreasing every year and that the Platte hadn't flooded since 1973 so it probably
wouldn't flood again before the dam was built. With this in mind, he went ahead and built the house.

The second variable of interest is outcome knowledge. Subjects within each probability condition (Low or High) were divided randomly into two groups. Subjects assigned to the Informed group were told that an accident did, in fact, occur. They also knew which of the two consequences of the accident occurred. Other subjects (Uninformed group) received no information about the actual consequences of the actor's behavior but knew that an accident could occur and could result in either of the two consequences of differing severity.

The third manipulated variable concerns the severity of outcomes. Subjects within each outcome-knowledge condition were further divided into two groups. Some subjects in the Informed group read that the accident occurred and produced the mildly severe outcome. The remaining subjects in the Informed group read that the consequences of the actor's behavior were more serious. To illustrate, using the above example, Informed subjects in the Mild outcome group read:

A few months after the Smith family moved into their new home, and before the dam was completed, the Platte river flooded. Although none of the Smiths were injured in the flood, the house was ruined.
Informed subjects in the Severe outcome condition received the following information:

A few months after the Smith family moved into their new home, and before the dam was completed, the Platte river flooded. The house was ruined and two members of the Smith family were critically injured as the flood swept through their house.

Subjects in these groups were asked to judge how responsible or irresponsible was the behavior and how responsible (morally blame-worthy) was the actor for the consequences produced by his behavior. Within the Uninformed condition, half the subjects were asked to evaluate the behavior and assign personal responsibility to the actor if the mild outcome were to occur. The other half of the Uninformed subjects were asked to make the same judgments of responsibility if the more serious outcome were realized.

Dependent Variables

The principal dependent variables of interest are the assignments of responsibility to actions and to actors. Attributions made to actions were assessed by an 8 point scale which asked subjects simply to rate how responsible or irresponsible was the behavior in each story. Attributions of personal responsibility to actors were made on an 8 point scale ranging from "totally responsible" to "not at all responsible". This measure explicitly asked
for a judgment of moral and personal responsibility and not a decision of legal liability.

Each subject also rated the extent to which the actor's conduct was appropriate or prudent in the situation. The appropriateness measure was generated from subjects' responses to five semantic differential items. Each subject was asked to locate the actor's behavior along the following dimensions, each anchored at the extremes: safe-unsafe, wise-unwise, good-bad, morally right-morally wrong, justified-unjustified. The sum of these responses comprised an index of subjects' evaluations of the perpetrator's act, with higher scores reflecting more negative evaluations.

In order to calculate the expected value of the behaviors, each subject was asked to estimate the probabilities associated with the potential events described in each of the four stories. Uninformed subjects made straight-forward predictions of the likelihoods of both the occurrence and, later in the questionnaire, the non-occurrence of the accident. They also estimated the likelihood of the two conditional outcomes in each situation. Informed subjects were asked to ignore their knowledge of the actual consequences and to estimate these likelihoods "as (they) would have had (they) not known" the particular outcome in the situations.

The valence or desirability of each of these potential outcomes was also solicited of subjects.
RESULTS

Manipulation Checks

The probability manipulation sought to construct situations in which the actor's behavior or neglect was likely or unlikely to produce an accident. Subjects were asked to estimate, from 0% to 100%, the probability that an accident would occur. Another measure allowed subjects to estimate the probability that an accident would not occur. Subjects' estimates of both these parameters suggest that the probability manipulation was accurately perceived. Subjects who read the low probability versions of the stories judged the accident to be less likely ($\bar{X} = 35\%$) than those who read the high probability versions ($\bar{X} = 63\%; F = 187.27, df = 1/112, p < .01$). This probability estimate was, understandably, influenced by the situational context. This influence was evidenced by a main effect of the different stories on the probability estimates. Furthermore, a story x probability interaction was also obtained: although the probability of harm was judged to be significantly greater in the high probability versions, the difference between estimates in the two probability versions differed across the four stories. Table 1 presents the average likelihood estimates for each story by subjects in each experimental group. It might be noted that the outcome knowledge variable did not affect estimates
TABLE 1

Average Estimated Likelihoods of the Accident
Across Different Stories and Experimental Conditions

<table>
<thead>
<tr>
<th>Probability</th>
<th>Uninformed Group</th>
<th>Informed Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild Consequence</td>
<td>Severe Consequence</td>
</tr>
<tr>
<td>Story 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>.48</td>
<td>.38</td>
</tr>
<tr>
<td>High</td>
<td>.72</td>
<td>.65</td>
</tr>
<tr>
<td>Story 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>.31</td>
<td>.33</td>
</tr>
<tr>
<td>High</td>
<td>.57</td>
<td>.50</td>
</tr>
<tr>
<td>Story 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>.33</td>
<td>.30</td>
</tr>
<tr>
<td>High</td>
<td>.45</td>
<td>.49</td>
</tr>
<tr>
<td>Story 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>.28</td>
<td>.27</td>
</tr>
<tr>
<td>High</td>
<td>.81</td>
<td>.81</td>
</tr>
</tbody>
</table>
of the likelihood of the accident. Subjects who knew
the actual chain of events in each story did not assign a
higher probability to the accident than those who did not.

The analysis of variance did reveal a significant
second order interaction of story \( \times \) probability \( \times \) outcome
information. In three of the four stories the difference
in likelihood estimates between the low and high versions
was greater when subjects knew the actual outcome in the
situation than when they did not. It is unclear why
estimates of Story #4 deviated from the predominant pat-
tern of interaction depicted in Figure 1.

Subjects' estimates of the likelihood that the acci-
dent would not occur also showed the influence of the prob-
ability manipulation. The average estimate by subjects who
read the low probability versions was 63%, while those who
read the high probability versions judged the likelihood
of the non-occurrence of the accident to be 39% (\( F = 114.49, \)
df = 1/112, \( p < .01 \)). With the exception of the second
order interaction which was not replicated, the probability
of the non-occurrence of the accident exhibited the same
main effects and interactions as were obtained for the
estimates of the occurrence of the accident.\(^1\)

\(^1\)Logically, the probability of the occurrence of an acci-
dent and the probability of its non-occurrence should
equal 1.0. Our results show that while these estimates
were highly inversely related (\( r = -.70 \)), they were not
perfect complements of one another. The analyses reported
below used the separate estimates of each parameter
provided by subjects.
FIGURE 1

Interaction of Story x Probability x Outcome Information on Estimates of the Likelihoods of the Accidents

Difference in Likelihood Estimates between Low and High Probability Conditions

Uninformed    Informed
In addition to these measures of the probability of an accident, subjects also estimated the likelihoods of the accident's mutually exclusive outcomes, as described in each story. These probabilities were measured contingent upon the occurrence of the accident. For example, the probability that the actor's home would be damaged (Mild outcome) or that his family would be injured (Severe outcome) depended upon the occurrence of the flood. Each subject estimated the likelihood of both the mild and severe outcomes, if the accident happened. Since the probability manipulation sought only to vary the probability of the accident, the likelihoods of the contingent outcomes should not be affected. Analyses of variance were performed on estimates of the likelihood of both the mild and the severe contingent outcomes. No significant effects were obtained with respect to the mild outcome. Estimates of its likelihood were substantially the same in both low and high probability conditions ($\bar{x} = 52\%$ and 54\%, respectively).

The likelihood of the severe outcome was, however, influenced by the probability manipulation. Subjects who read the low probability versions of the stories judged the severe outcome to be less probable ($\bar{x} = 47\%$) than those who read the high probability versions ($\bar{x} = 54\%$; $F = 10.50, df = 1/112, p < .01$). This unexpected finding suggests that variations in the likelihood of the initial
accident affected the likelihood of the severe contingent outcome, but not the likelihood of the mild outcome. It should be noted that although the probability manipulation created differences in the likelihood of the severe consequence, the magnitude of this effect depended upon the particular story in which it was embedded, as evidenced by the significant probability x story interaction. Individual comparisons of the cell means (Table 2) revealed that the severe outcome was viewed as significantly less likely in the low probability versions of only two of the stories, but of about equal probability in the other two stories. This interaction is depicted in Figure 2. The summary of the analysis of variance is presented in Table 3.

The valence of consequences manipulation was accurately perceived. Severe consequences were judged less desirable (\(\bar{X} = 6.74\)) than mild consequences (\(\bar{X} = 5.10; t = 17.81, p < .01\)). To determine if the undesirability of the outcomes was affected by other variables, analyses of variance were performed. The perceived severity of the mild outcome varied across the four stories; some mild outcomes were, of course, judged more serious than others. The analysis also revealed a story x probability interaction for the mild outcome. In three of the four stories, the mild outcome was viewed as significantly less desirable when the probability of an accident was low than when it
TABLE 2
Average Estimated Likelihoods of the Severe Consequence
Across Different Stories and Experimental Conditions

<table>
<thead>
<tr>
<th>Probability</th>
<th>Uninformed Group</th>
<th>Informed Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild Consequence</td>
<td>Severe Consequence</td>
</tr>
<tr>
<td>Story 1</td>
<td>Low</td>
<td>.50</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>.45</td>
</tr>
<tr>
<td>Story 2</td>
<td>Low</td>
<td>.20</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>.47</td>
</tr>
<tr>
<td>Story 3</td>
<td>Low</td>
<td>.62</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>.53</td>
</tr>
<tr>
<td>Story 4</td>
<td>Low</td>
<td>.39</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>.54</td>
</tr>
</tbody>
</table>
FIGURE 2

Estimated Likelihood of the Severe Consequence as a Function of the Probability of an Accident Across Different Stories

Estimated Likelihood of Severe Consequence

Low Probability

High Probability

.7

.6

.5

.4

.3

.2

.1

.63

.62

.52

.54

.48

.52

.49

.25
### TABLE 3

Summary of Analysis of Variance of Likelihood of the Severe Consequence

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability (P)</td>
<td>1</td>
<td>.6021</td>
<td>10.498**</td>
</tr>
<tr>
<td>Outcome Information (I)</td>
<td>1</td>
<td>.1763</td>
<td>3.074</td>
</tr>
<tr>
<td>Valence of Consequences (V)</td>
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<td>.1687</td>
<td>2.942</td>
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<tr>
<td>PxI</td>
<td>1</td>
<td>.0440</td>
<td>.7687</td>
</tr>
<tr>
<td>PxV</td>
<td>1</td>
<td>.033</td>
<td>.581</td>
</tr>
<tr>
<td>IxV</td>
<td>1</td>
<td>.0187</td>
<td>.326</td>
</tr>
<tr>
<td>IxPxV</td>
<td>1</td>
<td>.0003</td>
<td>.005</td>
</tr>
<tr>
<td>Between Groups Error</td>
<td>112</td>
<td>.0573</td>
<td></td>
</tr>
<tr>
<td>Story (S)</td>
<td>3</td>
<td>1.3229</td>
<td>46.170**</td>
</tr>
<tr>
<td>SxP</td>
<td>3</td>
<td>.4034</td>
<td>14.081**</td>
</tr>
<tr>
<td>SxI</td>
<td>3</td>
<td>.0046</td>
<td>.1609</td>
</tr>
<tr>
<td>SxV</td>
<td>3</td>
<td>.0094</td>
<td>.330</td>
</tr>
<tr>
<td>SxIxP</td>
<td>3</td>
<td>.0128</td>
<td>.4469</td>
</tr>
<tr>
<td>SxIxV</td>
<td>3</td>
<td>.0014</td>
<td>.051</td>
</tr>
<tr>
<td>SxPxV</td>
<td>3</td>
<td>.039</td>
<td>1.366</td>
</tr>
<tr>
<td>SxPxIxV</td>
<td>3</td>
<td>.070</td>
<td>2.448</td>
</tr>
<tr>
<td>Error</td>
<td>336</td>
<td>.02865</td>
<td></td>
</tr>
</tbody>
</table>

** p < .01
was high. When the probability of the accident is high, subjects apparently perceive that greater damage or injury could have occurred and the mild outcome is thus seen as less severe. Figure 3 shows the pattern of this interaction.

The analysis of the undesirability of the severe outcome showed no main effects or interactions.

**Primary Analysis**

The principal contention of the proposed model is that the attribution of personal responsibility to an actor is based upon and influenced by the extent to which his act is deemed irresponsible. A preliminary assumption is that a judgment of the irresponsibility of an action is part of a more general evaluation of that act. To test this assumption, subjects' judgments about the irresponsibility of the behavior were correlated with the five item evaluative index. The obtained correlation, .88, confirms this initial assumption. More importantly, both the general evaluation of the behavior and its perceived irresponsibility were found to reflect estimable parameters of the situation; i.e., probabilities and valences. The expected-value of the behaviors in each of the four stories was calculated according to the formula presented above (page 10). It was highly related both to the perceived irresponsibility of the act (r = -.54,
FIGURE 3
Perceived Undesirability of the Mild Consequence as a Function of Probability and Story

![Graph showing perceived undesirability of mild consequence as a function of probability and story. The x-axis represents probability (low to high), and the y-axis represents perceived undesirability (6 to 4). There are three lines showing different probabilities: low, medium, and high, with corresponding perceived undesirability values: 6.02, 5.33, 5.32, 4.40, 5.08, and 4.30, 4.25, 4.30, 4.25, respectively.]
measures of responsibility (to actions and to actors) were submitted to analyses of variance. Tables 5 and 6 present the cell means of these dependent measures under each of the experimental conditions. The results of the analyses of variance are presented in Tables 7 and 8. Both measures were strongly influenced by the probability manipulation. An act was judged more irresponsible if it was more likely to lead to an accident than if it was not (\(F = 87.58, \text{df} = 1/112, p < .01\)). Likewise, more personal responsibility was assigned to the actors in the high probability versions of the stories than in the low (\(F = 40.58, \text{df} = 1/112, p < .01\)). These findings tend to support the hypothesis that the probability of harm is a central consideration in attributions of responsibility to persons, and in the perceived irresponsibility of their actions.

Secondly, both measures, like the estimates of probabilities, were uniformly influenced by the context in which the behavior occurred; i.e., a main effect of the different stories was obtained.

Third, Figures 4 and 5 show that a similar pattern of story x probability interaction was obtained in both measures. Although actions were judged more irresponsible, and actors more personally culpable, in the high probability versions of each story, the differences between and high versions varied across stories. Individual
p < .01) and to the evaluation of the behavior (r = -.57, p < .01). As the expected value of the behavior decreased there was a strong tendency to evaluate it more negatively and to perceive it as more irresponsible.

This correlational evidence confirms the expected relationship between the attribution of irresponsibility to an action, the general evaluation of that action, and its expected value. The next step in this analysis examines the relationship between attributions of irresponsibility to actions and attributions of responsibility to actors. The predicted relationship between these different measures of responsibility was obtained (r = .58, p < .01). Attributed personal responsibility was, as expected, also related to the general negative evaluation of the action (r = .59, p < .01), and inversely related, but to a lesser extent, to its expected-value (r = -.27, p < .05). These correlations are presented in Table 4.

Having established that the extent of responsibility assigned to an actor varies directly with the perceived irresponsibility of the action, it is now possible to assess the effects of the independent variables on these attributions. The proposed model asserts that the irresponsibility of the action and the responsibility assigned to an actor are related because they are both influenced by the same variable, the probability of the accident. To test this prediction, the data for both
TABLE 4

Correlations Among Measures of Attributed Responsibility and Evaluations of the Action

<table>
<thead>
<tr>
<th></th>
<th>Resp(act)</th>
<th>Eval(act)</th>
<th>E.V.(act)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resp(act)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eval(act)</td>
<td>.878</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.V.(act)</td>
<td>-.537</td>
<td>-.574</td>
<td></td>
</tr>
<tr>
<td>Resp(actor)</td>
<td>.578</td>
<td>.592</td>
<td>-.275</td>
</tr>
</tbody>
</table>

Resp(act) = amount of responsibility/irresponsibility attributed to the action
Eval(act) = general negative evaluation of the action
E.V.(act) = expected-value of the action
Resp(actor) = amount of personal responsibility attributed to the actor
### TABLE 5

Average Amount of Irresponsibility Assigned to Actions Across Experimental Conditions

<table>
<thead>
<tr>
<th>Probability</th>
<th>Uninformed</th>
<th></th>
<th></th>
<th>Informed</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild Outcome</td>
<td>Severe Outcome</td>
<td></td>
<td>Mild Outcome</td>
<td>Severe Outcome</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>4.48</td>
<td>4.45</td>
<td></td>
<td>4.18</td>
<td>4.73</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>6.25</td>
<td>6.47</td>
<td></td>
<td>5.88</td>
<td>6.20</td>
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</table>

### TABLE 6

Average Amount of Personal Responsibility Assigned to Actors Across Experimental Conditions

<table>
<thead>
<tr>
<th>Probability</th>
<th>Uninformed</th>
<th></th>
<th></th>
<th>Informed</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild Outcome</td>
<td>Severe Outcome</td>
<td></td>
<td>Mild Outcome</td>
<td>Severe Outcome</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>4.92</td>
<td>5.03</td>
<td></td>
<td>4.00</td>
<td>4.05</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>5.65</td>
<td>5.87</td>
<td></td>
<td>5.45</td>
<td>5.60</td>
<td></td>
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</tbody>
</table>
### TABLE 7

Summary of Analysis of Variance of Attributed Responsibility to the Actor

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability (P)</td>
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<td>156.408</td>
<td>40.578**</td>
</tr>
<tr>
<td>Outcome Information (I)</td>
<td>1</td>
<td>42.008</td>
<td>10.898**</td>
</tr>
<tr>
<td>Valence of Consequences (V)</td>
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<td>2.133</td>
<td>.553</td>
</tr>
<tr>
<td>PxI</td>
<td>1</td>
<td>15.408</td>
<td>3.997*</td>
</tr>
<tr>
<td>PxV</td>
<td>1</td>
<td>.300</td>
<td>.077</td>
</tr>
<tr>
<td>IxV</td>
<td>1</td>
<td>.133</td>
<td>.034</td>
</tr>
<tr>
<td>PxIxV</td>
<td>1</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td>Between Groups Error</td>
<td>112</td>
<td>3.854</td>
<td></td>
</tr>
<tr>
<td>Story (S)</td>
<td>3</td>
<td>96.347</td>
<td>45.981**</td>
</tr>
<tr>
<td>SxP</td>
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<td>7.23**</td>
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<td>.479</td>
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<td>SxIxV</td>
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<td>3.161</td>
<td>1.508</td>
</tr>
<tr>
<td>SxPxV</td>
<td>3</td>
<td>2.050</td>
<td>.978</td>
</tr>
<tr>
<td>SxPxIxV</td>
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<td>4.594</td>
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<tr>
<td>Error</td>
<td>336</td>
<td>2.095</td>
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</tr>
</tbody>
</table>

** p < .01
### TABLE 8

Summary of Analysis of Variance

of Attributions of Irresponsibility to Actions

<table>
<thead>
<tr>
<th>Source</th>
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<th>F</th>
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</thead>
<tbody>
<tr>
<td>Probability (P)</td>
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<td>362.27</td>
<td>87.58**</td>
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<tr>
<td>Outcome Information (I)</td>
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<td>.77</td>
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<tr>
<td>Valence of Consequences (V)</td>
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<tr>
<td>PxI</td>
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<td>.69</td>
</tr>
<tr>
<td>IxV</td>
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<td>.85</td>
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<td>.01</td>
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<td>PxIxV</td>
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<td>1.75</td>
<td>.42</td>
</tr>
<tr>
<td>Between Groups Error</td>
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<td>4.136</td>
<td></td>
</tr>
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<td>Story (S)</td>
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<td>17.02</td>
<td>6.15**</td>
</tr>
<tr>
<td>SxP</td>
<td>3</td>
<td>31.17</td>
<td>11.27**</td>
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<tr>
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<td>3</td>
<td>5.22</td>
<td>1.87</td>
</tr>
<tr>
<td>SxV</td>
<td>3</td>
<td>1.27</td>
<td>.47</td>
</tr>
<tr>
<td>SxPxI</td>
<td>3</td>
<td>.95</td>
<td>.34</td>
</tr>
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<td>SxIxV</td>
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<td>SxPxV</td>
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<td>.874</td>
<td>.315</td>
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<td>SxPxIxV</td>
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</tr>
<tr>
<td>Error</td>
<td>336</td>
<td>2.77</td>
<td></td>
</tr>
</tbody>
</table>

** p < .01
FIGURE 4
Perceived Irresponsibility of the Action as a Function of Probability Across Different Stories

Perceived Irresponsibility of the Act

Probability

Low

High

7

6

5

4

3

2

1

5.25

5.033

4.23

3.33

6.433

6.316

6.083

5.967
FIGURE 5

Attributions of Personal Responsibility to the Actor as a Function of Probability Across Different Stories

Responsibility Attributed to the Actor

Probability
comparisons between the cell means for both measures showed that the difference between low and high probability conditions was significant in each of the stories.

Neither of the other two manipulated variables, outcome information or severity of consequences, was found to affect the attribution of irresponsibility to actions. It appears then that the prior probability of harm influences the perceived irresponsibility of an act, but the severity of whatever consequences ensue does not.

The analysis of variance did reveal that the kind of outcome information subjects were given influenced the amount of personal responsibility they assigned to the actor himself. Subjects who knew that the actor's behavior or neglect produced negative consequences assigned less responsibility ($\bar{X} = 4.77$) than those who were asked to assign responsibility if, hypothetically, an accident occurred and led to negative outcomes ($\bar{X} = 5.37; F = 10.90, df = 1/112, p < .01$). This result suggests that subjects can, if instructed to do so, ignore (or perhaps even over-compensate for) their knowledge of the consequences of an actor's conduct when assigning personal responsibility to him.

A significant interaction between probability and outcome information was also obtained in the analysis of attributed personal responsibility. Although subjects systematically assigned more responsibility to actors in
the high probability versions of the stories than in the low probability versions, the discrepancy was greater when they knew of the actual consequences of the behavior than when they did not. Table 9 presents the cell means associated with this interaction.

The analysis of variance also provided the clearest test of the predictions of the defensive hypothesis, as opposed to those suggested by the information processing model. Contrary to the expectations of the defensive model, and in support of the position proposed here, the valence of the actual or hypothetical outcome contributed virtually nothing to the extent of attributed personal responsibility. The responsibility assigned for severe outcomes was substantially the same as for mild outcomes ($\bar{X} = 5.00$ for mild outcomes, 5.14 for severe), nor did outcome severity have any other significant effects. Thus, the valence of the outcome affected neither assignments of personal responsibility nor the perceived irresponsibility of the act, while the probability manipulation affected both.

Evidence Concerning the "Creeping Determinism" Effect

A secondary purpose of this study was to explore the issue of retrospective revisions in probability estimates, and the implication for judgments of responsibility. There were four opportunities for the "creeping determinism"
<table>
<thead>
<tr>
<th>Probability</th>
<th>Uninformed</th>
<th>Informed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>4.97</td>
<td>4.02</td>
</tr>
<tr>
<td>High</td>
<td>5.76</td>
<td>5.52</td>
</tr>
</tbody>
</table>
effect to obtain in each story. Subjects estimated the likelihood of occurrence and the non-occurrence of the accident, as well as the likelihoods of the two contingent consequences (mild and severe outcomes). There was no significant effect of the outcome knowledge variable on any of these estimates. Table 10 presents the average likelihood estimates for these parameters under both outcome knowledge conditions. It shows no consistent pattern of results. There was a slight tendency to revise probability estimates in the predicted direction in three of the four measures (probability of occurrence and non-occurrence of the accident, and probability of the severe outcome). However, estimates of the likelihood of the mild outcome show a slight revision in the opposite direction. Overall, there was no significant tendency to regard actual outcomes as more inevitable by subjects who knew that they had occurred.

DISCUSSION

The information processing model of the attribution process was proposed as an alternative to the defensive interpretation of attributional judgments. The defensive hypothesis asserts that self-serving motives predispose the observer to attend to and base his assignments of responsibility principally on the severity of the consequences which follow from the actor's behavior. In
TABLE 10

Effect of Outcome Information on Estimated Likelihoods of Events

<table>
<thead>
<tr>
<th></th>
<th>Uninformed</th>
<th>Informed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of occurrence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of the accident</td>
<td>.48</td>
<td>.49</td>
</tr>
<tr>
<td>Probability of occurrence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of the mild consequence</td>
<td>.54</td>
<td>.53\textsuperscript{a}</td>
</tr>
<tr>
<td>Probability of occurrence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of severe consequence</td>
<td>.49</td>
<td>.54\textsuperscript{b}</td>
</tr>
<tr>
<td>Probability of non-occurrence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of the accident</td>
<td>.52</td>
<td>.49\textsuperscript{c}</td>
</tr>
</tbody>
</table>

a. Estimated by those Informed subjects who knew the Mild outcome occurred.

b. Estimated by those Informed subjects who knew the Severe outcome occurred.

c. Since the accident always occurred, the lower estimate of this parameter by Informed subjects conforms to the "creeping determinism" prediction.
contrast, the model proposed here emphasizes the importance of the observer's assessment of the act itself in the context in which it occurs, independent of the severity of any obtained consequences. Furthermore, the model argues that the assessment of the act is a rational, non-defensive process which principally involves a consideration of the probability of foreseeable consequences. The results obtained in this study seem to support the alternative explanation.

According to this interpretation, the attribution of personal responsibility to an actor is the result of a series of judgments which begins with an evaluation of the act itself. The reasoning which guides this assumption is that the necessary condition for the attribution of responsibility to an actor is the prior attribution of irresponsibility to his action. The judgment of an act's irresponsibility was postulated to be part of a general evaluation of the act, and the obtained correlation, .88, confirms this assumption. Additionally, both the perceived irresponsibility of the behavior and its general evaluation were significantly related to its expected-value. This finding validates the usefulness of an expected-value analysis of behaviors and supports the contention that although evaluative judgments of actions may be subjective, they can be re-defined in terms of measurable parameters---probabilities and valences. With respect to the expected-
value analysis, it should be noted that an action can have multiple consequences, each associated with a valence. In this study only two of the possible consequences of an accident were specified, and none of the positive outcomes which would accompany the non-occurrence of the accident were described. A moderate correlation was obtained between the expected-value of the act and its global evaluation using this procedure. When more of the potential consequences are included in the calculation of the expected-value formula, a higher correlation could, presumably, be expected.

Since, according to this information processing model, the attribution of responsibility to actors reflects, in large part, the attribution of irresponsibility to his action, the two measures of "responsibility" were expected to be related. The obtained correlation, .58, supports this reasoning. Furthermore, the results from the analysis of variance show that the relationship between attributions to actions and to actors was, as expected, mediated by the prior probability of harm.

The positive linear function of probability on responsibility was independent of the severity of the outcomes. The lack of any effects due to the seriousness of consequences casts further doubt upon the validity of the defensive hypothesis. No evidence was found to support the claim that attributions of responsibility to acts or
actors are influenced by the self serving biases Walster (1966) proposed. These findings serve to support the contention that previous experiments which demonstrated an effect of the severity manipulation may have confounded legal responsibility with moral responsibility. Legal liability; i.e., the compensation demanded for negligent conduct, is proportional to the extent of damage incurred. The proposed model of the attribution process argues that the assignment of personal responsibility is a moral decision and does not depend upon the severity of realized outcomes, and the obtained findings support that argument. However, both the mild and severe outcomes described in this study may be considered relatively serious. Future research should explore the validity of this model when a wider range of outcome severities are involved.

One unanticipated finding was the effect of outcome knowledge. Subjects who knew of the actual consequences of the actor's behavior assigned less personal responsibility than those who did not. The "creeping determinism" hypothesis implies that outcome knowledge may prejudice responsibility judgments if the probability estimates upon which they depend are postdictively revised. However, no such revision was found to occur. Furthermore, since the obtained effect of outcome knowledge on personal responsibility was not replicated in measures of the irresponsibility of the act, and was, in fact, opposite in
direction to that which would be predicted by the creeping
determinism analysis, this finding should be cautiously
regarded.

Overall, the obtained results support the proposed
information processing model. Based upon these results,
the following picture of the attribution process seems
to emerge. Assignments of personal responsibility to an
actor are influenced, first of all, by an assessment of the
act itself. Because the evaluation of the act, and the
degree to which it is perceived to be irresponsible are
defined, in large part, by the probability that the
behavior will lead to an accident, the likelihood of the
accident also greatly affects the extent of personal re-
sponsibility assigned to the perpetrator. However, the
relationship between personal responsibility and the prob-
ability of harm is mediated by another variable which was
not directly measured in this study---the foreseeability
of the accident. According to the model proposed here,
and consistent with Heider's (1958) analysis of the con-
ceptual distinctions between types of responsibility, an
actor will be held morally blameworthy for the negative
consequences of his behavior to the extent that he could
have anticipated those consequences. Ordinarily, an in-
crease in the probability associated with an event will also
augment the extent to which the event could have been
foreseen and thus more personal responsibility will be
assigned. However, the translation between likelihoods and attributed personal responsibility is not direct. The ascription of moral culpability depends upon the perceived ability of the actor to have accurately estimated the probabilities associated with the accident. Actors who cannot reasonably be expected to have foreseen the consequences of their behavior will be held less accountable than those who should have been able to anticipate the negative effects of their conduct. This reasoning is the basis of the common tradition of excusing children from responsibility. It also explains the legal tradition of holding those with "special knowledge" more culpable than those whose inexperience in a situation deprives them of the ability to accurately anticipate the consequences of their behavior or neglect.

This emphasis on foreseeability suggests a reinterpretation of findings which purport to demonstrate the operation of defensive biases in the attribution process (e.g., McKillip, 1972; Shaver, 1970a; Shaver and Carroll, 1970). According to this modification of Walster's (1966) original hypothesis, it is in the interests of observers to deny that they too could be involved in similar misfortunes. This self protective bias leads them to take into account actor characteristics such as the age and status of perpetrators, and to assign less responsibility to actors who are similar to themselves. According to the
information processing interpretation, on the other hand, observers consider personal characteristics of the actor in order to assess his ability to have foreseen the consequences of his behavior. Responsibility, therefore, is attributed as a function of perceived foreseeability and not as a function of perceived similarity. This interpretation is supported by the lack of consistent findings in previous tests of the defensive hypothesis, and by Shaver's own results in the first experiment in his 1970 study in which attributed responsibility increased with the age of the actor but was independent of the similarity between actors and observers. Future research could profitably be applied to defining the personal and situational characteristics which mitigate the perceived ability of actors to anticipate the consequences of their actions.

The information processing model proposed here provides an interpretive framework for analyzing attributions of responsibility, including the effects of actor-characteristics and the severity of outcomes, without relying on defensive interpretations. Although such self-serving attributions may occasionally occur, it appears that much of the attribution process can be explained by a non-motivational information processing analysis.
REFERENCES


APPENDIX A

Stimulus Materials
and
Questionnaires Used
in the Study
STORY #1

(Changes appearing in the high probability versions of the stories are in parentheses.)

The owners of Appalachian Mining Corporation were planning to open a new coal mine in the mountains of West Virginia. The owners had heard about the possibility of hitting pockets of trapped gas beneath the earth's surface. When sparks from the mining drills hit trapped gas, explosions can occur. If the pocket of gas is small, the explosion is mild, but usually destroys drilling equipment. Larger pockets of gas are more dangerous. If hit they cause severe explosions which often collapse the mine-shafts and kill miners.

Other mining companies had operated successfully in the area in the past and none of them had hit any pockets of trapped gas (but recently some mines had been shut down because they had hit pockets of trapped gas). Since the area was known to have large coal deposits the owners of the Appalachian Mining Corporation went ahead and began mining.
OUTCOMES DESCRIBED IN STORY #1

Informed subjects read one of the following outcome descriptions:

MILD OUTCOME

Seven months after the mine was opened and operating, the drilling equipment broke through a layer of rock and hit a small pocket of trapped gas. The explosion shattered the drilling equipment but did not injure any of the miners.

SEVERE OUTCOME

Seven months after the mine was opened and operating, the drilling equipment broke through a layer of rock and hit a large pocket of trapped gas. A tremendous explosion occurred. The drilling equipment was shattered and 16 miners were killed when the mineshaft collapsed on them.
Measures of the Probabilities and Valences
Assigned to the Events Described in Story #1

(Informed subjects were asked to respond to the following questions "as you would have had you not known that the pocket of trapped gas was hit".)

1. Opening the mine was:
   - good - bad
   - unwise - wise
   - justified - unjustified
   - safe - unsafe
   - irresponsible - responsible
   - morally wrong - morally right

   (Subjects responded to this item on six 8-point Semantic Differential type scales, each anchored at the extremes.)

2. What is the probability that a pocket of trapped gas would be hit?¹

3. How bad or undesirable would it be if a pocket of trapped gas were hit?²

4. If a pocket of trapped gas were hit, what is the probability that drilling equipment would be destroyed, but people would not be hurt?

5. How undesirable would it be if drilling equipment were destroyed?

¹ All probabilities were measured on 11-point continua, labelled from 0% to 100%.

² All valences were measured on 8-point continua, labelled "not at all undesirable" and "extremely undesirable" at the extremes.
6. If a pocket of trapped gas were hit, what is the probability that miners would be killed?

7. How undesirable would it be if miners were killed?

8. What is the probability that pockets of trapped gas would not be hit and that neither drilling equipment would be destroyed nor would miners be killed?

9. How desirable or good would it be if pockets of trapped gas were not hit?
Measures of the Responsibility

Assigned to the Actor in Story #1

Uninformed/Mild Outcome Condition:
Imagine that a pocket of trapped gas was hit and drilling equipment was destroyed, but miners weren't hurt. How responsible or blameworthy for that damage would the mine owners be? 

Uninformed/Severe Outcome Condition:
Imagine that a pocket of trapped gas was hit, equipment was destroyed and miners were killed. How responsible for their deaths would the mine owners be?

Informed/Mild Outcome Condition:
We know that the drilling equipment was destroyed when the drills hit a small pocket of trapped gas. How responsible or blameworthy for that damage are the mine owners?

Informed/Severe Outcome Condition:
We know that the drilling equipment was destroyed and 16 miners were killed when the drills hit a large pocket of trapped gas. How responsible or blameworthy for their deaths are the mine owners?

---

3 All subjects were asked to answer these questions "in terms of (the actors) moral and personal responsibility, disregarding any legal liability".

4 All responsibility attributions were measured on 8-point continua, labelled "not at all responsible" and "totally responsible at the extremes."
STORY #2

Betty was babysitting her 3 year old neighbor, Monica, while the child's parents were at a movie. After her dinner Monica began to play with Betty's dog. Monica had often played with the dog in the past (the dog was temperamental and had always avoided the child in the past). While playing, Monica was pulling the dog's tail and teasing him, but the dog didn't seem to mind and was, in fact, very protective of Monica. (This clause was omitted from the high probability version.) Betty thought about putting the dog outside since she didn't want Monica scratched or bitten by the dog, but decided it wasn't necessary.
MILD OUTCOME

About \( \frac{1}{2} \) hour later, while Betty was in the kitchen, she heard Monica scream. Betty rushed into the playroom and found that the dog had become angry and had scratched Monica's shoulder.

SEVERE OUTCOME

About \( \frac{1}{2} \) hour later, while Betty was in the kitchen, she heard Monica scream. Betty rushed into the playroom and found that the dog had become angry and had bitten Monica's shoulder. The wound was severe and required surgery.
Measures of the Probabilities and Valences
Assigned to the Events Described in Story #2

1. Leaving the dog in the room with the baby was:
   good - bad
   unwise - wise
   justified - unjustified
   safe - unsafe
   irresponsible - responsible

2. What is the probability that the child will be hurt at all by the dog?

3. How bad or undesirable would it be if the child were injured by the dog?

4. What is the probability that the dog will scratch, but not bite, the child?

5. How undesirable would it be if the child were scratched, but not bitten, by the dog?

6. What is the probability that the dog will bite the child?

7. How undesirable would it be if the child were bitten by the dog?

8. What is the probability that the child would not be injured at all by the dog?

9. How good or desirable would it be if the child were not injured at all by the dog?
Measures of the Responsibility
Assigned to the Actor in Story #2

Uninformed/Mild Outcome Condition:
Imagine that the child was scratched by the dog. How responsible or blameworthy for that injury would Betty be?

Uninformed/Severe Outcome Condition:
Imagine that the child was bitten by the dog. How responsible or blameworthy for that injury would Betty be?

Informed/Mild Outcome Condition:
We know that Monica was scratched by the dog. How responsible or blameworthy for that injury is Betty?

Informed/Severe Outcome Condition:
We know that Monica was bitten by the dog. How responsible or blameworthy for that injury is Betty?
STORY #3

The state of Colorado voted to build a dam on the Platte River in order to store more water for the growing city of Denver. Before the dam was completed, William Smith and his family decided to build a house on land they owned near the banks of the Platte River, downstream of the proposed dam site. Mr. Smith knew that the Platte had never flooded before (that the Platte had flooded 3 times in the past eight years). If the river flooded before the dam was completed, it could ruin the house and endanger the lives of Mr. and Mrs. Smith and their three children. Mr. Smith knew that Spring rainfall was, on the average, decreasing every year (and that the Platte hadn't flooded since 1973) so it seemed highly unlikely that the river would flood (again) before the dam was built. With this in mind, he went ahead and built the house.
MILD OUTCOME

A few months after the Smith family moved into their new home and before the dam was completed, the Platte River flooded. Although none of the Smiths were injured in the flood, the house was ruined.

SEVERE OUTCOME

A few months after the Smith family moved into their new home and before the dam was completed, the Platte River flooded. The house was ruined and two members of the Smith family were critically injured as the flood swept through their house.
Measures of the Probabilities and Valences
Assigned to Events Described in Story #3

1. Building the house before the dam was completed was:
   - good - bad
   - unwise - wise
   - justified - unjustified
   - safe - unsafe
   - irresponsible - responsible

2. What is the probability that the river will flood before the dam is completed?

3. How bad or undesirable would it be if the river were to flood?

4. If the river were to flood, what is the probability that the house would be damaged, but none of the family would be injured?

5. How undesirable would it be if the house was damaged, but the family was not injured?

6. If the river were to flood, what is the probability that the house would be damaged and some of Mr. Smith's family would be injured?

7. How undesirable would it be if the house was damaged and some of the family were injured?

8. What is the probability that the river would not flood before the dam was completed?

9. How good or desirable would it be if the river did not flood?
Measures of the Responsibility
Assigned to the Actor in Story #3

Uninformed/Mild Outcome Condition:
Imagine that the house was damaged by a flood, but none of the family was injured. How responsible or blameworthy would Mr. Smith be for that damage?

Uninformed/Severe Outcome Condition:
Imagine that the house was damaged and some members of the family were injured in a flood. How responsible or blameworthy would Mr. Smith be for those damages and injuries?

Informed/Mild Outcome Condition:
We know that the house was ruined in the flood. How responsible or blameworthy for that damage is Mr. Smith?

Informed/Severe Outcome Condition:
We know that the house was ruined and two members of his family were critically injured when the river flooded. How responsible or blameworthy for that damage and those injuries is Mr. Smith?
John Shaw, a 17 year old youth, was arrested and charged with arson. He confessed to setting fire to a neighbor's garage and was in court to hear his sentence. As is customary, the judge asked for the recommendations of the defense attorney and the prosecuting attorney. John Shaw's attorney told the judge that the boy had set fire to the garage only because some schoolmates had dared him to do it. The attorney also noted that damage to the garage had been relatively minor and that no one had been hurt, and that Shaw had promised to work after school to pay for all the damage he had caused. Furthermore, the attorney told the judge that the boy had a good reputation in the community. He was a good student and had never been in any kind of trouble before. (The previous two sentences were omitted from the high probability version.) The attorney said that Shaw's actions could best be regarded as a foolish prank and urged the judge to put Shaw on probation.

The prosecuting attorney argued that John Shaw was too dangerous to be out on the streets. (He advised the judge that Shaw had been in the same kind of trouble before. Shaw's first contact with the police came when he was 13. He had started a brush fire while playing with matches behind his house. Later when he was 15, Shaw had started a fire in his school's auditorium. He was also responsible
for another fire in the town library one year later.)
The prosecutor said that Shaw's actions were an indication of the boy's lack of concern for the lives and property of other people. The prosecutor argued that Shaw might some day set fire to another building and injure or kill other people. With this in mind, he urged the judge to send Shaw to the Youth Correctional Facility for one year where he could be kept under supervision and given whatever psychiatric help he needed.
MILD OUTCOME

The judge ordered John Shaw put on probation for one year instead of sending him to the state correctional facility. Four months after his appearance in Court, John Shaw set fire to a warehouse in the business district of the town. No one was in the building at the time, but the warehouse was extensively damaged.

SEVERE OUTCOME

The judge ordered John Shaw put on probation for one year instead of sending him to the state correctional facility. Four months after his appearance in Court, John Shaw set fire to a warehouse in the business district of the town. The building was extensively damaged and two men working in the warehouse died in the blaze.
Measures of the Probabilities and Valences
Assigned to the Events Described in Story #4

1. Letting John Shaw return to the community without sending him to the state facility for supervision and psychiatric care was:
   - good - bad
   - unwise - wise
   - justified - unjustified
   - safe - unsafe
   - irresponsible - responsible

2. What is the probability that Shaw will commit arson again?

3. How bad or undesirable would it be if Shaw commits arson again?

4. If he does commit arson again, what is the probability that he will set fire to an unoccupied building?

5. How undesirable would it be if Shaw damaged or destroyed an unoccupied building?

6. If he does commit arson again, what is the probability that people would be injured or killed in the fire?

7. How undesirable would it be if people were injured or killed in such a fire?

8. What is the probability that Shaw will not commit arson again?

9. How desirable or good would it be if Shaw did not commit arson again?
Measures of the Responsibility Assigned to the Actor in Story #4

Uninformed/Mild Outcome Condition:
Imagine that John Shaw did commit arson again and an unoccupied building was damaged or destroyed. How responsible or blameworthy for that damage would the judge be because he let Shaw return to the community without supervision or psychiatric care?

Uninformed/Severe Outcome Condition:
Imagine that John Shaw did commit arson again and people were injured or killed in the fire. How responsible or blameworthy for the injuries or deaths would the judge be because he let Shaw return to the community without supervision or psychiatric care?

Informed/Mild Outcome Condition:
We know that John Shaw did commit arson again and a warehouse was destroyed. How responsible for that damage is the judge because he let Shaw return to the community without supervision or psychiatric care?

Informed/Severe Outcome Condition:
We know that John Shaw did commit arson again and a building was destroyed and two men were killed in the fire. How responsible or blameworthy for that damage and their deaths is the judge because he let Shaw return to the community without supervision or psychiatric care?