# CURRENT RESEARCH IN SOCIAL PSYCHOLOGY

http://www.uiowa.edu/~grpproc/crisp/crisp.html

Volume 10, Number 14
Submitted: April 27, 2005
First Revision: May 3, 2005
Second Revision: June 9, 2005
Third Revision: July 1, 2005
Accepted: July 2, 2005
Published: July 2, 2005


## CAUSAL CHAINING: EFFECTS OF BEHAVIORAL DOMAIN AND OUTCOME VALENCE ON PERCEIVED CAUSAL STRUCTURE


Yun Chu
University of Hawaii, Manoa

Jerry I. Shaw
California State University, Northridge



**ABSTRACT**

*Study 1 investigated how persons link together sequential causes to explain everyday events. One hundred fifty-four undergraduates were asked to explain the cause(s) of positive or negative outcomes in three domains (achievement, accidental, and interpersonal). Perceivers used two or more causes linked in a temporal chain more often than a single, proximal cause to explain outcomes. Accidents and events with positive outcomes produced the fewest and shortest chains. However, positive accidents produced longer chains than negative accidents. More explanations were terminated at a dispositional than at a situational node. Although judgments of outcome foreseeability were lowest for accidents and for positive rather than negative outcomes, negative accidents were judged the most foreseeable. In Study 2, 68 undergraduates rated the foreseeability of 10 different outcomes in each of the three previous domains. Results indicated that patterns of complex causality depend on the perceived foreseeability of an outcome, rather than its valence.*

## INTRODUCTION

Traditional attribution theories direct our attention toward the processes and consequences of inferring the immediately preceding (proximal) cause of a behavioral outcome. For example, Heider (1958) described the processes enabling a perceiver to determine whether a behavior was instigated within the person or the environment. Likewise, Kelley (1967, 1971) detailed the criteria used by perceivers to differentiate between a person and an entity attribution to explain a given behavior. Jones and Davis (1965) emphasized the factors permitting a dispositional causal explanation that corresponds to an observed behavior, and Weiner (1985a; 1986) documented the affective, cognitive, and behavioral consequences of the attributional dimensions of the perceived causes of achievement behaviors.

Focusing on the proximal cause of behavioral outcomes has been useful, both for theory building and suggesting many practical applications. While these simple causal structures are commonplace in everyday thinking, they omit more complex causal structures sometimes invoked to explain behavior and its outcomes. As a case in point, a typical formulation of many social theories is to posit a temporal sequence of interrelated variables that produce the behavioral outcome of interest (Cacioppo, 2004; Fiske, 2004). For example, the theory of stereotype content proposes that discriminatory behavior results from various stereotypes that, in turn, are the product of perceived social structures (Fiske, Cuddy, Glick & Xu, 2002). The mediational format of such a theory constitutes a causal chain consisting of a behavioral outcome (discrimination), an immediate antecedent (proximal) cause, and a prior (distal) cause. While such formulations are common in scientific discourse, they are also present to a degree in everyday thinking. For example, when McGuire (2004) asked students to explain an assumed relationship between a behavioral variable (e.g., aggression) and its antecedent (e.g., media violence), more than 75% proposed a mediational variable (*e.g.,* arousal) organized in the temporally linked sequence of a causal chain.

An early acknowledgement that causal perception may proceed beyond a single, proximal cause was made by Kelley (1972) who pointed out that atypical outcomes are likely to elicit a "multiple necessary" schema, whereby the outcome is explained by the presence of several causes. In contrast, more typical outcomes elicit a "multiple sufficient" schema with either of several causes sufficing as explanations. Weiner (1985b) proposed that causal analysis is more likely to proceed if the event to be explained is negative, unexpected, or extreme. In some instances, single cause explanations may be preferred, such as when the perceiver lacks the time, cognitive resources, or motivation to ponder additional possibilities. In other cases, however, where such constraints are lacking, substantial effort may be spent on considering a variety of possible causes for the event in question. (Anderson, Krull, & Weiner, 1996). When multiple causes are considered, perceivers often base their explanations on their past experience or intuitive theories (Gilbert, 1989; Krull & Erickson, 1995). As a result, the most accessible or plausible explanation is likely to be accepted (Higgins, 1996).

The work on multiple causation has generally assumed a perceived causal structure consisting of multiple proximal causes to be chosen among, rather than a temporal sequence of linked prior causes organized as causal chains. In his later theorizing, however, Kelley (1983) acknowledged that everyday explanations are often framed in terms of chains and networks of causes. Recognizing this, several investigators have directly examined perceived causal structures and attributional chaining. Work on comprehension of text suggests that causal chains are used to reconstruct a series of connected events in the past to remember what happened by establishing a plausible chain between causes and events (Brown & French, 1976). In support of this, these researchers found that after reading a story, causally-chained events are better remembered than dead-end events that do not continue to a goal state. Trabasso, Secco, and Van Den Broek (1984) pointed out that the more links a chain contains, the more memorable a story will be because a sequence of chained events leads to more consequences. Jaspars, Finchman, and Hewstone (1983) have commented that comprehension is often enhanced by building complex causal structures consisting of several chains, as well as multiple proximal causes. These causal networks constitute cognitive structures that describe how people attempt to understand the world. As Cacioppo (2004) has recently pointed out, considerably more descriptive work is needed on the logical structure of such mediational and other types of explanatory theories.

A few studies have provided information about causal chains preceding a particular outcome to determine their effects on perceiver's judgments. In a study of attribution of responsibility, Brickman, Ryan, and Wortman (1975) found that participants who were informed of both the proximal and distal causes of an auto accident judged internal causes to be more important in determining responsibility than external causes, regardless of their position in the chain. They also found that accidents caused by longer chains are viewed as less foreseeable than outcomes caused by shorter chains. In a different study, Vinokur and Ajzen (1982) found that prior events in a causal chain are perceived as more important than immediate events when they are of equal relevance to the outcome.

Using a different approach, Gold and Shaw (1998) asked participants to arrange as many as they thought were necessary of eight possible causes for both positive and negative achievement outcomes into a perceived causal structure on a causal grid. Most participants incorporated at least one causal chain in their arrangement, often accompanied by additional, single proximal causes. The typical chain had three links, with dispositional causes cited more frequently than situational causes. They also found that more distal causes are attributed to situational factors, while more proximal causes are attributed to dispositional factors.

Some investigations have examined interviews and verbal reports of people's explanations and justifications for their behaviors to determine if causal chains are present in such discourse. Antaki (1985) analyzed unstructured interviews about personally relevant political events and found frequent use of causal chains with two links. In a study of spousal attributions for relationship breakup, Fletcher (1983) also found the use of chains, typically with two links, wherein the proximal cause tended to be dispositional and the distal cause typically referred to the spouse's upbringing.

Other work on causal chains has used network analysis to model causal perceptions relating to a variety of life events. Lunt and his colleagues (Lunt, 1988; Lunt & Livingstone, 1991) have applied this technique to study peoples' explanations for examination failure, as well as the causes of personal debt. In both instances they found the use of chained explanations involving proximal, medial, and distal causes. Consistent with other findings (Fletcher, 1983, Gold & Shaw, 1998), they also found that distal causes are attributed to situational factors, whereas more proximal causes are attributed to dispositional factors. In their study on the perceived causes of heart attacks, French, Marteau, Senior, and Weinman (2002) found that certain causes form chains, such as the belief that smoking leads to high blood pressure, which, in turn, leads to a heart attack. In contrast, certain other causes, such as lack of exercise, are not typically chained with any other causes and are perceived only as proximal causes of a heart attack.

## STUDY 1

Study 1 investigated how persons link together sequential causes to explain positive and negative outcomes in three common domains (achievement, accidental, and interpersonal). Although these domains overlap somewhat (such as the possibility of having an interpersonal achievement), they can also be viewed as conceptually distinctive. By achievement we refer to task outcomes that mostly reflect individual prowess, such as occupational or educational successes. Accidents occur where chance is perceived to play a primary role, such as gambling luck or other fortuitous outcomes. Interpersonal outcomes occur where persons attempt to manage their social interdependence, such as in forming relationships or giving assistance to others.

Achievement outcomes have been the most frequently used in studies of proximal causal attribution (Hewstone, 1989), and there is evidence that such outcomes are more likely to be attributed to the person than to external circumstances (Russel, 1982). Although only a few prior studies have investigated causal chaining in explaining achievement outcomes, the prior work suggests that we may expect frequent use of chains in this domain (Gold & Shaw, 1998), partly because a sense of understanding what happened is enhanced by building complex causal structures involving chained explanations (Jaspars, Finchman, & Hewstone, 1983; Lunt, 1988; Lunt & Livingstone, 1991).

In contrast, accidental outcomes have seldom been used in studies of causal attribution, perhaps because they are typically attributed to simple external factors, such as good or bad luck (Shaver, 1985). In certain circumstances, however, accidents may be attributed to internal factors, such as negligence, especially when self-protective motivation is aroused among observers by the fear that a similar misfortune could happen to themselves (Shaw & McMartin, 1977; Shaw & Skolnick, 1971; Walster, 1966). Without such self-relevance, however, accidents may be perceived as primarily due to chance and therefore we may expect relatively infrequent use of complex causal chains to explain outcomes in this domain.

Interpersonal outcomes were included because stressful events, such as interpersonal conflict, are especially likely to elicit attributions to explain the outcome (Wong & Weiner, 1981). In support of this, Fletcher (1988) found recurrent use of chained explanations by spouses who were attempting to account for their relationship failure. Thus, relatively frequent use of chained explanations is expected in this domain. Since different outcome domains may produce different causal attribution patterns, the present study includes three common outcome domains. Since virtually all prior studies of attributional chaining have restricted themselves to a single domain (typically, achievement), the inclusion of different outcome domains in a single study provides an indication of external validity, that is, the degree to which we can generalize findings across diverse outcome domains.

Another factor that may affect chaining behavior is the valence of the outcome. People cite more internal attributions following their own successes, whereas external attributions are more common following their own failures (de Jong, Koomen, & Mellenbergh, 1988; Russell, 1982). This self-serving bias is often explained as protecting the ego, but there are cognitive explanations for it as well (Fiske & Taylor, 1991). Expected successes do not require much explanation, but people tend to re-evaluate following less anticipated failures (Weinstein, 1980). More "why" questions are asked after failure and more external and excusable causes are given (de Jong et al., 1988). Thus, both positive and negative outcomes are included in the present study to determine their effects on causal chaining.

In this experiment, participants were shown a behavioral outcome in each of three relevant domains, along with its proximal cause. They were asked if the given cause completely explained the outcome, or if more explanation was necessary. Depending on their response, the sequence was either terminated, or they were shown a prior cause that had led to the proximal cause. The same procedure was repeated four times. If they felt additional explanation was required, they were asked to complete the chain by suggesting their own, final cause.

It was hypothesized that fewer and shorter chains would be used to explain accidents than outcomes in the other two domains, because accidents should be perceived as largely due to chance and require little further explanation. We expected negative outcomes will produce more and longer chains than positive outcomes, because they are less anticipated and therefore require a more complex explanation. Participants should terminate chains at a dispositional node more often than at a situational node, because dispositional causes are cited more frequently in causal chains (Gold & Shaw, 1998). A negative correlation is expected between chain length and foreseeability of the outcome, because the more foreseeable an outcome, the less explanation is needed (Brickman, Ryan, and Wortman,1975). Among the three domains, we expect accidents to be perceived as least foreseeable.

## METHOD

### Participants

One hundred fifty-four introductory psychology students (46 men, 108 women) at California State University, Northridge, volunteered to participate in this experiment in partial fulfillment of their course requirements.

**Design and Procedure**

Participants received three positive or negative outcomes, one from each domain. This resulted in a 2 x 3 mixed factorial design with outcome valence (positive or negative) as the between-subjects factor and outcome domain (achievement, accidental, and interpersonal) as the within-subjects factor.

After being seated in a research cubicle by themselves, participants were told that the study was about how people explain things. They were shown a sample behavioral outcome and its cause. They were then told that may be all that is required to explain the outcome. If not, they could request another causal explanation that explains why the first cause happened. Again, they were told they could end the sequence if it was now completely explained, or they could ask for another, prior cause. This sequence was repeated several times until participants were familiar with the task. Participants were reminded that we were interested only in determining when they believed the outcome had been completely explained and they were assured that there was no right or wrong answers. To preclude the possibility that participants might ask to see additional causes merely out of curiosity, they were told that they could view any causes remaining after they had terminated the sequence. After answering participants' questions about the sample item, the actual experiment began.

All information was shown to participants on a laptop screen using a PowerPoint presentation. After viewing an outcome and its proximal cause, participants indicated if the outcome had been fully explained, or if more explanation was necessary. If requested, participants were shown a second slide displaying the outcome, its proximal cause, and a prior, medial cause that was the antecedent of the proximal cause. The experimenter read the sequence aloud to the participant beginning with the outcome, followed by each preceding cause. Again, they could terminate the sequence if they thought it was fully explained, or they could request another prior cause. This same procedure continued, with each new slide displaying the original outcome and each of its preceding causes, until participants terminated a sequence, or until a fourth prior (distal) cause was shown. If they required still more causal information, they were asked to provide their own final cause that would terminate the sequence. After each sequence, participants were asked to rate the foreseeability of the outcome. This same process was repeated for the other two outcome domains. The order of the three domains was counterbalanced among participants and the locus of the causes (internal or external) was also counterbalanced by starting half of all chains with an internal cause and half with an external cause. In each case, preceding causes in the sequence were alternated between internal and external loci.

The achievement outcome consisted of being hired or fired as the CEO of a large corporation. Winning or losing a large sum of money on the lottery served as the accidental outcome, and a successful or failed romantic relationship constituted the interpersonal outcome. Two variations of each positive and negative outcome were alternated between participants. One began with an internal or dispositional cause (sequence 1) and the other began with an external or situational cause (sequence 2). The complete set of causal chains is shown in Appendix 1.

When participants had completed the third outcome domain, the experiment was ended. They were debriefed, thanked for their participation, and dismissed.

**Dependent Measures**

There were four dependent measures. The first recorded whether participants chained (requested one or more additional causes) or not (stopped after the proximal cause). The second measured the length of chains indicated by the number of causes used to explain an outcome. The possible range of this measure is from 1-5. The third dependent measure was the locus (internal or external) of the terminating cause, or node, in the chain. Finally, foreseeability of the outcome was assessed on a 7-point Likert scale ranging from "1" = "Completely unforeseeable," to "7" = "Completely foreseeable." The question asked, "How foreseeable was this outcome?"

**RESULTS**

**Number of Causal Chains**

Since each of the 154 participants had an opportunity to form three causal chains, one in each domain, a total of 462 chaining explanations were possible. Relevant data are shown in Table 1. The number of chaining explanations (278) was significantly higher than the number of explanations that did not include chains (184), Chi-Square (1, N = 154) = 19.13, $p < .001$. Considered separately by domain, the number of chaining explanations was significantly higher than the number of explanations without chains in the achievement domain (121 vs. 33), Chi-Square (1, N = 154) = 50.29, $p < .001$, and in the interpersonal domain (102 vs. 52), Chi-Square (1, N = 154) = 16.23, $p < .001$. This pattern was reversed, however, in the accidental domain where, as expected, the number of explanations with chains was lower than those without chains (55 vs. 99), Chi-Square (1, N = 154) = 12.57, $p < .001$. In unison with these findings, there was significantly less chaining in the accidental domain (55) than in the achievement (121) and interpersonal (102) domains, Cochran's q = 55.86, $p < .001$, df = 2. Of the 154 participants, nine (5.8%) did not chain within any domain. Thirty-three (21.4%) participants chained within one domain, 91 (59.1%) chained within two domains, and 21 (13.6%) chained within all three domains.

**Table 1. Number of Causal Chains for Positive and Negative Outcomes in Three Domains**

| Domain | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Valence | Achievement | | Accidental | | Interpersonal | | Totals | |
| | Chain | No Chain | Chain | No Chain | Chain | No Chain | Chain | No Chain |
| Positive | 58 | 20 | 36 | 42 | 33 | 45 | 127 | 107 |
| Negative | 63 | 13 | 19 | 57 | 69 | 7 | 151 | 77 |
| Totals | 121 | 33 | 55 | 99 | 102 | 52 | 278 | 184 |

The hypothesis that more chaining explanations would be produced by negative than by positive outcomes was also clearly supported. Table 1 also presents these data. For negative outcomes, the number of explanations with and without chains was 151 versus 77, whereas for positive outcomes, comparable data were 127 versus 107, Chi-Square (1, N = 154) = 6.89, $p < .01$. Considered by domain, it was revealed that this pattern was obtained only in the interpersonal area where the number of explanations with and without chains to explain negative outcomes was 69 versus 7 and to explain positive outcomes was 33 versus 45, Chi-Square (1, N = 154) = 40.46, $p < .001$. There was no effect of outcome valence on chaining in the achievement area where the number of explanations with and without chains for negative outcomes was 63 versus 13 and was 58 versus 20 for positive outcomes, Chi-Square (1, N = 154) = 1.67, p = n.s. Outcome valence had a reverse effect on chaining with accidents where the number of explanations with and without chains for negative outcomes was 19 versus 57 and was 36 versus 42 for positive outcomes, (Chi-Square (1, N = 154) = 7.50, $p < .01$.

**Length of Causal Chains**

A two-way mixed analysis of variance was performed on chain length with valence as the between subjects independent variable and outcome domain as the within subjects independent variable. The resulting findings are displayed in Table 2. The average chain length was 1.99 links. Average chain length among domains was significantly different, F (2, 300) = 23.11, $p < .001$, partial eta-squared = .133. Confirming our prediction, the average chain length was significantly shorter in the accidental domain (M = 1.56) than in the achievement domain (M = 2.24), t (153) = 6.18, $p < .001$, and the interpersonal domain (M = 2.17), t (153) = -4.87, $p < .001$. The achievement domain was not significantly longer than the interpersonal domain, t (153) = .58, p = n.s.

**Table 2. Mean Length of Causal Chains for Positive and Negative Outcomes in Three Domains**

| | Domain | | | |
|---|---|---|---|---|
| Valence | Achievement | Accidental | Interpersonal | Means |
| Positive | 2.14 (.99) | 1.77 (1.04) | 1.68 ( .96) | 1.87 (.99) |
| Negative | 2.33 (.93) | 1.36 ( .73) | 2.67 (1.11) | 2.12 (.95) |
| Means | 2.24 (.08) | 1.56 ( .07) | 2.17 ( .09) | 1.99 (.05) |

Note. Standard deviations in parentheses

As expected, negative outcomes (M = 2.12) produced significantly longer chains than positive outcomes (M = 1.87), F (1, 150) = 1.73, p = .012, partial eta-squared = .041. However, this main effect is qualified by a significant interaction between outcome valence and domain, F (2, 300) = 21.24, $p < .001$ , partial eta-squared = .124. The interaction indicates that average chain length was longer for negative than positive outcomes in the achievement (Ms = 2.33 vs. 2.14), t (152) = -1.21, p = n.s. and interpersonal domains (Ms = 2.67 vs. 1.68), t (152) = -5.93, $p < .001$. This pattern was reversed for accidents where the average chain length for negative outcomes (M = 1.36) was significantly shorter than for positive outcomes (M = 1.77), t (152) = 2.85, p = .005.

**Terminal Node**

The number of causal chains terminated at dispositional and situational nodes in the different experimental conditions is shown in Table 3. Consistent with predictions, more explanations were terminated at a dispositional node (272) than at a situational node (190), Chi-Square (1, N = 154) = 14.55, $p < .001$. This pattern was obtained in all three domains, but was significant only with achievements with 102 chains terminated at a dispositional node and 52 chains terminated at a situational node, Chi-Square (1, N = 154) = 16.23, $p < .001$. Comparable data in the accidental and interpersonal domains were respectively, 87 versus 67, Chi-Square (1, N = 154) = 2.10, p = n.s. and 83 versus 71, Chi-Square (1, N = 154) = 0.94, p = n.s. Chains were terminated at a dispositional node more frequently in the achievement domain (102) than in the accidental (87) and interpersonal (83) domains, Cochran's q = 5.73, p = .057, df = 2.

**Table 3. Mean Number of Causal Chains Terminated at Dispositional and Situational Nodes for Positive and Negative Outcomes in Three Domains**

| Domain | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Valence | Achievement | | Accidental | | Interpersonal | | Totals | |
| | Dis | Sit | Dis | Sit | Dis | Sit | Dis | Sit |
| Positive | 49 | 29 | 42 | 36 | 43 | 35 | 134 | 100 |
| Negative | 53 | 23 | 45 | 31 | 40 | 36 | 138 | 90 |
| Totals | 102 | 52 | 87 | 67 | 83 | 71 | 272 | 190 |

Note. Dis = Dispositional; Sit = Situational

Outcome valence did not differentially affect the overall tendency to terminate chains at dispositional and situational nodes. For negative outcomes, the number of chains terminated at dispositional and situational nodes was 138 and 90, whereas for positive outcomes comparable data were 134 and 100, Chi-Square (1, N = 154) = 0.51, p = n.s. A similar pattern was observed in each of the three domains examined separately. In the achievement domain, the number of chains terminated at a dispositional node versus at a situational node was 49 and 29 for positive outcomes and 53 and 23 for negative outcomes, Chi-Square (1, N = 154) = 0.82, p = n.s. In the accidental domain, the number of chains terminated at a dispositional node versus at a situational node was 42 and 36 for positive outcomes and 45 and 31 for negative outcomes, Chi-Square (1, N = 154) = 2.60, p = n.s. In the interpersonal domain, the number of chains terminated at a dispositional node versus at a situational node was 43 and 35 for positive outcomes and 40 and 36 for negative outcomes, Chi-Square (1, N = 154) = 0.94, p = n.s.

**Foreseeability**

Overall foreseeability ratings for the outcomes considered were essentially average (overall M = 4.16 on a Likert scale from 1-7, see Table 4). However, mean foreseeability was significantly different among the outcome domains, F (2, 300) = 17.19, $p < .001$, partial eta-squared = .103. As predicted, mean foreseeability was significantly higher in the interpersonal (M = 4.71) and the achievement (M = 4.16) domains than the accidental domain (M = 3.60), t (153) = 10.39, $p < .001$, and t (153) = 2.50, p = .014, respectively. Mean foreseeability was also significantly higher in the interpersonal than the achievement domain, t (153) = -3.38, p = .001.

**Table 4. Mean Foreseeability for Positive and Negative Outcomes in Three Domains**

| | Domain | | | |
|---|---|---|---|---|
| Valence | Achievement | Accidental | Interpersonal | Means |
| Positive | 4.44 (1.56) | 1.91 (1.65) | 5.15 (1.50) | 3.83 (1.57) |
| Negative | 3.91 (1.74) | 5.21 (1.92) | 4.29 (1.51) | 4.47 (1.75) |
| Means | 4.16 (0.14) | 3.60 (0.15) | 4.71 (0.13) | 4.16 (0.08) |

Note. Standard deviations in parentheses

Mean foreseeability for negative outcomes (M = 4.47) was significantly higher than for positive outcomes (M = 3.83), F (1, 150) = 15.64, p < .001, partial eta-squared = .094. A significant interaction between valence and domain clarified the relationship between outcome valence and foreseeability, F (2, 300) = 78.39, p < .001, partial eta-squared = .343. This interaction indicates that positive outcomes were perceived as more foreseeable than negative outcomes in the achievement (Ms = 4.44 vs. 3.91), t (152) = 1.99, p = .049, and interpersonal domains (Ms = 5.15 vs. 4.29), t (152) = 3.49, p = .001. An extremely robust reversal of this pattern in the accidental domain where positive outcomes were judged less foreseeable (M = 1.91) than negative outcomes (M = 5.21), t (152) = -11.44, p < .001 accounts for the aforementioned main effect.

A final analysis examined the expected negative correlation between the length of causal chains and foreseeability. Although in the anticipated direction, the overall correlation between these two variables was not significant, r = -.031, p = n.s. This was also the case within the achievement domain, r = -.005, p = n.s. However, the expectation of a significant negative correlation between chain length and foreseeability was upheld within both the accidental, r = -.183, p = .023, and interpersonal domains, r = -.296, p < .001. Though neither was significant, a negative correlation between chain length and foreseeability was obtained for both positive and negative outcomes, r = -.065, p = n.s. and r = -.143, p = n.s., respectively.

## DISCUSSION

This experiment examined how persons link together sequential causes to explain everyday events. This extends to more complex forms of causal perception other work in causal attribution which typically examines only the perceived proximal cause. While it could be argued that either "demand characteristics" of the procedure, or simply being asked to think about causal explanations (metacognition) may have prompted at least some of the chaining explanations, a number of reliable differences in when and how chaining occurred were observed.

Accidental outcomes prompted fewer chains than achievement or interpersonal outcomes. Chains were used more frequently to explain negative outcomes than positive outcomes, except for accidents where the pattern was reversed. Accidents were explained with shorter chains than the other two outcome domains. Whereas negative outcomes elicited longer chains than positive outcomes in both the achievement and interpersonal domains, accidents again reversed this pattern with negative accidents yielding shorter chains than positive ones. Accidents were judged less foreseeable than the other two types of outcomes, and positive accidents were judged less foreseeable than negative accidents, once more reversing the pattern observed in the other two domains.

The unique status of accidents relative to the other outcome domains merits comment. If accidents are perceived primarily as due to chance, then they require less complex explanations than other types of outcomes. In such cases, the proximal cause may be deemed sufficient, leading to fewer and shorter chains. Interestingly, the positive accident in the present study produced more and longer chains than the negative accident, reversing the pattern for the other two outcome domains. If people assume that accidents are usually negative, then positive accidents would be perceived as more unusual than negative accidents. Fortuitous outcomes, such as winning the lottery in the present experiment, are likely viewed as highly improbable events. Indeed, we found that the positive accident was judged least foreseeable by far compared to the other outcome and valence combinations. Weiner (1985b) and others (Hilton & Slugoski, 1986) have argued that unexpected outcomes elicit more effortful causal analysis than expected outcomes. The finding that participants used more and longer chains for positive accidents than for negative accidents may thus reflect a distinctive property of accidents, whereby positive ones are seen as less foreseeable than negative ones.

Alternatively, it is possible that the particular instances of positive and negative accidents used in the current study (winning and losing a lottery) may be responsible for the more complex causal chains used to explain the positive relative to the negative accident. After all, participants are certainly aware that winning a lottery is much less likely than losing one. Thus, before it can be argued that the accident domain, itself, is different from the other two domains, it must be shown that, in general, people view positive accidents as less foreseeable than negative ones, whereas they view positive outcomes in other domains as more foreseeable than negative ones. This provides the basis for Study 2.

## STUDY 2

## METHOD

### Participants

Sixty-eight undergraduate students (32 men, 36 women) studying introductory psychology at the University of Hawaii, Manoa, volunteered to participate in this experiment for extra credit during a scheduled classroom meeting.

### Design and Procedure

Participants received a 30-item questionnaire while seated in their classroom and were asked to rate how foreseeable each of 30 outcomes was on a 7-point Likert scale ranging from "1" = "Completely unforeseeable," to "7" = "Completely foreseeable." Each questionnaire described 10 outcomes in each of three domains (achievement, accidental, and interpersonal). In two versions of the questionnaire, the outcomes described were either all positive or all negative. The order of the 30 items in each version of the questionnaire was randomized among the participants. These arrangements resulted in a 2 x 3 mixed factorial design with outcome valence (positive or negative) as the between-subjects factor and outcome domain (achievement, accidental, and interpersonal) as the within-subjects factor.

Participants were told that this was a study about how we think about different everyday outcomes that happen to people. They were asked to indicate how foreseeable they thought each outcome was by circling the appropriate point on the accompanying scale. A wide range of varying outcomes was included within each outcome domain. The complete set of 10 positive and 10 negative outcomes in each of the three domains is shown in Appendix 2.

## RESULTS

Foreseeability ratings for 10 positive and 10 negative outcomes in each of the three domains are shown in Table 5. As in Study 1, mean foreseeability was significantly different among the three outcome domains, $F(2, 132) = 122.18$, $p < .001$, partial eta-squared = .649. Consistent with our earlier findings, mean foreseeability was significantly higher in the achievement ($M = 4.81$) and the interpersonal ($M = 4.57$) domains than the accidental domain ($M = 3.15$), $t(67) = 11.81$, $p < .001$, and $t(67) = 8.37$, $p < .001$, respectively. Mean foreseeability was also significantly higher in the achievement than the interpersonal domain, $t(67) = 2.25$, $p = .028$.

**Table 5. Mean Foreseeability for 10 Positive and 10 Negative Outcomes in Three Domains**

| | Domain | | | |
|---|---|---|---|---|
| Valence | Achievement | Accidental | Interpersonal | Means |
| Positive | 5.14 (0.15) | 2.81 (0.16) | 5.17 (0.15) | 4.37 (0.12) |
| Negative | 4.48 (0.15) | 3.49 (0.16) | 3.97 (0.15) | 3.98 (0.12) |
| Means | 4.81 (0.11) | 3.15 (0.11) | 4.57 (0.11) | 4.18 (0.09) |

Note. Standard deviations in parentheses

However, unlike Study 1, mean foreseeability was significantly higher for positive ($M = 4.37$) than for negative outcomes ($M = 3.98$), $F(1, 66) = 5.04$, $p = .028$, partial eta-squared = .071. A significant domain x valence interaction clarifies why this is so, $F(2, 132) = 35.84$, $p < .001$, partial eta-squared = .352. This interaction shows that positive outcomes were perceived as more foreseeable than negative outcomes in the achievement (Ms = 5.14 vs. 4.48), $t(67) = 22.66$, $p < .001$, and interpersonal domains (Ms = 5.17 vs. 3.97), $t(67) = 17.80$, $p < .001$. This pattern was reversed, however, in the accidental domain where positive outcomes were judged less foreseeable ($M = 2.81$) than negative outcomes ($M = 3.49$), $t(67) = -14.35$, $p < .001$. While this interaction is of the exact same form as was observed for the foreseeability data in Study 1, the difference in foreseeability between the positive and negative accident was not as marked as it was in the first study. Owing to this, negative outcomes were not judged overall more foreseeable than positive outcomes as in Study 1.

## GENERAL DISCUSSION

Study 2 demonstrates that the tendency to perceive positive accidents as less foreseeable than negative accidents generalizes across different instances of the two categories. This suggests that the results of Study 1 showing that positive accidents produce more and longer chaining explanations than negative accidents is not merely a reflection of a particular type of accident. Similarly, Study 2 shows that a reverse tendency to perceive positive outcomes as more foreseeable than negative ones in other outcome domains also generalizes over many instances of the other domains.

Insofar as foreseeability reliably varies with outcome valence, albeit differently for different outcome domains, the results from the current investigations strongly support the notion that foreseeability (outcome expectancies), rather than outcome valence itself plays the key role in complex causal attributions such as chaining. This pattern of findings suggests that the contention by attribution theorists that more attributional work is elicited by negative, unexpected, and/or extreme outcomes (seeWeiner, 1985b) may be due to the fact that in most outcome domains, negative outcomes are less expected than positive outcomes. An exception to this is for accidents where negative outcomes are more expected than positive outcomes. More complex causal reasoning occurs where outcomes are less expected, rather than simply where they are negative, thereby suggesting that outcome expectancies is the more important determinant of causal reasoning. This not only extends traditional attribution theory to more complex types of causal analyses, but suggests also that attributional analyses depend on the outcome domain considered.

The finding that more explanations were terminated at a dispositional node than at a situational node further extends traditional theory by confirming that the fundamental attribution error (a tendency to attribute others' behaviors to dispositional causes) is also characteristic of complex cognitive structures involving temporally-linked causes for outcomes. That this pattern was observed in all three domains, but was significant only with achievement outcomes, indicates, once again, that complex causal structures depend on the type of behavioral outcome that is assessed.

Although the present findings are clearly relevant for attributional theories, there are practical applications to consider as well. For example, in civil court cases, jurors must determine a percentage of liability to be assigned to the plaintiff and the defendant for a civil infraction. Jurors do this by assessing causal probabilities and considering how far removed each of the parties is from the disputed outcome. It would be interesting (and useful) to determine the extent to which the perceived proximal cause or more distant causes establish the amounts of liability.

**REFERENCES**

Anderson, C.A., Krull, D.S., & Weiner, B. (1996). Explanations: Processes and consequences. In E.T. Higgins & Kruglanski, A.W. (Eds.), Social psychology: Handbook of basic principles (pp. 271-296). New York: Guilford.

Antaki, C. (1986). Ordinary explanation in conversation: Causal structures and their defence. European Journal of Social Psychology, 15, 213-230.

Brown, A. & French, J. (1976). Construction and regeneration of logical sequences using causes or consequences as the point of departure. Child Development, 47, 930-940.

Brickman, P., Ryan, K., & Wortman, C.B. (1975). Causal chains: Attribution of responsibility as a function of immediate and prior causes. Journal of Personality and Social Psychology, 32, 1060-1067.

Cacioppo, J.T. (2004). Common sense, intuition, and theory in personality and social psychology. Personality and Social Psychology Review, 8, 114-122.

de Jong, P.F., Koomen, W., & Mellenbergh, G.J. (1988). Structure of causes for success and failure: A multidimensional scaling analysis of preference judgments. Journal of Personality and Social Psychology, 55**,** 718-725.

Fiske, S.T. (2004). Mind the gap: In praise of informal sources of formal theory. Personality and Social Psychology Review, 8*,* 132-137.

Fiske, S.T., Cuddy, A.J., Glick, P., & Xu. J. (2002). A model of (often mixed) stereotype content: Competence and warmth respectively follow from perceived status and competition. Journal of Persona Psychology, 82, 879-902.

Fiske, S.T. & Taylor, S.E. (1991). Social cognition. New York: McGraw-Hill.

Fletcher, G. (1983). The analysis of verbal explanations for marital separation: Implications for attribution theory. Journal of Applied Social Psychology, 13, 245-258.

French, D.P., Marteau, T.M., Senior, V., & Weinman, J. (2002). The structure of beliefs about the causes of heart attacks: A network analysis. British Journal of Health Psychology, 7(4), 463-480.

Gilbert, D.T. (1989). Thinking lightly about others. In J.S. Uleman & J.A. Bargh (Eds.), Unintended thought (p. 189-211). New York: Guilford.

Gold, G.J., & Shaw, J.I. (1998). Causal chaining: The structure and complexity of accounts. Journal of Social Behavior and Personality, 13, 651-666.

Heider, F. (1958). The psychology of interpersonal relations. New York: Wiley.

Hewstone, M. (1989). Causal attribution: From cognitive processes to collective beliefs. Cambridge: Basil Blackwell.

Higgins, E.T. (1996). Kowledge activation: Accessibility, applicability, and salience. In E.T. Higgins & Kruglanski, A.W. (Eds.), Social psychology: Handbook of basic principles (pp. 133-168). New York: Guilford.

Hilton, D.J., & Slugoski, B.R. (1986). Knowledge-based causal attribution: The abnormal conditions focus model. Psychological Review, 93*,* 75-88.

Jaspers, J., Finchman, F.D., & Hewstone M. (Eds.) (1983). Attributional theory and research: Conceptual, developmental and social dimensions. London: Academic Press.

Jones, E.E., & Davis, K.E. (1965). From acts to dispositions: The attribution process in person perception. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol.2, pp. 220-266). New York: Academic Press.

Kelley, H.H. (1967). Attribution theory in social psychology. In D. Levine (Ed.), Nebraska Symposium on Motivation (Vol. 15, pp. 192-240). Lincoln: University of Nebraska Press.

Kelley, H.H. (1971). Attribution in social interaction. Morristown, NJ: General Learning Press.

Kelley, H.H. (1972). Causal schemata and the attribution process. In E.E. Jones, D.E. Kanouse, H.H. Kelley, R.E. Nisbett, S. Valins, & B. Weiner (Eds.), Attribution: Perceiving the causes of behavior. (pp. 151-174). Morristown, NJ: General Learning Press.

Kelley, H. (1983). Perceived causal structures. In J. Jaspars, F. Fincham, & M. Hewstone (Eds.), Attribution theory and research: Conceptual, development and social dimensions (pp. 343-372). London: Academic Press.

Krull, D.S., & Erickson, D.J. (1995). Judging situations: On the effortful process of taking dispositional information into account. Social Cognition, 13(4), 417-438.

Lunt, P.K. (1988). The perceived causal structure of examination failure. British Journal of Social Psychology, 27(2), 171-179.

Lunt, P.K., & Livingstone, S.M. (1991). Everyday explanations for personal debt: A network approach. British Journal of Social Psychology, 30(4), 309-323.

McGuire, W.J. (2004). A perspectivist approach to theory construction. *Personality and Social Psychology Review, 8,* 173-182.

Russell, D. (1982). The causal dimension scale: A measure of how individuals perceive causes. Journal of Personality and Social Psychology, 42, 1137-1145

Shaver, K. (1985). The attribution of blame, causality, responsibility and blame worthiness, New York: Springer-Verlag.

Shaw, J.I., & McMartin, J.A. (1977). Personal and situational determinants of attribution of responsibility for an accident. Human Relations, 30, 95-107.

Shaw, J.I., & Skolnick, P. (1971). Attribution of responsibility for a happy accident. Journal of Personality and Social Psychology, 18, 380-383.

Trabasso, T., Secco, T., & Van Den Broek, P. (1984). Causal cohesion and story coherence. In Mandl, H., Stein, N.L., & Trabasso, T. (Eds.), Learning and comprehension of text. Hillsdale, NJ: Erlbaum.

Vinokur, A., & Ajzen, I. (1982). Relative importance of prior and immediate events: A causal primacy effect. Journal of Personality and Social Psychology, 42, 820-829.

Walser, E. (1966). Assignment of responsibility for an accident. Journal of Personality and Social Psychology, 3, 73-79.

Weiner, B. (1985a). An attributional theory of achievement motivation and emotion. Psychological Review, 92, 548-573.

Weiner, B. (1985b). "Spontaneous" causal thinking. Psychological Bulletin, 97, 74-84.

Weiner, B. (1986). An attributional theory of achievement motivation and emotion. New York: Springer-Verlag.

Weinstein, N.D. (1980). Unrealistic optimism about future life events. Journal of Personality and Social Psychology, 39, 806-820.

Wong, P.T.P., & Weiner, B. (1981). When people ask "why" questions and the heuristics of attributional search. Journal of Personality and Social Psychology, 40, 650-653.

## APPENDIX 1. CAUSAL CHAINS USED IN STUDY 1

**Achievement/Positive Outcome: "Sarah was hired as the president of a large corporation."**

**Sequence 1/Internal Proximal Cause**

1. (Internal) because Sarah was a hard worker
2. (External) because Sarah's parents told her that she wouldn't do well
3. (Internal) because Sarah was unmotivated to do well in high school
4. (External) because of peer pressure to not do well

**Sequence 2/External Proximal Cause**

1. (External) because the hiring board liked Sarah
2. (Internal) because Sarah was a hard worker
3. (External) because Sarah's parents told her that she wouldn't do well
4. (Internal) because Sarah was unmotivated to do well in high school

**Achievement/Negative Outcome: "Sarah was fired as the president of a large corporation."**

**Sequence 1/Internal Proximal Cause**

1. (Internal) because Sarah wasn't motivated to do a good job
2. (External) because Sarah's employees didn't show her proper respect
3. (Internal) because Sarah lacked leadership qualities
4. (External) because Sarah's parents were overly protective when she was growing up

**Sequence 2/External Proximal Cause**

1. (External) because the board of directors decided a change was needed
2. (Internal) because Sarah wasn't motivated to do a good job
3. (External) because Sarah's employees didn't show her proper respect
4. (Internal) because Sarah lacked leadership qualities

**Accidental/Positive Outcome: "Sarah won a large amount of money playing the lottery."**

**Sequence 1/Internal Proximal Cause**

1. (Internal) because Sarah studied the pattern of past winning lottery numbers
2. (External) because Sarah's friend bet her that she couldn't win the lottery
3. (Internal) because Sarah was overconfident that she could win the lottery
4. (External) because Sarah learned to be overconfident from her father

**Sequence 2/External Proximal Cause**

1. (External) because Sarah's friend suggested the winning lottery numbers
2. (Internal) because Sarah was afraid to take risks
3. (External) because Sarah's parents provided everything when she was growing up
4. (Internal) because Sarah was an insecure child

**Accidental/Negative Outcome: "Sarah lost a large amount of money playing the lottery."**

**Sequence 1/Internal Proximal Cause**

1. (Internal) because Sarah was overconfident that she could win the lottery
2. (External) because Sarah's friends encouraged her to take risks
3. (Internal) because Sarah enjoyed winning
4. (External) because Sarah's parents taught her the value of success

**Sequence 2/External Proximal Cause**

1. (External) because Sarah's friend suggested the losing lottery numbers
2. (Internal) because Sarah wasn't confident in her own choices
3. (External) because Sarah's parents made all her decisions for her when she was growing up
4. (Internal) because Sarah was an insecure child

**Interpersonal/Positive Outcome: "Sarah got married to her boyfriend."**

**Sequence 1/Internal Proximal Cause**

1. (Internal) because Sarah loved her boyfriend
2. (External) because Sarah's boyfriend had a great sense of humor
3. (Internal) because Sarah's personality brought it out of him
4. (External) because Sarah's mom raised her to be that way

**Sequence 2/External Proximal Cause**

1. (External) because Sarah's mom pressured her to get married
2. (Internal) because Sarah was afraid of relationships
3. (External) because Sarah's previous boyfriends cheated on her
4. (Internal) because Sarah was uncaring

**Interpersonal/Negative Outcome: "Sarah got divorced from her husband."**

**Sequence 1/Internal Proximal Cause**

1. (Internal) because Sarah was uncaring
2. (External) because Sarah's husband was cold towards her
3. (Internal) because Sarah was a workaholic
4. (External) because Sarah's parents raised her to be that way

**Sequence 2/External Proximal Cause**

1. (External) because Sarah's husband was cold towards her
2. (Internal) because Sarah was unwilling to give him enough attention
3. (External) because Sarah had to take care of her sick mom
4. (Internal) because Sarah was a loving daughter

## APPENDIX 2. POSITIVE AND NEGATIVE OUTCOMES USED IN STUDY 2

| **Achievement/Positive Outcomes** | **Achievement/Negative Outcomes** |
|---|---|
| A person gets an "A" in a class | A person gets an "F" in a class |
| A person is accepted to a university | A person is rejected by a university |
| A person bowls a great game | A person bowls a horrible game |
| A person graduates from medical school | A person flunks out of medical school |
| A person passes the lawyer's bar exam | A person fails the lawyer's bar exam |
| A person gets promoted | A person gets demoted |
| A person gets hired | A person gets fired |
| A person wins first place in a race | A person gets last place in a race |
| A person finishes a marathon | A person drops out during a marathon |
| A person earns enough money for a vacation | A person doesn't earn enough money for a vacation |
| **Accidental/Positive Outcomes** | **Accidental/Negative Outcomes** |
| A person wins the lottery | A person loses the lottery |
| A person finds $100 at the park | A person loses $100 at the park |
| A person accidentally discovers a cure | A person accidentally blows up a lab |
| A person's wedding day is sunny | A person's wedding day is rainy |
| A person is just in time to catch a plane | A person just misses his plane |
| A person bets on a winning horse | A person bets on a losing horse |
| A person finds a great seat at a concert | A person finds a lousy seat at a concert |
| A person finds his lost watch | A person loses his watch |
| A person finds drinking fountain when thirsty | A person can't find drinking fountain when thirsty |
| A person gets last newspaper on rack | A person finds only empty newspaper racks |
| **Interpersonal/Positive Outcomes** | **Interpersonal/Negative Outcomes** |
| A person makes friends | A person loses friends |
| A person gets engaged | A person breaks up with partner |
| A person does friend a favor | A person refuses to do friend a favor |
| A person joins a group | A person gets kicked out of a group |
| A person gets lots of dates | A person can't get any dates |
| A person cooperates with partner | A person conflicts with partner |
| A person gets along with siblings | A person fights with siblings |
| A person makes people laugh | A person makes people cry |
| A person comforts a friend | A person is not there for a friend in need |
| A person is kind to a stranger | A person ignores a stranger |

## AUTHOR BIOGRAPHIES

Yun-Chu is a graduate student in psychology at the University of Hawaii, Manoa. Her research interest is in social cognition.

Jerry I. Shaw received his Ph.D. in social psychology from UCLA in 1969 and has been professor of psychology at California State University, Northridge since 1977. His research interests are in social cognition and psychology and law. Email to jerry.shaw@csun.edu.