

# The Influence of Causal Conditional Reasoning on the Acceptance of Product Claims

ELISE CHANDON  
CHRIS JANISZEWSKI\*

The believability of product claims depends on the consumer's ability to generate disabling conditions (i.e., other events blocking a cause from having its effect) and alternative causes (i.e., other events causing the outcome). The consideration of disabling conditions hurts the believability of product claims supported by arguments stated in a cause → effect and a ~ effect → ~ cause format, whereas the consideration of alternative causes hurts the believability of product claims supported by arguments stated in an effect → cause and a ~ cause → ~ effect format. These results have implications for the selection of the most persuasive product claim format.

There is a long history of research into the processes that influence a consumer's response to persuasive communications (for reviews, see Kardes 2005; Meyers-Levy and Malaviya 1999; Petty and Cacioppo 1983). At a general level, theories of persuasion posit that people respond to a persuasive attempt based on a critical assessment of the message (e.g., central route to persuasion, systematic processing) or an intuitive inference about easily processed cues (e.g., peripheral route, heuristic processing; Eagly and Chaiken 1993; Petty and Cacioppo 1986). At a more specific level, researchers try to understand the processes that contribute to persuasion. For example, a systematic assessment of a persuasive communication relies on elaboration, reflection, and inference processes (Ahluwalia 2000; Kardes, Posavac, and Cronley 2004).

Advertisers can influence the systematic assessment of a persuasive communication by altering the presentation format of the communication. For example, consider the causal claim represented in the advertising slogan "Crest fights cavities." The advertiser wants the consumer to make the deductive inference that using Crest toothpaste will prevent cavities. Yet, there are other ways that this information could have been conveyed. It could have been claimed that the failure to use Crest leads to more cavities, that people with-

out cavities regularly use Crest, or that people with cavities did not use Crest. The persuasiveness of these different argument formats will depend on the consumer's ability to draw a deductive inference and the degree to which this inference is counterargued (Kardes 1988; Kardes et al. 2004; Wright 1980).

Prior research investigating a person's willingness to accept a causal claim has focused on two types of counterarguments (Cummins 1995; Cummins et al. 1991; Dieussaert, Schaeken, and D'Ydewalle 2002). First, a person's ability to think of disabling conditions can make a claim less believable. For example, knowing that people with high sugar diets are more likely to have cavities may decrease a person's willingness to believe that Crest prevents cavities. The presence of disabling conditions casts doubt on the sufficiency of the cause (e.g., using Crest). Second, the person's ability to think of alternative causes can make a claim less believable. For example, knowing that good oral hygiene also prevents cavities may decrease a person's willingness to believe that Crest prevents cavities. The presence of alternative causes casts doubt on the necessity of the cause.

We contend that the persuasiveness of a product claim will depend on a consumer's ability to consider disabling conditions and alternative causes. Experiment 1 shows that encouraging a person to generate disabling conditions reduces the believability of claims stated using some types of argument formats, whereas encouraging a person to generate alternative causes reduces the believability of claims stated using other types of argument formats. Experiment 2 shows that consumers naturally list disabling conditions as reasons not to believe some types of product claims but list alternative causes as reasons not to believe other types of product claims. Thus, it may be beneficial to search for moderators

\*Elise Chandon is assistant professor of marketing, Pamplin College of Business, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061 (echandon@vt.edu). Chris Janiszewski is the Jack Faricy Professor of Marketing, Warrington College of Business Administration, University of Florida, Gainesville, FL, 32611-7155 (chris.janiszewski@cba.ufl.edu). The authors thank Noreen Klein for her helpful comments.

John Deighton served as editor and Stephen Hoch served as associate editor for this article.

Electronically published October 8, 2008

that encourage or discourage the generation of disabling conditions and alternative causes and, consequently, decrease or increase persuasion.

## CONDITIONAL REASONING

The assessment of a causal product claim is an active, elaborative activity that depends on deductive inferences (Kardes et al. 2004). Insight into this inference process depends on an understanding of how people engage in conditional reasoning. In a standard causal conditional reasoning task, people are given a rule of the form "If  $p$ , then  $q$ " (where  $p$  is called the antecedent and  $q$  the consequent) and then are asked to make an inference about the truth of a conditional premise. A conditional premise is a combination of a fact (also called a premise) and a conclusion (also called a conditional statement). This task gives rise to four classic conditional inferences (see table 1).

Among the four conditional inferences, modus ponens and modus tollens are logically valid. Newstead et al. (1997) use the following example to illustrate why the modus ponens ( $MP_{p \rightarrow q}$ ) and modus tollens ( $MT_{\sim q \rightarrow \sim p}$ ) inferences are true and the affirmation of the consequent ( $AC_{q \rightarrow p}$ ) and the denial of the antecedent ( $DA_{\sim p \rightarrow \sim q}$ ) inferences are false. Assume a person is given the rule "If it is a dog, then it is an animal." A  $MP_{p \rightarrow q}$  conditional premise (e.g., fact: it is a dog; conclusion: it is an animal) is true (i.e., given the rule, the conclusion follows from the fact). A  $MT_{\sim q \rightarrow \sim p}$  conditional premise (e.g., fact: it is not an animal; conclusion: it is not a dog) is also true. However, an  $AC_{q \rightarrow p}$  conditional premise (e.g., fact: it is an animal; conclusion: it is a dog) and a  $DA_{\sim p \rightarrow \sim q}$  conditional premise (e.g., fact: it is not a dog; conclusion: it is not an animal) do not follow from the original rule. Research shows that people who are not trained in formal rules of inference can distinguish valid conditional premises from invalid conditional premises (Evans, Clibbens, and Rood 1995; Evans et al. 1999), although there are many situations in which they do not (Evans 1993; Evans and Handley 1999).

### Mental Model Theory

When a person has not been trained to use formal rules of inference, deductive reasoning must occur via another process. Mental model theory proposes that people use their general knowledge to represent models proposed by infor-

mation in their environment. Then, people assess the validity of these models by trying to think of competing models that might contradict the conclusion (Evans 1993; Evans and Handley 1999; Evans et al. 1999; Goldvarg and Johnson-Laird 2001; Johnson-Laird and Byrne 1991). To illustrate, consider the  $MP_{p \rightarrow q}$  claim "If you brush your teeth, you will not get cavities." Mental model theory assumes that a person will begin the reasoning process by representing the model (e.g., brush teeth  $\rightarrow$  do not get cavities). Next, the person will attempt to think of models (counterexamples) that contradict the model. These counterexamples can include situations in which the antecedent does not lead to the consequent (e.g., "I brush my teeth, and I have cavities") or the consequent occurs in the absence of the antecedent (e.g., "I do not brush my teeth, and I do not have cavities"). Third, if the search for valid (i.e., diagnostic) counterexamples is successful (unsuccessful), the person rejects (accepts) the original model and its conclusion.

### Naive Causal Deduction

Denise Cummins and her colleagues (Cummins 1995; Cummins et al. 1991) assess the diagnosticity of two types of counterexamples: disabling conditions and alternative causes. A disabling condition prevents the consequent, despite the presence of the antecedent, because it casts doubt on the sufficiency of the antecedent. For example, Cummins gave respondents the rule "If the brake was depressed, then the car slowed down." She then asked a question corresponding to the  $MP_{p \rightarrow q}$  conditional premise (e.g., "Given that the brake was depressed, do you agree that the car slowed down?"). To assess the truth of the conditional premise, participants supposedly generated scenarios in which the brake was depressed but the car did not slow down (e.g., the brake lines were cut, the road was icy). To the extent that participants could generate these disabling conditions, they were less likely to believe  $MP_{p \rightarrow q}$  conditional premises. Cummins found a similar result for  $MT_{\sim q \rightarrow \sim p}$  conditional premises.

An alternative cause can generate the consequent independent of the antecedent, hence it can cast doubt on the necessity of the antecedent. Again, Cummins gave participants the rule "If the brake was depressed, then the car slowed down." She then asked a question corresponding to the  $AC_{q \rightarrow p}$  conditional premise (e.g., "Given that the car slowed down, do you agree that the brake was depressed?").

TABLE 1

FOUR TYPES OF ARGUMENT FORMATS

Argument format	Label	Rule	Conditional premise	
			Fact	Conclusion
Modus ponens	$MP_{p \rightarrow q}$	If $p$ , then $q$	$p$	$q$
Modus tollens	$MT_{\sim q \rightarrow \sim p}$	If $p$ , then $q$	Not $q$	Not $p$
Affirmation of the consequent	$AC_{q \rightarrow p}$	If $p$ , then $q$	$q$	$p$
Denial of the antecedent	$DA_{\sim p \rightarrow \sim q}$	If $p$ , then $q$	Not $p$	Not $q$

To assess the truth of the conditional premise, participants supposedly generated scenarios in which the car could slow down for reasons other than depressing the brake (e.g., the car was going uphill, the engine stopped working). To the extent that participants generated alternative causes, they were less likely to believe  $AC_{q \rightarrow p}$  conditional premises. Cummins found a similar result for  $DA_{\sim p \rightarrow \sim q}$  conditional premises.

There is considerable evidence that people engage in naive causal deduction. De Neys and his colleagues replicate Cummins's findings and demonstrate that there is a high correlation between the number of disabling conditions and alternative causes associated with a conditional premise and the acceptance of the premise (De Neys, Schaeken, and D'Ydewalle 2002, 2003). They also show that retrieving additional disabling conditions and alternative causes encourages the rejection of a conditional premise (De Neys et al. 2002). Liu, Lo, and Wu (1996) show that the acceptance of  $MP_{p \rightarrow q}$  and  $MT_{\sim q \rightarrow \sim p}$  conditional premises is directly related to  $Pr(q|p)$ . They also show that the availability of disabling conditions directly influences  $Pr(q|p)$ . Verschueren, Schaeken, and D'Ydewalle (2005) find that  $Pr(q|p)$  is correlated with the availability of disablers and that it influences the acceptance rate of  $MP_{p \rightarrow q}$  and  $MT_{\sim q \rightarrow \sim p}$  conditional premises. They also find that  $Pr(q|p)$  is correlated with the availability of alternative causes and that it influences the acceptance rate of  $AC_{q \rightarrow p}$  and  $DA_{\sim p \rightarrow \sim q}$  conditional premises.

## Research Plan

The evidence on causal conditional reasoning, and the role of disabling conditions and alternative causes in naive causal deduction, is compelling. Yet, these processes need not be instrumental in the acceptance of product claims. First, the sample of conditional premises used to investigate naive causal deduction was deterministic (e.g., "If Mary jumped in the swimming pool, then she got wet"), whereas product claims are often probabilistic (e.g., "If you use hair conditioner, then your hair will be healthy"). Second, the methodology used to draw conclusions about processes supporting conditional reasoning has provided correlational evidence. It would be useful to provide experimental evidence that disabling conditions and alternative causes influence the acceptance of a conditional premise.

Our research plan is as follows. In experiment 1, we investigate the influence of considering disabling conditions and alternative causes on the believability of a conditional premise. We ask participants to read a conditional premise, to list disabling conditions or alternative causes, and to make a conditional inference. We show that listing disabling conditions influences the acceptance of a  $MP_{p \rightarrow q}$  and a  $MT_{\sim q \rightarrow \sim p}$  conditional premise but not an  $AC_{q \rightarrow p}$  and a  $DA_{\sim p \rightarrow \sim q}$  conditional premise. Similarly, we show that listing alternative causes influences the acceptance of an  $AC_{q \rightarrow p}$  and a  $DA_{\sim p \rightarrow \sim q}$  conditional premise but not a  $MP_{p \rightarrow q}$  and a  $MT_{\sim q \rightarrow \sim p}$  conditional premise. Study 2 shows that disabling conditions are naturally recruited as evidence against a claim made using a  $MP_{p \rightarrow q}$  or a  $MT_{\sim q \rightarrow \sim p}$  argument format and that

alternative causes are naturally recruited as evidence against a claim made using an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format.

## EXPERIMENT 1

Experiment 1 investigated the influence of disabling conditions and alternative causes on the acceptance of a conditional premise. Consistent with prior correlational evidence (Cummins 1995), we expected that asking people to generate disabling conditions would reduce the acceptance of a conditional premise stated using a  $MP_{p \rightarrow q}$  or a  $MT_{\sim q \rightarrow \sim p}$  argument format. In contrast, we expected that asking people to generate alternative causes would reduce the acceptance of a conditional premise stated using an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format.

**H1a:** Generating disabling conditions will reduce the acceptance of conditional premises stated using a  $MP_{p \rightarrow q}$  or a  $MT_{\sim q \rightarrow \sim p}$  argument format but not using an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format.

**H2b:** Generating alternative causes will reduce the acceptance of conditional premises stated using an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format but not using a  $MP_{p \rightarrow q}$  or a  $MT_{\sim q \rightarrow \sim p}$  argument format.

## Method

*Stimuli.* A pretest was used to identify product claims that had the potential to elicit both disabling conditions and alternative causes. An initial set of 25 product claims was selected based on the authors' subjective assessment of the believability of the claims. Forty-eight pretest participants were asked to generate reasons why each statement might be false. Participants were instructed to produce reasons that were realistic and different from each other, as well as to avoid simple variations of the same idea. Participants' responses were used to generate a list of disabling conditions and alternative causes. The list was used to score each participant's protocols. Eight product claims that had a high, and relatively similar, number of disabling conditions ( $M = 2.40$ ) and alternative causes ( $M = 2.66$ ) were selected as stimuli (see the appendix). Product claims were given at the category level so that the differential familiarity with brand names would not influence the results.

*Design.* The experiment used a 4 (argument format:  $MP_{p \rightarrow q}$ ,  $MT_{\sim q \rightarrow \sim p}$ ,  $AC_{q \rightarrow p}$ ,  $DA_{\sim p \rightarrow \sim q}$ ; within subject) by 3 (reasons generated: disablers, alternatives, none; between subject) mixed design with two sets of four product claim replicates (between subject) and two argument format orders (a between-subject counterbalancing factor). The first replicate set included product claims corresponding to Certs, Crest, Jeep, and Pampers (see the first four statements in the appendix), and the second replicate set included product claims corresponding to Head & Shoulders, Pantene,

Slim-Fast, and Whiskas (see the last four statements in the appendix). The argument format counterbalance factor conditions were  $MP_{p \rightarrow q}$ ,  $MT_{\sim q \rightarrow \sim p}$ ,  $AC_{q \rightarrow p}$ , and  $DA_{\sim p \rightarrow \sim q}$  and  $MT_{\sim q \rightarrow \sim p}$ ,  $MP_{p \rightarrow q}$ ,  $DA_{\sim p \rightarrow \sim q}$ , and  $AC_{q \rightarrow p}$  so that a conditional premise stated in the positive (e.g.,  $MP_{p \rightarrow q}$ ,  $AC_{q \rightarrow p}$ ) appeared before or after a conditional premise stated in the negative (e.g.,  $MT_{\sim q \rightarrow \sim p}$ ,  $DA_{\sim p \rightarrow \sim q}$ ). A four-cell Latin square design was used to control the assignment of product claims to each argument format (i.e., a participant saw four product claims, each stated in a different argument format). The key dependent measure was an assessment of whether a conclusion followed from a fact given a rule. The between-subject manipulation of argument format for a single product claim is illustrated in table 2.

**Procedure.** The procedure consisted of two stages. Stage 1 familiarized participants with the procedure. Participants were informed that they would be asked to assess whether a fact led to a conclusion. Participants were shown a sample rule and a corresponding fact and conclusion. Then, participants in the two reasons conditions were told that they would be asked to list reasons the conclusion could be false. They were told, "Consider the following rule: if a person uses a liquid dishwasher detergent, the person's dishes will be spotless." Then, participants in the disabling conditions condition were told, "Now imagine that a person uses a liquid dishwasher detergent but the dishes are not spotless. Can you think of reasons why the dishes might not be spotless (even though the person used a liquid dishwasher detergent)?" The instructions listed sample reasons including "faulty dishwasher," "unusually shaped dishes not adapted for dishwasher use," and "there was no hot water available." Similarly, participants in the alternative causes condition were told, "Now imagine that a person does not use a liquid dishwasher detergent but the dishes are spotless. Can you think of reasons why the dishes might be spotless (even though the person did not use a liquid dishwasher detergent)?" The instruction listed sample reasons including "the dishes are brand new," "the dishes were washed by hand," and "the dishes were not dirty after eating."

Next, all participants were given an explanation of the dependent measure. Participants were told that they would have to determine whether a fact leads to a conclusion. They were then given a sample conditional premise:

Rule	If a person uses a liquid dishwasher detergent, the person's dishes will be spotless.
Fact	The person's dishes are spotless.
Conclusion	A person used a liquid dishwasher detergent.

The validity of the conclusion was assessed using a 7-point rating scale, where 1 was "very sure I cannot draw this conclusion" and 7 was "very sure I can draw this conclusion," with 4 representing "cannot tell." Participants in the no-reasons condition only received an explanation of the dependent measure (i.e., the instructions did not mention reasons).

In stage 2, participants in the reasons conditions were

TABLE 2

ILLUSTRATION OF A CONDITIONAL PREMISE STATED USING THE FOUR TYPES OF ARGUMENT FORMATS

Argument format	Presentation	Conditional premise
$MP_{p \rightarrow q}$	Rule	If the person uses a breath mint, the person will have fresh breath.
	Fact	The person uses a breath mint.
	Conclusion	The person will have fresh breath.
$MT_{\sim q \rightarrow \sim p}$	Rule	If the person uses a breath mint, the person will have fresh breath.
	Fact	The person does not have fresh breath.
	Conclusion	The person did not use a breath mint.
$AC_{q \rightarrow p}$	Rule	If the person uses a breath mint, the person will have fresh breath.
	Fact	The person has fresh breath.
	Conclusion	The person used a breath mint.
$DA_{\sim p \rightarrow \sim q}$	Rule	If the person uses a breath mint, the person will have fresh breath.
	Fact	The person did not use a breath mint.
	Conclusion	The person will not have fresh breath.

asked to (1) generate reasons and (2) judge the validity of the conclusions for four conditional premises. Participants in the reasons conditions (e.g., generate disablers, generate alternatives) were given a minimum of 1 minute to generate reasons. Participants in the no-reasons condition simply assessed the validity of the conclusions for four conditional premises.

## Results

Four hundred nineteen students from an undergraduate subject pool at the University of Florida participated in the study in exchange for extra credit. Reasons were coded as disabling conditions or alternative causes in order to perform a manipulation check (see table 3 for means). There were more disabling conditions listed by the generate disablers group ( $M = 2.35$ ) than by the generate alternatives group ( $M = .01$ ;  $F(1, 272) = 469.0$ ,  $p < .01$ ), whereas there were more alternative causes listed by the generate alternatives group ( $M = 2.33$ ) than by the generate disablers group ( $M = .00$ ;  $F(1, 272) = 433.9$ ,  $p < .01$ ). The number of disabling conditions ( $F(3, 270) = .50$ ,  $p > .10$ ) and alternative causes ( $F(3, 270) = .67$ ,  $p > .10$ ) listed did not vary by type of argument format.

The key dependent measure was the judged validity of the conclusion. An initial analysis confirmed that the argument presentation order counterbalance factor and product claim replicate factors did not interact with the reasons generated or argument format factors (all  $p$ 's  $> .20$ ). The means, collapsed across replicate and counterbalance order, are presented in table 3.

A test of the type of reasons generated by type of argument format interaction was significant ( $F(6, 1,113) = 6.09$ ,  $p < .001$ ). Four planned contrasts were used to test the hypothesis that conditional premises stated using the  $MP_{p \rightarrow q}$  and  $MT_{\sim q \rightarrow \sim p}$  argument formats would be perceived

TABLE 3  
RESULTS OF EXPERIMENT 1

Argument format	Control group	Generate disablers group			Generate alternatives group		
	Claim acceptance	Disablers generated	Alternatives generated	Claim acceptance	Disablers generated	Alternatives generated	Claim acceptance
MP <sub>p→q</sub>	5.07	2.42	.00	4.49 <sup>a</sup>	.03	2.31	4.96
MT <sub>~q→~p</sub>	3.84	2.36	.00	3.48 <sup>b</sup>	.00	2.33	3.66
AC <sub>q→p</sub>	3.81	2.32	.00	3.86	.00	2.41	3.32 <sup>a</sup>
DA <sub>~p→~q</sub>	3.52	2.30	.00	3.89 <sup>b</sup>	.01	2.26	2.99 <sup>a</sup>

<sup>a</sup>Cell mean differs from control group mean at  $p < .05$  significance.

<sup>b</sup>Cell mean differs from control group mean at  $p < .10$  significance.

as less (equally) valid when participants were asked to generate disabling conditions (alternative causes) than when they were not. For the MP<sub>p→q</sub> argument format, generating disablers ( $M = 4.49$ ) led to less acceptance of the conditional premises as compared to not generating reasons ( $M = 5.07$ ;  $F(1, 401) = 8.45$ ,  $p < .01$ ), whereas generating alternatives ( $M = 4.96$ ) had no influence on the acceptance of the conditional premises as compared to not generating reasons ( $M = 5.07$ ;  $F(1, 401) = .28$ ,  $p > .05$ ). For the MT<sub>~q→~p</sub> argument format, generating disablers ( $M = 3.48$ ) led to less acceptance of the conditional premises as compared to not generating reasons ( $M = 3.84$ ;  $F(1, 401) = 3.79$ ,  $p = .06$ ), whereas generating alternatives ( $M = 3.66$ ) had no influence on the acceptance of the conditional premises as compared to not generating reasons ( $M = 3.84$ ;  $F(1, 401) = .66$ ,  $p > .05$ ). These results are consistent with hypothesis 1a.

Four planned contrasts were used to test the hypothesis that conditional premises stated using the AC<sub>q→p</sub> and DA<sub>~p→~q</sub> argument formats would be perceived as less (equally) valid when participants were asked to generate alternative causes (disabling conditions) than when they were not. For the AC<sub>q→p</sub> argument format, generating alternatives ( $M = 3.32$ ) led to less acceptance of the conditional premises as compared to not generating reasons ( $M = 3.81$ ;  $F(1, 401) = 4.89$ ,  $p < .01$ ), whereas generating disablers ( $M = 3.86$ ) had no influence on the acceptance of the conditional premises as compared to not generating reasons ( $M = 3.81$ ;  $F(1, 401) = .19$ ,  $p > .05$ ). For the DA<sub>~p→~q</sub> argument format, generating alternatives ( $M = 2.99$ ) led to less acceptance of the conditional premises as compared to not generating reasons ( $M = 3.52$ ;  $F(1, 401) = 5.79$ ,  $p < .05$ ), and generating disablers ( $M = 3.89$ ) unexpectedly led to more acceptance of the conditional premises as compared to not generating reasons ( $M = 3.52$ ;  $F(1, 401) = 3.80$ ,  $p = .06$ ). These results are consistent with hypothesis 1b.

## Discussion

The results of experiment 1 showed that actively generating disabling conditions reduced a person's acceptance of conditional premises stated using a MP<sub>p→q</sub> or a MT<sub>~q→~p</sub> argument format but not the person's acceptance of conditional premises stated using an AC<sub>q→p</sub> or a DA<sub>~p→~q</sub> ar-

gument format. In contrast, actively generating alternative causes reduced a person's acceptance of conditional premises stated using an AC<sub>q→p</sub> or a DA<sub>~p→~q</sub> argument format but not the person's acceptance of conditional premises stated using a MP<sub>p→q</sub> or a MT<sub>~q→~p</sub> argument format. These results supplement the conditional reasoning literature in two important ways. First, experiment 1 stimuli consisted of rules that were probabilistic (e.g., advertising claims) as opposed to deterministic (i.e., statements of fact). Second, unlike prior studies, the content of the rule and the propensity to consider disabling conditions and alternative causes were not confounded. That is, the same content was used to assess the influence of disabling conditions and alternative causes on the acceptance of the four types of conditional premises.

Experiment 1 is a good starting point for understanding how naive causal deduction might influence the acceptance of product claims, but it is not representative of how people naturally experience and respond to advertising claims. Experiment 1 used a procedure that is common to the conditional reasoning literature. Participants were asked to consider a rule (i.e., a product claim), consider a fact, consider a conclusion, and then decide whether the conclusion could be drawn from the fact given the rule. Although this procedure maximizes the internal validity associated with a conditional reasoning test, it limits the external validity associated with the evaluation of advertising claims. In experiment 2, we asked participants to counterargue product claims stated using a fact-conclusion format.

## EXPERIMENT 2

The objective of experiment 2 was to show that consumers naturally use disabling conditions and alternative causes to judge the validity of a conditional premise. Unlike experiment 1, in which participants were forced to generate disabling conditions or alternative causes prior to judging the validity of the conditional premise, the experiment 2 procedure asked participants to report reasons to reject the conditional premise. Thus, we expected that an assessment of a MP<sub>p→q</sub> or a MT<sub>~q→~p</sub> argument would result in the listing of disabling conditions as the reason to reject the claim, whereas an assessment of an AC<sub>q→p</sub> or a DA<sub>~p→~q</sub> argument

would result in the listing of alternative causes as the reasons to reject the claim.

Similar to experiment 1, we presented these claims using a category label (e.g., breath mint) as opposed to a brand label (e.g., Certs) in order to avoid biases created by familiarity with the brand or its advertising. There was one noteworthy change in the experiment 2 procedure relative to experiment 1. We made the procedure more representative of how a person might experience an advertising claim. More specifically, we presented a conditional premise (i.e., fact/conclusion) and asked the participant to list two reasons the conditional premise could be false.

## Method

**Stimuli and Design.** The product claims were the claims used in experiment 1. The experiment used a four-cell (argument format:  $MP_{p \rightarrow q}$ ,  $MT_{\sim q \rightarrow \sim p}$ ,  $AC_{q \rightarrow p}$ ,  $DA_{\sim p \rightarrow \sim q}$ ) within-subject design with two product claim presentation orders (a between-subject counterbalancing factor). A Latin square design was used to control the assignment of argument format to each product claim (i.e., a participant saw eight product claims, two stated in each argument format). The presentation order counterbalance factor conditions were Head & Shoulders, Certs, Crest, Jeep, Pampers, Pantene, Slim-Fast, Whiskas, and the reverse. The key dependent measure was the type of counterargument listed.

**Procedure.** The procedure was fairly simple. The instructions told participants that they would see nine statements (the first statement was always a practice statement). Participants were told, "For each statement, we will ask you to read it and list the reasons it could be false." For each conditional premise, an initial page presented the premise (e.g., a fact and conclusion). Participants hit a Continue button to advance. The second page presented the conditional premise a second time and asked participants to list two logically valid reasons why the statement could be false. We specified "logically valid reasons" because we wanted the respondents to give us reasons that were diagnostic, which might not necessarily be the same as reasons that were most accessible. This process was repeated for the next eight conditional premises. Unlike experiment 1, the procedure contained no reference to, or information about, disabling conditions and alternative causes. In effect, participants were free to respond using any format they wished.

## Results

Eighty one students from an undergraduate subject pool at the University of Florida participated in the study in exchange for extra credit. The counterarguments were coded as alternative causes, disabling conditions, and other. These thoughts were then aggregated across the eight replicates. They are listed in table 4.

As predicted, there were main effects of argument format on the number of disabling conditions and alternative causes listed by the participants. The number of disabling condi-

**TABLE 4**  
RESULTS OF EXPERIMENT 2

Argument format	Disablers listed	Alternatives listed	Other thoughts listed
$MP_{p \rightarrow q}$	1.35	.27	.37
$MT_{\sim q \rightarrow \sim p}$	1.28	.25	.45
$AC_{q \rightarrow p}$	.22	1.26	.51
$DA_{\sim p \rightarrow \sim q}$	.36	1.09	.53

tions listed was higher when the  $MP_{p \rightarrow q}$  ( $M = 1.35$ ) and  $MT_{\sim q \rightarrow \sim p}$  ( $M = 1.28$ ) argument formats were used as compared to when the  $AC_{q \rightarrow p}$  ( $M = .22$ ) and  $DA_{\sim p \rightarrow \sim q}$  ( $M = .36$ ) argument formats were used ( $F(1, 73) = 185.60$ ,  $p < .001$ ). The number of alternative causes listed was higher when the  $AC_{q \rightarrow p}$  ( $M = 1.26$ ) and  $DA_{\sim p \rightarrow \sim q}$  ( $M = 1.09$ ) argument formats were used as compared to when the  $MP_{p \rightarrow q}$  ( $M = .27$ ) and  $MT_{\sim q \rightarrow \sim p}$  ( $M = .25$ ) argument formats were used ( $F(1, 73) = 171.49$ ,  $p < .001$ ). There was no interaction of argument format and the counterbalance factor on the number of disabling conditions ( $F(1, 79) = 2.09$ ,  $p > .05$ ) or alternative causes ( $F(1, 79) = 1.17$ ,  $p > .05$ ) listed.

## Discussion

Experiment 2 shows that people naturally recruit disabling conditions when assessing the validity of claims made using a  $MP_{p \rightarrow q}$  or a  $MT_{\sim q \rightarrow \sim p}$  argument format and naturally recruit alternative causes when assessing the validity of claims made using an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format. Thus, the experiment provides further evidence that these are the types of counterarguments that are recruited when assessing the validity of a product claim.

## GENERAL DISCUSSION

In this article, we have provided evidence that a person's acceptance of a product claim is influenced by his ability to think of disabling conditions and alternative causes. When asked to generate disabling conditions, participants were less prone to believe conditional premises stated using a  $MP_{p \rightarrow q}$  or a  $MT_{\sim q \rightarrow \sim p}$  argument format as opposed to an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format. When asked to generate alternative causes, participants were less prone to believe in conditional premises stated using an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format as opposed to a  $MP_{p \rightarrow q}$  or a  $MT_{\sim q \rightarrow \sim p}$  format. Experiment 2 extended these findings by showing that people naturally recruit disabling conditions when assessing the validity of claims made using a  $MP_{p \rightarrow q}$  or a  $MT_{\sim q \rightarrow \sim p}$  argument format and naturally recruit alternative causes when assessing the validity of claims made using an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format. This research shows that, unless a product claim is clearly more engaging in a specific format, it may be informative to test the claim in a  $MP_{p \rightarrow q}$  or a  $MT_{\sim q \rightarrow \sim p}$  argument format for those claims that naturally generate more alternative causes than disabling

conditions and, similarly, to test the claim in an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format for those claims that naturally generate more disabling conditions than alternative causes.

There was one unexpected finding. Experiment 1 found that when participants were asked to generate disablers, the perceived validity of the  $DA_{\sim p \rightarrow \sim q}$  formatted claim (e.g.,  $M = 3.89$ ) increased compared to the control group (e.g.,  $M = 3.52$ ). This pattern of results has been found in previous research (De Neys et al. 2002, 2003; Markovits and Potvin 2001) in which premises associated with many disablers were perceived as more valid when stated using an  $AC_{q \rightarrow p}$  or a  $DA_{\sim p \rightarrow \sim q}$  argument format. De Neys and his colleagues argued that generating disabling conditions prevented people from generating alternative causes. This interference effect could explain our unexpected result. Curiously, Markovits and Potvin (2001) found that generating alternative causes decreased the perceived validity of premises stated using  $MP_{p \rightarrow q}$  and  $MT_{\sim q \rightarrow \sim p}$  formats. They reasoned that generating disablers prevents the generation of alternatives (the De Neys result) but that the reverse is not true. In fact, it seems that generating alternatives leads to spontaneously generating disablers. To reconcile these two findings, De Neys et al. (2002) suggested that people tend to retrieve disablers before alternatives. Indeed, in experiment 2, the data showed directional evidence that participants generated more disablers than alternatives. More specifically, the  $DA_{\sim p \rightarrow \sim q}$  format led to generating relatively fewer alternatives ( $M = 1.09$ ) as compared to the  $AC_{q \rightarrow p}$  format ( $M = 1.26$ ;  $F(1, 80) = 3.15$ ,  $p < .1$ ) and slightly more disablers ( $M = .36$ ) as compared to the  $AC_{q \rightarrow p}$  format ( $M = .22$ ;  $F(1, 80) = 5.53$ ,  $p < .05$ ).

Results of experiment 2 suggested that participants tend to generate the highest number of counterarguments (both disablers and alternatives) when statements were stated in the  $MP_{p \rightarrow q}$  format (compared to the  $DA_{\sim p \rightarrow \sim q}$  format). For the  $MP_{p \rightarrow q}$  format, the total number of counterarguments generated in experiment 2 ( $M = 1.62$ ) was higher than the total number of counterarguments generated in the  $DA_{\sim p \rightarrow \sim q}$  format ( $M = 1.45$ ;  $F(1, 80) = 5.37$ ,  $p < .05$ ). However results in experiment 1 seemed to indicate that the  $MP_{p \rightarrow q}$  format led to a higher acceptance rate than that of the  $DA_{\sim p \rightarrow \sim q}$  format. In the control group condition of experiment 1, the acceptance rate for the  $MP_{p \rightarrow q}$  format ( $M = 5.07$ ) was higher than that of the  $DA_{\sim p \rightarrow \sim q}$  format ( $M = 3.52$ ;  $F(1, 146) = 66.59$ ,  $p < .05$ ). How could this apparent contradiction be explained?

It is possible that a factor might moderate the consideration of alternative causes and disabling conditions. Investigations into counterfactual thinking suggest that the accessibility of different types of counterarguments will depend on the framing of the causal claim. Roese, Hur, and Pennington (1999) investigated scenarios in which protagonists failed to achieve a promotion goal (e.g., "Jane failed to get an A in a class") or a prevention goal (e.g., "John mistakenly ate nuts and suffered an allergic reaction"). Participants were asked to consider the scenario and provide counterfactual thoughts (e.g., "If only . . .") that would

have achieved the promotion/prevention goal. Promotion scenarios encouraged participants to list alternative causes (e.g., "If only Jane had studied more"), whereas prevention scenarios encouraged participants to list disabling conditions (e.g., "If only John had an adrenaline injection after eating the food"). Along the same line, Markovits and Barrouillet (2002) also introduced the idea (without testing) that different types of conditional premises (class based and causal) could influence the ease with which one can generate alternative causes or disabling conditions. They suggested that a class-based conditional premise (e.g., "If an animal is a cow, then it has four legs") leads to more alternative causes and less disabling conditions than a causal conditional premise (e.g., "If a rock is thrown at a window, the window will break"). They also suggested that causal conditionals require more complex processing. This means that it could be easier to generate counterarguments for class-based conditional premises than for causal conditional premises. If this is so, combining a conditional premise format (e.g.,  $MP_{p \rightarrow q}$  or  $MT_{\sim q \rightarrow \sim p}$ ) with a frame (e.g., promotion) or with a specific type of premise (e.g., class based) should encourage a person to recruit nondiagnostic counterarguments (e.g., alternative causes), which may make the claim more persuasive.

One assumption of this research is that a person will generate counterexamples when assessing a product claim. However, there may be situations in which it is difficult to think of any disabling conditions or alternative causes. For instance, certain statements are naturally less questionable than others (e.g., "If you cut your finger, you will bleed"), thus eliminating the impact of the format factor. Similarly, generating implausible counterexamples should not affect acceptance ratings as much as plausible ones. Certain researchers also argue that people do not generate counterexamples spontaneously (Schroyens, Schaeken, and Handley 2003). They acknowledged that "not much is known about the conditions under which people would make an effort" to generate counterexamples, but their studies show that, when put under a timing constraint, respondents tend to be less likely to search for counterexamples (Schroyens et al. 2003, 1130). Indeed, it has been found that context could weaken (and maybe impair) one's ability to counterargue (Sengupta and Venkataramani Johar 2001), or it could enhance it (Mano 1997). The different factors influencing counterarguing have been extensively documented: the most recognized one is involvement (Petty and Cacioppo 1986), but a wide variety of other factors influence the level of message elaboration, such as attitudinal ambivalence (Clark, Wegener, and Fabrigar 2008), self-affirmation (Briñol, Petty, and Gallardo 2007), social context (Levitan and Visser 2008), rate of speech (Smith and Shaffer 1991), language power (Sparks and Areni 2008), and message repetition (Claypool, Mackie, and Garcia-Marques 2004), among others. An interesting avenue would be to investigate whether these factors moderating persuasion (as well as those mentioned previously) would also affect the consideration of disabling conditions and alternative causes. This should al-

low us to gain a better understanding of why certain conditional premises, and by extension product claims, are more believable.

## APPENDIX

### STIMULI IN EXPERIMENT 1

Product claims:

1. If a person uses a breath mint, then the person will have fresh breath.
2. If a person uses toothpaste, then the person will not have cavities.
3. If a person uses a four-wheel-drive vehicle, then the person can travel on rough terrain.
4. If a person uses diapers with stretchy elastic, the diapers will not leak.
5. If a person uses antidandruff shampoo, the person will not have dandruff.
6. If a person uses hair conditioner, then the person's hair will be strong, shiny, silky, and soft.
7. If a person consumes diet food, then the person will lose weight.
8. If a person gives food to a cat, then the cat will purr.

## REFERENCES

- Ahluwalia, Rohini (2000), "Examination of Psychological Processes Underlying Resistance to Persuasion," *Journal of Consumer Research*, 27 (September), 217–32.
- Briñol, Pablo, Richard E. Petty, and Ismael Gallardo (2007), "The Effect of Self-Affirmation in Nonthreatening Persuasion Domains: Timing Affects the Process," *Personality and Social Psychology Bulletin*, 33 (November), 1533–46.
- Clark, Jason K., Duane T. Wegener, and Leandre R. Fabrigar (2008), "Attitudinal Ambivalence and Message-Based Persuasion: Motivated Processing of Proattitudinal Information and Avoidance of Counterattitudinal Information," *Personality and Social Psychology Bulletin*, 34 (April), 565–77.
- Claypool, Heather M., Diane M. Mackie, and Teresa Garcia-Marques (2004), "The Effects of Personal Relevance and Repetition on Persuasive Processing," *Social Cognition*, 22 (June), 310–35.
- Cummins, Denise D. (1995), "Naive Theories and Causal Deduction," *Memory and Cognition*, 25 (September), 646–58.
- Cummins, Denise D., Todd Lubart, Olaf Alksnis, and Robert Rist (1991), "Conditional Reasoning and Causation," *Memory and Cognition*, 19 (May), 274–82.
- De Neys, Wim, Walter Schaeken, and Gery D' Ydewalle (2002), "Causal Conditional Reasoning and Semantic Memory Retrieval: A Test of the Semantic Memory Framework," *Memory and Cognition*, 30 (September), 908–20.
- (2003), "Inference Suppression and Semantic Memory Retrieval: Every Counterexample Counts," *Memory and Cognition*, 31 (June), 581–95.
- Dieussaert, Kristien, Walter Schaeken, and Gery D' Ydewalle (2002), "The Relative Contribution of Content and Context Factors on the Interpretation of Conditionals," *Experimental Psychology*, 49 (July), 181–95.
- Eagly, Alice H. and Shelly Chaiken (1993), *The Psychology of Attitudes*, Ft. Worth, TX: Harcourt Brace Jovanovich.
- Evans, Jonathan St. B. T. (1993), "The Mental Model Theory of Conditional Reasoning: Critical Appraisal and Revision," *Cognition*, 48 (July), 1–20.
- Evans, Jonathan St. B. T., John Clibbens, and Benjamin Rood (1995), "Bias in Conditional Inference: Implications for Mental Models and Mental Logic," *Quarterly Journal of Experimental Psychology: Human Experimental Psychology*, 48 (August), 644–70.
- Evans, Jonathan St. B. T. and Simon J. Handley (1999), "The Role of Negation in Conditional Inference," *Quarterly Journal of Experimental Psychology: Human Experimental Psychology*, 52 (August), 739–69.
- Evans, Jonathan St. B. T., Simon J. Handley, Catherine N. J. Harper, and Philip N. Johnson-Laird (1999), "Reasoning about Necessity and Possibility: A Test of the Mental Model Theory of Deduction," *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 25 (November), 1495–1513.
- Goldvarg, Eugenia and Philip N. Johnson-Laird (2001), "Naive Causality: A Mental Model Theory of Causal Meaning and Reasoning," *Cognitive Science*, 25 (July/August), 565–610.
- Johnson-Laird, Philip N. and Ruth M. J. Byrne (1991), *Deduction*, Hillsdale, NJ: Erlbaum.
- Kardes, Frank R. (1988), "Spontaneous Inference Processes in Advertising: The Effects of Conclusion Omission and Involvement on Persuasion," *Journal of Consumer Research*, 15 (September), 225–33.
- (2005), "The Psychology of Advertising," in *Persuasion: Psychological Insights and Perspectives*, ed. Timothy C. Brock and Melanie C. Green, Thousand Oaks, CA: Sage, 281–304.
- Kardes, Frank R., Steven S. Posavac, and Maria L. Cronley (2004), "Consumer Inference: A Review of Processes, Bases, and Judgment Contexts," *Journal of Consumer Psychology*, 14 (July), 230–56.
- Levitan, Lindsey Clark and Penny S. Visser (2008), "The Impact of the Social Context on Resistance to Persuasion: Effortful versus Effortless Responses to Counter-attitudinal Information," *Journal of Experimental Social Psychology*, 44 (May), 640–49.
- Liu, In-Mao, King-Chung Lo, and Jei-Tun Wu (1996), "A Probabilistic Interpretation of 'If-Then,'" *Quarterly Journal of Experimental Psychology: Human Experimental Psychology*, 49 (August), 828–44.
- Mano, Haim (1997), "Affect and Persuasion: The Influence of Pleasantness and Arousal on Attitude Formation and Message Elaboration," *Psychology and Marketing*, 14 (July), 315–35.
- Markovits, Henry and Pierre Barrouillet (2002), "The Development of Conditional Reasoning: A Mental Model Account," *Developmental Review*, 22 (March), 5–36.
- Markovits, Henry and Frédéric Potvin (2001), "Suppression of Valid Inferences and Knowledge Structures: The Curious Effect of Producing Alternative Antecedents on Reasoning with Causal Conditionals," *Memory and Cognition*, 29 (July), 736–44.
- Meyers-Levy, Joan and Prashant Malaviya (1999), "Consumers' Processing of Persuasive Advertisements: An Integrative Framework of Persuasion Theories," *Journal of Marketing*, 63 (Special Issue), 45–60.
- Newstead, Stephen, M. Charles Ellis, Jonathan St. B. T. Evans, and Ian Dennis (1997), "Conditional Reasoning with Realistic Material," *Thinking and Reasoning*, 3 (February), 49–76.
- Petty, Richard E. and John T. Cacioppo (1983), *Attitudes and Per-*

- sua-sion: Classic and Contemporary Approaches*, Dubuque, IA: Brown.
- (1986), *Communication and Persuasion: Central and Peripheral Routes to Attitude Change*, New York: Springer.
- Roese, Neal J., Taekyun Hur, and Ginger L. Pennington (1999), "Counterfactual Thinking and Regulatory Focus: Implications for Action versus Inaction and Sufficiency versus Necessity," *Journal of Personality and Social Psychology*, 77 (December), 1109–20.
- Schroyens, Walter, Walter Schaeken, and Simon Handley (2003), "In Search of Counterexamples: Deductive Rationality in Human Reasoning," *Quarterly Journal of Experimental Psychology: Human Experimental Psychology*, 56 (October), 1129–45.
- Sengupta, Jaideep and Gita Venkataramani Johar (2001), "Contingent Effects of Anxiety on Message Elaboration and Persua-sion," *Personality and Social Psychology Bulletin*, 27 (February), 139–50.
- Smith, Stephen M. and David R. Shaffer (1991), "Celerity and Cajolery: Rapid Speech May Promote or Inhibit Persuasion through Its Impact on Message Elaboration," *Personality and Social Psychology Bulletin*, 17 (December), 663–69.
- Sparks, John R. and Charles S. Areni (2008), "Style versus Substance: Multiple Roles of Language Power in Persuasion," *Journal of Applied Social Psychology*, 38 (January), 37–60.
- Verschueren, Niki, Walter Schaeken, and Gery D'Ydewalle (2005), "A Dual Specification of Causal Conditional Reasoning," *Thinking and Reasoning*, 11 (August), 239–78.
- Wright, Peter (1980), "Message-Evoked Thoughts: Persuasion Research Using Thought Verbalizations," *Journal of Consumer Research*, 7 (September), 151–75.