Research Article

Emotional and Deliberative Reactions to a Public Crisis

Mad Cow Disease in France

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ABSTRACT—*Although most theories of choice are cognitive, recent research has emphasized the role of emotions. We used a novel context—the Mad Cow crisis in France—to investigate how emotions alter choice even when consequences are held constant. A field study showed that individuals reduced beef consumption in months after many newspaper articles featured the emotional label "Mad Cow," but beef consumption was unaffected after articles featured scientific labels for the same disease. The reverse pattern held for the disease-related actions of a government bureaucracy. A lab study showed that the Mad Cow label induces people to make choices based solely on emotional reactions, whereas scientific labels induce people to consider their own probability judgments. Although the Mad Cow label produces less rational behavior than scientific labels, it is two to four times more common in the environment.*

Across the social sciences, standard theories of individual decision making under risk are *consequentialist*, assuming people decide by weighing the outcomes or consequences associated with various alternatives, and *cognitive*, assuming people weigh consequences dispassionately and nonemotionally. Recent research has challenged both assumptions. The cognitive assumption has been challenged by Slovic and his colleagues' work on the *affect heuristic*, which has shown that individuals' choices are influenced in pervasive ways by their emotions (Slovic, Finucane, Peters, & MacGregor, 2002). In a review, Kahneman and Frederick (2002) conceded that this affect heuristic is sufficiently important that researchers could have missed it earlier only because of "the narrowly cognitive focus that characterized psychology for some decades" (p. 56).

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The cognitive and consequentialist assumptions were both challenged by Loewenstein, Weber, Hsee, and Welch (2001), who proposed a *risk-as-feelings* hypothesis positing that people infer risk directly from their emotions, not from evaluating consequences cognitively. For example, people pay more for airline travel insurance covering death from "terrorist acts" (a vivid, emotional alternative) than for insurance covering death from "all possible causes" (a less emotional but more inclusive category; Johnson, Hershey, Meszaros, & Kunreuther, 1993). People perceive risks on the basis of the dread (i.e., anxiety and lack of control) they feel when contemplating hazards (Slovic, 1987), and they are less sensitive to probability when contemplating a vivid, emotionally involving stimulus (e.g., a brief electric shock) than when contemplating a more impoverished stimulus (e.g., the loss of $20; Rottenstreich & Hsee, 2001).

To examine how emotions influence important decisions, we investigated a unique context: the Mad Cow crisis in France. An ideal test of how emotions alter choice would examine a situation in which consequences are constant but emotions vary. Such tests are generally infeasible—different affective domains involve different consequences. Research on dread has considered hazards that vary widely in affect and consequences (e.g., nuclear power, vaccines, food additives), and even careful lab experiments have difficulty manipulating affect while holding consequences constant (e.g., electric shock vs. losing $20). The advantage of studying Mad Cow disease is that it offers alternate frames for the same disease (and thus an identical set of consequences). One frame is more affective and vivid ("Mad Cow"), and others are more abstract and scientific (Creutzfeldt-Jakob disease, CJD, or bovine spongiform encephalopathy, BSE). These frames hold consequences constant even while emotions vary.

Thinking about Mad Cow disease also provokes strong emotion, whereas Loewenstein et al. (2001) noted that most laboratory work has involved "relatively mild emotions" (p. 280). Mad Cow disease creates strong emotions because it involves

contamination and death (see Rozin, Haidt, & McCauley, 1993). Not surprisingly, it created a major social and political crisis in France (Peretti-Watel, 2001).

Finally, Mad Cow disease allowed us to study whether more or less affective frames prevail in the social environment. Although research has often shown framing effects in laboratory settings, such experiments typically present people with one frame or the other in a carefully balanced design. This disease allowed us to assess how frames arise and spread in a natural environment. We thought it would be interesting to examine whether the scientific frame or the vivid, affective Mad Cow frame prevailed when they competed in the social marketplace of ideas.

TWO SYSTEMS OF JUDGMENT

Research suggests that humans are equipped with two systems of reasoning (Kahneman & Frederick, 2002; Sloman, 1996; Stanovich & West, 2000): An *associative* system works through similarity relationships and temporal contiguity; a *deliberative* system works through abstract symbolic structures, logically and systematically. The associative system is "spontaneous, intuitive, effortless and fast," whereas the deliberative system is "deliberate, effortful, and slow" (Kahneman & Frederick, 2002, p. 49).

Because affective reactions are spontaneous and unavoidable (Zajonc, 1980), risk perceptions are often driven by the associative system (Finucane, Alhakami, Slovic, & Johnson, 2000; Loewenstein et al., 2001; Slovic et al., 2002). As hazards involve more emotion, risk perceptions increase (e.g., Hsee & Rottenstreich, 2004; Johnson et al., 1993; Rottenstreich & Hsee, 2001), and emotional associations may override crisp numerical estimates (Windschitl & Weber, 1999).

It is natural to ask when the second, deliberative system will override the faster associative system (Frederick, 2003; Kahneman & Frederick, 2002; Stanovich & West, 2000, pp. 657–658). In the case of Mad Cow disease, thinking about the hazard may—regardless of frame—produce negative affect; the key question is how that initial affective reaction is used or corrected by the deliberative system. In the following sections, we describe two mechanisms that might have cued the deliberative system in the context of Mad Cow disease in France: At the level of individual consumers, the deliberative system might have been cued by the scientific labels for the disease. At the level of institutional actors, such as government bureaucracies, it might have been cued by routines and procedures that made the decision more deliberative.

CUING THE DELIBERATIVE SYSTEM IN INDIVIDUALS: THE EFFECT OF LABELS

We suggest that the Mad Cow label may evoke the associative system, whereas scientific labels (BSE or CJD) may evoke the deliberative system. People are more likely to override the associative system the more obvious the value of abstract information. When they are thinking like statisticians (rather than as clinical psychologists), people consider statistical base-rate information (Schwarz et al., 1991), and they use probabilities more appropriately when they confront a hazard that is abstract or symbolic, rather than concrete and emotional (Rottenstreich & Hsee, 2001).

In French, the Mad Cow label and scientific labels have quite different semantic connotations. Although the "bovine" in BSE is the formal species name in French and typically appears in scientific or technical discussions, *vache* (the French word for "cow" in "Mad Cow") is used to refer to cows as animals and to the beef that people consume, so it is associated in a more immediate and concrete way with food. Contaminated food elicits strong disgust (Rozin et al., 1993), and rumors of food contamination often arouse social panics (Fine, 1992). Additionally, "madness" has negative emotional associations because it evokes a lack of control and predictability (Foucault, 1967/1988); it has been used in France to counter the credibility of science in discussions of genetic engineering (e.g., "mad corn"; Fournier, 1998). In contrast, labels such as BSE and CJD, because they are strongly associated with science, may induce people to consider risks more deliberatively. Language theorists have argued that naming a disease makes people feel as if they have delimited it (Eco, 1994/1995). Girard (1982) quipped that "a disease well named seems half cured" (p. 11). In sum, the Mad Cow label seems more likely to trigger the associative system, whereas the scientific labels for this disease are more likely to trigger the deliberative system.

CUING THE DELIBERATIVE SYSTEM IN ORGANIZATIONS: THE EFFECT OF ROUTINES AND PROCEDURES

Collectives, such as government agencies, also react to risks. We suggest that the routines and procedures of such collectives make them more likely than individuals to decide deliberatively.

Since Weber, organizational research has noted that bureaucracies employ rules and procedures that make decisions more deliberative (e.g., Simon, 1976; Weber, 1946). Individuals are more deliberate and less emotional when they have more time to make a decision (Finucane et al., 2000), and bureaucratic routines are designed to produce slower, more consensual decisions (e.g., Crozier & Friedberg, 1980). Conscious application of decision rules reduces the likelihood that individuals will rely on the associative system (Kahneman & Frederick, 2002), and bureaucratic routines require formal decision rules to be used. Bureaucrats are often required to reason in terms of probabilities, frequencies, and acceptable risk; individuals are not (Fischhoff, Lichtenstein, Slovic, Derby, & Keeney, 1981; Powell & Leiss, 1997, pp. 27–29).

Thus, we predicted that government institutions are more likely than individuals to respond to frames that are congruent with deliberation.

WHICH FRAMES PREVAIL IN THE MARKETPLACE OF IDEAS?

Although there is a long tradition of studying framing effects in psychology, researchers have not examined which frames prevail in the natural environment. If affective frames spread throughout an environment, then they may help sustain emotional reactions.

Previous researchers have emphasized that people pass along ideas and stories because they are informative, but recent research suggests that ideas and stories may also succeed in the marketplace of ideas because they evoke strong emotions (Flynn, Peters, Mertz, & Slovic, 1998; Heath, Bell, & Sternberg, 2001). We thus expected affective frames to be more common than scientific ones in newspaper articles.

OVERVIEW OF EMPIRICAL WORK

We conducted two studies. A field study (from 1991 to 2002) explored how the media prevalence of the Mad Cow frame and of the scientific frames influenced (a) the beef consumption of individual consumers and (b) the activities of the French government. We measured the prevalence of emotional and scientific frames by counting the number of articles in two prominent French newspapers that mentioned each label. We predicted that the beef consumption of individual consumers would be more sensitive to the Mad Cow frame than to the scientific frames, whereas governmental activity would be more strongly related to the scientific frames.

In the second, laboratory study, we manipulated frames for the disease. We presented French participants with a questionnaire that asked how they would respond to the disease, and we manipulated, in a between-subjects design, the way the disease was labeled. We predicted that the Mad Cow label, relative to the scientific labels, would make individuals more likely to react on the basis of their emotions.

FIELD STUDY

Period of Study

We collected data from public databases and archives for a period of 11 years, from January 1991 to March 2002. The Mad Cow crisis began on March 20, 1996, when the British Secretary of State for Health announced—to great media attention—that prions, the causal agent of the disease, had crossed the species barrier and infected people. Immediately, the French government started monitoring programs and prohibited imports of English beef (March 22, 1996). Over time, consumers' confidence was restored, but concerns arose again in October 2000, when some French cows developed BSE even after monitoring programs were in place. Subsequently, the government added additional screening procedures. Over the whole period, six people in France were diagnosed with the human variant of Mad Cow disease. Our data set begins substantially before the crisis and ends afterward.

Independent Variables

We measured the prevalence of the Mad Cow and scientific frames by counting articles that used them in two large, daily French newspapers: *Le Monde* (the premier newspaper in France, roughly equivalent to *The New York Times*) and *Les Echos* (a premier business publication, equivalent to *The Wall Street Journal*). These counts were our proxy for the overall prevalence of the two frames in the social environment, so we chose papers from different contexts to increase the coverage of our measure.

Using archival search engines, we counted the number of articles each month that mentioned Mad Cow but neither of the scientific terms, BSE or CJD (Cronbach's $\alpha = .97$ across the two newspapers). We also counted the number of articles that mentioned either of the scientific terms with or without Mad Cow (Cronbach's $\alpha = .80$).

Dependent Variables

Our dependent variables were beef consumption and government action.

Beef Consumption

Our measure of monthly beef consumption was the gross total of beef and veal consumed in France (in thousands of metric tons) as reported in the *Bulletins Agreste* of the French Department of Agriculture and Fisheries (2002).

Government Action

Government action was measured by counting regulatory decisions by the French government, as compiled by a professional agricultural magazine, *Production Laitière Moderne* (http://www.plm-magazine.com). Examples of government action include setting up a cross-departmental, scientific committee to study BSE (April 1996), prohibiting marrow in consumer products (June 1996), deciding to create a tracking system for beef (February 1997), and prohibiting consumption of beef kidneys (October 2000).

Data Analysis

The raw data are displayed in Figure 1. We used the independent variables in a given month ($t - 1$) to predict the dependent variables in the following month (t). Preliminary analysis showed substantial periodicity in beef consumption, so we used ARIMA (autoregressive integrated moving average) regression models to analyze the time series (Cryer, 1986). ARIMA models measure the association between an outcome

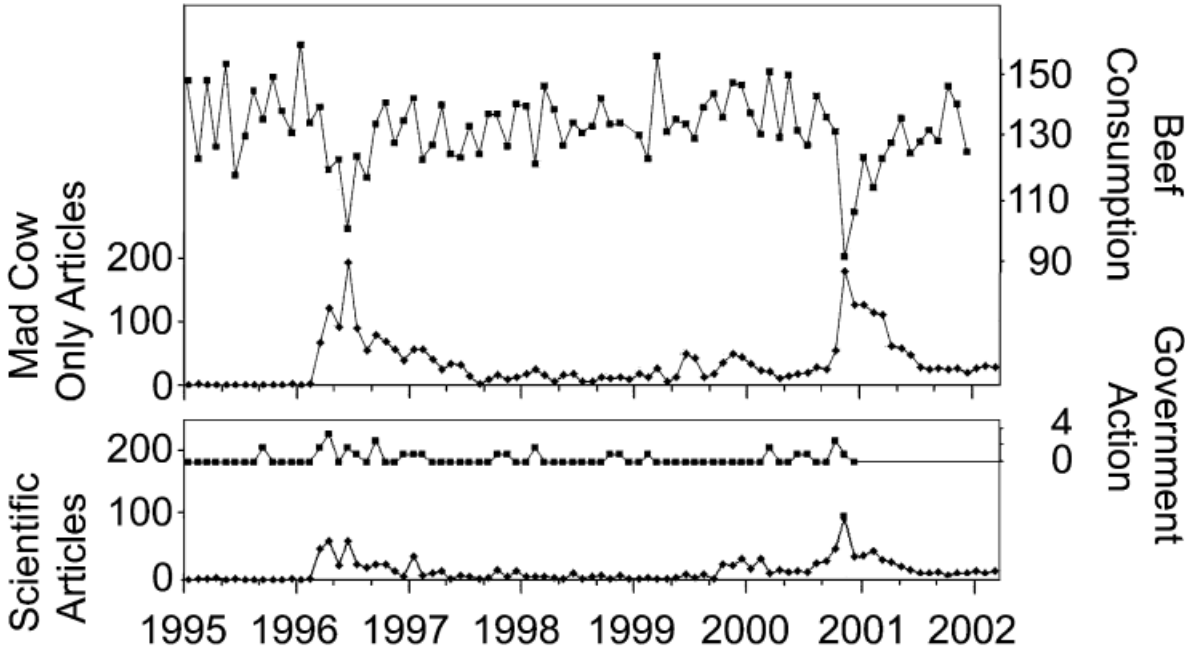

Fig. 1. Time series from the field study. The top panel presents the time series of beef consumption in France (upper series) and the number of newspaper articles mentioning Mad Cow only. The bottom panel presents the time series of French government activity (upper series) and the number of newspaper articles mentioning scientific terms.

sequence (e.g., beef consumption) and one or more explanatory variables (e.g., counts of articles). Sequential data often show high autocorrelation, and ARIMA regressions explicitly model autocorrelation by adding autoregressive and moving-average terms so that correlated residuals do not violate the independence assumptions of statistical inference. After modeling our dependent variables with an appropriate ARIMA model, we added Mad Cow and scientific frames as independent predictors. Throughout, we used SAS PROC ARIMA to estimate models by maximum likelihood.

Results

Table 1 suggests that the Mad Cow frame prevailed in the marketplace of ideas. Articles mentioning this emotional frame alone outnumbered articles using the scientific frames by ratios of 2:1 and 4:1 in the two newspapers (both ps $< .001$ by chi-square tests).

Table 2 reports standardized coefficients from the ARIMA regressions. As we predicted, beef consumption dropped significantly when many articles mentioned the Mad Cow frame during the previous month ($\beta = -.491$, $p < .001$), but was unaffected by the number of articles in the previous month that mentioned the scientific frames ($\beta = -.104$, n.s.). In contrast, government activity increased significantly when many articles used the scientific frames during the previous month ($\beta = .432$, $p < .05$), but did not vary with the number of articles mentioning Mad Cow ($\beta = -.201$, n.s.). To put these numbers in perspective, in months after the number of Mad Cow articles rose one standard deviation above the mean, beef consumption dropped by 4%; in months after the number of articles using scientific terms rose one standard deviation above the mean, regulatory activity doubled (from 1/3 action per month to 2/3).

Discussion

Our first finding was that in the social marketplace of ideas, the Mad Cow frame dominated the scientific frames in both newspapers. This evidence is consistent with Heath and his colleagues' (2001) argument that ideas may spread in the social environment on the basis of their emotional impact. Granted that ours is a single case study and is subject to other interpretations, but accidents of history frequently prevent emotional and scientific frames from competing during the same time period, so this field study allows an unusual test. The result could indicate that newspapers prefer concrete labels rather than abstruse abbreviations like BSE, but AIDS is a widely used

TABLE 1

Field Study: Number of Articles Using the Different Labels for the Disease, 1991–2002

Newspaper	Label		Articles mentioning Mad Cow only (%)
	Mad Cow only	Scientific terms	
Le Monde	1,653	887	65
Les Echos	1,337	286	82

TABLE 2
Field Study: Predicting Individual Beef Consumption and Government Action

	Beef consumption		Government action	
Predictor	β	*t*	β	*t*
Mad Cow articles in month $t - 1$	−.491***	−3.58	−.201	−0.89
Scientific-term articles in month $t - 1$	−.104	−0.58	.432*	2.10

Note The standardized coefficients are from ARIMA (autoregressive integrated moving average) models for the two dependent variables. Independent variables were the average number of articles in *Le Monde* and *Les Echos* that mentioned Mad Cow only and the average number that mentioned one of the scientific terms for this disease. To simplify presentation, autoregressive and moving-average terms are omitted.
*$p < .05$. ***$p < .001$.

acronym, and SARS (severe acute respiratory syndrome) is 1.5 times more common on French Web pages than the alternate scientific term "atypical pneumonia."

As hypothesized, beef consumption was easier to predict by fluctuations in the frequency of the affective Mad Cow frame than by the prevalence of the scientific frames, whereas government activity was easier to predict through fluctuations in the frequency of the scientific frames. The lag structure of the analysis suggests that frames drive behavior, rather than the opposite. One month after heavy attention to the Mad Cow label, beef consumption dropped but government activity was unaffected, whereas the opposite was true 1 month after heavy attention to scientific labels (see Lerner, Gonzalez, Small, & Fischhoff, 2003, for a similar lagged response to an emotional event). The government effect may seem surprisingly fast, but note that many of the actions we tallied (e.g., writing rules that prohibit consumption of beef kidneys or marrow) take relatively little time; moreover, bureaucracies often release regulations in response to current events, even if they have been in process for months (Sullivan, 2003). Notably, however, the government responded to different frames than did individual consumers.

Obviously, the two kinds of articles may have differed on dimensions other than labels used, but additional analyses suggest that the articles' content reinforced the basic associative and deliberative cues the labels provided. Articles using the Mad Cow and scientific labels did not differ significantly in length, but articles using scientific terms provided more systematic, scientific discussions of the disease—for example, they were significantly more likely to mention words such as *prion*, *scientist*, *research*, *symptoms*, *data*, and *figures*. A native French speaker, blind to our hypothesis, coded the titles of the first two articles about Mad Cow disease and BSE each month; Mad Cow articles were significantly less likely to focus on the disease itself, and more likely to focus on broader issues in French society, frequently mentioning Mad Cow only in passing. So, when beef consumption responded more to articles using the Mad Cow label than to articles using the scientific labels, it was responding to "information" that was more impoverished, less detailed, and more likely to cue the associative than the deliberative system.

Although the field study established real changes in behaviors, it obviously had limitations. Most important, the lag results suggest rather than establish that frames causally affect behavior. Our lab study, which we report next, allowed us to test the impact of emotion more cleanly by manipulating frames.

LABORATORY STUDY

How do affective and scientific frames influence choice? The affect heuristic and the risk-as-feelings hypothesis suggest that when people are thinking about Mad Cow disease, their choices should be heavily influenced by their emotional reactions. Dual-process views suggest an additional hypothesis: When one or more scientific labels cue people to think deliberatively, they may be more likely to discount their emotional reactions and rely on their cognitive judgments.

Method

Our experiment used a between-subjects design with three conditions defined by disease label (Mad Cow vs. BSE vs. CJD). M.B.A. students at three French Grandes Ecoles participated for course credit ($N = 245$). Participants imagined the following situation (with alternative wording for the three conditions indicated by brackets):

> You have just finished eating your dinner. . . . You have eaten a packaged food product made with beef meat that was bought at the supermarket. While listening to the evening news on the radio, you find out that eating this packaged food may have exposed you to [the human variant of Mad Cow disease/the human variant of bovine spongiform encephalopathy (BSE)/a variant of Creutzfeldt-Jakob disease (CJD)].

Participants then answered several questions using 7-point Likert scales that ranged from 1, *little*, to 7, *a lot*. Whenever a question mentioned the disease, participants saw the label appropriate to their condition.

Knowledge About the Disease

The first question concerned participants' knowledge about the disease: "How much have you heard about this disease?"

Dependent Measure

Our dependent measure was estimated change in consumption, the average of responses to two items (Cronbach's $\alpha = .88$): "To what extent would you decrease your consumption of beef?" and "To what extent would you change your diet habits?"

TABLE 3

Laboratory Study: Mean Values for Key Measures and Correlations Between Negative Emotion and Probability Judgment

	Condition		
		Scientific label	
Measure	Mad Cow (n = 82)	Bovine spongiform encephalopathy (n = 84)	Creutzfeldt-Jakob disease (n = 79)
Estimated change in consumption	4.2_a (1.7)	3.8_b (1.7)	3.7_b (1.8)
Negative emotion	4.0_a (1.5)	4.3_a (1.4)	3.8_a (1.2)
Probability judgment	3.3_a (1.1)	3.2_a (1.3)	3.2_a (1.2)
Knowledge about the disease	6.1_a (1.1)	6.1_a (1.1)	5.8_a (1.1)
Correlation between negative emotion and probability judgment	$.71_a$	$.71_a$	$.64_a$

Note. All four measures were on a scale from 1 to 7. Within a row, values that do not share a subscript differ significantly at $p < .05$. Standard deviations are in parentheses.

Negative Emotion

Negative emotion was the average of four items (Cronbach's α = .84): how scared, worried, anxious, and concerned participants were about the disease.

Probability Judgment

Probability judgment was the average of four items (Cronbach's α = .81): Three items asked participants to judge the probability that they would be exposed to the disease, that they would be harmed by it, and that it would become widespread in France; the final item asked them whether they thought they had already been exposed.

Results

Table 3 presents means and key correlations. A planned contrast comparing the scientific-label conditions with the Mad Cow condition showed that estimated change in consumption differed across the two types of labels, $t(241) = 2.06$, $p < .05$. Participants were quite knowledgeable about the disease, providing high average ratings of their knowledge that did not differ across conditions. The conditions also did not differ in emotional reactions or probability estimates.

Our key question was whether the labels altered how people processed their emotional reactions and their cognitive probability estimates. Results shown in Table 4 are consistent with the risk-as-feelings hypothesis and the affect heuristic: In the Mad Cow condition, negative emotional reactions predicted estimated consumption quite well ($\beta = .70$, $p < .001$), whereas personal probability judgments did not ($\beta = -.03$, n.s.). In contrast, in the scientific-label conditions, probabilities played a comparatively greater role ($\beta = .37$, $p < .001$), although the effect of emotional reactions was still significant—but reduced ($\beta = .29$, $p < .001$). A Goodman test (Baron & Kenny, 1986) showed that the difference in influence of emotional reactions across conditions was significant, $t(241) = 3.06$, $p < .005$. Table 5 presents the full regression, showing that the interaction between condition and both negative emotion and probability judgment was significant. All regressions in Tables 4 and 5 were similar in pattern and significance when we controlled for participants' knowledge about the disease.

Discussion

Results from the lab study are consistent with the affect heuristic and the risk-as-feelings hypothesis: When people

TABLE 4

Laboratory Study: Effect of Negative Emotion and Probability Judgment on Estimated Change in Consumption

	Condition			
		Scientific label		
Measure	Mad Cow	Combined	Bovine spongiform encephalopathy	Creutzfeldt-Jakob disease
Negative emotion	.70***	.29***	.38**	.22†
Probability judgment	−.03	.37***	.27*	.44***
R^2	.45	.37	.36	.35

Note. The table reports standardized coefficients from an ordinary least squares regression predicting estimated change in consumption from negative emotion and probability judgment.
$^{\dagger}p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

TABLE 5

Laboratory Study: Full Regression Predicting Estimated Change in Consumption

Predictor variable	β
Negative emotion	.65***
Probability judgment	−.03
Negative Emotion × Condition	−.55*
Probability Judgment × Condition	.58*
Condition	−.11
R^2	.39

Note. The table reports standardized coefficients from an ordinary least squares regression predicting estimated change in consumption from negative emotion and probability judgment. For the condition variable, scientific label was coded as ''1,'' and Mad Cow label was coded as ''0.''
*$p < .05$. ***$p < .001$.

contemplated future beef consumption, the Mad Cow label caused them to rely more on their emotional reactions than they did when scientific labels were used. The results are also consistent with dual-system theories in that although scientific labels did not eliminate the effect of emotion, they caused people to think more deliberatively—taking into account their own cognitive assessments of probability. These results suggest a more nuanced interpretation of our field data: The laboratory findings do not show that the Mad Cow label makes people have more negative emotional reactions, but do show that this label does make people rely more on those reactions.

GENERAL DISCUSSION

Our results extend the affect heuristic (Slovic et al., 2002) and the risk-as-feelings hypothesis (Loewenstein et al., 2001) to everyday behavior, and they show that affective frames can influence choices even when consequences are constant. The Mad Cow and scientific frames reference the same disease, but they affected choices, even real consumption, differently.

Together, the field and laboratory data suggest that frames alter how people process and respond to their emotions. Thus, they support the idea that situational factors may cue the deliberative system of reasoning (Kahneman & Frederick, 2002; Sloman, 1996; Stanovich & West, 2000): Government bureaucracies were more likely to respond to the scientific labels than to the Mad Cow labels, and individuals whose questionnaire used a scientific label responded to their own probability estimates in a more coherent, rational fashion than did individuals whose questionnaire used the Mad Cow label. Although the deliberative system may not prevent people from reacting emotionally, it may alter how emotional reactions influence behavior.

Emotional reactions are often useful. They allow people to respond quickly to persistent threats in the environment. Also, immediate affective reactions may effectively predict long-run preferences better than does deliberation (Hsee, Zhang, Yu, & Xi, in press; Wilson & Schooler, 1991). But when people confront risks that are new, emerging, ill-formed, or collectively defined, emotions may not guide them effectively. And indeed, if the social environment magnifies threats by favoring emotionally charged frames and ideas, then individuals who react to such "information"—selected for its emotional kick by the social marketplace of ideas—may end up being troubled by threats that in more deliberative moments they would regard as insignificant (Glassner, 1999).

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