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# Comparing Theories of Media Learning: Cognitive Mediation, Information Utility, and Knowledge Acquisition from Cancer News

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Determining what factors predict media learning is an important avenue of research for the field of mass communication. The present study provides a comparative investigation of two models of media learning: the cognitive mediation model and the information utility model. Participants ( $N = 1,076$ ) read a news article related to scientific discoveries relevant to cancer prevention and responded to all constructs of the two models. Recognition and comprehension were used to measure knowledge acquisition. Results generally support previous predictions of each model, though predicted variance remains small. In addition to testing the existing models, a modified cognitive mediation model using a key construct related to information utility—perceived relevance—was tested. The refined cognitive mediation model offered a more nuanced understanding of certain causal mechanisms but did not result in a meaningful change in predictive power of the model. Implications of the theoretical comparison and integration are discussed.

Investigations about media learning have been taking place since the early years of communication research and continue to be an area of interest. There are a number of theoretical frameworks that can be used to predict knowledge acquisition from news stories, two of which are the cognitive mediation model (CMM; Eveland, 1998, 2001) and the information utility model (IUM; Knobloch, Carpentier, & Zillmann, 2003; Knobloch, Zillmann, Gibson, & Karrh, 2002). These models contain unique and shared constructs that work in complex and indirect ways to predict media learning outcomes. Although there has been considerable research on the CMM recently (i.e., Beaudoin & Thorson, 2004; Ho, Peh, & Soh, 2013; Jensen, 2011), work specifically testing the IUM has been less frequent (for exceptions, see Knobloch-Westerwick, 2008). Researchers have suggested there is a need for more frequent and rigorous comparisons of theoretical frameworks in mass communication, as well as attempts to integrate theories (Bryant & Miron, 2004). The present investigation answers that call by testing two models from two prominent theoretical frameworks in mass communication—cognitive mediation and selective exposure (see Bryant & Miron, 2004)—in a context that represents an important area of public communication about population-relevant health information (cancer

news coverage; see Smith, Niederdeppe, Blake, & Cappella, 2013). The current article compares the CMM and the IUM by examining the predictive power of each on knowledge acquisition related to cancer prevention. In addition, an integrated model of these two theories is discussed and tested.

### KNOWLEDGE ACQUISITION FROM NEWS

Mass communication research focused on direct effects of learning from news media for many years. These direct effect research endeavors typically utilized a simple research design in which a person's news exposure was measured along with an assessment of recognition or recall about the information in the news exposure. These types of empirical investigations offer some insight about how people learn from news coverage, but given the complexities associated with processing of news information (see, e.g., Graber, 1988), there is a benefit to continuing a progression of mass communication research beyond direct effects approaches to determine how people learn from the news.

Direct effects research is an important foundation for work on knowledge acquisition from news, but there are a number of limitations. Some research suggests that people actually comprehend much of what they see on the news in the moment, but after time passes people tend to remember the general topic of a news story accurately or the theme of stories, as opposed to specific details (e.g., van Dijk, 1988). Further, many stories within news outlets are generally ignored by consumers (Graber, 1988).

These issues related to news consumers' lack of attention and difficulty remembering content calls into question how to study knowledge acquisition in this context appropriately. There are certain areas of news coverage — for example, stories related to cancer—in which people process information in both positive and negative ways. On the positive side, Stryker, Moriarty, and Jensen (2008) found that attention to health news was related to greater knowledge of modifiable cancer risks after controlling for major demographic predictors of knowledge acquisition. On the negative side, cancer news coverage can distort knowledge acquisition about topics such as cancer incidence (Jensen et al., 2014). These patterns identified in previous research are either a direct product or a by-product of news consumption, but current models do not offer robust explanations of knowledge acquisition from cancer news. By engaging in theory comparison and integration, a better understanding of the strengths and weaknesses of the current news environment can be attained. In doing so, it is important to specify what types of knowledge and learning outcomes, specifically, are being changed by exposure to news coverage.

One helpful way to specify learning outcomes is to assess two distinct, but relevant, outcomes: recognition and comprehension (see Berry, 1983;

Findahl & Höijer, 1985; Woodall, Davis, & Sahin, 1983). Recognition focuses on a person's ability to identify key pieces of information and in the news learning context would refer to the ability to recognize key elements of news stories. Comprehension focuses on a slightly different type of learning, assessing whether a person can apply information from a news article to other contexts.

Measuring both recognition and comprehension allows for a more thorough understanding of knowledge acquisition from news, which assists in moving past a direct effects approach. Graber (1988), and later Findahl (2001), suggested that learning often takes place after news consumption, but specific details (recognition) are lost, whereas the ability to apply information from stories (comprehension) is more likely.

By expanding emphasis on what "counts" as knowledge acquisition in the context of media learning, demanding more rigorous standards, researchers make it difficult to justify the use of simple direct effects models. The result of this shift, as is the case with many other areas of mass media theorizing, has been embracing more nuanced models of understanding how people acquire knowledge from news stories. Two models in particular have received substantial scholarly attention: the CMM and the IUM.

### COGNITIVE MEDIATION MODEL

The CMM proposes that media learning occurs through a causal process whereby surveillance motivation determines how people process news information, ultimately determining the amount of learning (Eveland, 2001). According to Eveland (1998), the CMM specifies three factors to predict learning from mediated news: surveillance motivations, attention to news, and cognitive elaboration. Specifically, surveillance motivations for news media will generate information-processing activities in the form of greater attention to content and more elaborative processing of news information (Eveland, 1998). Elevated levels of elaboration initiate greater recall of health information and, in turn, knowledge acquisition.

The model suggests cognitive considerations, such as surveillance motivations, of news users are highly relevant to the media learning process. Eveland (1998) explicated how the CMM could be measured through survey research. Surveillance gratifications measures can be utilized as a proxy for motivations; items about attention to news in general can be adapted for specific purposes; and the measurement of elaboration processes can be "derived from research on learning strategies, audience activity, and information processing strategies" (Eveland, 1998, p. 31). Although there are limitations of the CMM in explaining the media learning process, due to its specific focus on cognitive processes, the model has been applied and tested

in different media learning situations, most frequently to assess political campaigns (Beaudoin & Thorson, 2004; Eveland, 2001; Eveland, Shah, & Kwak, 2003) and health news coverage (Ho et al., 2013; Jensen, 2011).

In continued testing of the CMM, the specific predictive relationships of motivations, attention, elaboration, and knowledge acquisition were modified (Jensen, 2011). In the modified model (see Figure 1a), motivations predict knowledge acquisition through elaboration, with attention to news moderating the relationship between motivations and elaboration, as well as elaboration and knowledge acquisition. As just noted, knowledge acquisition and learning outcomes can be delineated into recognition- and comprehension-specific outcomes. The modified CMM was found to predict comprehension but not recognition (Jensen, 2011). The present article replicates that test of the modified model, as it offers a comprehensive consideration of relevant research on cognitive mediation in a health news context. However, the present project moves beyond replication by comparing the CMM to a related theoretical perspective (IUM) and attempting to

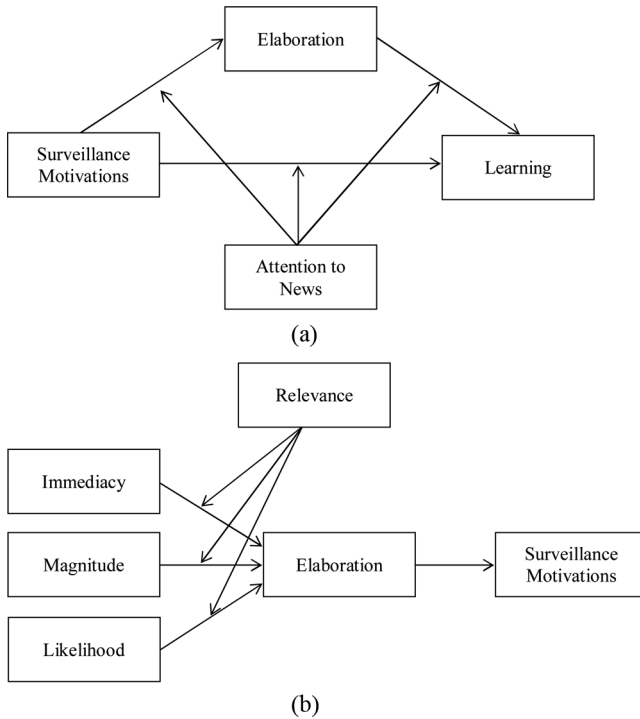


FIGURE 1 Tested models for the (a) cognitive mediation model and (b) information utility model.

integrate CMM and IUM predictions to elucidate theoretical mechanisms and improve the predictive power of the CMM.

The initial hypotheses presented are related to the replication of the CMM as modified by Jensen (2011). The most basic assumption of the CMM is that surveillance motivations will be positively associated with knowledge acquisition. As such, those direct relationships will be tested initially:

- H1: News surveillance motivations will be associated with (a) recognition and (b) comprehension.

Further, news surveillance motivation is assumed to be associated with elaboration after being exposed to a news article:

- H2: News surveillance motivations will be associated with greater elaboration.

Similar to various theories of information processing (e.g., Petty & Cacioppo, 1986), elaboration is believed to be positively associated with retention and comprehension of received messages. As such,

- H3: Elaboration will be associated with knowledge acquisition, specifically (a) recognition and (b) comprehension.

Given these direct relationships, the CMM assumes that the relationship between surveillance motivations and knowledge acquisition is explained through elaboration. This suggests the likelihood of a simple mediation relationship:

- H4: The effect of surveillance motivations on knowledge acquisition is mediated by elaboration.

The complete, modified cognitive mediation model suggests a complex, moderated mediation model to fully explain the influence of surveillance motivations on knowledge acquisition. To test the full, modified model on knowledge acquisition (recognition and comprehension), the following hypotheses are tested:

- H5: The relationship between surveillance motivations and recognition will be mediated by elaboration, and attention to news will moderate the relationships between (a) surveillance motivations and elaboration, (b) elaboration and recognition, and (c) surveillance motivations and recognition.
- H6: The relationship between surveillance motivations and comprehension will be mediated by elaboration, and attention to news will moderate

the relationships between (a) surveillance and elaboration, (b) elaboration and comprehension, and (c) surveillance and comprehension.

### INFORMATION UTILITY MODEL

Information selection by individuals has been researched within the field of communication in great detail. Knobloch-Westerwick (2008) suggested that research on information utility sparked from earlier work on cognitive dissonance, persuasion, and protection motivation, which is directly related to research and theorizing on selective exposure. Cognitive dissonance theory (Festinger, 1957) proposes that individuals will try to avoid information that is dissonant to their own beliefs and actions, whereas information utility counters that individuals are more likely to actively engage with information they perceive as important to their own lives. Enhanced perceptions of information utility provide greater incentive to elaborate on a message, which in turn should improve knowledge acquisition.

Atkin (1973) proposed that information utility affects information seeking, as well as surveillance, guidance, performance, and reinforcement. Atkin's proposed model suggests that messages will be selected when an individual weighs the costs of expenditures incurred against the benefits of the information within the message. If the benefits of the message exceed the costs, an individual is more likely to consume and elaborate on said mass media message. Benefits of mass media messages, then, are gauged upon their utility or usefulness for each person (Atkin, 1973). From these original considerations on information utility and its effects on message selection and continued research on knowledge acquisition, the IUM was proposed by Knobloch et al. (2003).

The IUM adjusts for people's feelings of curiosity and interest through the variables immediacy, likelihood, and magnitude while accounting for individual exposure to informative messages (Knobloch et al., 2003; Knobloch et al., 2002). According to this model, individuals use selective exposure to improve comprehension concerning events of interest. This provides individuals with a better orientation in, as well as more effective resources of acting on, their physical and social surroundings (Knobloch et al., 2003; Knobloch et al., 2002). Perceived utility of information generates curiosity and motivates an individual to select information as a form of instrumental learning. The perceived usefulness of information is what motivates an individual to respond. If information has little value (low information utility) to an individual, then that individual would be more likely to pass over that information for other messages with high perceived utility.



Within these varying levels of usefulness three principle dimensions have been suggested (Knobloch et al., 2003; Knobloch et al., 2002), which are used to predict elaboration: (a) immediacy, (b) likelihood, and (c) magnitude. Immediacy is the degree of salience, or how relevant an individual believes the information to be. Likelihood is the consideration of the possibility that information has or will have a direct or indirect effect on one's self. Magnitude is measured as the importance or significance of information to an individual. Evidence suggests an additive relationship of these three constructs in predicting elaboration (Knobloch et al., 2003). Based on a recent review of the IUM (Knobloch-Westerwick, 2008), relevant empirical investigations (e.g., Knobloch et al., 2003; Knobloch et al., 2002), and personal communication with the theorist (S. Knobloch-Westerwick, personal communication, September 23, 2013), the IUM is set up to predict knowledge acquisition through the paths and relationships outlined in Figure 1b.

To test assumptions of the IUM, initial analyses must consider the established predictive relationship between the three IUM constructs and relevant processing and knowledge acquisition outcomes:

- H7: Magnitude, likelihood, and immediacy will predict (a) elaboration, (b) recognition, and (c) comprehension.

Similar to the CMM, the IUM predicts that elaboration will, in turn, predict knowledge acquisition outcomes. This specific hypothesis is already proposed as part of the CMM, so H3, although not specifically posited again, is important to testing the IUM.

What has not been previously tested in the information utility literature is if the full model, which incorporates a prominent selective exposure concept in perceived relevance (see Figure 1b), predicts knowledge acquisition.

- H8: The relationship between information utility constructs and recognition will be mediated by elaboration, with perceived relevance moderating the relationship between IUM constructs and elaboration, as well as IUM constructs and (a) recognition and (b) comprehension.

## INTEGRATING THE TWO MODELS

One way to contribute to theory development is to integrate related theoretical perspectives. The CMM and the IUM offer complementary perspectives on how certain motivations and information judgments influence elaborative processing, which in turn influences knowledge acquisition. As noted, the CMM suggests that learning from news can be

predicted by a model that includes surveillance motivations, attention to news, and elaboration. Elaboration is a key consideration of the IUM as well, with IUM constructs (immediacy, likelihood, and magnitude) interacting with personal relevance to predict central processing and, in turn, knowledge acquisition.

These similarities suggest that potential synthesis of model features might be useful. A fundamental prediction of the CMM is that people motivated to engage with news content will be more likely to elaborate on news content, which is consistent with other information-processing theories like the elaboration likelihood model (ELM; Petty & Cacioppo, 1986). It is also consistent with ELM that relevance is an important factor in predicting elaboration, which is an assumption in work on the IUM (see, e.g., Knobloch et al., 2002). Conceptually, perceived relevance and information utility are closely linked concepts. Perhaps, given the predictions of the CMM, perceived relevance is higher for individuals who have high surveillance motivations. For example, someone with higher levels of surveillance motivations might perceive news content as being more relevant to them in general, and in turn elaborate more on the information leading to greater knowledge acquisition. In other words, perhaps the CMM can be supplemented by the IUM's consideration of perceived relevance in considering a serial mediation model of knowledge acquisition from news coverage. Further, it seems possible that perceived relevance is a more important consideration to the model than attention, given the limited effects of attention in adding explanatory power to the model in previous work (e.g., see Jensen, 2011).

The proposed extension of the CMM takes on most of the core assumptions of the relationships between constructs in initial theorizing, save attention (see H1 to H3). In addition, though, it removes attention to news and inserts perceived relevance into a serial mediation model (see Figure 2). The integrated model tests the relationship just described, which is an indirect effect of surveillance motivations on knowledge acquisition outcomes through perceived relevance and elaboration:

- H9: Surveillance motivations indirectly influence (a) recognition and (b) comprehension through causally linked multiple mediators (perceived relevance and elaboration).

Hypotheses thus far are interested in clarifying relationships among variables in existing models of media learning. The final goal of the article is to provide details about the predictive power of the CMM, the IUM, and the integrated model.

- RQ: Which of the tested models explains the most variance in knowledge acquisition outcomes?

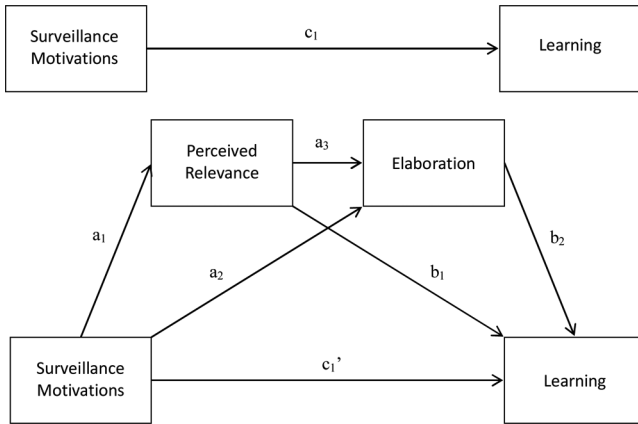


FIGURE 2 The tested integrated model.

## METHODS

### Design

The current article utilizes data from a larger study examining the impact of cancer news features on perceptions of cancer (see Jensen et al., 2011). The present study used data from a survey presented to participants after they viewed a randomly selected news article.<sup>1</sup> Using a similar design to Jensen (2011), all participants in the current study were randomly assigned to read a news article (one of 16) and then answered recognition/comprehension questions specific to that article (details about the questions provided next). Participants also completed measures of all CMM and IUM variables to enable both a replication and extension of previous research.

<sup>1</sup>The larger study was a 2 (hedged vs. not hedged)  $\times$  2 (hedging attributed to the scientists responsible for the research vs. attributed to scientists not responsible for the research)  $\times$  4 (cancer news articles: nanobombs, lung cancer surgery, lycopene pills, Mediterranean diet) between subjects experimental design. In other words, participants were randomly assigned to one of four news articles that were each manipulated in terms of two message factors (hedging and attribution). After reading their respective news article, participants then completed measures of cancer fatalism, medical skepticism, patient trust, backlash, and recognition/comprehension of the content. They also completed measures relevant specific to this study, described below. As reported in Jensen et al. (2011), hedging significantly influenced perceptions of cancer fatalism and nutritional backlash, and attribution was related to medical skepticism. Hedging and attribution were not related to recognition/comprehension of the content—nor were they expected to be—thus those outcomes were not reported in the aforementioned article. Purdue University's institutional review board reviewed and approved study procedures in 2009.

The survey creation tools offered by the company Qualtrics were used to create the study online and randomly assign participants to news stories. Prior to viewing the news stories, a survey was administered assessing demographics and two theoretical constructs: attention to news and surveillance motivations. Participants then viewed the news stories, after which they responded to items assessing elaboration, perceived relevance, information utility (magnitude, likelihood, immediacy), and knowledge acquisition.

### Sample

University students ( $N = 1,076$ ) participated in the study. The study took place at a large midwestern university, and participants received class credit or extra credit for completing the study. More participants identified as female (52.64%;  $n = 569$ ) than male (47.27%;  $n = 511$ ), with one participant failing to report their sex. Most participants identified as White (79.9%;  $n = 864$ ), with fewer identifying as Black/African American (4.0%,  $n = 43$ ), Hispanic/Latino (3.5%,  $n = 38$ ), Asian/Pacific Islander (12.3%;  $n = 133$ ), American Indian/Native American (0.5%;  $n = 5$ ), with the remainder of participants identifying as Other (2.0%;  $n = 22$ ). Participants were allowed to check multiple boxes, which is why the percentages add up to more than 100%. Participants ranged in age from 18 to 43 ( $M = 19.87$ ,  $SD = 1.90$ ).

### Cognitive Mediation Model Constructs

*Surveillance motivations.* The present study utilized surveillance motivation measures consistent with past cognitive mediation model research (see Eveland et al., 2003). Five items assessed surveillance motivations including, "I use the news to stay aware of my surroundings." Participants responded to 5-point scales, which were used to create a mean index ( $M = 3.77$ ,  $SD = .58$ ), with higher scores indicating higher surveillance motivation. The five items demonstrated acceptable reliability (Cronbach's  $\alpha = .71$ ).

*Attention to news.* Participants identified what types of news stories they typically read when reading a newspaper. Response options included nine different types of stories (e.g., health). Each story type was classified as never being read or sometimes being read. An index was created ranging from possible scores of 0 to 9 to indicate participants' global attention to news ( $M = 6.11$ ,  $SD = 1.63$ ). Higher scores indicated more attention to news.

### Information Utility Model Constructs

**Magnitude.** Adapting items from Knobloch et al. (2003), magnitude was measured with four items. Participants responded to items such as “How concerned are you about the information suggested in this report?” Responses to each item were summed and averaged to create an overall score for magnitude ( $M = 3.35$ ,  $SD = .71$ ). Reliability for the measure was acceptable (Cronbach’s  $\alpha = .70$ ).

**Likelihood.** Likelihood was assessed using a single item, replicating the measurement from Knobloch et al. (2003): “How likely is it that you will be impacted by the information in this report?” Participants responded on a scale from 1 (*very unlikely*) to 5 (*very likely*) ( $M = 2.78$ ,  $SD = .97$ ).

**Immediacy.** Again adapting items from previous research (Knobloch et al., 2003), immediacy was measured using four items, including questions such as “How directly do you think the information suggested by this report would affect you?” Each question used a 5-point scale, with all items being summed and averaged to create an immediacy value ( $M = 3.13$ ,  $SD = .63$ , Cronbach’s  $\alpha = .65$ ).

**Perceived relevance.** Perceived relevance was measured using two items used in previous message research (Kreuter, Farrell, Olevitch, & Brennan, 2000). These items were “How appropriate was the information in the materials to your life?” and “How personally relevant was the health information you received?” The mean of participant responses to these items was used in analysis ( $M = 4.48$ ,  $SD = 1.21$ , Cronbach’s  $\alpha = .80^2$ ).

### Shared Constructs of the CMM and IUM

The CMM and IUM share two relevant study variables: elaboration and knowledge acquisition. As noted, two dimensions of knowledge acquisition were considered (recognition and comprehension).

**Elaboration.** To measure elaboration, thought listing procedures were utilized (see Cacioppo, von Hippel, & Ernst, 1997). Participants were shown the following prompt:

We are now interested in what you were thinking about while reading the news article. You might have had ideas all favorable to the news article, all opposed,

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<sup>2</sup>The correlation of the two perceived relevance items was high ( $r = .68$ ,  $p < .001$ ). There is some debate among researchers about whether to report two-item measures using correlational metrics or Cronbach’s alpha (see Eisinga, te Grotenhuis, & Pelzer, 2013). Both are provided for reader consideration.

all irrelevant, or a mixture of the three. Any case is fine; simply list what it was that you were thinking while reading.

Further instructions told participants to write the first words that came to mind and not to worry about spelling or grammar. There were 20 text boxes available for participants to fill in. Two members of the research team coded a subsample of 100 participants' thought listings for content relevant thoughts. Intercoder reliability was assessed after the coding of the initial 100 thought listing responses and was found to be high (Krippendorff's  $\alpha = .98$ ). Any disputes from the initial coding check were resolved through research team discussion, and coding for the remainder of the sample was carried out independently by the two trained coders. Participants generated almost six relevant thoughts on the news articles ( $M = 5.81$ ,  $SD = 3.00$ ).

*Knowledge acquisition.* Recognition and comprehension were independently assessed in the present study. Participants answered four multiple-choice questions that tested recognition and three that tested comprehension. These questions, similar to the stimuli, were borrowed from previous research (Jensen et al., 2011). Questions were classified as being correct or incorrect then summed to create a recognition score between 0 and 4 ( $M = 2.57$ ,  $SD = 1.18$ ) and a comprehension score between 0 and 3 ( $M = 2.12$ ,  $SD = .89$ ).

## RESULTS

### Data Analysis

Prior to analysis, data were screened for outliers. No outliers were found after examining statistical indicators (e.g., Mahalanobis distance scores; see Tabachnick & Fidell, 2013) and response patterns. Although some participants were found to be statistical outliers, the response patterns—when examined—did not demonstrate impossible or unlikely responses and as such were retained for analysis. Less than 5% of data were missing. Data were analyzed using PROCESS (Hayes, 2013) within the SPSS program. PROCESS allows analysis of direct and indirect effects for mediation and moderation independently or together. Information about which model(s) was tested for a particular hypothesis is provided next, as the CMM, IUM, and proposed integration require different analytical approaches within PROCESS. As noted previously, experimental conditions were entered as covariates into all analyses to control for differences

associated with those manipulations that are not directly relevant to the present manuscript and analyses.

## CMM Results

H1a predicted an association between surveillance motivations and recognition. Multiple hierarchical linear regression analysis, with study conditions entered in Block 1 and surveillance motivations in Block 2, supported this hypothesis,  $\Delta R^2 = .004$ ,  $F(3, 1077) = 2.36$ ,  $p = .03$ . H1b predicted the same relationship between surveillance motivations and comprehension. Multiple hierarchical linear regression analysis, again with study conditions entered in Block 1 and motivations in Block 2, supported the hypothesis,  $\Delta R^2 = .007$ ,  $F(3, 1077) = 3.50$ ,  $p = .005$ .

H2 posited that surveillance motivations would predict elaboration. Multiple hierarchical linear regression analysis, with study conditions entered in Block 1 and surveillance motivations in Block 2, supported this proposition,  $\Delta R^2 = .009$ ,  $F(1, 1075) = 9.69$ ,  $p = .002$ . Elaboration was positively associated with scores on recognition,  $\Delta R^2 = .03$ ,  $F(1, 1075) = 11.57$ ,  $p < .001$ , and comprehension,  $\Delta R^2 = .01$ ,  $F(1, 1075) = 5.52$ ,  $p = .001$ , fully supporting H3.

Two simple mediation analyses were run to test H4. Bootstrapping methods were used to test the significance of potential mediation using the PROCESS procedures outlined by Hayes (2013), using 5,000 bootstrapped samples. There was an indirect effect of surveillance motivations on recognition through elaboration (Indirect effect  $B = .03$ ,  $SE = .01$ ), confidence interval (CI) [.01, .06]. There was also an indirect effect found for surveillance motivations on comprehension through elaboration (Indirect effect  $B = .02$ ,  $SE = .01$ ), CI [.00, .03]. Results support H4.

H5 and H6 were tested using moderated mediation analyses. As with the simple mediation analysis, PROCESS was used (see Hayes, 2013) to examine indirect relationships. Hypotheses were tested using Model 59 of PROCESS (Hayes, 2013, p. 455) consistent with a previous test of the CMM (Jensen, 2011). Two regression analyses were run to test the two distinct learning outcomes (recognition and comprehension). The model set surveillance motivations as the independent variable (X), elaboration as the mediator (M), attention to news as the moderator (W), and the appropriate learning variable—recognition or comprehension—as the outcome (Y). For the analyses, products were mean centered, a 95% CI used, and 5,000 bootstrap samples occurred for indirect effects analysis. All models included study conditions as covariates. With recognition as the outcome, no moderated mediation occurred. With comprehension as the outcome, no moderated mediation was found. Follow-up analysis did find support, again, for an indirect effect (simple mediation) of surveillance motivations

TABLE 1  
Cognitive Mediation Model With Comprehension as Outcome

	<i>B</i> ( <i>SE</i> )	<i>t</i>
Mediation variable model		
Constant	.17 (.16)	1.09
Surveillance motivations	.46 (.16)	2.81**
Attention to news	.09 (.06)	1.51
Surveillance Motivations × Attention to News	.07 (.08)	.84
Dependent variable model		
Constant	2.05 (.05)	43.86***
Surveillance motivations	.12 (.05)	2.36*
Attention to news	.01 (.02)	.50
Elaboration	.03 (.01)	3.37***
Elaboration × Attention to News	-.00 (.01)	-.30
Surveillance Motivations × Attention to News	-.00 (.02)	-.02

Note.  $N = 1,076$ . The table reports the results of a moderated mediation analysis. Study conditions were entered as covariates. Analysis used PROCESS (Model 59) and 5,000 bootstrap samples were used for confidence intervals.

$p < .10$  \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

on comprehension through elaboration (Indirect effect  $B = .01$ ,  $SE = .01$ ), CI [.00, .03]. Analyses revealed no support for H5 or H6. See Table 1.

### IUM Results

H7a predicted an association between information utility variables and elaboration. Regression analysis supported this hypothesis,  $\Delta R^2 = .02$ ,  $F(5, 1065) = 6.16$ ,  $p < .001$ . H7b predicted an association between information utility variables (magnitude, likelihood, immediacy) and recognition. Multiple hierarchical regression analysis did not provide support for this hypothesis,  $\Delta R^2 = .005$ ,  $F(5, 1067) = 1.53$ ,  $p = .18$ . H7c predicted the same relationship between information utility constructs and comprehension. Regression analysis provided support for the hypothesis,  $\Delta R^2 = .01$ ,  $F(5, 1067) = 4.61$ ,  $p < .001$ .

Moderated mediation analysis was used to test H8. Using procedures outlined in Hayes (2013), and the SPSS PROCESS extension, each IUM construct was run as an independent variable. In PROCESS, when analyzing multiple independent variables in a moderated mediation model, each independent variable is run separately, with additional independent variables run as covariates. This process is repeated to obtain all needed coefficients. Results provided no support for H8a, as there was no evidence of moderated mediation. Results are presented in Table 2 for H8b. Analysis



TABLE 2  
Information Utility Model With Comprehension as Outcome

	<i>B</i> ( <i>SE</i> )	<i>t</i>
Mediation variable model		
Constant	5.93 (.60)	9.90***
Magnitude	.25 (.18)	1.42
Likelihood	.16 (.12)	1.28
Immediacy	-.17 (.20)	-.86
Relevance	.43 (.09)	4.59***
Magnitude × Relevance	.25 (.09)	2.65**
Likelihood × Relevance	.12 (.07)	1.73
Immediacy × Relevance	.05 (.10)	.53
Dependent variable model		
Constant	1.65 (.19)	8.84***
Magnitude	.11 (.05)	2.17*
Likelihood	-.03 (.04)	-.75
Immediacy	.10 (.06)	1.67 <sup>†</sup>
Relevance	.01 (.03)	.49
Elaboration	.03 (.01)	2.99**
Magnitude × Relevance	.01 (.03)	.28
Likelihood × Relevance	.03 (.02)	1.34
Immediacy × Relevance	-.03 (.03)	-.84

*Note.*  $N = 1,076$ . The table reports the results of a moderated mediation analysis. Study conditions were entered as covariates. In PROCESS, multiple X variables can be analyzed by running separate moderated mediation analyses ( $k - 1$  analyses using Model 8, in this instance) with additional X variables ( $k - 1$ ) as covariates. Five thousand bootstrap samples were used for confidence intervals.

<sup>†</sup> $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

partially supported H8b, as there was evidence of moderated mediation for the relationship between magnitude and comprehension.

### Integrated Model Results

The integrated model took one construct from the IUM and inserted within the general framework of the CMM. To test H9, a serial mediation analysis was run with surveillance motivations as the independent variable; perceived relevance and elaboration, respectively, as sequential mediators; and the two knowledge acquisition outcomes (recognition and comprehension). Analyses were completed using the SPSS PROCESS extension with bootstrap methods (see Hayes, 2013).

Paths for the serial mediation model are presented in Figure 2 and coefficients for specified paths can be found in Table 3. Analysis indicated that the total effect ( $c_1$ ) of surveillance motivations on recognition was

TABLE 3  
 Integrated Model: PROCESS Path Coefficients for Recognition and Comprehension

	Recognition		Comprehension	
	<i>B</i> ( <i>SE</i> )	<i>t</i>	<i>B</i> ( <i>SE</i> )	<i>t</i>
<i>a</i> <sub>1</sub>	.31 (.06)	4.80***		
<i>a</i> <sub>2</sub>	.35 (.16)	2.21*		
<i>a</i> <sub>3</sub>	.46 (.08)	6.09***		
<i>b</i> <sub>1</sub>	.08 (.03)	2.82**	.06 (.02)	2.47*
<i>b</i> <sub>2</sub>	.06 (.01)	4.90***	.03 (.01)	2.89**
<i>c</i> <sub>1</sub>	.12 (.06)	1.98*	.13 (.05)	2.85**
<i>c</i> ' <sub>1</sub>	.07 (.06)	1.11	.10 (.05)	2.19*

Note. No coefficients are provided for *a*<sub>1</sub>, *a*<sub>2</sub>, or *a*<sub>3</sub> in the Comprehension column as they are identical to those presented in the Recognition column.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

significant (*B* = .12, *t* = 1.98, *p* = .05) and the total direct effect (*c*'<sub>1</sub>), which removes the effects of the mediators, was not significant (*B* = .07, *t* = 1.11, *p* = .27). The total indirect effect of surveillance motivations on recognition was significant (*a*<sub>1</sub>*a*<sub>3</sub>*b*<sub>2</sub> = .01), CI [.00, .02]. Indirect effects of surveillance motivations on recognition through relevance (*a*<sub>1</sub>*b*<sub>1</sub> = .05), CI [.03, .09], and through elaboration (*a*<sub>2</sub>*b*<sub>2</sub> = .02), CI [.00, .05], were also statistically significant. Results suggest partial serial mediation of the effect of surveillance motivations on recognition. H9a is supported.

For comprehension, analysis indicated that the total effect (*c*<sub>1</sub>) was significant (*B* = .13, *t* = 2.85, *p* = .005) and the total direct effect (*c*'<sub>1</sub>) was also significant (*B* = .10, *t* = 2.19, *p* = .03). The total indirect effect of surveillance motivations on comprehension was significant (*a*<sub>1</sub>*a*<sub>3</sub>*b*<sub>2</sub> = .00), CI [.00, .01]. Indirect effects of surveillance motivations on recognition through relevance (*a*<sub>1</sub>*b*<sub>1</sub> = .02), CI [.00, .04], and through elaboration (*a*<sub>2</sub>*b*<sub>2</sub> = .01), CI [.00, .03], were also statistically significant. Analysis suggests partial serial mediation of the effect of surveillance motivations on comprehension. H9b was supported.

### Predictive Power of Each Model

To address the research question, hierarchical linear regression analyses were performed with the study conditions in Block 1 and all relevant theoretical variables and interactions in Block 2. The  $\Delta R^2$  statistics were examined and are presented here to provide the total variance explained in the two knowledge acquisition outcomes (recognition and comprehension).

As expected, Block 1 with the study conditions never significantly explained any variance in the outcomes of interest.

All models, considering all constructs, predicted variance in both knowledge acquisition outcomes. Effect sizes were small for all models. The IUM predicted more variance in recognition,  $\Delta R^2 = .04$ ,  $F(10, 1052) = 4.89$ ,  $p < .001$ , and comprehension,  $\Delta R^2 = .04$ ,  $F(10, 1052) = 4.48$ ,  $p < .001$ , than either other model. The integrated model predicted similar variance in recognition,  $\Delta R^2 = .04$ ,  $F(5, 1065) = 8.94$ ,  $p < .001$ , but less variance in comprehension,  $\Delta R^2 = .02$ ,  $F(5, 1065) = 5.72$ ,  $p < .001$ . The CMM predicted slightly less variance for recognition,  $\Delta R^2 = .03$ ,  $F(7, 1066) = 5.78$ ,  $p < .001$ , and comprehension,  $\Delta R^2 = .02$ ,  $F(7, 1066) = 3.27$ ,  $p = .002$ . Although variance explained is marginally larger for certain models, none of the models seem to have an advantage in terms explanatory prowess.

## DISCUSSION

Knowing the processes by which people acquire knowledge from news sources is important for communication researchers, particularly those interested in areas where the public report receiving much of their news (e.g., health, politics, science). Still, predicting knowledge acquisition from the news is difficult to assess and often produces small effects. The present study attempted to enhance understanding of the predictive utility of two models of media learning and tested a third integrated model that might better explain knowledge acquisition by integrating two established perspectives.

The results generally support the propositions put forward by the CMM and the IUM. The IUM does seem to have a slight predictive advantage, but the overall effects for all models were small. Attempts at combining the models heeded relatively little additional variance explained, but refining the CMM did provide an explanatory mechanism for the effect of surveillance motivations on elaboration that had not been previously examined. Overall, results presented make three contributions to research on learning from news: (a) outlines similarities, based on the statistical comparisons, of two models of learning from news; (b) provides an additional and potentially important intervening factor for research on the CMM; and (c) underscores the need to develop more comprehensive theories of media learning. These contributions are discussed in turn.

Both the CMM and IUM were partially supported by the current study. Elaboration is a key construct in both models, which suggests more similarities than differences in these models. Indeed, IUM had a small advantage in predicting variance in the knowledge acquisition outcomes but given

more variables in the model that difference is likely a methodological artifact rather than a meaningful theoretical distinction. Identification of what predicts elaboration is the real difference between these two models. Given the present results it seems clear that surveillance motivations are a better predictor of elaboration compared to individual information utility constructs or those constructs' interactions with perceived relevance. Given the importance of perceived relevance in research on elaboration in work related to the ELM, it seems a logical integration of the CMM and IUM to incorporate perceived relevance in some way and, as results indicated, perceived relevance could meaningfully have a role in future work on the CMM.

The addition of perceived relevance to the CMM proved to be helpful in two ways. First, it provided an explanatory factor regarding the influence of surveillance motivations on elaboration. Theoretically, this suggests that people with higher surveillance motivations might be more likely to process news, in general, as being more relevant to them and as such are more likely to engage in elaboration. This is consistent with core predictions of the CMM and merges some core predictions of the ELM into the existing model of news learning. Indeed, this work on ELM has been considered within the CMM context previously, but no studies had tested the serial model put forward in this article. Another benefit of adding perceived relevance to the CMM is an enhanced predictive power. With relevance added to CMM constructs, save attention to news, knowledge acquisition was higher in terms of recognition and comprehension. Again, the gains in variance explained were small, but as additional factors are considered and tested in light of these findings, perhaps gains in variance explained will be greater.

The present study used news stories specifically about cancer prevention, an area of news coverage that has been found to affect outcomes like cancer fatalism (Jensen et al., 2011) and cancer information overload (Niederdeppe et al., 2013) in negative ways. Cancer news coverage is a research and public health concern that would benefit from news stories crafted to improve knowledge and can decrease uncertainty and other negative psychosocial outcomes. There is still much unknown about what predicts learning from news coverage, though. This is especially true for nondemographic factors, as a considerable amount of learning from news can likely be accounted for by demographics factors predicting topic-specific knowledge like sex, age, and education (see Carpini & Keeter, 1991, for research on this area in a political setting). Perhaps the next additions to the models will be to expand on this work in other specific contexts—like science or technology news—to determine if concepts relevant to innovation acceptance or religious beliefs moderate key relationships outlined in the serial model. Improving understanding

of media learning, broadly considered, might best be accomplished through more specific examinations of people's processing and knowledge integration of specific types of information.

Another area of research that should be incorporated into work on the CMM is a larger selective exposure framework (e.g., Knobloch-Westerwick & Johnson, 2013) that has explicated, and will continue to explicate, additional theoretical considerations to improve predictions about news selection and how selected stories versus presented stories are processed differently. Indeed, given some findings related to information scanning (incidental exposure to information) compared to information seeking (intentional seeking and exposure to information), it seems that the effects of scanning and seeking could be incorporated to future survey research on the CMM, the IUM, or the integrated model.

One way to further assess these two models is to bring in another point of comparison. Models of message processing like the limited capacity model for motivated mediated message processing (LC4MP; Lang, 2006) could offer additional insight into improving the predictive capability of these models. For example, determining how constructs like perceived relevance differentially activate the aversive or appetitive systems within certain individuals could improve explanatory power of the models in studies where exposure is controlled in a lab setting. Furthermore, the LC4MP framework could explain how affective responses to news can help predict media learning. Indeed, some work has already shown that one affective response, cancer worry, served as an intervening variable within the CMM framework (see Jensen, 2011). Considering message processing theories like the LC4MP, as well as discrete emotional responses as additional intervening variables, provides another possible next step for research in this area.

Another consideration for news learning theorizing moving forward is the changing news environment. As print news begins to diminish in its present form, there may be additional considerations of the online news environment that warrant theoretical inclusion. Perhaps, for example, eye tracking should be used to determine total gaze time at an article as a measure of physical, visual attention—complementing the use of elaboration in these models, which measures cognitive attention. There may be a greater likelihood that people scan through Internet news articles in slightly different ways than they do traditionally presented articles. Although the articles in this study were presented in an online format, they were not presented in a fully immersed online environment (e.g., with hyperlinks available, additional stories linked in the side or below the story text, advertisements, etc.). The key seems to be the identification and investigation of a variable that likely moderates the relationship between elaboration and knowledge acquisition. Theorizing interested on the varied

effects of technology on a concept like credibility, such as the MAIN model (Sundar, 2008), might make meaningful additions to the models tested in the present study.

### Limitations

As with any study, there are limitations of the current design that merit discussion. College students, although certainly consumers of news, may be abnormal in their news consumption compared to the general population. Some of the students were likely communication majors, for example, and might be more heavily invested in consuming news media. There were also some measurement concerns in the manuscript. Even though almost all measurement devices used in the present article were taken from previous research specific to these theoretical models, some of the scales had shortcomings (reliability issues), similar to previous studies (see Eveland, 2001; Ho et al., 2013; Jensen, 2011; Knobloch et al., 2003). The direct measures for information utility model constructs should be examined using more advanced scaling procedures in the future. Having one item measure the likelihood construct, for example, is suboptimal. In addition, the reliability coefficient for the immediacy measure was low. The measure for surveillance motivations might be tapping two distinct dimensions of the construct, such as knowledge legitimization and current event interest. Longer tests of comprehension and recognition, to provide greater variability in participant scores, would also be beneficial. Future research should attempt to solidify measurement of CMM and IUM constructs.

### CONCLUSION

Overall there were modest differences between the CMM and the IUM. Both models predicted only modest variance for either learning outcome, which suggests that there are other explanatory variables that should be included in these models to improve their predictive power. An integrated model of the CMM and IUM offered an expanded explanation of the influence of surveillance motivations by incorporating a key information utility variable—perceived relevance—which enhanced the predictive power of the CMM. Perceived relevance should be further considered in investigations of the CMM. The ability to predict learning from the news seems to continue to be an elusive goal in communication research. Still, the present study adds support for the potential utility existing models, but more important indicating the integration of these models will likely improve the ability to predict the general public's learning from news coverage in time.

## REFERENCES

- Atkin, C. (1973). Instrumental utilities and information seeking. In P. Clarke (Ed.), *New models for mass communication research* (pp. 205–242). Oxford, England: Sage.
- Beaudoin, C. E., & Thorson, E. (2004). Testing the cognitive mediation model: The roles of news reliance and three gratifications sought. *Communication Research, 31*, 446–471. doi:10.1177/0093650204266098
- Berry, C. (1983). Learning from television news: A critique of the research. *Journal of Broadcasting, 27*, 359–370. doi:10.1080/08838158309386502
- Bryant, J., & Miron, D. (2004). Theory and research in mass communication. *Journal of Communication, 54*, 662–704. doi:10.1111/j.1460-2466.2004.tb02650.x
- Cacioppo, J. T., von Hippel, W., & Ernst, J. M. (1997). Mapping cognitive structures and processes through verbal content: The thought-listing technique. *Journal of Consulting and Clinical Psychology, 65*, 928–940. doi:10.1037/0022-006X.65.6.928
- Carpini, M. X. D., & Keeter, S. (1991). Stability and change in the U.S. public's knowledge of politics. *Public Opinion Quarterly, 55*, 583–612. doi:10.1086/269283
- Eisinga, R., te Grotenhuis, M., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *International Journal of Public Health, 58*, 637–642.
- Eveland, W. P., Jr. (1998, August). *The cognitive mediation model: A framework for studying learning from the news with survey methods*. Paper presented at the annual meeting of the Association for Education in Journalism & Mass Communication, Baltimore, MD.
- Eveland, W. P., Jr. (2001). The cognitive mediation model of learning from the news: Evidence from non-election, off-year election, and presidential election contexts. *Communication Research, 28*, 571–601. doi:10.1177/009365001028005001
- Eveland, W. P., Jr., Shah, D. V., & Kwak, N. (2003). Assessing causality in the cognitive mediation model: A panel study of motivations, information processing and learning during campaign 2000. *Communication Research, 30*, 359–386. doi:10.1177/0093650203253369
- Festinger, L. (1957). *Theory of cognitive dissonance*. Stanford, CA: Stanford University Press.
- Findahl, O. (2001). News in our minds. In K. Renckstorf, D. McQuail, & N. Jankowski (Eds.), *Television news research: Recent European approaches and findings* (pp. 111–128). Chicago, IL: Quintessence.
- Findahl, O., & Höijer, B. (1985). Some characteristics of news memory and comprehension. *Journal of Broadcasting & Electronic Media, 29*, 379–396. doi:10.1080/08838158509386594
- Graber, D. A. (1988). *Processing the news: How people tame the information tide*. New York, NY: Longman.
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.
- Ho, S. S., Peh, X., & Soh, V. W. L. (2013). The cognitive mediation model: Factors influencing public knowledge of the H1N1 pandemic and intention to take precautionary behaviors. *Journal of Health Communication, 18*, 773–794. doi:10.1080/10810730.2012.743624
- Jensen, J. D. (2011). Knowledge acquisition following exposure to cancer news articles: A test of the cognitive mediation model. *Journal of Communication, 61*, 514–534. doi:10.1111/j.1460-2466.2011.01549.x
- Jensen, J. D., Carcioppolo, N., King, A. J., Bernat, J. K., Davis, L., Yale, R., & Smith, J. (2011). Including limitations in news coverage of cancer research: Effects of news hedging on fatalism, medical skepticism, patient trust, and backlash. *Journal of Health Communication, 16*, 486–503.
- Jensen, J. D., Scherr, C. L., Brown, N., Jones, C., Christy, K., & Hurley, R. J. (2014). Public estimates of cancer frequency: Cancer incidence perceptions mirror distorted media depictions. *Journal of Health Communication, 19*, 609–624. doi:10.1080/10810730.2013.837551

- Knobloch, S., Carpentier, F. D., & Zillmann, D. (2003). Effects of salience dimensions of informational utility on selective exposure to online news. *Journalism & Mass Communication Quarterly*, 80, 91–108. doi:10.1177/107769900308000107
- Knobloch, S., Zillmann, D., Gibson, R., & Karrh, J. A. (2002). Effects of salient news items on information acquisition and issue perception. *Zeitschrift für Medienpsychologie*, 14, 14–22. doi:10.1026//1617-6383.14.1.14
- Knobloch-Westerwick, S. (2008). Informational utility. In W. Donsbach (Ed.), *International encyclopedia of communication* (pp. 2273–2276). Oxford, UK: Wiley-Blackwell.
- Knobloch-Westerwick, S., & Johnson, B. K. (2013). Selective exposure for better or worse: Its mediating role for online news' impact on political participation. *Journal of Computer-Mediated Communication*, 19, 184–196. doi:10.1111/jcc4.12036
- Kreuter, M., Farrell, D., Olevitch, L., & Brennan, L. (2000). *Tailoring health messages: Customizing communication with computer technology*. Mahwah, NJ: Erlbaum.
- Lang, A. (2006). Using the limited capacity model of motivated mediated message processing to design effective cancer communication messages. *Journal of Communication*, 56, S57–S80.
- Niederdeppe, J., Lee, T., Robbins, R., Kim, H. K., Kresovich, A., Kirshenblat, D., . . . Fowler, E. F. (2013). Content and effects of news stories about uncertain cancer causes and preventive behaviors. *Health Communication*, 29, 332–346. doi:10.1080/10410236.2012.755603
- Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York, NY: Springer-Verlag.
- Smith, K. C., Niederdeppe, J., Blake, K. D., & Cappella, J. N. (2013). Advancing cancer control research in an emerging news media environment. *Journal of the National Cancer Institute Monographs*, 47, 175–181. doi:10.1093/jncimonographs/igt023
- Stryker, J. E., Moriarty, C. M., & Jensen, J. D. (2008). Effects of newspaper coverage on public knowledge about modifiable cancer risks. *Health Communication*, 23, 380–390. doi:10.1080/10410230802229894
- Sundar, S. S. (2008). The MAIN model: A heuristic approach to understanding technology effects on credibility. In M. J. Metzger & A. J. Flanagin (Eds.), *Digital media, youth, and credibility* (pp. 73–100). Cambridge, MA: MIT Press.
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Boston, MA: Pearson.
- van Dijk, T. A. (1988). *News as discourse*. Hillsdale, NJ: Erlbaum.
- Woodall, W. G., Davis, D. K., & Sahin, H. (1983). From the boob tube to the black box: Television news comprehension from an information processing perspective. *Journal of Broadcasting*, 27, 1–23. doi:10.1080/08838158309386469