The Interplay of News Frames on Cognitive Complexity

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This research considers how distinct news frames work in combination to influence information processing. It extends framing research grounded in prospect theory (Tversky & Kahneman, 1981) and attribution theory (Iyengar, 1991) to study conditional framing effects on associative memory. Using a 2 x 3 experimental design embedded within a probability survey (N = 379), tests examined the effects of two different frame dimensions—loss-gain and individual-societal—on the complexity of individuals' thoughts concerning the issue of urban growth. Findings indicate that news frames interact to generate more or less complex cognitive responses, with societal-gain frame combinations generating the most detailed cognitions about the causes, components, and consequences of urban growth. Directions for research on media framing are discussed.

Communication researchers, especially those focusing on media psychology, have become increasingly interested in the concept of framing as a means to describe the influence of the press on individuals' information processing and social judgments (Cappella & Jamieson, 1997; Iyengar, 1991; Shah, Domke, & Wackman, 1996). These scholars assert that news accounts are often constructed in ways that privilege certain orienting and organizing schemes over others, subtly altering the activation of thoughts about a topic among members of the audience (Pan & Kosicki, 1993; Price & Tewksbury, 1997). As a consequence of this process, people apparently form individual interpretations of issues and act in ways that support these views (Shah, 2001).

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There is growing support for this perspective. Shifts between news frames (e.g., strategy versus policy, ethical versus material, episodic versus thematic) have been found to influence the process and outcome of social judgments ranging from political cynicism to electoral support (see Cappella & Jamieson, 1997; Iyengar, 1991; Shah, Domke, & Wackman, 1996). Research has not considered the possibility that news stories may contain multiple, crosscutting frames that combine various categories (e.g., episodic-strategy coverage or ethical-policy coverage). This is surprising, given the inherently intersecting context of prominent news frames and the potential of this interplay to shape cognitive responses. Indeed, the combination of certain frames seems likely to intensify or diminish media effects on audiences.

Further, the majority of extant framing research foregoes measurement of basic psychological variables, such as construct activation and mental elaboration, focusing instead on further removed social attitudes and behavioral intentions. Although most models assume that the primary effect of framing is on the cognitive system (see Price & Tewksbury, 1997), this supposition is rarely tested. This is particularly unfortunate given recent research that indicates individuals' cognitive responses mediate news effects on a wide range of social judgments and participatory behaviors (McLeod et al., 2000; Shah, Domke, & Wackman, 2001).

In this article, we attempt to address these issues by examining the interplay of news frames on the complexity of individuals' cognitive responses. Using an experiment embedded in a probability survey, this study manipulates two distinct frame dimensions of a local environmental issue, urban growth: (a) presentation of the issue in terms of losses or gains and (b) discussion of the debate at different levels, from a focus on the individual to one on society. To gauge the complexity of individuals' cognitive responses, we attempt to reconstruct their mental models about the causes, components, and consequences of urban growth through close analysis of the structure and detail of their verbatim responses to an open-ended question about growth in their community.

Framing Effects on Information Processing

Research has long recognized that news framing shapes information processing through a variety of cognitive heuristics and biases. Beginning with the classic prospect theory studies of Tversky and Kahneman (1981), research has examined how seemingly trivial changes in the framing of information can substantially alter decision making due to the application of judgmental heuristics. According to these scholars, individuals are prone to take risks when choices emphasize losses but to be risk-aversive when they emphasize gains (Kahneman & Tversky, 1984). Experiments exposing subjects to scenarios that were numerically

equivalent but framed in terms of losses or gains confirmed that message framing altered social judgments, with losses looming larger than gains for most people (Hale & Dillard, 1995; Quattrone & Tversky, 1988).

Complementing this work, research by Iyengar (1991) considered the role of attributional biases in news framing effects (see Jones, 1990; Ross, 1977). He asserted that the tendency of reporters to construct social issues around specific instances and individuals (episodic framing) encourages "attributions of responsibility both for the creation of problems or situations (causal responsibility) and for the resolution of these problems or situations (treatment responsibility)" to the people featured in press reports (Iyengar, 1991, p. 3). In contrast, news that emphasizes broader trends and social conditions (thematic framing) is thought to foster a sense of shared responsibility and spur collective action. A series of experimental studies concerning crime, poverty, and unemployment provide some support for these claims; however, many tests of the central hypothesis, while directionally consistent, fail to achieve statistical significance.

These inconsistent results may result from the confounding of two distinct frame dimensions in the contrast between episodic and thematic coverage. That is, episodic coverage not only favors specific instances over enduring problems (i.e., time span), it also emphasizes individual situations over societal conditions (i.e., social level). From an attribution perspective, a sense of shared responsibility for solving social problems should be minimized when audiences encounter stories featuring an individual struggling with a persistent problem. The crosscutting frame dimensions thus may have countervailing effects, reducing observed differences.

More important for the purposes of this study, shifts from an individual to a societal level likely work in combination with loss and gain frames. As suggested by prospect theory and attribution theory, the combination of these frame categories may create contexts in which audiences are particularly likely (or unlikely) to generate inferences about the causes, components, and consequences of social problems. Associative network models of memory provide a basis to understand how these news frames may jointly influence the complexity of cognitive responses.

Associative Network Models of Memory

The conceptualization of the human mind as a network of interlinked or associated concepts has been around since the time of Aristotle (Anderson, 1983). Associative network models persist to this day and are frequently used as a basis for social and cognitive science research (e.g., Acton, Johnson, & Goldsmith, 1994; Carley, 1986; Carley & Palmquist, 1992; Lazo, Kinnel, Bussa, Fisher, & Collamer, 1999). Prominent models assume that behind all information processing is a mental system made up of networks of associated cognitive units, or nodes. Within this

system, activation of one node can spread through the network of interconnected units, leading to the activation of linked nodes.

Prompted by theories of spreading activation, social scientists have become interested in extracting individuals' mental models about a wide range of topics in order to illuminate the relationships among declarative and procedural memory, social inference, and human behavior (Carley, 1986; Lazo et al., 1999; Novak & Gowin, 1984). Many methods for deriving mental models rely on content analysis of verbatim responses to deduce the causal and categorical connections among relevant cognitions (e.g., Langston & Kramer, 1998; Rye & Rubba, 1998; Wallace & Mintzes, 1990). These data can be used to represent the structure of mental models in an analyzable form. As Carley and Palmquist (1992) noted, these approaches assume that (a) mental models are representations of associations in memory, (b) language is the key to understanding these associations, and (c) these models can be represented as networks of activated concepts.

Common to most of these studies is an interest in the complexity of mental models, particularly the differentiation of unique elements and their integration with one another (Neuman, 1981). For example, Lazo et al. (1999) proposed that the overall level of detail (elaboration of specific categories), depth (causal connections among categories), and width (the discreet categories that serve as the foundation for these causal connections) could function as a measure of complexity of mental models (see also Carley & Palmquist, 1992; Novak & Gowin, 1984). As we discuss below, examination of the complexity of activated mental models may be particularly useful for understanding the interplay of news frames on individuals' mental systems.

Frame Combinations and Cognitive Complexity

There are a number of reasons to expect that the crossing of loss and gain frames with individual and societal frames will influence cognitive complexity. Building upon the insights offered by Tversky and Kahneman (1981; also Hale & Dillard, 1995; Kahneman & Tversky, 1984), we adopt the view that losses typically loom larger than gains. Specifically, the framing of a problem in the language of loss seems especially likely to generate complex mental models when it is presented at the individual level. This is consistent with research that finds feelings of personal threat foster more thorough information processing than feelings of personal mastery (Marcus, 1988; Marcus, Sullivan, Theiss-Morse, & Wood, 1995). The combination encourages individuals to connect the potential threat and their personal situation, spurring more thorough processing. In contrast, when societal elements are featured—either as a dominant or shared frame characteristic—feelings of personal threat may dissipate due to the implication

of generalized effects. That is, the presence of a societal frame, exclusively or in combination with an individual frame, may encourage audience members to assume the threat is more likely to have consequences for others, consistent with social attribution processes (Jones, 1990; Ross, 1997). This would likely diminish the likelihood of detailed information processing.

If certain conditions are present, however, people may also generate complex mental models when they encounter an issue framed at the societal level (Iyengar, 1991). Press reports that portray an issue in communal terms seem particularly likely to generate detailed mental models when focusing on what is to be gained, not lost. Presentations of issues in terms of societal gains have been shown to capture and maintain the attention of citizens. Research on economic voting is particularly relevant. It indicates that citizens look beyond their personal economic well-being to consider what is in the best interests of society when deciding which candidate to support (Feldman, 1982; Kinder & Kiewiet, 1981; Niemi & Weisberg, 1993), but they reduce the use of such sociotropic criteria when they are doubtful of the capacity of a politician to make positive changes (Krause, 1997). That is, societal gains apparently generate a stronger response than societal losses When individual elements are included in the gain framing of a news story—either as a primary story characteristic or in combination with societal framing—these potential benefits are likely discounted as feelings of personal mastery reduce the impetus for detailed processing. The research hypotheses may thus be stated as follows:

H1a: People who encounter an individual loss frame will express more complex mental models than people who encounter an individual gain frame.
H1b: People who encounter an individual loss frame will express more complex mental models than people who encounter a societal loss frame.
H1c: People who encounter an individual loss frame will express more complex mental models than people who encounter mixed gain or mixed loss frames.
H2a: People who encounter a societal gain frame will express more complex mental models than people who encounter an individual gain frame.
H2b: People who encounter a societal gain frame will express more complex mental models than people who encounter a societal loss frame.
H2c: People who encounter a societal gain frame will express more complex mental models than people who encounter mixed gain or mixed loss frames.

METHOD

In order to examine the relationship between individuals' mental models and particular media frames, it was necessary to develop a study that

centered on a particular issue. For this study, we chose the issue of urban growth. The decision to focus on a single issue had two advantages: (a) it permitted examination of multiple dimensions of respondents' interpretation of this issue and (b) it allowed priming of respondents with certain issue-relevant information prior to exposure to the framing manipulation.[1]

The data used in these analyses came from telephone interviews with a sample of 379 respondents from Madison, WI, and its surrounding areas. The interviews were conducted between October 14 and November 1, 1999. Probability sampling procedures were used, combining a systematic sample and a variant of random digit dialing. Within each household, respondents were randomly selected. The response rate was 49.7%.

After a series of traditional media-use and political-participation questions, respondents were asked to rate their attitudes on environmental issues such as pollution standards and the health effects of pollution. Next a series of questions about the rate of growth in vehicular traffic and employment in Dane County asked respondents to indicate if they felt current rates of growth should increase, decrease, or stay the same. With both environmental attitudes and certain consequences of growth primed, respondents then heard a radio story about urban growth in Dane County.

Design

To test the effects of framing on cognitive complexity, we developed a 2 x 3 experimental design using a simulated radio news report as the manipulation. Respondents were randomly assigned to one of the six conditions. The broadcasts were professionally produced in an attempt to make them seem realistic to respondents. The reports framed urban growth in terms of losses or gains and presented the issue at an individual, mixed, or societal level. In the loss condition, the broadcast contrasted the negative consequences of uncontrolled growth with the negative consequences of restricting growth; in the gain condition, it contrasted the positive consequences of controlled growth and the positive consequences of unrestricted growth. Respondents receiving the societal condition heard about growth in terms of its effects (loss or gain) on the community without mention of individuals. Those receiving the individual condition heard people describe the effects of growth on their families. In the mixed condition, respondents heard about how growth would affect both individuals and the community.[2] Across all conditions, the factual information remained the same and the language remained as constant as possible; respondents were told that growth was related to the stability of small businesses and the financial security of business owners as well as to the quality of drinking water and the health of those who consumed it.

Cognitive Mapping

In order to examine the relationship between people's cognitive complexity and their communication patterns, it was necessary to capture not just the opinion of respondents about a particular issue but also the way they organized and described their thoughts. This was done by asking respondents to "explain the issue of urban growth and its impact on the quality of life in the Madison area to a friend." Interviewers were trained to use neutral probes to prompt respondents to provide any additional thoughts they might have. These interviewers were blind to the hypotheses and therefore unlikely to influence respondents systematically during the probing process. Most important, each person's complete response was tape-recorded and transcribed verbatim.

Since respondents were asked to relate their thoughts about urban growth "to a friend," most felt that they could complete the request with ease. Although reaction from the interviewer was held to typical probing techniques, the interaction was more conversational than having a respondent use the more cumbersome mode of writing out an answer or thought listing. Respondents were free to talk at their own pace about a topic that they had just heard discussed in a radio report.

After an extensive training process with the coding system, five research assistants analyzed the transcriptions for their manifest and latent structure. Response analyses often relied upon the coding of discrete categories to discern an individual's mental model concerning a given subject. Large issues were broken down into specific topics and linkages among these topics were coded. Based upon the issues raised in the interviews as well as in the media coverage, 28 categories, or topics, were identified.

The categories fit into two general sets: primed and spontaneous. The primed categories ($M = .96$, $SD = 1.01$) were those mentioned in the simulated radio broadcast respondents heard immediately before answering the open-ended question. These categories included the effects of urban growth on the environment in general (including mentions of "pollution" without further description), on lake quality, and on health, as well as the effects of growth on the economy in general, the business climate, and the financial security of individuals in the area. Additional primed categories (e.g., traffic and jobs) were raised in questions contained earlier in the interview. Spontaneous categories ($M = .90$, $SD = 1.16$) covered other concept categories associated with growth not mentioned anywhere in the interview schedule; examples include air quality, crime, school crowding, taxes, biodiversity, and green-space concerns (see Kim & Van Dusen, 1998).

These 28 categories proved to be sufficient to capture all but three of the more than 1,000 independent statements made describing urban growth in the transcribed interviews. Wherever a statement that could be

classified under one of these categories was made in the respondent's description of urban growth, the coder marked it as present. Categories could be described as direct results of urban growth, as possible outcomes of growth, as events caused by outcomes of growth, or results of growth in other places.

Although it is important to know the specific aspects of growth that different respondents mentioned, this does not adequately capture the relationships present in their mental model. Accordingly, responses were coded for dimensions other than mere presence of a category. First, coders noted the degree of elaboration respondents used in describing each named category. Elaboration was defined as the degree of detail in respondents' descriptions of each individual category. Named categories were coded as having an elaboration level from one (category is mentioned without additional description) to three (category is described using at least two independent clauses or sentences). If an individual mentioned no growth-related issues for the primed or spontaneous category groups, their elaboration score for that group was zero. The average elaboration for all primed (M = .97, SD = .95) and spontaneous (M = .86, SD = 1.00) categories was then calculated.

Next, the connections among constructs were mapped. In extant research, these relationships can take a number of forms, including any specifically mentioned ties, comparisons, hierarchical relationships, item-order, or temporal connections. In coding the responses in this study, coders looked specifically at the implicit and explicit causal connection among issue attributes. Those present in the transcriptions were coded for the causal "level" at which the respondent placed them. Levels were defined in terms of the causal chain of attributes stemming from urban growth. Those attributes described by the respondent as being a direct result of growth were coded as being at level one, the foundation on which other causal connections were built. Those resulting from level one categories were in turn coded as level two. For example, if a respondent described growth as leading to increased traffic, traffic would be recorded at level one. If he or she next explained that there was more air pollution due to increased traffic, then air quality would be recorded as a level-two attribute. The same principle was applied to code for additional levels. No respondent employed more than four causal levels in his or her descriptions.

In addition to naming attributes that represent results of growth, respondents could also name factors that caused growth and factors that could help address the outcomes of growth. As with issues related to growth, a list of possible causes and solutions was developed and used by coders (25 such items were included in the list). For both causes and solutions, coders noted what the category was and who was assigned

responsibility for those reasons or remedies. For both, there were nine possible categories of actors who were responsible for the 25 causes and solutions deemed possible. As with the outcomes of growth, coders noted every remedy and cause present in the response.

Using these measures, two composite measures (width and depth) were calculated to capture structural aspects of the cognitive models of the respondents. Width refers to the base of cognitive categories most closely linked to the topic at hand; it equals the number of attributes at the initial causal level ($M = 1.65$, $SD = 1.32$). As stated above, these categories functioned as the foundation on which the causal connections concerning urban growth were built.[3] Depth refers to the length of these cognitive chains; it equals the number of links in the causal chains given by the respondent as indexed by the number of levels given. Causes and remedies form part of a larger cognitive model of causally related concepts; accordingly, respondents were given an additional depth level if a cause or remedy was mentioned. Given that a maximum of four attribute levels were named, including causes and remedies, depth scores could range from zero to six ($M = 1.60$, $SD = 1.15$).

The reliability among coders was tested using Krippendorff's alpha. For number of primed categories, alpha was .77. For number of spontaneous categories, it was .69. For cognitive depth the figure was .70, and for width it was .75. Finally, the alpha for elaboration of primed attributes was .55, and for elaboration of spontaneous attributes it was .52.[4] In conjunction, these measures give a good sense of the complexity of the cognitive structure about urban growth as reflected in respondent comments. The distinction between primed and spontaneous categories provides a basis for judging the susceptibility of individuals to social context. Elaboration indicates the level of detail of the discrete concepts. Width captures the range of concepts the individual immediately associated with urban growth. Depth provides a measure of the causal relationships among concepts occupying the respondent's understanding of urban growth.

Blocking Variables

Previous studies have found that people's cognitive complexity is influenced by pre-experimental factors such as formal education, knowledge, and communicative behaviors, among others. Although this was an experimental design, controls for some of these measures were still included in the analyses as blocking variables (Keppel, 1991). This helped ensure that none of these factors was confounded with an experimental condition by chance and limits the potential influence of these extraneous factors on the observed differences.

Demographic Variables

Four demographic variables were used as controls: age (M = 45, SD = 15.72), sex (48% females), education (M = 15 years, SD = 2.97), and income (Mdn = $40,000 to $49,999). Age was measured through asking how old the respondent was on his or her last birthday. Gender was coded by the interviewer. Education was measured as highest year of school completed. Income was the respondent's estimate of his or her total household income for the previous year.

Public Affairs Knowledge

The knowledge measure was an additive index constructed from six questions concerning local, national and international issues and political figures (α = .77). Correct answers were scored one, all other answers zero.

Mass Communication Variables

Newspaper hard news use consists of ten measures of attention and exposure to hard news content about international affairs, national government and politics, local politics, economy and social issues, lake quality, and urban growth (α = .94). Television hard news use was constructed from five measures of attention to content about international affairs, national government and politics, local politics and social issues, the environment, and urban growth (α = .92). Exposure and attention were measured on a ten-point scales ranging from "rarely" to "all the time" and from "little attention" to "very close attention," respectively.

Interpersonal Communication Variables

Size of discussion network is measured by the number of individuals with whom the respondent discusses political issues (M = 6.36, SD = 5.22). Values ranged from zero to more than 20. Interpersonal discussion frequency is an additive index of nine measures of frequency of discussion with groups of people about local politics or community issues (α = .76). The groups were co-workers, people with extreme far left-wing views, people with extreme far right-wing views, ethnic minorities, atheists, family, friends, neighbors, and acquaintances. Frequency of discussion was measured on a ten-point scale ranging from "not at all" to "very often."

Reflective Information Processing

Reflective processing is an additive index of four items measuring the respondent's use of local news (α = .72). Respondents read a series of statements concerning whether they thought about local media content

after consuming it and related it to what they knew. They then rated their level of agreement with each statement on a ten-point scale ranging from "strongly disagree" to "strongly agree."

RESULTS

Consistent with expectations, preliminary analysis of the experimental data showed a pattern of transverse interactions for all indicators of cognitive complexity: width and depth of the mental model, number of primed and spontaneous attributes, and average elaboration of primed and spontaneous attributes. Specifically, the mean values for societal gain and individual loss conditions were highest in complexity, while the societal loss and individual gain conditions were lowest. The mixed conditions tended to fall in between these two values for all six dependent variables.

This pattern was formally tested through ANCOVA contrast tests, in which the only factor was a six-level cross of the two original frame manipulations with the effects of covariates removed. Overall, H1a, H1b, and H1c, as well as H2a, H2b, and H2c, predicted that individual loss and societal gain frames would yield more complex mental models than alternate frame conditions. Even though this was an experiment with random assignment, the inclusion of controls allows for greater confidence in the findings and permits some insights into the psychological processes underlying the observed effects (see Keppel, 1991, for use of ANCOVA in experimental analysis). Demographics (age, gender, education, and income); communication variables (newspaper public affairs use, television public affairs use, interpersonal discussion network size, and discussion frequency), public affairs knowledge, and reflective information processing were included as covariates in the analyses. Results of the contrast tests for the individual loss and societal gain frames are presented in Tables 1 and 2, respectively.

Contrast testing of the individual loss frame yielded little support for H1a and H1c and only partial support for H1b. Out of 24 possible tests, five were significantly different at $p < .05$, with most of these differences concentrated in contrasts with the societal loss frame, including significant differences in the width and depth of individuals' mental models, and the average elaboration of primed attributes. In addition, when people encountered the individual gain or mixed loss frame, they described primed issue attributes in less detail than when they encountered the individual loss frame. It is worth noting that the ability of the individual loss frame to produce more complex mental models was least pronounced with respect to the number of spontaneous issue attributes mentioned and elaboration of these attributes (see Table 1).

TABLE 1
ANCOVA Contrast Tests for Individual Loss Frame

	Contrast conditions (Individual loss versus:)			
Dependent variables	*Individual gain*	*Mixed gain*	*Mixed loss*	*Societal loss*
Cognitive width	.301 (.224) $p = .090$	.08 (.226) $p = .359$	.07 (.228) $p = .374$	.540 (.227) $p = .009$
Cognitive depth	.196 (.190) $p = .152$	.03 (.192) $p = .433$	.262 (.194) $p = .089$	.395 (.193) $p = .021$
Number of primed issue attributes	.196 (.176) $p = .134$	.107 (.178) $p = .274$	.104 (.180) $p = .282$	.254 (.179) $p = .079$
Number of spontaneous issues attributes	.104 (.205) $p = .103$	.03 (.207) $p = .104$	.03 (.209) $p = .436$	.227 (.208) $p = .138$
Average elaboration of primed attributes	.283 (.162) $p = .041$	.224 (.164) $p = .086$	.280 (.165) $p = .046$	.364 (.164) $p = .014$
Average elaboration of spontaneous attributes	.03 (.179) $p = .494$	.07 (.181) $p = .358$	.125 (.182) $p = .247$	.226 (.181) $p = .107$

NOTE. One tail contrast tests; entries in each cell refer to contrast estimates, standard errors, and *p*-values

Contrast testing of the societal gain frame produced somewhat stronger results, providing partial support for H2a, H2b, and H2c. As shown in Table 2, out of 24 possible tests, 12 were significantly different at $p < .05$. Differences were most evident when the societal gain frame was contrasted with societal loss and individual gain frames. The societal gain frame generated more complex mental models than the societal loss frame with respect to width, depth, number of primed attributes, and average elaboration of these attributes. Those exposed to the societal gain frame, as compared with the individual gain frame, were also more likely to generate mental models with greater width, a larger number of primed issue attributes, and higher average elaboration of these attributes. The societal gain frame also yielded more complex mental models than mixed frame conditions in five out of 12 contrast tests. Notably, there was little difference between societal gain frame and alternative frame conditions in activating issue attributes that were not primed during the survey or

TABLE 2
ANCOVA Contrast Tests for Societal Gain Frame

	Contrast conditions (Societal gain versus:)			
Dependent variables	*Individual gain*	*Mixed gain*	*Mixed loss*	*Societal loss*
Cognitive width	.569 (.237) *p*=.009	.350 (.238) *p*=.071	.342 (.241) *p*=.079	.808 (.240) *p*=.001
Cognitive depth	.275 (.201) *p*=.086	.112 (.202) *p*=.292	.341 (.204) *p*=.048	.475 (.203) *p*=.010
Number of primed issue attributes	.443 (.186) *p*=.009	.354 (.187) *p*=.030	.351 (.190) *p*=.033	.501 (.189) *p*=.004
Number of spontaneous issues attributes	.113 (.217) *p*=.304	.03 (.218) *p*=.439	.04 (.220) *p*=.425	.235 (.219) *p*=.142
Average elaboration of primed attributes	.514 (.171) *p*=.002	.455 (.172) *p*=.005	.510 (.174) *p*=.002	.595 (.173) *p*=.001
Average elaboration of spontaneous attributes	.05 (.189) *p*=.399	.111 (.190) *p*=.280	.170 (.192) *p*=.288	.272 (.191) *p*=.079

NOTE. One tail contrast tests; entries in each cell refer to contrast estimates, standard errors, and *p*-values

in the manipulation. Consistent with the results observed in Table 1, none of the contrast tests concerning spontaneously mentioned issue attributes or elaboration of those attributes generated significant differences.

CONCLUSION

Given these results, there is some support for the assertion that the co-occurrence of certain media frames in news discourse produces conditional effects on cognitive complexity. Although there was only partial support for H1b, H2a, H2b, and H2c, the overall pattern of results helps sustain the broader theoretical argument advanced in this article. Frames do work in combination to generate more detailed cognitions about the causes, components, and consequences of urban growth.

Specifically, people who received the societal gain frame expressed mental models about urban growth with greater width, depth, number of primed attributes, and elaboration of those attributes than other frame combinations. A similar but considerably weaker pattern was observed for the individual loss frame. Those receiving this frame combination expressed mental models with greater width, depth, and elaboration of primed attributes than those receiving the societal loss frame. As these indicators represent dimensions of cognitive complexity, these data suggest that media frames work in combination to conditionally influence information processing.

This relationship however did not hold for the mention of spontaneous categories or the elaboration of those categories after controls were introduced. As suggested by McLeod et al. (2000), the activation of information beyond the scope of a particular news story may be dependent on individuals' preexisting networks of knowledge concerning the topic, which in turn are a function of education, news consumption, interpersonal discussion, and media reflection. Since we controlled for these factors as covariates in our analysis, it is not surprising that these effects failed to materialize.

More generally, the data presented in this article have clear implications largely ignored in the literature on framing: Different frame dimensions do have conditional effects. Journalists' use of certain types of language (loss or gain) and perspectives (individual or societal) influences the mental models brought to bear by individuals. Frames thus have distinct effects when used in combination with other frames, even when there is seemingly no inherent structural or practical connection between the two frame choices. In the case of this study, there are two possible reasons why respondents who simultaneously received the loss and the individual frame or the societal and the gain frame generally expressed more complex cognitive models: (a) the frame caused individuals to consciously feel more motivated to think about and respond to the open-ended question regarding urban growth for affective of functional reasons, or (b) the frame triggered increased associations with existing mental structures, thus automatically activating a greater number of linked constructs. Further research is needed to answer this question and clarify the psychological processes underlying these effects.

If individuals consciously felt more motivated to contemplate and discuss growth under the frame conditions in question, we might expect them to talk in greater detail and to draw more connections among attributes, rather than simply recalling more concepts. This was in fact the case. The societal gain frame combination and the individual loss frame combination both led to an increase in elaboration, particularly in terms of those attributes to which respondents had just been exposed. The frames

also triggered a marginally significant increase in depth, suggesting that respondents were working to causally connect the concepts rather than simply list them. As noted above, extant research provides possible explanations for why each of the frame combinations would have had such an effect. Research on affective responses to threats suggest that, when faced with an individual level scenario, people react more strongly to outcomes framed in terms of losses (see Tversky & Kahneman, 1981; Marcus et al., 1995). Conversely, research on sociotropic evaluations indicates that individuals are fully capable of making societal level evaluations as well and may be particularly motivated to do so when they feel there is some benefit to be gained (Kinder & Kiewiet, 1981; Krause, 1997).

These explanations may overestimate the degree to which respondents have deliberately thought harder about the framed issue. The frames may, in part, simply be triggering cognitive associations formed from prior thinking about the issue. The societal gain frame and, to a lesser degree, the individual loss frame may stimulate more of these associations. This could be due to the use of these particular frames with greater frequency in the media or to the possibility that these frames initiate certain heuristics or cognitive biases, as suggested by prospect and attribution theory (Jones, 1990; Ross, 1977; Tversky & Kahneman, 1981). The higher elaboration levels and increased depth suggest that respondents are deliberately "talking through" their understanding of growth under certain framing combinations. The relatively strong relationship between these frame combinations and width of activated mental models and the recall of primed categories indicates that the co-occurrence of certain frames may simply trigger associations that do not necessarily require effortful processing. In fact, some of the variables controlled for in the regression analyses are typically linked to thoughtfulness; because the relationships continue to hold, this suggests that a portion of the frame effects may be due to automatic processes.

Regardless, these data support the view that the combination of certain frame categories led to more detailed descriptions of urban growth by respondents. Research on associative network models and mental mapping suggests that these fuller descriptions are related to the activation of more complex models about the issue. Such cognitive complexity is significant because of its capacity to predict certain types of political behavior (see McLeod et al., 2000; Shah et al., 2001). Research shows that cognitive complexity is positively related to deliberative and participatory behaviors. Thus, individuals who generate more complex mental models may, in turn, engage in increased deliberative and information seeking behaviors. However, the data cannot definitely show what mental processes are at work. As explained earlier, the findings could be the result of a mix of motivational and cognitive processes, some of which are more likely than others given the pattern of findings and existing literature.

These findings also have implications for future research on media psychology. Much of the literature of framing has made no attempt to discover such interactions (cf., Shah, 2001). This opens up a vast area of potential research; even without adding new categories or conceptualizations of frames, the relationships among frame dimensions delineated in existing research are worth investigation. Further, research on frame interplay should test outcomes across topics to help clarify what aspects of human cognition and media coverage might help explain the reasons for interactive effects. Such examinations appear to be aided by the application of cognitive mapping procedures, which allow researchers to observe the most basic consequences of news framing on information processing. The fact that cognitive complexity has attitudinal and behavioral consequences only adds to the potential importance of this approach for future research.

In addition, these findings lend new meaning to content analyses of media. If the relationship among frames within news stories is important, then analyses should attempt to determine the relative frequencies not only of frames, but also of clusters of frames. An agenda for research growing out of this paper might include tracking the co-occurrence of framing in various types of news content, followed by a systematic examination of the implications of such co-occurrence for the processing of news texts. Moreover, research into media processes should consider how journalists select frames and whether the textual and structural considerations brought about by the use of one frame might contribute to the likelihood of a journalist selecting other news frames.

Finally, existing research into framing effects should be considered in light of these new findings. Given the pattern of effects observed in these data, traditional analysis limited to a consideration of direct effects of frames would have been unable to reject the null hypothesis. Prior studies that found no effects of news frames, or that found confusing or minimal effects, may have neglected to attend to an interaction among frames embedded in experimental stimuli. If this is the case, it makes a strong argument for more careful creation of framing manipulations in the future. Researchers need to minimize the confounding variance present within the frames under examination by isolating the exact qualities of the text that contribute to the framing condition being considered. Ideally, only those textual characteristics would be altered while keeping all other frame aspects constant. Indeed, as noted above, broad variations in "episodic" and "thematic" coverage may be confounding the effects of different frame dimensions.

As a whole, this study provides a preliminary effort on a promising avenue of research. It remains to be discovered whether such interactions in framing choices have similar effects across topics and whether such choices are correlated in the production process. Nevertheless, it is clear

that multiple frames, acting together, have effects that go beyond what would be predicted by summing the individual outcomes of the frames. This lends a new layer of complexity to our understanding of how the patterns present in media texts may contribute to the cognitions, judgments, and actions of individuals.

NOTES

1. Focusing on a single issue does have potential problems. Foremost is the degree to which this hinders our ability to generalize findings to other topic areas. Although the theories that inform our hypotheses are not specific to the topic of urban growth, we cannot rule out the possibility that individuals respond uniquely to urban growth.

2. The mixed condition provided a level-neutral control when examining the interplay of loss and gain framing with individual and societal framing. By creating manipulations that contained both individual and societal frame elements, we could examine whether the presence of both organizing devices in a single story produced the expected contrasts. That is, the inclusion of mixed conditions allowed observation of the direct and interactive effects of framing a news story in explicitly individual or societal terms as compared with a nonaligned condition. Because it is extremely difficult, and highly artificial, to have a news story completely free of any consideration of levels, the creation of the mixed category allowed us to examine the continuum of individual/societal frames when crossed with loss/gain frames.

3. For those individuals who did not mention any categories (i.e., attributes of growth) the value of width equaled the number of causes given. If neither causes nor consequences were given, width equaled the number of solutions. Only if no growth-related concepts were mentioned was width equal to zero, and only if no consequences were named were causes or solutions taken into account when calculating width.

4. Five research assistants each separately coded 50 transcriptions to establish the internal consistency of the coding. Although reliability for the elaboration measures is lower than desired, this reflects the fact that the elaboration score was the average of several coded values, adding to the difficultly of achieving high levels of agreement. Steps were taken to correct disagreements through discussion for final coding.

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