

# Integrative Complexity and Emotional Positivity during a Terrorist Attack

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## Abstract

Since September 11, 2001, much research has been conducted with a view to understand the psychological reactions of individuals to acts of terrorism. However, largely for practical reasons, there has been no systematic study of cognitive or emotional processing in the immediate moments of a terrorist attack. Using archival methods, live news broadcasts on the morning of 9/11/2001 from the United States, Canada, and Qatar were scored for integrative complexity (a measure of language structure that reflects the state level of available cognitive resources; Suedfeld & Tetlock, 2001) and negative affect. These scores were plotted against a timeline of events of that morning, beginning from baseline scores prior to the terrorist attacks. In this manner, it was possible to map out changes in both the structure and content of subjects' thinking, as well as pinpoint exactly when in real-time these changes occurred. Results show virtually identical patterns of integrative complexity among North American newscasters, while a possible effect of psychological or ideological distance was observed in the cognitive processing of the Qatari newscaster. In addition, integrative complexity was inversely related to the use of negative emotion words. Implications and future directions are discussed.

## Introduction

A terror attack occurring at most places in the world precipitates shock, disbelief, uncertainty about an appropriate course of action, and possibly worry for the safety of those close to us. Psychologically, we are confronted with an out-of-the-ordinary situation, for which a relevant pre-existing script likely does not exist<sup>1</sup>. In this broader sense, events such as terrorist attacks are terrifying simply because they constitute an unexpected and large-scale departure from the status quo. In the language of cognitive psychology, we are confronted with a barrage of schema-inconsistent information (Horowitz, 1986;

Solomon, Iancu, & Tyano, 1997). For example, prior to September 11, 2001, very few people might have conceived of commercial airplanes as potential weapons. Consequently, in the immediate moments of a terror attack, our perpetually-limited cognitive resources are suddenly taxed with the effort required to comprehend the event. Factors such as physical injury, and knowing others in the affected area, further reduce the likelihood of our arriving at a logically sound course of action, as concerns become more specific and personally relevant (Leach, 2004). Uncertainty also plays a particularly powerful role: the exact nature of the event, the severity of its impact, its course over time, the identity of the perpetrator(s), and the appropriate set of responses, become clear only over time (if ever) (Ofman, Mastria, & Steinberg, 1995). As time wears on and the situation sinks in, cognitive resources become available and reasoned action becomes more of a possibility. The paradox, however, is that it is often individuals' immediate reactions that can determine their survival or the quality thereof.

On the morning of September 11, 2001, while thousands were directly affected by the attacks in New York, Washington, and Pennsylvania, millions of others across the world watched, transfixed by the horror unfolding on television. Doubtless, the manner in which the breaking news was presented held the potential to influence the viewing public's psychological response<sup>2</sup>.

However, although many studies have addressed the effects of such coverage on viewers (e.g., Ahern et al., 2002; Schlenger et al., 2002; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002; Wayment, 2004), only a few researchers have attempted a more sophisticated measure of media exposure. For example, only one reported study so far has examined differences in the emotional tone of television and newspaper reports of the September 11 terrorist attacks (Cho et al., 2003). A next step in this regard could be to study the different ways in which the news of the attacks

<sup>1</sup> Exceptions to this rule may include places such as Israel, where a terrorist event is not a particularly singular event. However, it may be argued that the scale and targets of the terrorist attacks on September 11, 2001 may have required a revision of the "terrorism schema" even for Israelis.

<sup>2</sup> Among various media outlets, television news coverage of 9/11 has been linked with the strongest emotional responses to the attacks (Cho, Boyle, Keum, Shevy, McLeod, Shah, & Pan, 2003).

was framed (alarmist versus reassuring approaches, for example), and the different psychological implications of each. Similarly, it is also conceivable that a differential cognitive impact of the attacks on the various news anchors in turn mediated the impact of the attacks on viewers outside of the affected areas.

There has been no shortage of research focusing on the psychological impact of September 11, 2001. For example, researchers have found that the post-9/11 world brought with it higher levels of American identification (Silver & Silver, 2003), religious attendance (Meisenhelder, 2002), prosocial behaviours (Pyszczynski, Solomon, & Greenberg, 2003; Wayment, 2004), support for President Bush and his counter-terrorism policies (Landau, Solomon, Greenberg, Cohen, Pyszczynski, Arndt, Miller, Ogilvie, & Cook, 2004), as well as increased aggression (Argyrides & Downey, 2004), shock, desire for revenge (Kaiser, Vick, & Major, 2004), survivor guilt (Wayment, 2004), perceived risk of terrorism (Huddy, Feldman, Capelos, & Provost, 2002), worry (Bergstrom & McCaul, 2004), and incidents of racism and xenophobia (Pyszczynski, Solomon, & Greenberg, 2003; Scurfield, 2002).

Two features characterize the majority of this body of research. One is an almost exclusive reliance upon self-report methodology. As has been noted previously (e.g., Silver, 2004), most questionnaire-based research conducted on responses to traumatic events carries problems of small, non-representative samples in addition to the usual social desirability biases and reference group effects (Heine, Lehman, & Peng, 2002). These criticisms are especially valid with regard to studies of 9/11, the majority of which utilized samples of convenience and, most crucially, lacked a baseline measure of the variables under consideration.

A second feature of this literature is that all of the aforementioned studies measured their criteria (by necessity) in the days, weeks, months, or even years following 9/11. Thus far, no systematic effort has been made to understand the psychological impact of terrorist attacks along the much finer timeline of hours, minutes, or seconds. The present study is also aimed at filling this gap in the literature.

### *Cognitive Manager Model*

Human beings have innately limited information processing ability, and employ several methods in order to circumvent these constraints. These strategies include chunking similar information together, ignoring some of it, using decision-making heuristics, stereotypes, and schemas (Janis & Mann, 1977; Suedfeld, 1992; Tversky & Kahneman, 1981). However, even with the use of these strategies, the limitations become pronounced when the operating capacity of our working memory and attention is monopolized by extraneous factors. Such factors can include stress, fatigue, illness, information over- or under-load, and time pressure (Suedfeld, 1992). One of the principal methods developed to assess our state information processing ability is the construct of integrative complexity

(a related notion is that of an individual's relatively stable, trait level of complexity, referred to as "conceptual complexity"; Schroder, Driver, & Streufert, 1967).

Integrative complexity is a measure of language structure that assesses the degree to which an individual's current thinking<sup>3</sup> demonstrates differentiation and integration of ideas. Differentiation is defined as the extent to which a person is able to recognize two or more distinct alternatives or dimensions within a given topic, without discounting the legitimacy of either. Integration, on the other hand, refers to the extent to which these differentiated perspectives are recognized as interdependent, subsumed within an overarching strategy, or tied together in some other way (see Baker-Brown, Ballard, Bluck, de Vries, Suedfeld, & Tetlock, 1992). Integration, of course, cannot exist without differentiation. Integrative complexity is scored on a 1-7 scale, with 1=no differentiation, 3=clear differentiation, 5=differentiation with low level integration, and 7=high-level integration within a superordinate conceptual schema. Even numbers indicate some evidence of the next higher level, but not clear enough evidence to warrant the higher score (see Table 1; Baker-Brown, Ballard, Bluck, de Vries, Suedfeld, & Tetlock, 1992).

According to the cognitive manager model (Suedfeld, 1992), the level of complexity of thought achieved is directly related to the cognitive resources invested in the task. A good cognitive manager allots a justifiable proportion of resources for a given problem (Suedfeld & Tetlock, 2001). "Justifiable" is not synonymous with "maximal": some problems are not efficient or important enough for a major cognitive effort, or can be solved without one. It is important to note that the heuristic of equating higher complexity with better judgment or moral superiority is unwarranted (see Suedfeld, Guttieri, & Tetlock, 2003; Tetlock, Armor, & Peterson, 1994). The model likens the cognitive reaction to stressful situations to Selye's (1956) General Adaptation Syndrome: i.e., proceeding through the stages of alarm (recognizing the challenge), resistance (mustering the required proportion of resources), and exhaustion (when cognitive resources are depleted due to a "disruptive" level of stress; Suedfeld, Guttieri, & Tetlock, 2003). Thus, if the challenge is "too severe, too persistent, occurs simultaneously with too many other demands, or if cognitive resources are depleted through fatigue, illness, fear, or other adversities, complexity decreases" (Suedfeld & Tetlock, 2001, p. 294). Consistent with this model, previous research has shown integrative complexity to be affected by situational variables including cognitive load, emotional arousal, stress, uncertainty, accountability, fatigue, and illness (Suedfeld & Granatstein, 1995; Suedfeld, Guttieri, & Tetlock, 2003; Tetlock, 1986).

Integrative complexity is also moderated by emotional involvement in the task at hand. With increased emotional

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<sup>3</sup> A related notion is that of an individual's relatively stable, trait level of complexity, often referred to as "conceptual complexity" (Suedfeld & Tetlock, 2001)

involvement, the use of more cognitive resources can be justified, as per the cognitive manager model (Suedfeld, Bluck, & Ballard, 1994). This relationship only holds up to a point, however. If emotional arousal surpasses an optimal level, it has a deleterious effect on integrative complexity (disruptive stress hypothesis). According to Suedfeld and his colleagues, “when one’s entire nation is at risk, the combined effects of personal and societal upheaval (and perhaps a lesser sense of control) may lead to a level of emotional arousal that surpasses some optimal point and interferes with information processing complexity” (Suedfeld, Bluck, & Ballard, 1994, p. 445).

Another important moderating factor sometimes (although not always) closely tied to emotional involvement is the psychological distance between the individual and point of reference (Suedfeld et al., 1994). Specifically, lower psychological distance has been related to more unidimensional thoughts and feelings. In the case of September 11, 2001, individuals with greater personal involvement in the attacks (defined as having personally known victims of the attacks or having lived in the affected areas) recalled being more shocked and upset upon hearing about the attacks (Fivush, Edwards, & Mennuti-Washburn, 2003). These same individuals used fewer words indicative of cognitive processing (e.g., comprehend, realize, understand) and positive emotion (e.g., happy, pleased, joyful) in expressive writings 2-3 months following 9/11.

Integrative complexity scoring has been employed successfully in a number of applied contexts, including studies of political decision-making during times of international crisis. The typical research paradigm involves scoring speeches made by specific individuals through a period of around six months or several years, and plotting changes in mean complexity scores on a timeline of events. Research in this vein has shown that complexity scores tend to follow predictable patterns in relation to external events. For instance, in studies of countries involved in long-term disputes, sustained bilateral increases or decreases in complexity levels are associated with the resolution of a tense standoff through negotiation or armed conflict, respectively (e.g., Suedfeld, Jhangiani, & Weiszbeck, 2003).

## Method

Transcripts of the live television news footage from the morning of September 11, 2001 serve as source material for this study. These transcripts are well suited for content and structural analyses because: 1) Live coverage of the attack began almost immediately after the first plane crashed into the World Trade Centre (WTC) in New York, yet before all other crashes, resulting in a gradual and on-camera comprehension of the malicious nature and severity of the attacks, 2) By virtue of their position, news anchors were required to supplement the video footage with their own continual commentary, and 3) Baseline material, in the form of pre-attack broadcasts, was also available. Transcripts were obtained for the period beginning approximately 10 minutes prior to the breaking-news coverage, until approximately 2 hours after live coverage began (i.e. from

8:35am until 10:45am, EST). Footage or transcripts were obtained from the Vanderbilt television news archive (Nashville, TN), the Lexis-Nexis academic online database, or directly through requests to television networks in the United States (ABC, NBC, CBS, CNN), Canada (CBC), and the State of Qatar (Al-Jazeera). The rationale behind the selection of these three countries was to provide comparison groups from cultures with generally different (USA and Canada vs. Qatar), as well as largely comparable (USA and Canada), world views.

## Structural Analysis

In every case, information revealing the identity of the news anchor and the respective network was removed from the transcripts, which were subsequently coded by qualified scorers<sup>4</sup> for integrative complexity according to the criteria listed in the scoring manual (Baker-Brown et al., 1992). Ten percent of the scored paragraphs were additionally scored by a second qualified complexity scorer in order to assess inter-judge reliability, which was found to be .86. The complexity scores of the news anchors from all three countries were juxtaposed on a timeline of events from the morning of 9/11. Using this methodology, we were not only afforded the opportunity to study the effects of the attacks on the cognitive processing of television newscasters, but were also able to compare these effects across news anchors with different cultural backgrounds.

## Content Analysis

A relatively new weapon in the arsenal of available content analysis techniques is the software program Linguistic Inquiry and Word Count (LIWC; Pennebaker, Francis, & Booth, 2001). LIWC is capable of scanning text files for words related to 70 linguistic dimensions, ranging from words indicating causal reasoning (e.g., because, cause, effect) to negative and positive emotion-related words, and references to God or religion. A recent study by the author of the program analyzed entries into internet journals during the days immediately following September 11, 2001, and found evidence for increased cognitive processing<sup>5</sup> and psychological distancing within the first two weeks following the attacks (Cohn, Mehl, & Pennebaker, 2004). In addition, these same subjects’ emotional positivity (operationalised as the difference between the percentages of positive and negative emotion words) fell during the first two days following the attacks, only gradually recovering to baseline levels. Consistent with the studies mentioned earlier, the sharpest drops in emotional positivity were found among those who were the most preoccupied with the terrorist attacks in the weeks after.

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<sup>4</sup> Defined as someone having achieved a reliability of 0.85 or greater with an expert scorer.

<sup>5</sup> Defined here as concern with organizing and intellectually understanding issues at hand, and measured through the use of words such as *think*, *question*, and *because*.

The news transcripts from the morning of September 11, 2001 were scanned into the LIWC program in order to measure negative affect. It is assumed that the use of negative emotion-related words functions as a proxy measure of the level of emotional arousal experienced by the subjects in this study.

For comparative purposes, the transcripts were divided into the following time segments: 1) Baseline (pre-attack), 2) Breaking news of the first plane crash, 3) The second plane crash into the WTC, 4) Breaking news of the plane crash at the Pentagon, 5) The collapse of the first WTC tower, and 6) The collapse of the second WTC tower. Two specific hypotheses are offered:

1. It is predicted that drops in the level of integrative complexity will coincide with: a) breaking news of the terrorist attacks, b) the crash of the second plane into the WTC South Tower (when, for most, intuitive confirmation of the deliberate nature of the attacks occurred), c) the plane crash at the Pentagon, and d) the collapse of each of the WTC towers. Implicit in this hypothesis is the assumption that each subsequent event during the attacks will be associated with an increase in (predominantly negative) emotional arousal.
2. As a result of greater psychological, ideological, and geographical distance (and presumably less emotional involvement), it is expected that the speech of the newscaster from Qatar will evidence a lesser drop in integrative complexity than the newscasters from either the United States or Canada.

## Results

### Integrative Complexity

Integrative complexity scores for all networks (ABC, NBC, CBC, & Al-Jazeera) are shown in Figure 1. Data from CNN and CBS were excluded from the integrative complexity analyses because too few paragraphs ( $\leq 5$  per stage) were found to be scorable according to the criteria listed in the scoring manual (see Baker-Brown et al., 1992).

A 5 (News Anchor)  $\times$  6 (Stage) ANOVA was conducted, with News Anchor and Stage both treated as between-subjects factors<sup>6</sup> (see Table 3-1). Significant main effects were found for both News Anchor [ $F(4,214) = 4.17, p = .003$ ] and Stage [ $F(5,214) = 3.50, p = .005$ ]. The interaction between News Anchor and Stage showed a nonsignificant trend [ $F(12,214) = 1.57, p = .10$ ]. For each anchor, simple

<sup>6</sup> Although "Stage" ought to be treated as a within-subject factor, the insufficient degrees of freedom resulting from what are effectively multiple case-studies precluded such an analysis. It should be noted that treating stage as a between-subjects factors significantly reduces the power of this test, and all results should be interpreted in this light. Effect sizes ( $\eta^2$ ) provide a more objective indicator of relationship strength.

main effects tests were performed to determine whether integrative complexity scores differed significantly across stages. For each anchor, simple main effects tests were performed to determine whether integrative complexity scores differed significantly across stages.

Starting with the US newscasters, a simple main effects test for Gibson (ABC) attained statistical significance [ $F(2,16) = 8.71, p = .003; \eta^2 = .55$ ]. Tukey tests revealed that his baseline level of integrative complexity was significantly higher than either of the two stages following breaking news of the attacks [ $p$ 's  $= .006$  and  $.01$  respectively]. A simple main effects test for Jennings (ABC) also reached significance [ $F(3,72) = 3.14, p = .03; \eta^2 = .12$ ]. Post-hoc testing showed that only his rise in integrative complexity following the collapse of the second WTC tower approached significance [ $p = .06$ ]. Finally, a test of the effect of stage on Couric's (NBC) level of integrative complexity showed a trend towards significance [ $F(5,41) = 2.01, p = .10; \eta^2 = .22$ ]. However, there were no significant changes across stages.

For the Canadian news anchor (Kelley, CBC), a simple main effects test also attained statistical significance [ $F(5,47) = 4.82, p = .001; \eta^2 = .37$ ]. Tukey tests showed his baseline level of integrative complexity to be significantly higher than following the second crash at the WTC [ $p = .03$ ], or following the collapse of the first WTC tower [ $p = .001$ ].

A simple main effects test for Hafeez (Al-Jazeera) was not statistically significant [ $F(2,34) = .10, p = .91; \eta^2 = .01$ ].

Even where statistical significance was not attained, trends were largely in the hypothesized direction. In fact, Figure 1 reveals a remarkably consistent pattern for the news anchors from the United States and Canada.

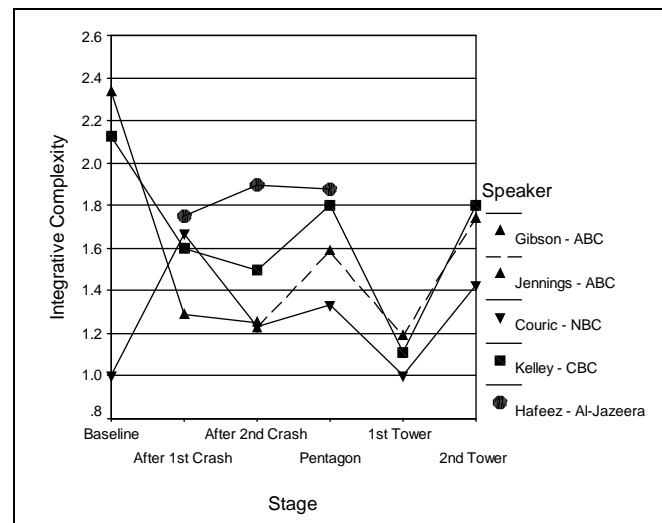


Figure 1: Mean changes in integrative complexity across all news networks.

### Negative Affect

A reasonably consistent pattern emerged across all four news networks, in that the use of negative emotion words tended to increase following the crashes at the WTC, decreased following news of the crash at the Pentagon, and rose again as each of the WTC towers collapsed. Because LIWC scores for each stage represent the proportion of words used in the chosen category, and because each score represents only one speaker, there is no variance to speak of within the cells of this factorial design. As a result, conventional statistical testing cannot be performed. Instead, mean change scores (from each immediately prior stage) were computed for both negative emotion and integrative complexity in order to provide a standardized basis on which to investigate any systematic relationship between the two variables. These scores, collapsed across all news anchors, are shown in Figure 2. Taken together, the integrative complexity and negative emotion word-use scores share a negative (although not statistically significant) linear relationship [ $r(6) = -.40, p = .43$ ], that is even stronger in the case of the North American news anchors taken alone [ $r(6) = -.51, p = .31$ ]. In other words, when integrative complexity rose, the use of negative emotion words fell, and vice-versa, particularly for those assumed to experience lower psychological distance and higher emotional involvement in the attacks. This confirms the assumption underlying the first hypothesis, although each stage was not associated with the predicted drop in integrative complexity.

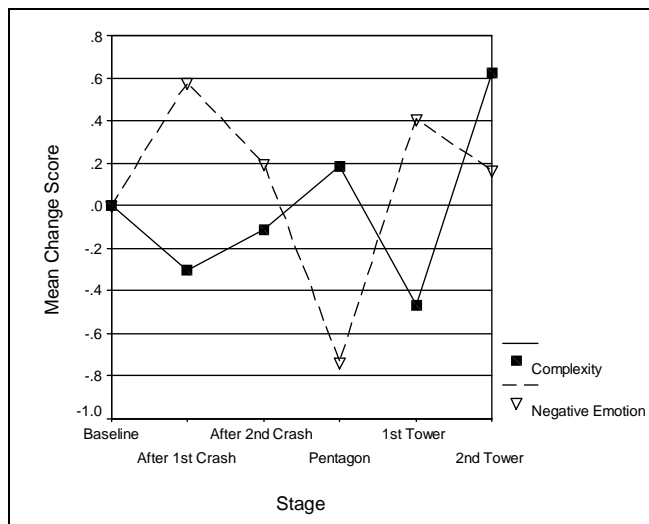


Figure 2: Mean change scores of integrative complexity and negative emotion word-use collapsed across all news anchors.

## Discussion

Two of the three news anchors showed decreases in integrative complexity when news broke regarding the first plane crash into the WTC, providing partial support for the

first hypothesis. The single exception to this pattern was the case of Couric (NBC), which is likely the result of a floor effect. Couric's mean integrative complexity at baseline was a score of 1.0 (on a 1-7 scale), so that, during the following stage, Couric's complexity could not possibly have decreased any further. The crash of the second plane twenty minutes later, however, removed any such presumption. The shock and stress accompanying the witnessing of this second crash is likely what led to a further drop in complexity at this stage across all three North American news networks, providing additional support for the first hypothesis.

The universal gain in complexity following breaking news of the attack on the Pentagon is particularly interesting because it contradicts the initial hypothesis, which assumed that each new stage would increase the degree of disruptive stress. However, the cognitive manager model also predicts that more complex situations (increased uncertainty, more possible explanations and responses) justify a greater investment of cognitive resources, which would result in an observed increase in integrative complexity. Thus, it may well be that, in the minds of the newscasters, the crash at the Pentagon introduced a new element that significantly complicated the nature of the occurring events (it was at that moment clear that the United States as a whole, and not just New York, was under concerted attack, and that key symbols of US economic and military power were the chosen targets). The increase in integrative complexity at this stage, therefore, may reflect efforts to cope cognitively with an increasingly complicated challenge. It is important to note that this stage was also associated with a universal decrease in the use of negative emotion-related words. To the extent that this dependent measure captures negative emotional arousal, the unexpected results actually provide additional support for the disruptive stress hypothesis, in that lower negative emotional arousal was associated with higher integrative complexity.

After the collapse of the first WTC tower, complexity universally decreased again (with a concurrent rise in negative emotion), effectively erasing any previous increases following the news from the Pentagon. This again is consistent with the belief that the collapse of the first WTC tower was yet another horrifying spectacle that could not have been anticipated, but that did add a new sense of uncertainty or complication, and therefore would lead to a sharp increase in the amount of stress experienced along with a temporary drain on information processing resources.

Finally, following the collapse of the second WTC tower, all three North American news anchors showed increases in complexity. While this was also not predicted by the first hypothesis, it is possible that, given the amount of time that had passed from the start of the attacks (1 hour 42 minutes from the first crash, and 29 minutes from the collapse of the first tower), this may reflect the beginning of a cognitive coping process. Specifically, news anchors at this stage may have begun to attempt to understand and find meaning in the attacks, through integrating them into (or modifying)

existing cognitive schemata. This explanation can be tested by conducting a follow-up study and obtaining transcripts from beyond this stage, in order to check for a continued regression to baseline levels of integrative complexity.

Overall, for two out of five stages, the first hypothesis did not receive support. In fact, a pattern opposite to that which was expected emerged. However, even during these exceptional stages, the relationship between integrative complexity and emotional positivity provides strong support for the disruptive stress hypothesis. The null hypothesis (which predicted no changes in integrative complexity during the attacks) was not supported at any stage, with the exception of the news anchor from Qatar.

With hindsight, it is clear that the initial directional hypothesis was not sensitive to qualitative differences between each pair of successive events during the 9/11 attacks. However, the disruptive stress model is able to account for the unexpected effects observed.

The consistency among the observed patterns of integrative complexity of the four news anchors from the US and Canada suggests that the situation contained a powerful enough influence to supercede any major individual differences in cognitive style. The remarkable degree of convergence also indicates that the effects are non-random, and effectively represent three replications of the same pattern. On the other hand, the integrative complexity of the news anchor from Al-Jazeera was a striking exception to the rule. In his case, statistical testing failed to show any significant changes across the three stages for which data were obtained, supporting the first null hypothesis as well as the third hypothesis concerning the effects of psychological and ideological distance. This result is qualified by the lack of available data for the Qatari newscaster during the baseline period and the stages following the collapse of the first WTC tower, which is when the greatest changes in integrative complexity occurred for the North American newscasters.

Effect sizes for stage ranged from .12 to .55 for the US, and .37 for the Canadian news anchors, to .01 for the news anchor from Qatar<sup>7</sup>. Among the US news anchors, the smallest effect size was obtained for Jennings ( $\eta^2=.12$ ), who was the only anchor not present and on-air during the breaking news of the attacks or the second crash at the WTC site. In his case, it could be that having off-air time to absorb and adjust to news of the attacks provided him with a

greater level of emotional detachment and objectivity than the other news anchors were afforded, tempering the severity of his cognitive reaction, and reducing the frequency of polarized scores at each stage.

It is conceptually and clinically interesting that the pattern of integrative complexity exhibited by Kelley (CBC) so closely mirrored that of the three US newscasters. This finding is consistent with previous research in that it supports the idea that vicariously witnessing a large-scale stressor such as a terrorist attack can be stressful and carries cognitive implications, even for individuals from untargeted areas. The severity of the Canadian newscaster's reactions can be explained by the cultural, ideological, and geographical proximity of the two countries (the events may have been conceived as an attack on the psychological in-group, however defined). Future case studies (including of, for example, news anchors from Israel and Britain) will provide important insights into whether variables such as cultural identity, ideological distance, or previously existing terrorism schemata can moderate these effects.

Cross-culturally, the relative patterns of LIWC scores for negative emotion-related words showed more consistency than was the case with integrative complexity. This is an important finding because it highlights integrative complexity's ability to reveal differences in *how* individuals are thinking even if *what* is being said may largely be the same (Suedfeld, Guttieri, & Tetlock, 2003).

Having said this, there was also noticeably more variation in the absolute scores for negative affect at and across stages than was the case with integrative complexity. A possible reason for this might stem from the scoring procedure employed. Whereas scoring text for integrative complexity is a time-consuming task that requires rigorous training, scanning text files with the LIWC software is a comparatively quick and crude method of analyzing speech. For example, – unlike complexity scoring – LIWC is easily “fooled” by the use of double-negatives, clichés, and straw-man arguments, is limited by its internal dictionary, and does not take into account the context in which particular words are used.

In order to assess the prevalence of coding errors committed by the LIWC software program, ten percent of the transcripts (approximately 3000 words) were also analyzed manually. Identified errors included false positives such as “good-size plane” and “Good Morning America” (coded by LIWC as positive affect) and “I saw, *seriously*, these girls . . . getting botox in their head” (coded by LIWC as negative affect). Based on this subset, the error rate of LIWC was estimated as 0.33%, which is significant, given that the range of LIWC scores was very small for all variables (e.g., 0-2% for negative affect). Yet, despite these shortcomings, a reasonably consistent pattern emerged across all news anchors.

As mentioned earlier, the effects of the upheaval on cognitive processing caused by the 9/11 terrorist attacks were expected to transcend individual differences as well as any efforts at impression management. The extent to which

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<sup>7</sup> The cultural difference found in this study is not likely an artifact of the use of different languages, nor the process of translation. Previous studies have comprehensively answered this question by having integrative complexity scored in the foreign language by a native speaker, with a subset of the paragraphs translated into English and scored again to assess inter-judge reliability (e.g., Suedfeld & Rank, 1976). This procedure has never revealed significant differences between the two sets of scores, and demonstrates that integrative complexity scoring can be reliably applied to any language.

either of these factors significantly influenced the news anchors' cognitive responses would have confounded the effect of the terrorist attacks on the cognition of the news anchors. News anchors as a group, in particular, can fairly be assumed to be quite proficient at impression management, as well as ad libbing during unexpected events. The cognitive reactions of lay people in the same situation might have been more severe.

This is the first time to our knowledge that integrative complexity analyses have been conducted along such a fine timeline, or applied to transcripts of live news broadcasts. The success of this new methodology opens exciting possibilities for future research.

There are also a few important caveats related to the results. One is that we could not obtain data for each speaker at each stage, due to reasons ranging from copyright restrictions to budgetary concerns. The resulting gaps in the data rendered conventional tests of statistical significance inadequate, as important assumptions could not be satisfied. As well, given that the sample consisted of only six individuals who are not representative of the general population, one must be cautious in drawing general conclusions from the results of this study. Finally, while the archival nature of the study ensures a high level of external validity, replicating these patterns in other case studies (such as that of the Madrid train bombings on March 11, 2004) as well as controlled laboratory studies would provide more insight into the specific causal and moderating variables at work. These may include emotional arousal, uncertainty, schema violation, degree of identification, and cognitive load.

## Conclusion

Considerable support was found for the predictions of the cognitive manager model of integrative complexity. The stress and uncertainty arising from unexpected and severe multiple terrorist attacks were associated with both decreasing and increasing levels of integrative complexity. As well, negative emotion word-use possessed an inverse relationship with integrative complexity, consistent with the disruptive stress hypothesis. Newscasters from the United States and Canada demonstrated virtually identical patterns of complexity. Future research will test potential moderators of these relationships using convergent methodology.

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Table 1

*Sample Paragraphs Representing the Modal Integrative Complexity Scores*

Complexity	Paragraph	Explanation
Score of 1	It is completely impossible to understand why this is happening and to figure out what the--what in the world is going on.	One-dimensional statement, with no evidence of either differentiation or integration.
Score of 2	You mentioned earlier that, of course, as we all know, years ago there was that terrorist attack. It took place down on the ground and in the underground levels, in the garage levels. But, again, that's not to imply that we have any reason at this point to believe that this is--this is terrorism or not. We simply don't know.	Increased tolerance for ambiguity, reflecting low level differentiation, but no integration.
Score of 3	And xxx, it's important to note that if these planes were hijacked, if they were carrying passengers, there isn't much military officials could have done. You can't shoot down a plane like that for risk of the people on board, plus, for the injuries you could cause on the ground in a place like Manhattan.	Multiple dimensions recognized, revealing clear differentiation, but still no integration.