

# Comfortably Numb: Effects of Prolonged Media Coverage

Journal of Conflict Resolution

1-27

© The Author(s) 2020

Article reuse guidelines:

[sagepub.com/journals-permissions](https://sagepub.com/journals-permissions)

DOI: 10.1177/0022002720907675

[journals.sagepub.com/home/jcr](https://journals.sagepub.com/home/jcr)**Aaron M. Hoffman<sup>1</sup>, and José Kaire<sup>2</sup>****Abstract**

Exposure to a single report about terrorism in the mass media can trigger a range of emotional and political reactions. The consequences of exposure to several terrorism reports in row, however, are a matter of controversy. We examine the effects of prolonged terrorism coverage using an experimental design that combines self-report measures of emotions and political attitudes with instantaneous biometric data on emotions. Consistent with research on nonassociational learning, we find that exposure to multiple videos habituates people to depictions of terrorism: the longer people watch terrorism coverage, the less intense their reactions are to the images of terrorism they see. Some images and videos, however, contribute to this result more than others. This suggests that the ultimate effects of terrorism coverage depend on the interplay between the quantity and quality of reporting, not the quantity alone.

**Keywords**

terrorism, media, political psychology, experiment, emotion

Exposure to just one terrorism story can trigger emotions that make people feel insecure (Breckenridge, Zimbardo, and Sweeton 2010), inclined to trade liberty for security (Davis and Silver 2004; Merolla and Zechmeister 2009), and enthusiastic

---

<sup>1</sup>Department of Political Science, Simon Fraser University, Burnaby, British Columbia, Canada

<sup>2</sup>Department of Political Science, University of Minnesota, Minneapolis, MN, USA

**Corresponding Author:**

Aaron M. Hoffman, Department of Political Science, Simon Fraser University, 8888 University Drive, Burnaby, British Columbia, Canada V5A 1S6.

Email: [aaron\\_hoffman@sfu.ca](mailto:aaron_hoffman@sfu.ca)

about the use of military force (Huddy et al. 2005). What happens, though, when people see multiple reports about terrorism? Nightly news watchers sometimes watch as many as five terrorism stories in a row. Do these longer presentations have emotional and political effects above and beyond those produced by a single terrorism story?

Many say “yes.” According to Nacos (2007, 21), for example, persistent exposure to “. . . new threat warnings by terrorists, pessimistic threat assessments by public officials, and identification of vulnerable terror targets by or in the media heighten public fear among heavy news watchers.” Indeed, prolonged exposure to coverage of the 9/11 attacks resulted in increased rates of post-traumatic stress disorder (PTSD) and PTSD-like symptoms among viewers (Schuster et al. 2001; Silver et al. 2002). Continual watchers of the Boston Marathon bombing coverage experienced acute stress more than less dedicated viewers (Holman, Garfin, and Silver 2014). Similarly, regular watchers of television news express greater levels of concern about terrorism than people who watch the news infrequently (Nellis et al. 2012).

Nevertheless, other studies imply that prolonged exposure to terrorism coverage habituates people to this form of political violence. In Israel, chronic terrorism apparently has little influence on Israelis’ life satisfaction (Romanov, Zussman, and Zussman 2012), leisure pursuits (Gal 2014), and psychiatric stress levels (Bleich, Gelpkopf, and Solomon 2003). Londoners who experienced terrorism by the Irish Republican Army reported less distress from the 3/11 attack on the London underground than 9/11 created among Americans (Rubin et al. 2005).

These contradictory findings are puzzling. Persistent reporting about terrorism is thought to encourage perpetrators to use violence by amplifying the psychological effects of their attacks. Media presentations that habituate people to terrorist threats, however, call the idea that the media makes people more susceptible to terrorism’s effects into question. Rather than making terrorism’s psychological onslaught worse, extensive terrorism coverage might make it harder for perpetrators to intimidate their enemies.

Our research addresses the issue of prolonged exposure to terrorism coverage using an experiment that compares the emotional effects of exposure to several terrorism videos with exposure to one. This approach addresses two challenges that undercut the internal validity of observational studies. First, it eliminates a selection problem: people who feel threatened rely on the mass media more (Gadarian 2010). Consequently, attention to terrorism coverage may be a product of anxiety rather than a cause of it. Assigning the amount of terrorism coverage people see at random protects against drawing this mistaken inference.

Second, using a laboratory enables us to assess people’s emotions in real time. Studies of terrorism coverage typically ask people to recall how terrorism presentations influenced them. People, however, tend to report their emotions inaccurately, except for the one they experienced last (Bonanno and Keltner 2004). An automated facial action coding system we use enables us to avoid this problem by tracking emotional responses as they happen.

We find that people who watched several terrorism videos became desensitized to the material they saw, although a striking video of a suicide attack worked against this result. This suggests that blanket condemnations of the media for sensitizing the public to terrorism through repeated coverage of it may be misleading. Some presentations about terrorism may produce problematic emotional effects, but others may help people become emotionally resilient to the threat of terrorism.

## **Terrorism as Psychological Warfare**

At the heart of the controversy over prolonged terrorism coverage is an important question for political scientists: how do people react to affective stimulation (Hall and Ross 2015)? This is an issue that appears in the field's foundational texts and in modern reflections on them. Thucydides, for example, believed the Peloponnesian War resulted from Sparta's fear of a rising Athens, a claim recent analyses question (Renshon, Lee, and Tingley 2017). Affective stimuli also influence public support for modern military operations. On the one hand, battlefield deaths are supposed to reduce support for war (Mueller 1970). On the other hand, battlefield success is thought to make military casualties less salient (Gelpi, Feaver, and Reifler 2009). Which of these emotional catalysts matters more? Do individuals vary in their ability to resist the influence of affective stimuli like these (Kertzer 2017)?

Terrorism analysts also have long-standing interest in responses to affective stimuli, owing to their belief that terrorism is a more potent psychological weapon than kinetic one. Even though terrorists use violence frequently, their attacks pose a minor threat to human health (Mueller 2006). In a typical year, for example, accidents on US highways kill more people than terrorists do worldwide. Nevertheless, people react to the threat of terrorism as if it presents serious risks. Something more than physical threat must make this form of violence intimidating.

The explanation many practitioners and security analysts give for the disconnect between the actual and imagined threat terrorism poses is that perpetrators stimulate people's emotions effectively—provided the mass media publicizes their attacks. Without media attention, terrorists could not produce nationwide responses. With media attention, terrorists stir strong emotions like anxiety (Breckenridge, Zimbardo, and Sweeton 2010), anger (Lerner et al. 2003), and sadness (Hobfoll, Canetti-Nisim, and Johnson 2006): It is common to find people suffering from PTSD and PTSD-like symptoms (Silver et al. 2002; Aber et al. 2004; Holman, Garfin, and Silver 2014), feelings of depression (Huddy et al. 2005), and generalized distress (Wayment 2004) whose only connection to terrorism is what they see on the news.

Amazingly, all it takes is one report about terrorism to excite people's emotions in politically salient ways. People who are exposed to just a single terrorism story (1) feel more vulnerable to terrorism than others (e.g., Breckenridge, Zimbardo, and Sweeton 2010; Slone 2000; Willer and Adams 2008), (2) prefer military action over diplomacy (Albertson and Gadarian 2015), (3) invest in the future cautiously (Bausch, Faria, and Zeitzoff 2013), (4) avoid foreign travel (Hoffman and Shelby

2017), (5) express prejudice toward out-groups (Das et al. 2009), (6) accept restrictions on civil liberties (Garcia and Geva 2014; Merolla and Zechmeister 2009), and (7) seek safety by supporting charismatic leaders (Merolla, Ramos, and Zechmeister 2007). No wonder many consider media attention a powerful amplifier of terrorist activity.

### *The Evolutionary Psychology of Terrorism Coverage*

Why does this happen? Why does media coverage magnify terrorism's psychological effects so intensely? The basic answer is that media coverage of terrorism triggers defensive reactions that have their roots in human evolution (Sunstein 2005). People are naturally sensitive to threats to their survival, but this is no guarantee that human threat responses are well matched to the dangers they face (Witte 1992).

Survival is a basic human instinct. People keep themselves safe using a defensive system that alerts them to risks and motivates protective action. Emotions, like fear, anger, and disgust, are central to the operation of this system. When the body detects threats, it sends warnings to the brain. Fear, anxiety, and disgust tell the brain to initiate evasive actions (Lerner and Keltner 2001; Lerner et al. 2003). Anger encourages aggression to neutralize dangers (Sell, Tooby, and Cosmides 2009).

The human defensive system is built for speed. The brain receives messages about threats and initiates responses before people are conscious of this neural activity. Feelings of anxiety, anger, and so on are products of the system's activation, although once people become aware of their emotions the important signaling work is complete.

The defensive system's emphasis on speed, however, comes at the cost of discrimination. The body's basic bet is that survival is threatened more by inattention to dangers than sensitivity to them (Öhman 2000). The system operationalizes this principle using a liberal definition of threat. Stimuli that might seem inconsequential upon reflection still trigger prophylactic action. Human defenses presume that it is better to be safe than sorry.

This inclination to define threats broadly and to react quickly to them explains why a single terrorism report in the media can stimulate strong emotional and political responses. Even though the risk of injury from terrorism is remote, people evolved to respond to the awareness of threats not the chances that harm will come to them (Sunstein 2005). This sensitivity to threats is magnified when other people are the source of danger (Gilbert 2009) and when dread risks—low-probability, high-damage events (Gigerenzer 2006)—come into view. Presentations about terrorism in the mass media often highlight both of these dimensions of terrorist activity.

## What We Know

Experimental research on the effects of terrorism coverage is consistent with the evolutionary perspective on emotions (see Jhangiani [2009] for a review). News reports about terrorism provoke strong emotional and political responses.

Experimental research on terrorism reporting, however, has little to say about changes in the dose of terrorism coverage Americans get. The typical experiment models exposure to terrorism news using a single terrorism story or video. Responses to these single-shot treatments are then compared to responses produced by research participants who had either no exposure to news of any sort (e.g., Hoffman and Shelby 2017) or who were exposed to a non-terrorism news story (e.g., Merolla and Zechmeister 2009; Slone, Shoshani, and Baumgarten-Katz 2008). Both of these modeling choices are imperfect for understanding the consequences of exposure to prolonged terrorism reporting.

Using a single terrorism report to simulate the experience of watching terrorism news does not capture what happens when people see several terrorism stories in a row. Our research using the Vanderbilt Television Archive suggests that television news programs in the United States have presented their audiences multiple terrorism stories in succession at least once per month since 2010.

The baseline conditions existing studies utilize are also suboptimal for understanding the effects of extended terrorism coverage. Using a no-news baseline implies that the important effects of terrorism coverage are ones that emerge relative to the responses of people who do not see or read the news, but this is a small portion of the US population. Only about 20 percent of Americans goes a day without any exposure to news at all (Kohut et al. 2010).

Using a no-terrorism-news baseline is a more plausible representation of what people in the United States might experience. The trouble is that it exaggerates how easy it is for people to avoid terrorism coverage since the 9/11 attacks. Between 2002 and 2006, for example, readers of *The Washington Post* could read an average of eleven terrorism articles in their newspaper per day. Between 1975 and 2000, those same readers would encounter an average of just 1.5 terrorism article per day (Hoffman et al. 2010). Televised terrorism coverage increased as well. Between 2002 and 2005, some networks boosted their reporting by as much as 135 percent (Pew Research Center 2006).

These trends in terrorism news suggest that in order to understand the common effects of prolonged terrorism coverage, we should compare people who are exposed to several terrorism stories in a row with people who are exposed to just one. Terrorism coverage is almost unavoidable for people who stay abreast of the news. The question is how much terrorism reporting people see, not whether they see it at all. Existing experimental studies of terrorism coverage tell us little about how exposure to prolonged terrorism coverage compare to the effects of exposure to a single story.

## Two Theories of Nonassociational Learning

We turned to studies of people who are exposed to negative stimuli for extended periods via the mass media for insights into the effects of prolonged exposure to terrorism coverage. Like research on terrorism coverage, work on the effects of prolonged exposure to negative images and violent media typically relies on experimental designs that compare exposure to negative stimuli to exposure to neutral or even positive stimuli (e.g., Di Tella et al. 2019; Krahe et al. 2011). The consequences of prolonged exposure to negative images and violent media are also studied observationally, by asking research subjects to self-report the time they spend either viewing or playing these pictures and games (e.g., Bartholow, Bushman, and Sestir 2006; Romer, Jamieson, and Aday 2003). Carefully controlled comparisons between prolonged and brief exposure to violent media content are unusual (for an exception, see Valadez and Ferguson 2012).

Nevertheless, we see this literature as helpful because terrorism coverage is a type of violent content distributed by and through the mass media. Theoretical insights from research on exposure to mass-mediated violence, therefore, should apply in the specific case of prolonged exposure to terrorism coverage considered here.

What we know from these studies suggests that people experience either *sensitization*, that is, amplified reactions, or *habituation*, that is, diminished responses, to repetitively presented pleasant or unpleasant stimuli (Overmier 2002). Psychophysiological studies by Smith, Bradley, and Lang (2005) and Smith et al. (2006), for example, show that sequencing negative, positive, and neutral affective pictures can produce sensitization effects in people. This finding is echoed in Hopwood and Schutte's (2017) meta-analysis of exposure to the coverage of disasters and large-scale violence. In contrast, Bradley, Cuthbert, and Lang (1996) and Codispoti, Ferrari, and Bradley (2006) establish that people's emotions habituate during exposure to a series of unpleasant images. Prolonged exposure to violent video games appears to produce similar effects (Grizzard et al. 2015).

Sensitization and habituation to affective stimuli are the principle reactions to threatening stimuli resulting from nonassociational learning. During nonassociational learning, changing responses to a stimulus do not depend on either the introduction of a new stimulus that contextualizes the first or the drawing of connections between one stimulus and another. Instead, learning occurs from the repetition of similar stimuli (e.g., learning about threats through exposure to threats).

This distinguishes sensitization and habituation from associational learning processes that animate research in international relations. In everything from analogical reasoning during novel foreign policy situations (Houghton 2001) to reputational effects in interstate crises (Crescenzi 2007) and to compliance with international agreements (Checkel 2001), actors learn by drawing inferences from one thing to another. In these associational learning situations, actors develop an appreciation of the relationship between either unrelated or loosely related items (e.g., inferring

intentions from behavior; Levy [1994] reviews associational learning in international relations).

Sensitization and habituation are simpler learning processes than ones involving associational learning. From an evolutionary standpoint, nonassociational learning processes enable species to adjust to their surroundings by filtering out irrelevant stimuli and attending to significant ones more effectively (Rankin et al. 2009). Sensitization and habituation, however, are not equally probable responses to repetitive stimulation. Habituation works through the central nervous system, the most direct route between stimulus and response. In contrast, sensitization takes place through the slower, more indirect “state” system—“the collection of pathways and systems and regions that determines the general level of responsiveness by the organism” (Groves and Thompson 1970, 421; Thompson 2009). As a result, people are more likely to habituate to stimuli than become sensitized to them.

### *The Core of the Sensitization–Habituation Debate*

From the vantage point of nonassociational learning theory, the debate over prolonged exposure to terrorism coverage turns on beliefs about people’s ability to reassure themselves about their security. For Holman, Garfin, and Silver (2014), sensitization happens because prolonged terrorism presentations (1) persistently deliver trauma-related information to viewers and (2) encourage rumination, a style of thinking that involves fixating on a problem and one’s feelings about it without taking ameliorative action (Nolen-Hoeksema, Wisco, and Lyubomirsky 2008).

This argument is consistent with research on emotional sensitization. Emotional sensitization occurs when people cannot defend themselves against repeatedly experienced negative stimuli (Ursin 2014). Self-preservation is a strong evolutionary drive, but reactions to threatening stimuli depend on what people can do to mitigate their risk of harm. Threats fail to intimidate when people believe they can meet these threats efficaciously (Ruiter et al. 2014). Sensitization occurs in response to threats that are resistant to prophylaxis (Brosschot 2002).

Terrorism is one of the threats that people have trouble controlling on their own. Governments have this responsibility. Terrorism presentations, however, do not always emphasize the protective measures governments can take to mitigate threats. Instead, they permit people to dwell on the causes and effects of their negative affect in ways that obscure information that might correct their sense of helplessness (in other words, to ruminate).

Rumination connects prolonged exposure to terrorism coverage with amplified emotional reactions. Inflated emotions, however, are not the only possible effect of lengthy terrorism presentations. Prolonged terrorism coverage might depress the emotional reactions people have to these productions (Rubin et al. 2005; Spilerman and Stecklov 2009).

In contrast, the habituation argument is that terrorism coverage does not compromise people’s security. True threats produce negative consequences. False

threats do not. People learn the difference through exposure (Yechiam et al. 2005) and adapt appropriately.

The idea that people become habituated to false threats is the core of “exposure therapy,” a therapeutic regimen that helps people overcome pathological anxiety through safe exposure to their phobias (Foa and Kozak 1986). This strategy has been used to cure people of their fear of snakes (Bandura, Adams, and Beyer 1977), heights, and public speaking (Clark 2011). It is an approach to anxiety that trades on the inverse relationship between habituation and threats. Less intense threats desensitize people more quickly (Rankin et al. 2009).

The habituation argument views prolonged media coverage of terrorism as analogous to exposure therapy. Initially, people react strongly to presentations about terrorism. The longer the coverage, however, the more people learn that the presentations are not themselves dangerous. Consequently, people’s emotional reactions to terrorism coverage subside.

## Research Design

We adjudicate between competing perspectives on prolonged terrorism coverage using an experimental design comparing the effects of prolonged exposure to several terrorism stories in a row with the effects of exposure to a single terrorism story. Existing studies establish the effects of watching a terrorism video relative to watching none on people’s attitudes and emotions. This design builds on these earlier efforts by modeling the situation in which news audiences see extended terrorism coverage instead of a single, isolated story.

The principle hypothesis we pursue is that *prolonged terrorism coverage influences people’s emotions relative to people who are exposed to a single terrorism story*. This framing reflects the seriousness of the arguments for both positive and negative effects.

## Subjects

We recruited 180 volunteers from a large Midwestern university’s student population for a study of “reactions to TV news items.” Volunteers were recruited in two waves between July 12 and 26, 2013, and March 6 and May 30, 2014.<sup>1</sup> Participants were paid US\$5.00 for their time.

University students are appropriate subjects for this research even if they are statistically unrepresentative of the US population. This is because sensitization and habituation are normal human responses to threatening situations. Indeed, research on animals that are exposed to negative stimuli for prolonged periods suggests sensitization and habituation are nearly universal responses to threats (see Thompson [2009] for a review). Individual attitudes and personalities mostly influence the intensity and speed of responses to threatening material, not the direction of the effects people experience. Thus, while the men in our study may react less strongly

and the political conservatives more strongly than other people to terrorism coverage, there is no suggestion that members of these groups sensitize when others habituate or vice versa.

Similarly, while undergraduates are thought to be more anxious than average Americans (Booth, Sharma, and Leader 2016), this does not necessarily make them slower to habituate to threatening stimuli; people between the ages of eighteen and twenty-four who lived in the New York area in 2001, for example, were as likely as people in other age cohorts to report psychologically healthy, symptom-free states of mind after the 9/11 attacks (Bonanno et al. 2006). Readers should refrain from applying the precise quantities we observe to other populations, but they also should not worry that the nonassociational learning our volunteers do differs fundamentally from what other people experience whose main exposure to terrorism is via the mass media.<sup>2</sup>

## Procedures

Volunteers completed the study in a campus laboratory sitting in front of a computer equipped with a high-definition camera that recorded their facial responses to video presentations. In keeping with our institutional review board approval, we asked volunteers to affirm their willingness to take part in this study before recording them.

Volunteers were assigned at random to either a baseline or an experimental group; a series of  $\chi^2$  tests of independence we conducted confirmed that this procedure produced statistically indistinguishable groups along dimensions known to influence reactions to terrorism coverage: gender, age, party affiliation, media use, and authoritarian predispositions (using the Right-wing Authoritarian Scale pretest). Political knowledge did not equalize across our groups; we note in the text where accounting for political knowledge matters. A table of results for these balance checks appears in the online appendix.

We also asked our volunteers about their emotional states during the 24-hour period before they took part in this study using the Profile of Mood States (POMS) questionnaire, a Likert-type scale inventory designed to measure the following six mood states: depression-dejection, tension-anxiety, anger-hostility, fatigue-inertia, vigor-activity, and confusion-bewilderment.<sup>3</sup> We did this to guard against the possibility that the reactions we observed during the study were influenced by the emotions volunteers experienced prior to participating in this research. The experimental groups we created were balanced along these emotional dimensions as well.

Subjects in the baseline group watched a 2-minute, 20-second Cable-News-Network (CNN) video about a suspected terrorist attack in Beirut, Lebanon. Those in the experimental group watched a 9-minute, 21-second presentation involving five videos about terrorism, including the CNN video, delivered in random order.

We selected videos from a pool of fifteen terrorism videos based on ratings provided by workers recruited from Mechanical Turk ([www.mturk.com](http://www.mturk.com)). We chose the five videos that generated the most negative reactions from the candidate pool

**Table 1.** Videos Presented to Baseline and Treatment Groups.

Video	Summary	Viewed by	Notes
1	CNN reports on a bombing in Lebanon	Baseline and treatment groups	CNN correspondent describes life under threat in Lebanon after bombing
2	CNN reports on the aftermath of a suicide bombing in Israel	Treatment group	Images of aftermath of attack. Shows wounded people being tended to by paramedics. Used by Breckenridge, Zimbardo, and Sweeton (2010)
3	ABC reports on threats to the United States from global terrorism	Treatment group	Describes concerns among experts that threats to the United States from al Qaeda are increasing (used by Gadarian [2010])
4	CNN reports on attack in Bulgaria against Israeli targets	Treatment group	Includes still images from scene of attack. Israel accuses Iran of complicity
5	Security cameras capture act of suicide terrorism	Treatment group	Grainy footage of woman entering secure area and detonating a bomb strapped to her body

Note: CNN = Cable News Network.

for this study (see Table 1). These videos include those used by Gadarian (2010) and Breckenridge, Zimbardo, and Sweeton (2010).<sup>4</sup>

### *Dependent Variables*

We gauged the effects of prolonged exposure to terrorism coverage using self-report measures and biometric data on emotions. Consistent with Carnagey, Anderson, and Bushman (2007), we define emotional sensitization (habituation) as a reduction (increase) in emotion-related reactivity to depictions of terrorism. We track these changes in emotional reactivity using posttest responses to questions about authoritarianism, foreign policy hawkishness, and emotional states. We also used valence scores generated by FaceReader. These measures are described below.

*Self-report items.* All participants completed this study by reanswering the POMS questionnaire. We also asked respondents questions on their anxiety about future terrorist attacks (“On a scale from 0 [totally unlikely to occur] to 100 [absolutely certain to occur], how likely do you feel a terrorist attack is somewhere within the United States?”), about their attraction to authoritarian attitudes using the Right-wing Authoritarian questionnaire (which contains questions like, “Life imprisonment is justified for certain crimes”), and about their foreign policy hawkishness

(e.g., “Please indicate which of the following statements comes closest to your view even if neither is exactly right: The best way to ensure peace is through military strength or good diplomacy is the best way to ensure peace”).

**Biometric data.** We gathered biometric measures of people’s emotional reactions to terrorism coverage using FaceReader, a computer program that assesses people’s emotional states by monitoring their expressions and facial movements. FaceReader implements Paul Ekman’s work on the use of faces as a source of emotion data. According to Ekman, faces and facial movements, called facial actions, reveal a set of emotions (happy, sad, angry, surprised, scared, and disgusted) that are universally expressed in similar ways cross-culturally (Cohn, Ambadar, and Ekman 2007). Angry people, for example, furrow their brows and tighten their lips.

We turned to FaceReader to access reactions to prolonged terrorism coverage as they occur. Emotions are momentary experiences that change as circumstances and stimuli change. Self-reported emotional assessments, however, are hard to collect contemporaneously without altering the way people experience and, hence, report emotional reactions. FaceReader monitors emotional reactions three times every 100 milliseconds and does not force us to interrupt the experience of watching several videos in a row to assess responses.

Using FaceReader also provides a check on some reporting biases people worry about in experimental research. College students, for example, are thought to be inclined to report the emotions they think investigators want to hear (Sears 1986). FaceReader makes this more difficult by focusing on indicators of emotion produced by the autonomic nervous system, which are difficult for people to manipulate deliberately (Gosselin, Perron, and Beaupré 2010; Lewinski, Franssen, and Tan 2014).

FaceReader operates using a three-step process. First, it detects a face. Then, it creates a three-dimensional model of the face with 491 tracking points on it. (We used version 5. Earlier versions used fewer tracking points, and later versions use more.) These tracking points monitor the facial actions people make. Finally, FaceReader relies on a neural network trained on more than 10,000 facial images to assess the emotional expressions it detects.

Tests of FaceReader suggest it correctly identifies emotions at a similar rate to people (Den Uyl and Van Kuilenburg 2005; Terzis, Moridis, and Economides 2013). FaceReader versions 1 and 6 both achieve accuracy scores of 88–89 percent in trials using still photographs and short video clips of people’s faces (Lewinski, den Uyl, and Butler 2014). These scores meet or exceed what trained coders achieve, although FaceReader requires only a fraction of the time people do to produce the same results. Expert coders then take several hours to examine and make judgments about still images of faces, whereas FaceReader requires just seconds.

FaceReader is not a perfect system (Lewinski, den Uyl, and Butler 2014). It can mistake the facial actions associated with one negative emotion for another.<sup>5</sup> This means FaceReader does not identify the specific emotions people experience

reliably. Even so, FaceReader is useful for this research. The valence scores FaceReader produces are reliable and of interest in a study of nonassociational learning. The controversy in this literature is over the intensity of the emotions people experience in response to prolonged exposure to terrorism coverage, not the specific emotions they experience. Focusing on the valence scores, therefore, enables us to zero in on the strength of people's emotions while avoiding FaceReader's characteristic errors.<sup>6</sup>

### *Effects of Burst Coverage on Self-reported Mood States and Political Attitudes*

Analyses of the self-report data we gathered suggest that prolonged terrorism coverage does not have broad-based effects on either the emotions people report or the political attitudes they express relative to the effects of brief exposure. In other words, traditional experimental data and methods tends to support a habituation account of prolonged terrorism coverage.

We arrived at this conclusion using analysis of variance (ANOVA). People who watched several terrorism stories expressed no greater sense than those who watched just one terrorism story that they were at heightened risk of harm from terrorism [ $F(1,166) = 1.67, p = .20$ ], although they worried more about the threat to friends and family [ $F(1,166) = 4.09, p = .04$ ] and were marginally more inclined to rate the chances of attacks against the US more highly than those who watched just one terrorism video [ $F(1,166) = 2.70, p = .10$ ].

This pattern—not worrying about themselves, but worrying about others—might indicate that study participants are hiding their true anxiety from researchers (see Helweg-Larsen and Shepperd 2001). Neither the other emotion data nor the information on policy attitudes supports this conclusion, however. Regarding the self-reported emotion data, we factor analyzed the pre- and the posttest responses to the POMS questionnaire and took the difference between them.<sup>7</sup> This procedure reveals that people in the prolonged exposure group experienced no more tension-anxiety [ $F(1,161) = 0.27, p = .60$ ] than people in the single-exposure condition. People in the prolonged exposure condition also experienced no more depression-dejection [ $F(1,161) = 1.00, p = .32$ ], fatigue-inertia [ $F(1,161) = 0.02, p = .88$ ], vigor-activity [ $F(1,161) = 0.22, p = .64$ ], or confusion-bewilderment [ $F(1,161) = 1.71, p = .19$ ] than those in the single-exposure condition. Anger-hostility [ $F(1,161) = 8.18, p = .005$ ] is the only emotion people in the prolonged exposure condition expressed more strongly than those in the brief exposure condition.

Policy attitudes among those in the brief and prolonged exposure conditions also varied minimally. People who saw several videos in a row favored giving less foreign aid than those who watched just one terrorism video [ $F(1,166) = -.61, p = .04$ ], but support for right-wing authoritarianism [ $F(1,166) = .38, p = .54$ ], support for increased border spending [ $F(1,166) = -.33, p = .27$ ], overall defense spending [ $F(1,166) = .06, p = .84$ ], and homeland security spending [ $F(1,166) = .34, p = .25$ ] did not.<sup>8</sup> People in both experimental conditions reported

similar levels of confidence in the US government's ability to prevent future strikes [ $F(1,166) = .69, p = .41$ ] and to protect people from attack [ $F(1,166) = .07, p = .79$ ]. Prolonged terrorism coverage might intensify people's negative emotions a little, but not enough to alter their political positions systematic ways.

### *Biometric Data Analysis*

The habituation thesis, which received some support in our initial analysis, receives stronger support when we turn to our biometric data. We determined this using a Bayesian multilevel model to predict each participant's average valence score after each video using an interaction between an indicator of the video they watched (e.g., videos 1 and 2) and its place (e.g., first, second) in the sequence they saw.<sup>9</sup> The interaction term reflects the idea that people have different reactions to the same videos depending on the position of those videos in the five-video sequence. We also used our pretest data to control for the intensity of the videos people watched. This accounts for the possibility that current responses to visual material are influenced by the intensity of past videos.

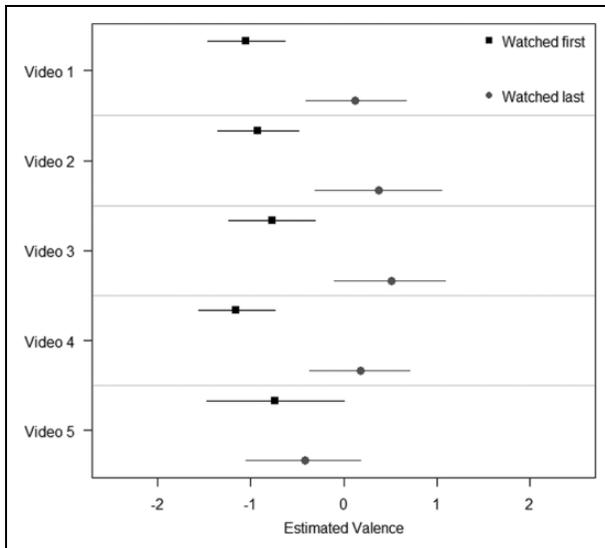
Multilevel models address the hierarchical structure of our data resulting from having repeated observations of participants who are clustered into experimental groups. In a situation like this, estimates generated using ANOVA can be inefficient and biased because the technique assumes that treatment effects are similar within groups. Multilevel models, in contrast, judge group-level reactions to stimuli while accounting for unobserved individual-level characteristics like personality traits.<sup>10</sup>

Our analysis suggests that all the videos generated negative emotions, but the intensity of those reactions depended on each video's position in the five-video sequence. Videos one through four generated their strongest negative reactions when people saw them first. These responses are consistent with the experimental literature showing that a single exposure to terrorism coverage generates negative emotions. Reactions to these videos, however, were about two standard deviations less negative ( $p < .05$ ) when people saw them last. Figure 1, below, depicts reactions people had to the videos depending on whether they saw them first or last (the videos gradually elicit more positive reactions later in the sequence, but these differences do not become statistically significant until the final video in the sequence).

Reactions to video five follow a different pattern. Volunteers responded to video five roughly the same way regardless of when it appeared in the sequence. The video presents images of a suicide terrorism mission and scenes of the female attacker's body exploding lowered people's valence scores no matter how many terrorism videos they saw prior to this one.

### *Dynamic Conditional Correlation Analysis*

Consistent with the research on nonassociational learning, we found that people were more likely to habituate to prolonged terrorism coverage than become



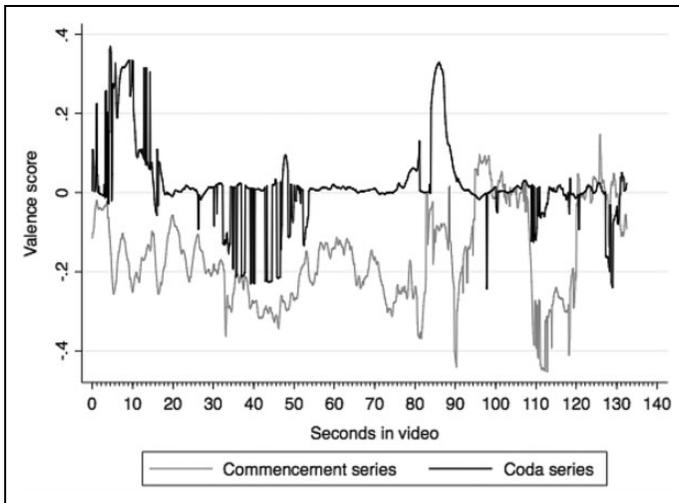
**Figure 1.** Estimated valence by video and presentation order with 95 percent confidence intervals.

sensitized to it, although responses to extremely shocking scenes are different. In this section, we look at the process of nonassociational learning. Habituation and sensitization are not just outcomes. The terms also imply progressions over time from one state to another. Our prior analyses, however, obscured this process-level view of nonassociational learning.

The millisecond-by-millisecond data we gathered using FaceReader make it possible to examine nonassociational learning as it happened. We used the emotional reactions to Gadarian’s (2010) “scary visuals” video for this process-level look at nonassociational learning. We selected this video because of the high-quality work it supported. We know from Gadarian’s work that a single exposure to this video stokes negative emotions. Her findings provide an important baseline for measuring the consequences of prolonged exposure to terrorism coverage.

As previously mentioned, FaceReader assesses facial cues three times every hundred milliseconds, producing a long and detailed time series for each subject. We used this information to create two groups. The first one—which we call the commencement series—includes everyone who watched Gadarian’s video first. The second series—the coda series—includes all subjects who saw Gadarian’s video last (i.e., fifth). This setup compares how the same stimulus effects people after varying degrees of exposure to terrorism coverage.

We analyzed these series using a Generalized Autoregressive Conditional Heteroskedasticity Dynamic Conditional Correlation (GARCH-DCC) model.



**Figure 2.** Time lines of the commencement and coda series.

GARCH-DCC models permit us to examine FaceReader's classifications of the emotional reactions people had to the videos they saw as they happened. Our previous analyses, in contrast, focused on the average responses people had to each video they watched rather than their second-by-second reactions.

GARCH-DCC models are well suited to this task. Correlations between the emotional reactions of people who watch the same video after different amounts of exposure to other terrorism presentations are likely to vary through time. Many time series models, however, assume these correlations are constant. GARCH-DCC models permit correlations among time series to fluctuate (Lebo and Box-Steffensmeier 2008).<sup>11</sup>

In this case, we expect people who watch the Gadarian video before seeing other terrorism videos will react to it differently than people who watch the Gadarian video after watching a sequence of terrorism videos. Specifically, the sensitization hypothesis suggests that the emotional reactions of people in the commencement series will be more negative than the emotional reactions of those in the coda series. These disparities will be reflected in moment-by-moment changes in correlations among respondent reactions. Particularly threatening scenes will be associated with more intensely negative valence scores in the coda series relative to the commencement series. The habituation hypothesis suggests the opposite.

Consistent with our previous analyses, visual inspection of the relationship between the commencement and coda time series suggests a habituation process took hold. People who watched the Gadarian video first had negative reactions to it. This is what we would expect and consistent with what Gadarian found in her own research using this video. People who watched the Gadarian video last, however, had more positive and more varied responses to it.

**Table 2.** DCC Estimates for Commencement and Coda Series.

Parameter	GARCH-DCC Estimates
$a_{\text{Commencement}}$	0.0003*** (.00004)
$b_{\text{Commencement}}$	1.16*** (.05)
$m_{\text{Commencement}}$	-0.18*** (.00)
$a_{\text{Coda}}$	0.0002*** (.00002)
$b_{1, \text{Coda}}$	0.13*** (.01)
$b_{2, \text{Coda}}$	0.89*** (.00)
$m_{\text{Coda}}$	-0.001*** (.0003)
$\alpha$	0.24** (.08)
$\beta$	0.41*** (.02)
$N$	1,326

Note: We model the commencement series as an ARCH(1) process and incorporated a GARCH term in the coda series. The GARCH term reflects a significant moving average identified with a preliminary Box–Jenkins model.  $a$ ,  $b$ , and  $m$  are univariate GARCH estimates.  $a$  is a constant.  $b$  is a measure of autocorrelation, and  $m$  describes the volatility of the estimates.  $\alpha$  and  $\beta$  are interpreted together. They gauge the changing coevolution of the two series.

\*\* $p < .05$ .

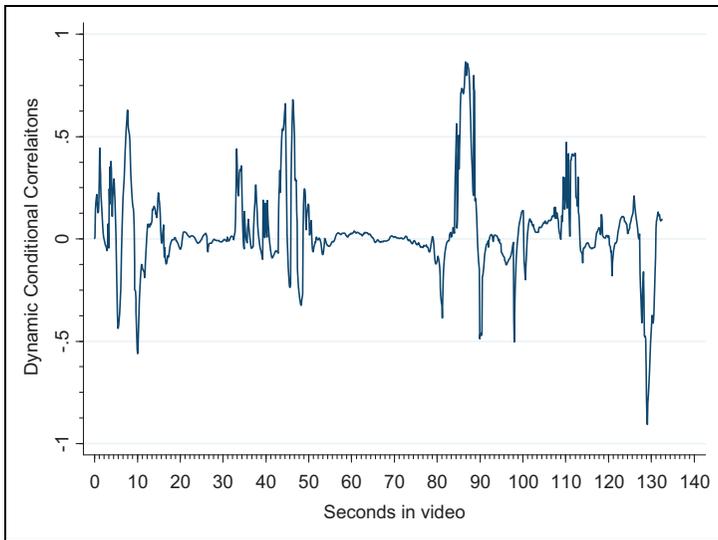
\*\*\* $p < .01$ .

As Figure 2 shows, the coda valence scores are virtually always more positive than the commencement scores at similar points in time. Negative spikes in the coda series at the 98 and 130 seconds marks are exceptions to this pattern. These brief moments, however, are balanced by periods (e.g., the 4- to approximately 15-second marks) when responses in the coda series are positive while responses in the commencement series are negative.

Following Box–Steffensmeier et al. (2014), we confirmed the GARCH-DCC model is appropriate for these data by testing for constant correlations and variances in the two time series. Both of the tests we conducted suggest it is. First, we identified a Box–Jenkins model for each of the series. Doing so points to the existence of an autoregressive term in both series and a moving average in the coda series (the residuals for this analysis appear in the online appendix). Next, we used Tse’s (2000) Lagrange multiplier test to examine whether the commencement and coda series have constant correlations between them. They do not ( $p = .053$ ). This implies that people in the commencement and people in the coda series differ in their reactions to the Gadarian video.

The results of our analysis of our GARCH-DCC model appear in Table 2. Reading from the top of the table to the bottom, the first seven coefficients are generated by the GARCH analysis (GARCH-DCC models are analyzed in two stages). The  $a$  parameters report constants for the commencement and coda series. The  $b$  terms describe autocorrelation in the two series. The  $m$  parameters describe the volatility of the two series.

The seven GARCH coefficients are statistically significant, indicating that the model does a good job capturing the dynamics within the data. The negative signs in front of the  $m$  coefficients imply that each series becomes more volatile after



**Figure 3.** Dynamic correlations between emotions of people who saw video three first and last.

negative reactions to visual stimuli. The relative magnitudes of the  $m$  coefficients ( $m_{Commencement} = -0.18$ ;  $m_{Coda} = -0.001$ ), however, suggest this volatility is stronger in the commencement series than the coda series. People who watched Gadarian's video after four other terrorism videos maintained more stable emotional states than those who watched it first. This result is consistent with habituation effects.

The parameters  $\bar{R}$ ,  $\alpha$ , and  $\beta$  reported in Table 2 are DCC parameters.  $\bar{R}$  measures the average correlation between the commencement and coda series. The correlation of .24 suggests the commencement and coda series move together, but imperfectly.  $\alpha$  and  $\beta$  are interpreted jointly (see below). They measure change in the correlations between the two series across time and can be used to find the moment-by-moment correlation between the two series.

These moment-by-moment correlations appear in Figure 3. As the figure (and  $\bar{R}$  parameter) suggests, the correlation between the commencement and coda series is positive much of the time. This is to be expected from people watching the same video. The figure, however, also shows that the correlation between the two series varies. Approximately 45 percent of the time, the two series are either uncorrelated or negatively correlated with one another. The same stimuli produced different reactions. Prior exposure to threatening material during the study explains this difference.

## Discussion

These analyses suggest that exposure to several terrorism stories in a row usually habituates people to the psychological effects of these presentations. The process

appears to be gradual, occurring one video at a time. This result is reminiscent of the one reported by Codispoti, Ferrari, and Bradley (2006) based on their study of exposure to still images, but our findings also depart from Codispoti, Ferrari, and Bradley's (2006) in two ways.

First, even though emotional desensitization appears to be the overall effect of prolonged terrorism coverage, those who saw several terrorism stories in a row expressed more anger than those who saw just one terrorism video. It is not clear why this happened. One possibility is that we are picking up a testing effect: we examined enough emotions that one could have registered a statistically significant change by chance. This would explain why people who were assigned to the prolonged exposure condition did not express generalized support for hawkish counterterrorism measures. Previous studies suggest terrorism-induced anger stimulates aggressive policy preferences (e.g., Huddy et al. 2005; Liberman and Skitka 2017). Our subjects, however, only indicated increased interest in reducing spending on foreign aid, one of the items on our policy preferences scale. The testing effect interpretation is also supported by some work on violent video games which suggests prolonged playing does not stimulate more anger than shorter periods of play (Valadez and Ferguson 2012).

Second, reactions to the suicide terrorism video we used also produced results that depart from Codispoti, Ferrari, and Bradley's (2006). Instead of habituating to this video, people reacted negatively to it regardless of how much other terrorism-related content they watched. This result implies that some images are easier for people to assimilate than others. Although we do not know what elements of the suicide terrorism video produced such consistent reactions—was it the graphic nature of the attack, its suddenness, the fact that a woman carried it out?—our investigation of Gadarian's (2010) "scary visuals" video study suggests that watching harm come to people is more difficult than watching property get destroyed. Similar findings appear in research on psychological effects of the 9/11 attacks (e.g., Silver et al. 2002). We also confirmed this finding about the quality of the violent images people see in the time series analysis we conducted.

Relatedly, the effects the suicide terrorism video had on our participants further imply that the specific images people see can be just as important in determining responses to terrorism coverage as the amount of exposure people have to terrorism-related content. No amount of previous exposure to terrorism coverage undercut the emotional effects of the suicide terrorism video. Perhaps unsurprisingly, we found in separate analyses not reported above that reactions to terrorism videos shown after the suicide terrorism video were depressed. What the news media shows their audiences and when they show it are variables to consider in assessments of the media's role in influencing terrorism's psychological impacts.

The design we used prevents us from answering these questions we raised about our results more definitively. We also cannot rule out the possibility that our findings are the product of experimental maturation, the tendency for subjects to change over time independent of treatment effects (Campbell and Stanley 1963), but the patterns

we observed are inconsistent with this threat to validity. Maturation effects, such as flagging attention, imply unidirectional changes in valence scores, but our volunteers' reactions fluctuated, especially to the suicide terrorism video. A clear maturation effect would have made responses to the suicide terrorism video similar to the other videos. In the future, it will be desirable to protect the integrity of future experimental results with mechanisms that are able to rule maturation out (by using eye tracking devices to assess attentiveness, for example).

Limits to the external validity of this study are also worth considering. The good news is that our volunteers reacted to the first videos they saw as previous studies implied they would (e.g., Merolla and Zechmeister 2009). The reactions our volunteers had to prolonged exposure to terrorism coverage are consistent with research showing that people are generally resilient when confronted with large-scale terrorist attacks (e.g., Bonanno et al. 2006). These reactions lend credibility to our contention that undergraduates are appropriately representative of Americans who watch terrorism news. At the same time, our focus on average treatment effects may make this research less applicable outside the laboratory (see Deaton and Cartwright 2018) because average treatment effects do not tell us about the individual differences among people that moderate responses to threatening stimuli. People with certain personality types, for example, are less likely than others to bounce back emotionally from traumatic events, while others are more likely to do so (Miller and Harrington 2011). Life experiences matter too (Klar, Zakay, and Sharvit 2002). The results of our hierarchical models control for these differences, but they do not permit us to drill down in order to determine the kinds of people who are most susceptible to the effects of prolonged terrorism coverage.

These limitations are important, but they are not showstoppers. Our research design still permits us to make one critical point: the experience of watching several terrorism videos in a row does not inevitably produce more extreme emotional and political effects than watching just one. Instead, exposure to prolonged terrorism coverage tended to inure our volunteers to the psychological effects of these presentations. Contra Nacos (2007), heavy news watching may make terrorist threats less formidable, not more.

## Conclusion

What, then, do we make of decisions by news organizations in the United States to expose their audiences to bursts of terrorism coverage? The media gets criticized for presentations like these on the grounds that they magnify the consequences of terrorism by inflaming people's emotions. Our results suggest these critiques miss the potential for prolonged terrorism coverage to have the opposite effect on viewers. Rather than making terrorism more emotionally evocative, extensive coverage might make it less so.

One thing is clear: the specific images the media chooses to present plays a role in determining the effects of prolonged terrorism coverage. Emotional

desensitization occurs more easily with some scenes than others. From a counter-terrorism perspective, it might make sense to encourage people to keep the television on while counseling reporters about the images that challenge people's coping mechanisms most.

There may be risks associated with this strategy, however. Terrorist organizations might respond to desensitized audiences by resorting to more violent, gruesome attacks to which people cannot become habituated. The ability of perpetrators to self-publicize their atrocities via social media could mean that images of these shocking attacks reach the public even if news organizations exercise restraint in their publishing decisions.

Habituation is a common response to repeated messages, but the consequences of habituation influence whether we should root for it or not. This is true not just for terrorism reporting but for the coverage of foreign affairs more generally. Some media productions stimulate "did you see that?" moments around water coolers and across dinner tables which provoke political action. Other productions just leave people comfortably numb to what they see.

### **Acknowledgment**

Thanks to Erin Hennes, Christopher Kowal, Kim Suissey, and seminar participants at Carleton University and McGill University for their input on this project.

### **Data Availability**

Replication data and supplemental material are available at <http://jcr.sagepub.com>.

### **Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### **Funding**

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### **Supplemental Material**

Supplementary material is available for this article online.

### **Notes**

1. We had difficulty attracting volunteers during our first recruitment effort and initiated a second one when we had access to more students.
2. People who live through extended periods of political violence are likely to respond to mediated terrorism presentations differently than those who have not have this experience (Hobfoll et al. 2011).
3. We used factor analysis to condense the 37 items in the Profile of Mood States scale into six principal components.

4. Thank-you to Jim Breckenridge and Shana Gadarian for sharing their materials with us.
5. FaceReader rarely misconstrues negative emotions for positive ones (or vice versa), although it cannot differentiate uncomfortable smiles from true ones. Our review of video taken during this study suggests FaceReader's insensitivity to fake smiles did not compromise our results.
6. There are reasons to prefer FaceReader to other autonomic measures of emotions, like skin conductance and facial electromyography. Skin conductivity measures changes in the capacity of skin to conduct electricity. The skin of people who are emotionally aroused conducts electricity more effectively than the skin of people who are not aroused (see Renshon, Lee, and Tingley [2017] for an example of this technique's use). These measures, however, cannot distinguish the valence of emotional responses (happiness and fear produce similar responses). Facial electromyography, another technique, measures activity in the zygomatic and corrugator muscles in the face (see Smith, Bradley, and Lang [2005] for an example of this technique). These muscles move imperceptibly when people are experiencing different emotions. Facial electromyography, however, involves the placement of pads on the face which interfere with the normal experience of watching videos.
7. Both factor analyses produced the following six mood states: anger-hostility, fatigue-inertia, depression-dejection, vigor-activity, tension-anxiety, and confusion-bewilderment.
8. These nonfindings persist after combining the policy preference items into an additive index as Gadarian (2010) did. We also find no conditional relationship between negative emotions, policy preferences, and our treatment.
9. We rescaled FaceReader's valence scores for this analysis because the original scale's range made it difficult to sample from the posterior. The new scale is the original one multiplied by ten. It ranges from  $-6$  to  $6$  with a standard deviation of  $1.3$ .
10. Our Bayesian approach outperforms regular multilevel models when the sample of people is too small to meet the asymptotic properties of maximum likelihood and when interaction terms are used (Shor et al. 2007).
11. The likelihood function of the DCC estimator is given by:

$$L = -0.5 \sum_{t=1}^T \left( k \log(2\pi) + 2 \log(|D_t|) + \log(|R_t|) + e_t' R^{-1} e_t \right),$$

where  $R_t$  is a  $k \times k$  matrix containing the history of correlations between time series.  $D_t$  is a  $k \times k$  diagonal matrix containing the time-varying standardized residuals produced by a GARCH model. Thus, the likelihood contains two varying parameters ( $R_t$  and  $D_t$ ) to be estimated. Once  $D_t$  is obtained, the DCC parameters,  $\alpha$  and  $\beta$ , can be estimated to obtain the conditional correlations between the variables:

$$R_t = (1 - \alpha - \beta) \bar{R} + \alpha \epsilon_{t-1} \epsilon_{t-1}' + \beta R_{t-1},$$

where  $\alpha$  and  $\beta$  describe the coevolution of the series and are the main objects of interest in this analysis. When the sum of these parameters equals zero, the model reduces to a single constant correlation ( $\bar{R}$ ).

## References

- Aber, J. Lawrence, Elizabeth T. Gershoff, Angelica Ware, and Jennifer A. Kotler. 2004. "Estimating the Effects of September 11th and Other Forms of Violence on the Mental Health and Social Development of New York City's Youth: A Matter of Context." *Applied Developmental Science* 8:111-29.
- Albertson, Bethany, and Shana Kushner Gadarian. 2015. *Anxious Politics: Democratic Citizenship in a Threatening World*. Cambridge, UK: Cambridge University Press.
- Bandura, Albert, Nancy E. Adams, and Janice Beyer. 1977. "Cognitive Processes Mediating Behavioral Change." *Journal of Personality and Social Psychology* 35:125-39.
- Bartholow, Bruce D., Brad J. Bushman, and Marc A. Sestir. 2006. "Chronic Violent Video Game Exposure and Desensitization to Violence: Behavioral and Event-related Brain Potential Data." *Journal of Experimental Social Psychology* 42:532-39.
- Bausch, Andrew W., Joao R. Faria, and Thomas Zeitzoff. 2013. "Warnings, Terrorist Threats and Resilience: A Laboratory Experiment." *Conflict Management and Peace Science* 30: 433-51.
- Bleich, A., M. Gelkopf, and Z. Solomon. 2003. "Exposure to Terrorism, Stress-related Mental Health Symptoms, and Coping Behaviors among a Nationally Representative Sample in Israel." *Journal of the American Medical Association* 290:612-20.
- Bonanno, George, and Dacher Keltner. 2004. "Brief Report the Coherence of Emotion Systems: Comparing "on-Line" Measures of Appraisal and Facial Expressions, and Self-Report." *Cognition and Emotion* 18:431-44.
- Bonanno, George A., Sandro Galea, Angela Bucciarelli, and David Vlahov. 2006. "Psychological Resilience after Disaster: New York City in the Aftermath of the September 11th Terrorist Attack." *Psychological Science* 17:181-86.
- Booth, Robert William, Dinkar Sharma, and T. I. Leader. 2016. "The Age of Anxiety? It Depends Where You Look: Changes in Stai Trait Anxiety, 1970–2010." *Social Psychiatry and Psychiatric Epidemiology* 51:193-202.
- Box-Steffensmeier, Janet M, John R Freeman, Matthew P Hitt, and Jon CW Pevehouse. 2014. *Time Series Analysis for the Social Sciences*. Cambridge University Press.
- Bradley, Margaret M., Bruce N. Cuthbert, and Peter J. Lang. 1996. "Picture Media and Emotion: Effects of a Sustained Affective Context." *Psychophysiology* 33:662-70.
- Breckenridge, James N., Philip G. Zimbardo, and Jennifer L. Sweeton. 2010. "After Years of Media Coverage, Can One More Video Report Trigger Heuristic Judgments? A National Study of American Terrorism Risk Perceptions." *Behavioral Sciences of Terrorism and Political Aggression* 2:163-78.
- Brosschot, Jos F. 2002. "Cognitive-emotional Sensitization and Somatic Health Complaints." *Scandinavian Journal of Psychology* 43:113-21.
- Campbell, Donald T., and Julian C. Stanley. 1963. *Experimental and Quasi-experimental Designs for Research*. Chicago: Rand McNally.
- Carnagey, Nicholas L., Craig A. Anderson, and Brad J. Bushman. 2007. "The Effect of Video Game Violence on Physiological Desensitization to Real-life Violence." *Journal of Experimental Social Psychology* 43:489-96.

- Checkel, Jeffrey T. 2001. "Why Comply? Social Learning and European Identity Change." *International Organization* 55:553-88.
- Clark, Taylor. 2011. *Nerve: Poise under Pressure, Serenity under Stress, and the Brave New Science of Fear and Cool*. New York: Little, Brown and Company.
- Codispoti, Maurizio, Vera Ferrari, and Margaret M. Bradley. 2006. "Repetitive Picture Processing: Autonomic and Cortical Correlates." *Brain Research* 1068:213-20.
- Cohn, Jeffrey F., Zara Ambadar, and Paul Ekman. 2007. "Observer-based Measurement of Facial Expression with the Facial Action Coding System." In *The Handbook of Emotion Elicitation and Assessment*, edited by J. A. Coan and J. J. B. Allen, 203-21. Oxford, UK: Oxford University Press.
- Crescenzi, Mark J. C. 2007. "Reputation and Interstate Conflict." *American Journal of Political Science* 51:382-96.
- Das, Enny, Brad J. Bushman, Marieke D. Bezemer, Peter Kerkhof, and Ivar E. Vermeulen. 2009. "How Terrorism News Reports Increase Prejudice against Outgroups: A Terror Management Account." *Journal of Experimental Social Psychology* 45:453-59.
- Davis, Darren W., and Brian D. Silver. 2004. "Civil Liberties vs. Security: Public Opinion in the Context of the Terrorist Attacks on America." *American Journal of Political Science* 48:28-46.
- Deaton, Angus, and Nancy Cartwright. 2018. "Understanding and Misunderstanding Randomized Controlled Trials." *Social Science & Medicine* 210:2-21.
- Den Uyl, M. J., and H. Van Kuilenburg. 2005. "The Facereader: Online Facial Expression Recognition." *Paper presented at the Proceedings of Measuring Behavior*, Wageningen, the Netherlands.
- Di Tella, Rafael, Lucía Freira, Ramiro H. Gálvez, Ernesto Schargrotsky, Diego Shalom, and Mariano Sigman. 2019. "Crime and Violence: Desensitization in Victims to Watching Criminal Events." *Journal of Economic Behavior & Organization* 159: 613-25.
- Foa, Edna B., and Michael J. Kozak. 1986. "Emotional Processing of Fear: Exposure to Corrective Information." *Psychological Bulletin* 99:20.
- Gadarian, Shana Kushner. 2010. "The Politics of Threat: How Terrorism News Shapes Foreign Policy Attitudes." *The Journal of Politics* 72:469-83.
- Gal, Reuven. 2014. "Social Resilience in Times of Protracted Crises: An Israeli Case Study." *Armed Forces & Society* 40:452-75.
- Garcia, Blake E., and Nehemia Geva. 2014. "Security versus Liberty in the Context of Counterterrorism: An Experimental Approach." *Terrorism and Political Violence* 28: 1-19.
- Gelpi, Christopher, Peter D. Feaver, and Jason Reifler. 2009. *Paying the Human Costs of War: American Public Opinion and Casualties in Military Conflicts*. Princeton, NJ: Princeton University Press.
- Gigerenzer, Gerd. 2006. "Out of the Frying Pan into the Fire: Behavioral Reactions to Terrorist Attacks." *Risk Analysis* 26:347-51.
- Gilbert, Daniel. 2009. *Stumbling on Happiness*. Vintage Canada.

- Gosselin, Pierre, Melanie Perron, and Martin Beaupré. 2010. "The Voluntary Control of Facial Action Units in Adults." *Emotion* 10:266.
- Grizzard, Matthew, Ron Tamborini, John L. Sherry, René Weber, Sujay Prabhu, Lindsay Hahn, and Patrick Idzik. 2015. "The Thrill Is Gone, but You Might Not Know: Habituation and Generalization of Biophysiological and Self-reported Arousal Responses to Video Games." *Communication Monographs* 82:64-87.
- Groves, Philip M., and Richard F. Thompson. 1970. "Habituation: A Dual-process Theory." *Psychological Review* 77:419.
- Hall, Todd H., and Andrew A. G. Ross. 2015. "Affective Politics after 9/11." *International Organization* 69:847-79.
- Helweg-Larsen, Marie, and James A. Shepperd. 2001. "Do Moderators of the Optimistic Bias Affect Personal or Target Risk Estimates? A Review of the Literature." *Personality and Social Psychology Review* 5:74-95.
- Hobfoll, Stevan E., Daphna Canetti-Nisim, and Robert J. Johnson. 2006. "Exposure to Terrorism, Stress-related Mental Health Symptoms, and Defensive Coping among Jews and Arabs in Israel." *Journal of Consulting and Clinical Psychology* 74:207-18.
- Hobfoll, Stevan E., Anthony D. Mancini, Brian J. Hall, Daphna Canetti, and George A. Bonanno. 2011. "The Limits of Resilience: Distress following Chronic Political Violence among Palestinians." *Social Science & Medicine* 72:1400-08.
- Hoffman, Aaron M., Dwaine H. A. Jengellely, Natasha T. Duncan, Melissa Buehler, and Meredith L. Rees. 2010. "How Does the Business of News Influence Terrorism Coverage? Evidence from the *Washington Post* and *USA Today*." *Terrorism and Political Violence* 22:559-80.
- Hoffman, Aaron M., and William Shelby. 2017. "When the 'Laws of Fear' Do Not Apply: Effective Counterterrorism and the Sense of Security from Terrorism." *Political Research Quarterly* 70:618-31.
- Holman, E. Alison, Dana Rose Garfin, and Roxane Cohen Silver. 2014. "Media's Role in Broadcasting Acute Stress following the Boston Marathon Bombings." *Proceedings of the National Academy of Sciences of the United States of America* 111:93-98.
- Hopwood, Tanya L., and Nicola S. Schutte. 2017. "Psychological Outcomes in Reaction to Media Exposure to Disasters and Large-scale Violence: A Meta-analysis." *Psychology of Violence* 7:316-27.
- Houghton, David Patrick. 2001. *US Foreign Policy and the Iran Hostage Crisis*. Cambridge, MA: Cambridge University Press.
- Huddy, Leonie, Stanley Feldman, Charles Taber, and Gallya Lahav. 2005. "Threat, Anxiety, and Support of Antiterrorism Policies." *American Journal of Political Science* 49:593-608.
- Jhangiani, Rajiv. 2009. "Psychological Concomitants of the 11 September 2001 Terrorist Attacks: A Review." *Behavioral Sciences of Terrorism and Political Aggression* 2:38-69.
- Kertzer, Joshua D. 2017. "Resolve, Time, and Risk." *International Organization* 71:S109-36.
- Klar, Yechiel, Dan Zakay, and Keren Sharvit. 2002. "'If I Don't Get Blown Up . . .': Realism in Face of Terrorism in an Israeli Nationwide Sample." *Risk, Decision and Policy* 7: 203-19.

- Kohut, Andrew, Carroll Doherty, Michael Dimock, and Scott Keeter. 2010. "Americans Spending More Time Following the News." *Pew Research Center*.
- Krahé, Barbara, Ingrid Möller, L. Rowell Huesmann, Lucyna Kirwil, Juliane Felber, and Anja Berger. 2011. "Desensitization to Media Violence: Links with Habitual Media Violence Exposure, Aggressive Cognitions, and Aggressive Behavior." *Journal of Personality and Social Psychology* 100:630.
- Lebo, Matthew J., and Janet M. Box-Steffensmeier. 2008. "Dynamic Conditional Correlations in Political Science." *American Journal of Political Science* 52:688-704.
- Lerner, Jennifer S., Roxana M. Gonzalez, Deborah A. Small, and Baruch Fischhoff. 2003. "Effects of Fear and Anger on Perceived Risks of Terrorism: A National Field Experiment." *Psychological Science* 14:144-50.
- Lerner, Jennifer S., and Dacher Keltner. 2001. "Fear, Anger, and Risk." *Journal of Personality and Social Psychology* 81:146-59.
- Levy, Jack S. 1994. "Learning and Foreign Policy: Sweeping a Conceptual Minefield." *International Organization* 48:279-312.
- Lewinski, Peter, Tim M den Uyl, and Crystal Butler. 2014. "Automated Facial Coding: Validation of Basic Emotions and FACS AUs in Facereader." *Journal of Neuroscience, Psychology, and Economics* 7:227-36.
- Lewinski, Peter, Marieke L. Fransen, and Ed S. H. Tan. 2014. "Predicting Advertising Effectiveness by Facial Expressions in Response to Amusing Persuasive Stimuli." *Journal of Neuroscience, Psychology, and Economics* 7:1-14.
- Lieberman, Peter, and Linda J. Skitka. 2017. "Revenge in Us Public Support for War against Iraq." *Public Opinion Quarterly* 81:636-60.
- Merolla, Jennifer L., Jennifer M. Ramos, and Elizabeth J. Zechmeister. 2007. "Crisis, Charisma, and Consequences: Evidence from the 2004 U.S. Presidential Election." *Journal of Politics* 69:30-42.
- Merolla, Jennifer L., and Elizabeth J. Zechmeister. 2009. *Democracy at Risk: How Terrorist Threats Affect the Public*. Chicago: University of Chicago Press.
- Miller, Mark W., and Kelly M. Harrington. 2011. "Personality Factors in Resilience to Traumatic Stress." In *Resilience and Mental Health: Challenges across the Lifespan*, edited by Steven Southwick, Brett T. Litz, Dennis Charney, and Matthew Friedman, 56-75. Cambridge, MA: Cambridge University Press.
- Mueller, John. 1970. *War, Presidents, and Public Opinion*. New York: Wiley.
- Mueller, John. 2006. *Overblown: How Politicians and the Terrorism Industry Inflate National Security Threats, and Why We Believe Them*. New York: The Free Press.
- Nacos, Brigitte L. 2007. *Mass-Mediated Terrorism: The Central Role of the Media in Terrorism and Counterterrorism*. Second ed. Lanham: Rowman & Littlefield Publishers, Inc.
- Nellis, Ashley Marie, and Joanne Savage. 2012. "Does Watching the News Affect Fear of Terrorism? The Importance of Media Exposure on Terrorism Fear." *Crime & Delinquency* 58:748-68.
- Nolen-Hoeksema, Susan, Blair E. Wisco, and Sonja Lyubomirsky. 2008. "Rethinking Rumination." *Perspectives on Psychological Science* 3:400-24.

- Öhman, Arne. 2000. "Fear and Anxiety: Evolutionary, Cognitive, and Clinical Perspectives." In *Handbook of Emotions*, 2nd ed., edited by Michael Lewis and Jeanette M. Haviland-Jones, 573-93. New York: Guilford Press.
- Overmier, J. Bruce. 2002. "Sensitization, Conditioning, and Learning: Can They Help Us Understand Somatization and Disability?" *Scandinavian Journal of Psychology* 43: 105-12.
- Pew Research Center. 2006. "How 9-11 Changed the Evening News." <http://www.journalism.org/2006/09/11/how-9-11-changed-the-evening-news/>.
- Rankin, Catharine H., Thomas Abrams, Robert J. Barry, Seema Bhatnagar, David F. Clayton, John Colombo, and Gianluca Coppola. 2009. "Habituation Revisited: An Updated and Revised Description of the Behavioral Characteristics of Habituation." *Neurobiology of Learning and Memory* 92:135-38.
- Renshon, Jonathan, Julia J. Lee, and Dustin Tingley. 2017. "Emotions and the Micro-foundations of Commitment Problems." *International Organization* 71:S189-218.
- Romanov, Dmitri, Asaf Zussman, and Noam Zussman. 2012. "Does Terrorism Demoralize? Evidence from Israel." *Economica* 79:183-98.
- Romer, Daniel, Kathleen Hall Jamieson, and Sean Aday. 2003. "Television News and the Cultivation of Fear of Crime." *Journal of Communication* 53:88-104.
- Rubin, G. James, Chris R. Brewin, Neil Greenberg, John Simpson, and Simon Wessely. 2005. "Psychological and Behavioural Reactions to the Bombings in London on 7 July 2005: Cross Sectional Survey of a Representative Sample of Londoners." *British Medical Journal* 331:606-06.
- Ruiter, Robert A. C., Loes T. E. Kessels, Gjalt-Jorn Y. Peters, and Gerjo Kok. 2014. "Sixty Years of Fear Appeal Research: Current State of the Evidence." *International Journal of Psychology* 49:63-70.
- Schuster, Mark A., Bradley D. Stein, Lisa H. Jaycox, Rebecca L. Collins, Grant N. Marshall, Marc N. Elliott, Annie J. Zhou, David E. Kanouse, Janina L. Morrison, and Sandra H. Berry. 2001. "A National Survey of Stress Reactions after the September 11, 2001, Terrorist Attacks." *New England Journal of Medicine* 345:1507-12.
- Sears, David O. 1986. "College Sophomores in the Laboratory: Influences of a Narrow Data Base on Social Psychology's View of Human Nature." *Journal of Personality and Social Psychology* 51:515-30.
- Sell, Aaron, John Tooby, and Leda Cosmides. 2009. "Formidability and the Logic of Human Anger." *Proceedings of the National Academy of Sciences of the United States of America* 106:15073-78.
- Shor, Boris, Joseph Bafumi, Luke Keele, and David Park. 2007. "A Bayesian Multilevel Modeling Approach to Time-series Cross-sectional Data." *Political Analysis* 15: 165-81.
- Silver, Roxane Cohen, E. Alison Holman, Daniel N. McIntosh, Michael Poulin, and Virginia Gil-Rivas. 2002. "Nationwide Longitudinal Study of Psychological Responses to September 11." *The Journal of the American Medical Association* 288:1235-44.
- Slone, Michelle. 2000. "Responses to Media Coverage of Terrorism." *Journal of Conflict Resolution* 44:508-22.

- Slone, Michelle, Anat Shoshani, and Inbar Baumgarten-Katz. 2008. "The Relation between Actual Exposure to Political Violence and Preparatory Intervention for Exposure to Media Coverage of Terrorism." *Anxiety, Stress, & Coping* 21:243-61.
- Smith, J. Carson, Margaret M. Bradley, and Peter J. Lang. 2005. "State Anxiety and Affective Physiology: Effects of Sustained Exposure to Affective Pictures." *Biological Psychology* 69:247-60.
- Smith, J. Carson, Andreas Löw, Margaret M. Bradley, and Peter J. Lang. 2006. "Rapid Picture Presentation and Affective Engagement." *Emotion* 6:208-14.
- Spilerman, Seymour, and Guy Stecklov. 2009. "Societal Responses to Terrorist Attacks." *Annual Review of Sociology* 35:167-89.
- Sunstein, Cass R. 2005. *Laws of Fear: Beyond the Precautionary Principle*. Cambridge: Cambridge University Press.
- Terzis, Vasileios, Christos N. Moridis, and Anastasios A. Economides. 2013. "Measuring Instant Emotions Based on Facial Expressions during Computer-based Assessment." *Personal and Ubiquitous Computing* 17:43-52.
- Thompson, Richard F. 2009. "Habituation: A History." *Neurobiology of Learning and Memory* 92:127-34.
- Tse, Y. K. 2000. "A Test for Constant Correlations in a Multivariate Garch Model." *Journal of Econometrics* 98:107-27.
- Ursin, Holger. 2014. "Brain Sensitization to External and Internal Stimuli." *Psychoneuroendocrinology* 42:134-45.
- Valadez, Jose J., and Christopher J. Ferguson. 2012. "Just a Game after All: Violent Video Game Exposure and Time Spent Playing Effects on Hostile Feelings, Depression, and Visuospatial Cognition." *Computers in Human Behavior* 28:608-16.
- Wayment, Heidi A. 2004. "It Could Have Been Me: Vicarious Victims and Disaster-focused Distress." *Personality and Social Psychology Bulletin* 30:515-28.
- Willer, Robb, and Nick Adams. 2008. "The Threat of Terrorism and Support for the 2008 Presidential Candidates: Results of a National Field Experiment." *Current Research in Social Psychology* 14:1-22.
- Witte, Kim. 1992. "Putting the Fear Back into Fear Appeals: The Extended Parallel Process Model." *Communication Monographs* 59:329-49.
- Yechiam, Eldad, Greg Barron, and Ido Erev. 2005. "The Role of Personal Experience in Contributing to Different Patterns of Response to Rare Terrorist Attacks." *Journal of Conflict Resolution* 49:430-39.