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Analyzing Projected Behavioral and Emotional Responses to Threat

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1. Overview

During the first year of this project, there have been two major goals. The substantive goal has been to examine factors anticipated to affect fear regarding terrorism threats. In our first empirical study, we employed a “dirty bomb” scenario previously explored by Rosoff and von Winterfeldt. We examined reactions to two factors manipulated within the scenarios: governmental recommendations (evacuate the area or do not) and on-site reactions by the public (panic or calm withdrawal).

Of particular concern is the way in which these factors might combine. This question is addressed using functional measurement methodology, which can determine whether the combination rule is additive or multiplicative. Additive combination, our working hypothesis, means the factors operate independently, which has the practical implication that the factors can be applied straightforwardly. Multiplicative combination, on the other hand, is a kind of interaction. Interaction is a more complex pattern that means one must check on possible amplification or cancellation effects when factors are applied in concert.

We are examining the effects of these factors in two contexts. An avowed goal of terrorism is to instill terror. Accordingly, we look for psychological impacts, such as worry and dread. We also look at anticipated behavioral responses. A working hypothesis is that actions taken in response to terrorism threats are constrained by pragmatic limitations. There is only so much one can do. Accordingly, factors that generate varied emotional responses may not generate variation in actions. The psychological importance of such a result is that putting people in a situation where they cannot find an appropriate response to a threat is a recipe for generating the classic phenomenon of learned helplessness. This may provide an explanation for apathetic public responses to warnings.

The methodological goals are twofold. First, we require a means of analyzing actions as they respond to factorial manipulation. The new NANOVA procedure, an analysis of “variance” for factorial designs, accomplishes that goal. The analysis was developed and a computer program was written; that work has been submitted for publication.

Second, we contrast independent groups designs (between-subjects) with repeated measures designs (within-subjects). The standard approach in functional measurement research is to have each person respond to all of the stimulus combinations, a repeated measures design. Here, where the scenarios are particularly vivid, that approach risks having the structure of the design become apparent to the respondent who might thereby artifactually generate an orderly response pattern. In addition, the repeated measures design risks fatigue and desensitization. The alternative is the independent groups design, in

“..."
which a respondent is exposed to only one cell of the factorial design. The potential downside of that approach is that a participant has no context in which to embed the response. A hybrid design, in which the first responses by participants in a repeated measures design themselves constitute an independent groups design, is another of our methodological innovations.

2. Research Accomplishments

We carried out data collection on the internet, using 200 USC undergraduates as the participant population. We are aware of possible limitations of that population with respect to the extent of fear they experience, but because our focus is on the interconnections between responses, the undergraduates are suitable for model evaluation. We used the Qualtrix system, newly introduced at USC, to facilitate stimulus presentation and data collection. Although Qualtrix was not set up to present factorial designs, we developed a means of doing so. This should prove helpful in expanding the subject pool.

The scenarios were described as simulated future news reports. The location of the bombs was varied across large public venues in the Los Angeles area. Here is a base scenario:

“December 15, 2008: Terrorists used a radioactive dirty bomb (explained separately*) to attack the Rose Bowl in Pasadena just minutes after USC’s football game began. The explosion produced a mushroom-like cloud of radioactive material. The cloud blew southwest of the stadium through Alhambra and towards downtown Los Angeles. It extended as far southwest as USC (over 10 miles from the Rose Bowl) before dissipating. Terrified by the smoky cloud forming above their heads, the 80,000 sports fans raced out of the stadium. Thousands of patrons were trampled and many fights broke out. The rush to evacuate created mass congestion at all major exits. To make matters worse, as the radioactive cloud became visible to patrons in the parking lot, they began breaking into parked cars in hopes of finding shelter. Hazardous materials specialists estimated that sports patrons were exposed to radiation levels that will mostly likely result in radiation sickness and possibly death to those with weakened immune systems. Persons outside of the hot zone and within a couple miles of the detonation site were said to be exposed to radiation levels equivalent to that used during a CAT scan (a medical diagnostic procedure). A government advisory was released stating that they were investigating the explosion and that updates would be provided as additional information was received.” Following the base scenario, one of four combinations (a 2x2 design) of governmental recommendations and public reaction was added.

Our questions included three inquiries regarding reactions in the fear domain:

1. Using the following scale, to what degree do you feel you could protect yourself from an event like this? (Select one)
   Low risk 0 1 2 3 4 5 6 7 8 9 10 High risk

2. Using the following scale, to what degree would you feel that you and your friends and/or family in Southern California were at risk after learning of this event? (Select one)
   Low risk 0 1 2 3 4 5 6 7 8 9 10 High risk

3. Using the following scale, to what degree would this event cause you to worry about your safety throughout the day until this event was resolved? (Select one)
   Limited worry 0 1 2 3 4 5 6 7 8 9 10 Very worried

Along with a question that looked at anticipated action:
4. You have tickets to an event at the Staples Center scheduled the week following the terrorist attack described here. What would you do as a result of learning about the attack?

The latter question generates a nominal response. The most common response we observed was to do nothing different.

Although the data analysis is not quite complete, we have noted some interesting results. For example, the independent groups result shown below depicts generally high degrees of worry (note the values of the cell means, in the range to 7 to 9). However, the governmental recommendations we included did not generate significant (differential) effects, while public reaction did (panic inspired more worry than calm). The same pattern emerged when we examined the repeated measures result shown below. Unfortunately, because we need two significant factors in order to evaluate a theoretical model, we were not been able to address the model question with these data.

Moreover, the results for the repeated measures design did not accord fully with the independent groups results, raising the concern that our methodological exploration is tapping into a matter of some importance. For the protect question, both main effects were significant, and the interaction nonsignificant, with the repeated measures design; but no effects were significant with the independent groups design. For the risk question, public reaction was the only significant effect; but only in the repeated measures design.

In sum, the additive model was supported only with the more powerful repeated measures design, and only for one question (protect). The positive way to regard these conflicting results is to champion the repeated measures design, and to say that a person’s responding to all of the stimuli does not artifactually induce results consistent with the model because the favorable result occurred for only one of the three quantitative questions.

Independent of the model test, we were able to demonstrate a consistent emotional effect of the social variable, how other people on the scene react. That is, people take as a cue to their own emotional response what other people did. In contrast, recommendations from the government are less likely to have a differential impact. However, nominal (behavioral) responses were not sensitive to either manipulated factor, consistent with the notion that actions are constrained whereas attitudes are not.
In the next phase of our research, we will change the setting of the terrorist threat to a venue that may appear more plausible to our participants, a terrorist attack at an airport. We will attempt to make our manipulated variables, government communication and response by others, more efficacious. Instead of having the government suggest a course of action, we will have them provide an assessment of the danger in the situation. The other people described in the scenario will be doing (or not doing) the behavior we are asking about; we will report on changes in flying rates. This is a more direct social cue. We hope to elicit larger differential effects of the variables we embed in the scenarios. We will also explore a
compromise experimental design, a mixed design in which the respondent sees some, but not all, of the stimulus combinations. This is an attempt to provide the power of a repeated measures design while reducing the risk of artifactual model support.

In addition to the experimental work, we compiled a large bibliography of published papers relevant to psychological responses to terrorism.

3. Research Products

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<tr>
<td>5a # of peer-reviewed journal reports published</td>
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<tr>
<td>5a # of peer-reviewed journal reports accepted for publication</td>
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<tr>
<td>5a # of non-peer reviewed publications and reports</td>
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<td>5c # of products delivered to DHS, other Federal agencies, or State/Local</td>
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<tr>
<td>5c # of products introduced to market</td>
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3.1. Publications and Reports


3.2. Presentations

- Weiss, D. J., John, R., Rosoff, H., Hovsepian, M. Emotional and behavioral responses to terrorism threats. Accepted for presentation at 2008 Brunswik Society Meeting.


3.3. Models, Databases, and Software Tools and Products

<table>
<thead>
<tr>
<th>Date Delivered</th>
<th>Item</th>
<th>Agency Receiving Product</th>
<th>Agency POC</th>
<th>Commercialization Status (D-delivered, P-Pipeline, M-Market)</th>
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<td>9/2/2008</td>
<td>NANOVA installer</td>
<td></td>
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<td>M (free download from website)</td>
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The NANOVA program is described on, and made available through, the web page http://www.davidjweiss.com/NANOVA.htm.

4. Education Products

Our research team has benefitted from the contributions of three USC graduate students, Heather Rosoff, Marcel Hovsepian, and Nick Scurich. In addition, we had two research interns during Summer 2008, Tarra Jackson from Howard University and Carlos Cintron from the University of Puerto Rico.