



Deception in stress reactivity and recovery research

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ABSTRACT

Objective: Testing stress reactivity in the laboratory often requires deception or at least concealment of the hypothesis in order to mimic real-life provocations. Researchers routinely conduct a post-experimental validity check about the success of deception in order to rule out competing hypotheses. The research literature on the impact of failed deception offers contradictory results about the 'cost' of failed deception. To date, no evaluation of this threat to internal validity has used objective physiological indices to assess the extent of damage to the results when deception or concealment fails. In this study we evaluated whether or not post-experimental assessment of participants' ability to see through a protocol affected physiological and subjective responses to an anger-provoking laboratory task.

Method: One hundred and thirty-seven participants were subjected to an anger provocation task disguised as a 'cognitively challenging arithmetic task'.

Results: Forty-six participants declared during debriefing that they had seen through or suspected that the underlying hypotheses were related to anger provocation but neither blood pressure, heart rate, or self-reported affect responses to the tasks differentiated the 'aware' from the 'unaware' group.

Discussion: We posit that concealment of the hypothesis in anger provocation experiments is usually effective and may not be a threat to the study's internal validity.

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1. Introduction

1.1. Objective of this manuscript

Psychologists conducting experimental research often use elements of deception in order to test their hypotheses (Hertwig and Ortmann, 2008). Such deception is implemented to assure experimental control and improve the internal validity of experimental protocols (Stang, 1976). The current manuscript provides an empirical test of what happens when research participants claim to have seen through deception or concealment. We had the opportunity to test the impact of attempted concealment in a study designed to evaluate emotional and physiological reactivities to an anger provocation stressor. A literature search revealed that no previous publication had tested this question using physiological outcomes.

1.2. Deception and concealment in psychological research

The current research needs to be placed within the context of existing literature on the use of deception in experiments. The word 'deception' is likely to trigger associations in the reader with the intriguing world of spies, marital infidelities, unsavory sales practices

and, for this readership at least, certain types of studies in psychology. There is widespread consensus that deception is generally undesirable and should be avoided (Hertwig and Ortmann, 2008; Ortmann and Hertwig, 1997, 2002; Fisher and Fyrberg, 1994), yet many psychological phenomena (for example, bystander effects, consumer behaviors, mood inductions, or social skills assessments) are best studied using outright deception or at least some form of concealment of the true experimental hypothesis (Bonetti, 1998; Kimmel, 1998). Use of deception is by no means rare; in Social Psychology journals, between 30% and 50% of experiments (somewhat variable between different journals) contain elements of deception (Hertwig and Ortmann, 2008).

Institutional review boards for research ethics habitually require that participants are fully debriefed after completion of the experiment (and before leaving the laboratory) so that they depart without emotional turmoil and without having developed antipathies against psychological research (Epley and Huff, 1998). To increase the probability of successful concealment, researchers prefer to work with relatively naïve subjects and, in the case of university students as participants, favour 1st and 2nd year students because they have yet to learn about the intricacies of experimental design.

This particular article deals with one aspect of deception in research, namely what happens to a study's internal validity (and ultimately the study results) when concealment of the hypothesis is reported post-experimentally as having failed. Use of deception in experimental designs is particularly undesirable when it fails to achieve its intention, namely to assure that responses are not confounded by expectations and knowledge about the experimenters' intentions (Taylor and

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Shepperd, 1996). This raises the question of how often and under what circumstances participants see through psychologists' concealments.

Researchers have reported contradictory results on this account and results may also vary between areas of research and types of protocols (Hertwig and Ortmann, 2008): [a] Research on conformity is greatly affected by participants' discovery of the study hypotheses, [b] participant responses are also changed if participants repeat a similarly deceptive study later, but [c] vague or non-specific announcements of potential deception appear to have little, if any impact.

Interestingly, all available studies involving manipulation checks for suspicion of deception used self-report or overt behavior to compare the response of naïve versus suspicious participants. None have used objective physiological indices (Hertwig and Ortmann, 2008). When psychologists began research involving deception and concealment, they reported that few subjects were suspicious (Stricker et al., 1967) whereas our own observations and unpublished anecdotal reports suggest that students have become more knowledgeable and suspicious over time.

1.3. The rationale for this study

The prevailing pathway model of how mood and affect relate to the development of high blood pressure and coronary artery disease is that some individuals react more strongly to affect provocation, and that sustained activation of the physiological stress response is the presumed mechanism for later disease development (Schwartz et al., 2003). A number of researchers have shown that a more comprehensive method of studying this pathway model is to carefully evaluate reactivity to and recovery from stressors (Andersen et al., 2005; Hocking-Schuler and O'Brien, 1997; Linden et al., 1997; Brosschot and Thayer, 1998). Furthermore, there is evidence that emotion provoking, interpersonal stressors are more likely to slow down recovery and maintain activation than are mere physical or cognitive challenges (Dickerson and Kemeny, 2004; Linden et al., 1998). To tap physiological activation we measured heart rate (which is mostly an index of motor activity), systolic blood pressure (which is mostly based on alpha-adrenergic activity) and diastolic blood pressure that largely reflects vascular changes and is sensitive to negative affect, in particular anger (Brosschot and Thayer, 1998; Schwartz et al., 2000). Intentional provocation of anger in laboratory reactivity paradigms has been a key tool in the psychophysiological study of affect inducement and health outcomes. Ideally, such linkages would be studied in the natural environment, however, there are pervasive and difficult to overcome methodological problems with any attempt to maintain control in field studies; lack of control, in turn, makes interpretation of field studies results very difficult. An additional concern is that of ethics, because researchers don't want to provoke anger in situations where they cannot assure the safety of research participants (and possibly the experimenters themselves). This has led to the development of laboratory tasks where anger is intentionally provoked but where the protocols are carefully crafted to ensure the hypothesis is concealed and the resulting anger level is not excessive. As well, researchers ensure that there is a comprehensive debriefing at the conclusion of the experiment (Andersen et al., 2005; Schwartz et al., 2000). In order for the anger provocation to be effective and interpretable, it is a methodological requirement that the participant does not fully understand the study's hypothesis and cannot prepare for his or her own emotional response. Therefore, researchers using anger provocation want to ensure that the intended deception or concealment actually worked and that the participant responded with genuine anger. If, for example, hostile participants were consistently more likely to see through concealment of an intended anger provocation than non-hostile participants, they might modulate their responses correspondingly and become even angrier or pull back in their efforts to perform well on the task. In such a case,

researchers have a serious threat to their study's internal validity and results may be difficult to interpret. It has become a standard protocol feature to ask participants after completion of the lab task whether or not they have seen through the deception or concealment.

In this manuscript we are reporting a study where healthy undergraduates were exposed to anger provocation and the researchers had the opportunity to use information garnered post-experimentally to objectively assess the impact of failure to fully conceal the hypothesis. "Impact" was operationally defined here as the affective and cardiovascular responses of participants.

2. Method and materials

Participants with complete, usable data for this study were 137 normotensive undergraduate students recruited from the psychology Human Subject Pool, as well as through posters situated around campus. The great majority of participants were 1st or 2nd year students who had not yet declared a major for their program of study. The sample's demographics included a mean age of 22.3 years, 100 females and 37 males, and ethnic diversity of 58% Asian, 28% Caucasian, 4% South Asian, and 10% 'other' participants. Inclusion criteria for this study included being over the age of 18 years and possessing a working knowledge of the English language. Exclusion criteria included the use of antihypertensive medication, a current blood pressure level of over 160/100 mm Hg, long term use of prescription or non-prescription sleep medication (as this study was being run concurrently with another study looking at sleep measures), and the frequent use of anxiolytics. Twenty-seven additional individuals had to be excluded from the final analysis for the following reasons: fifteen did not complete the lab session, seven did not meet inclusion criteria (e.g., prescription drug use, language barrier, etc.), and five were excluded due to experimental error. Subjects received course credit or an honorarium in exchange for their participation. The study was approved by the university's ethics committee.

2.1. Measures

2.1.1. Demographic information

Each participant completed a demographic questionnaire including ethnicity, age, gender, and chronic illness profile (as well as any diagnosed sleep disorders). Only participants in good health were included. Participants also completed a compilation of questionnaires on stress, anger, and worry chosen for their psychometric properties in order to obtain information on the psychological variables that may predict reactivity and recovery rates. These findings will be reported in a separate manuscript.

2.1.2. Blood pressure

A BP monitor was attached to the participant's non-dominant arm for the duration of the lab portion of the study. The VSM-100 BpTRU automatic blood pressure monitor has been found to be a reliable non-invasive measurement for both pediatric and adult populations (ages 3–83 years) (Mattu et al., 2004). BpTRU measurements were found to be within 5 mm Hg 89.2% of the time when compared to standard auscultatory mercury sphygmomanometer measurements, with 96.4% and 99.3% of measures being within 10 and 15 mm Hg, respectively (Mattu et al., 2004). Furthermore, Beckett and Godwin (2005) found significantly better correlations between the BpTRU clinic blood pressure monitor and daytime ambulatory BPs ($r=0.57$) than clinic averages ($r=0.15$) in a sample of hypertensive patients.

2.2. Procedure

Following eligibility screening, the participants arrived at the lab and were met by the primary experimenter. Participants then completed consent forms, which disclosed that the study was

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