

The Scientific Impotence Excuse: Discounting Belief-Threatening Scientific Abstracts

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The scientific impotence discounting hypothesis predicts that people resist belief-disconfirming scientific evidence by concluding that the topic of study is not amenable to scientific investigation. In 2 studies, participants read a series of brief abstracts that either confirmed or disconfirmed their existing beliefs about a stereotype associated with homosexuality. Relative to those reading belief-confirming evidence, participants reading belief-disconfirming evidence indicated more belief that the topic could not be studied scientifically and more belief that a series of other unrelated topics could not be studied scientifically. Thus, being presented with belief-disconfirming scientific evidence may lead to an erosion of belief in the efficacy of scientific methods.

Here we have a case where the National Science Foundation not only cannot give us an answer for the \$84,000 they are charging to taxpayers, but even if they could give an answer, we wouldn't want to hear it.

—Senator William Proxmire (National Science Foundation, 1975, p. 73)

We selectively admit new evidence . . . if it confirms us in our previous belief. . . . But if we find evidence that is contradictory to our preconception, we are likely to grow resistant.

—Gordon Allport (1954, p. 22)

The words of Senator Proxmire, who was targeting a grant written by Ellen Berscheid for inclusion among his Golden Fleece Awards—given to federally funded research projects that he deemed as wasting taxpayers' money—suggests two interesting anti-intellectual critiques of certain research projects (Shaffer, 1977). The first critique is of central importance to the current research. Specifically, the critique is that certain questions cannot be answered scientifically. The second critique may contribute to one's belief in the validity of the first critique. The second critique is that people do not want to hear the answers to certain scientific investigations.

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While Senator Proxmire preferred that close interpersonal relationships remain a mystery, rather than a target of Berscheid's scientific scrutiny, the current research focuses on situations in which people do not want to hear the results of a scientific study because they contradict pre-existing beliefs. As mentioned by Allport (1954), people resist belief-contradicting information. The current research investigates Senator Proxmire's first critique; that certain questions cannot be answered scientifically, as a potential resistance process that allows people to discount belief-contradictory scientific information.

The notion that belief-contradictory information is resisted is supported by a great deal of research in the area of biased assimilation. Research has investigated people's reactions to many different kinds of persuasive evidence including logical syllogisms (Edwards & Smith, 1996), a film of a sporting competition (Hastorf & Cantril, 1954), naturally occurring exposure to historical information (Hulsizer, Munro, Fagerlin, & Taylor, 2004), legal-type evidence summaries (McHoskey, 1995), arguments presented during a political debate (Munro et al., 2002), descriptions of technological breakdowns (Plous, 1991), and essays/editorials about a social policy issue (Miller, McHoskey, Bane, & Dowd, 1993; Pomerantz, Chaiken, & Tordesillas, 1995; Zuwerink & Devine, 1996). Jacks and Cameron (2003) identified seven general strategies that people claim to use when resisting persuasive attempts. These include counterarguing the message, bolstering one's original attitude, social validation of one's original attitude, derogating the source of the message, reacting with negative affect, avoiding the message, and asserting confidence in one's belief. Additionally, personal importance of the attitude being targeted, knowledge of the issue, social desirability of the resistance strategy, and the perceived effectiveness of the strategy (also see Ahluwalia, 2000, for research on ease of refutability) were associated with likelihood ratings of which strategies participants claimed they would use to resist persuasive attempts. For example, the likelihood ratings of derogating the source of the message, reacting with negative affect, and asserting confidence in one's belief were negatively correlated with social desirability, suggesting that these techniques are perceived to be less socially acceptable.

Research on resistance strategies (e.g., Ahluwalia, 2000; Jacks & Cameron, 2003) has attempted to further our understanding of resistance processes in general, understanding resistance to prototypical kinds of persuasive information. For example, participants listened to an anti-death-penalty speech (Jacks & Cameron, 2003) or media information about the Clinton-Lewinsky affair to which participants were naturally exposed (Ahluwalia, 2000). However, there is also a growing body of research suggesting that people resist evidence that comes in the form of scientific information (e.g., Cohen, Aronson, & Steele, 2000; Koehler, 1993; Lord, Ross, & Lepper,

1979; Mahoney, 1977; Munro & Ditto, 1997; Munro, Leary, & Lasane, 2004). Belief-contradicting scientific information may elicit different resistance processes than belief-contradicting information of a nonscientific nature. Source derogation, for example, might be less effective in response to scientific than nonscientific information. Scientific information is not usually presented in the form of an obvious persuasion attempt like many kinds of nonscientific information (e.g., advertisements, newspaper editorials, legal arguments, political debates). Thus, a blatant agenda is not often associated with the source of scientific information, especially because scientific researchers usually maintain (in their research reports, at least) a somewhat detached and dispassionate stance from their work.

As for counterarguing as a resistance process, the research referenced earlier suggests that people are quite adept at finding methodological flaws in research reports that are inconsistent with their existing beliefs (Cohen, Aronson, & Steele, 2000; Koehler, 1993; Lord, Ross, & Lepper, 1979; Mahoney, 1977; Munro & Ditto, 1997; Munro, Leary, & Lasane, 2004). Of course, the scientific studies used in that line of research were, in most cases, two- to four-page reports constructed by the researchers to be easy enough for undergraduates both to understand and critique effectively, if motivated to do so. When exposed to scientific research in the real world, however, people are rarely provided details regarding the methodology of the research. Newspaper and magazine articles, television reports, and even textbook passages usually provide only a brief summary of the research, usually focusing on the results and conclusions, rather than the methodology. For example, the following passage was taken from a well known social psychology textbook:

Under certain circumstances, people choose to believe only what they want to believe, usually what fits with their self-interests and personal preferences. . . . This tendency can affect persuasion. For example, people see information that contradicts what they prefer to believe as less valid than information that supports these beliefs; as a result, such evidence is less persuasive. (Kenrick, Neuberg, & Cialdini, 2005, p. 160)

Notice that if one wanted to resist this information, a methodological critique is not an option (without referring directly to the original articles). Additionally, because these brief reports of results and conclusions found in mass-media news outlets are often presented as fact rather than research evidence that could be either invalid or unreliable, resistance processes may be constrained both by the difficulty of refutability (Ahluwalia, 2000) and low perceived social desirability (Jacks & Cameron, 2003). Thus, the likelihood that other resistance processes will be used increases.

The current research explores the possibility that people might discount scientific conclusions by coming to believe that scientific methods are impotent to address the topic of study. For example, proponents of extrasensory perception (ESP) sometimes discount failed attempts to support the existence of ESP by claiming that the phenomenon disappears when placed “under the microscope,” especially the cold microscope of ESP nonbelievers (Randi, 1982; Schmeidler, 1997). That is, there is a kind of observer effect whereby ESP is changed or eliminated when attempts to observe and measure it are taken. Thus, scientific methods, including careful observation and measurement, are impotent to reveal answers to the question of whether or not ESP exists.

The scientific impotence method of discounting scientific research that disconfirms a belief is certainly worrisome to scientists who tout the importance of objectivity. Even more worrisome, however, is the possibility that scientific impotence discounting might generalize beyond a specific topic to which a person has strong beliefs. In other words, once a person engages in the scientific impotence discounting process, does this erode the belief that scientific methods can answer any question? From the standpoint of the theory of cognitive dissonance (Festinger, 1957), the answer to this question could very well be “Yes.”

The theory of cognitive dissonance suggests that inconsistent cognitions produce a feeling of psychological discomfort that motivates a person to reduce the unpleasant feeling by returning consistency to the cognitive system (Festinger, 1957). There are several ways to reduce cognitive dissonance, including changing one of the cognitions or adding new cognitions in a way that would bring consistency back to the system. While the original theory suggested that dissonance would occur in response to any inconsistent cognitions, more recent research and theory has emphasized the importance of cognitions that threaten one’s self-image as a smart and moral person (Aronson, 1968, 1969; Higgins, 1987, 1989; Steele, 1988; Tesser, 1988).

Cognitive dissonance theory has been used to explain numerous social psychological findings, including biased assimilation (Aronson, 1992; Berkowitz & Devine, 1989). There has been debate about whether biased assimilation is mediated by a purely cognitive, Bayesian process (Lord, 1989, 1992) or an affective–motivational, dissonance-like process (Aronson, 1992; Berkowitz & Devine, 1989). However, recent research has helped to clarify the nature of the process. When a person holds a belief, especially a strong one that is linked to important values (e.g., some sociopolitical beliefs), information threatening that belief creates inconsistency in the cognitive system that threatens one’s self-image as a smart person. This produces an unpleasant emotional state, which, research has suggested, mediates the resistance to belief-disconfirming information (Jacks & Devine, 2000; Munro &

Ditto, 1997; Munro et al., 2002; Zuwerink & Devine, 1996). In other words, the presentation of belief-disconfirming information appears to produce unpleasant psychological feelings, and the strength of these feelings is negatively correlated with judgments about the quality of the information.

Furthermore, self-affirmation manipulations reduce resistance to belief-threatening information (Cohen et al., 2000, 2007). For example, participants in the self-affirmation condition of Cohen et al.'s (2000) Study 1 wrote about experiences in which personally important values made them feel good about themselves (i.e., they affirmed an important aspect of their self-concept). Although the personally important values were unrelated to the issue of capital punishment, these participants rated a belief-threatening scientific report on the deterrent efficacy of the death penalty more favorably than did participants in a nonaffirmed control group. The fact that self-affirmed participants were less resistant to belief-threatening information than were nonaffirmed participants suggests that belief-threatening information does indeed threaten one's self-concept.

Studies supporting an affective-motivational model of belief resistance have allowed participants to evaluate the favorability of several-page scientific reports (Cohen et al., 2000, Studies 1 and 2; Munro & Ditto, 1997) or of sociopolitical debate information (Cohen et al., 2000, Study 3; Jacks & Devine, 2000; Munro et al., 2002; Zuwerink & Devine, 1996). Thus, participants could reduce their dissonance by critiquing the methodology of the scientific reports or counterarguing the logical arguments presented by the debaters to support their opinions. When these dissonance-reduction methods are not available because details about the methodology are not provided or because the information is presented as scientific fact, rather than partisan opinion, participants may be cornered into using other dissonance-reduction methods. Specifically, participants may resort to adding the cognition that science is incapable of answering the question addressed in the belief-threatening information.

Notice, however, that while adding such a cognition to the system should indeed reduce the dissonance caused by the presentation of the belief-threatening information, it also may have ripple effects throughout the rest of the cognitive system. The process of reducing cognitive dissonance has sometimes been called a *rationalizing process*. It follows that the effectiveness of a dissonance-reduction process would depend on the degree to which it produces a coherent, internally consistent resolution that allows the individual to view himself or herself as an intelligent, unbiased person who does not hold hypocritical beliefs.

Using the scientific impotence excuse for one and only one topic as a result of exposure to belief-disconfirming information about that topic might put the individual at risk for having to acknowledge that the system of beliefs

is somewhat biased and possibly hypocritical. Thus, to avoid this negative self-view, the person might arrive at the more consistent—and seemingly less biased—argument that science is impotent to address a variety of topics, one of which happens to be the topic in question. For example, Senator Proxmire's distaste for Ellen Berscheid's research on close interpersonal relationships was not solely an attack on the legitimacy of studying love, "even if" [the research] "could give an answer" (National Science Foundation, 1975, p. 73). It also extended to a lack of belief in the epistemology underlying social science research generally (Shaffer, 1977). This point is demonstrated by a statement about the social sciences that Senator Proxmire gave in an interview with the *APA Monitor* ("Proxmire Speaks Out," 1975): "It's too bad they're called 'social sciences,' because they are not quite. I don't know what they are. They're somewhere in between science and art."

Study 1

There are two hypotheses for Study 1. First, the scientific impotence discounting hypothesis states that, compared to people reading belief-confirming scientific abstracts, people reading belief-disconfirming scientific abstracts will report more belief that scientific methods are incapable of answering the question addressed in the abstracts. To test the scientific impotence discounting hypothesis, participants who believe or disbelieve the stereotype that homosexuality is associated with mental illness were asked to read a set of scientific summaries revealing results and conclusions that either confirm or disconfirm participants' pre-existing beliefs in the stereotype. Participants then had the opportunity to discount the summaries based on the reasoning that scientific methods cannot be used to answer the question of whether homosexuality is associated with mental illness.

Second, the scientific impotence generalization hypothesis states that, compared to people reading belief-confirming scientific abstracts, people reading belief-disconfirming scientific abstracts will report more belief that scientific methods are incapable of answering other questions that are unrelated to the question addressed in the abstracts. To test the generalization hypothesis, participants were given the opportunity to endorse the belief that scientific methods cannot address several other topics that are completely unrelated to the stereotype of homosexuality. Additionally, Study 1 included a control condition in which participants read scientific abstracts that were identical to those read by the belief-confirming and belief-disconfirming conditions, except that the groups were identified using novel group names, rather than the existing and culturally important group labels of *homosexual* and *heterosexual*. Inclusion of the control group will reveal which group or groups deviate from baseline on the dependent measures.

Method

Participants

Study participants were 84 students who volunteered to participate in a study entitled “Judging the Quality of Scientific Information.” As compensation, participants received extra credit in a psychology course.

Design Overview

Participants were divided into three groups. Approximately two thirds of participants were assigned to the experimental condition in which they read summaries of scientific studies assessing the validity of a stereotype of homosexuality. For half of these participants, the summaries concluded that the stereotype was valid; while for the other half, the summaries concluded that the stereotype was not valid. These participants were then assigned to a condition based on the summaries they read and their initial belief in the validity of the stereotype. Participants were categorized to either the confirming or disconfirming condition, depending on whether the summaries supported or opposed their pre-existing beliefs about the stereotype.

Approximately one third of participants were assigned to the control condition. They read summaries that were identical to those read by participants in the experimental conditions, with one exception. There was no mention of sexual preference groups in these summaries. Instead, the group names of *Zivs* and *Daps* were used in place of *heterosexuals* and *homosexuals*. Thus, three groups (confirming, disconfirming, and control) were created.

Procedure and Materials

Initial stereotype assessment. After reading consent forms and agreeing to participate, participants in the experimental conditions completed an assessment of their endorsement of the societal stereotype. In order to avoid any possibility that participants in the control group might associate the topic of the research summaries with sexual preference group differences, participants in the control conditions completed this measure only after completing all other experimental materials. The assessment measured endorsement of the stereotype that homosexuality is associated with mental illness on a 9-point scale ranging from -4 (*strongly believe homosexuals are mentally ill*) to 0 (*neither believe nor disbelieve*) to $+4$ (*strongly disbelieve homosexuals are mentally ill*).

Scientific summaries. After completing the initial attitude assessment, participants then read a sheet containing summaries of five scientific studies. The sheet first contained a set of instructions. For participants in the control group, the instructions began, "The following information may seem unusual to you, because we have adapted it somewhat from its original form. We have inserted the labels 'Zivs' and 'Daps' to refer to the groups used in the original research." The instructions continued by stating the following, which all participants read:

An extensive and thorough review was recently conducted of all published research articles on the topic of whether or not there is an association between homosexuality (Dap membership) and mental illness. The following is a representative sample summarizing the research on that topic. The research studies described in these five summaries are typical of the methods, results, and conclusions found in all of the studies on this topic. The five summaries below were taken from research that was published in highly regarded professional journals that use a peer-review system where other experts in the field review and evaluate the research to determine whether it will be accepted for publication or rejected.

The summaries were constructed so that the logic and wording of the summarized studies were designed to be easy enough for an undergraduate to clearly understand. One example is as follows:

The percentage of homosexuals (Daps) in a variety of psychological treatment centers was compared to the percentage of homosexuals (Daps) in the general population. Results indicated that the percentage of homosexuals (Daps) in psychological treatment centers was substantially higher than the percentage of homosexuals (Daps) in the general population. This study suggests that homosexuals (Daps) are overly represented in psychological treatment facilities . . .

The five summaries always arrived at similar conclusions, either revealing evidence of group differences (as in the aforementioned example) or revealing no evidence of group differences.

Discounting-topic assessment. The discounting assessment had two sections. First, the discounting-topic assessment consisted of one item measuring the degree to which participants discounted the results and conclusions of the scientific study summaries by endorsing the idea that whether or not the stereotype is valid is a question that cannot be answered using scientific

methods. Participants responded to a statement on a 9-point scale ranging from 1 (*completely disagree*) to 9 (*completely agree*). The statement was “The question addressed in the studies summarized on the previous page (i.e., the association or lack of association between homosexuality and mental illness) is one that cannot be answered using scientific methods.” For participants in the control group, the term “homosexuality” was replaced by “Dap membership.”

Discounting-unrelated assessment. The second section of the discounting assessment consisted of five items measuring the degree to which participants believed in the potency of scientific methods to answer five questions that are completely unrelated to stereotypes about homosexuality. These included the existence of clairvoyance, the effectiveness of spanking as a disciplinary technique for children, the effect of viewing television violence on violent behavior, the accuracy of astrology in predicting personality traits, and the mental and physical health effects of herbal medications. Participants responded on a 9-point scale ranging from 1 (*completely disagree*) to 9 (*completely agree*) to statements that were identical to the one used in the discounting-topic assessment, with the exception of the replacement of the five unrelated topics.

Debriefing

After completing the dependent measures, a thorough process debriefing occurred. Participants were informed of the true purpose of the study and that the scientific study summaries that they had read were completely fake. In addition, participants were offered the opportunity to read actual scientific studies on the topic of homosexuality and its association with mental illness.

Results

Design Overview

Based on responses to the initial stereotype assessment, participants were categorized as *believers*, those who believe that homosexuality is associated with mental illness (a negative number on the scale); or *nonbelievers*, those who do not believe that homosexuality is associated with mental illness (a positive number on the scale). There were 9 participants who circled the midpoint of the initial stereotype assessment scale and were not included in any of the analyses. Believers and nonbelievers were then categorized to either the confirming or disconfirming conditions, depending on whether the

summaries they read supported or opposed their pre-existing beliefs about the stereotype. Thus, originally, 2 (Initial Stereotype: believers vs. nonbelievers) \times 3 (Belief–Study Consistency: confirming, disconfirming, or control) two-way ANOVAs were conducted. However, no main effects or interactions involving the initial stereotype variable were significant. Therefore, the analyses reported here are one-way ANOVAs using only the belief–study consistency variable.

Discounting of Scientific Methods for Topic of Summaries

The ANOVA on the rating scale item from the discounting-topic assessment reveals a significant effect, $F(2, 72) = 11.82, p < .001$. Tukey's post hoc tests were used to identify whether the bias was located more among the confirming group, the disconfirming group, or both. That is, after reading belief-confirming summaries, participants might report less belief than the control group participants that science cannot effectively address such questions or, after reading belief-disconfirming summaries, participants might report more belief than the control group participants that science cannot address such questions effectively.

The post hoc tests reveal that the disconfirming group ($M = 6.10$) differed from both the control group ($M = 4.38, p < .01$) and the confirming group ($M = 3.61, p < .01$), which did not differ ($p = .24$). Thus, it appears that reading belief-disconfirming summaries produced more belief that scientific research could not effectively address the question of whether or not homosexuality is associated with mental illness.

Discounting of Scientific Methods for Unrelated Topics

The five items from the discounting-unrelated assessment were averaged to create one index ($\alpha = .64$), which was analyzed using a one-way ANOVA. This analysis reveals a significant effect, $F(2, 72) = 3.30, p < .05$. The results for the discounting-unrelated assessment were generally consistent, though not as strong, as the results for the discounting-topic assessment. The disconfirming group ($M = 4.87$) was marginally significantly different from both the control group ($M = 4.08, p = .082$) and the confirming group ($M = 3.95, p = .053$), which did not differ ($p = .92$).

Discussion

The results of Study 1 support the scientific impotence discounting hypothesis. Participants who read scientific abstracts that disconfirmed

their beliefs about a homosexuality stereotype were more likely to endorse the idea that scientific methods are incapable of answering the question of whether or not the stereotype is accurate. Additionally, inclusion of the novel groups control condition suggests that it is those who read belief-disconfirming abstracts that deviated from the normative baseline. That is, reading belief-disconfirming scientific abstracts increased endorsement of scientific impotence, and it does not appear that reading belief-confirming scientific abstracts decreased endorsement of scientific impotence.

The generalization hypothesis was also supported by the significant effect for the ANOVA. Consistent with the results for the discounting hypothesis, the pattern of means suggests that participants who read belief-disconfirming scientific abstracts were more likely to endorse the idea that scientific methods are incapable of answering several other questions unrelated to the homosexuality stereotype. However, the post hoc tests reveal only a marginally significant difference between the belief-disconfirming group and the other two groups.

Study 2

Study 2 had two goals. First, given the relatively small size of the effect on the discounting-unrelated assessment, it is important to assess the reliability of this finding using a different sample. Second, the discounting-unrelated assessment employed the same rating scales and, with the exception of the topic, the same question wording as the discounting-topic assessment. Thus, to minimize the possibility that responses to the discounting-unrelated assessment were caused by a demand characteristic, a different measure of discounting-unrelated topics was included in Study 2. This measure assessed participants' seeking of scientific versus nonscientific information to inform them about an important sociopolitical topic, but one that is not obviously related to stereotypes about homosexuality.

Method

Participants

Study participants were 93 students who volunteered to participate in a study entitled "Judging the Quality of Scientific Information." As compensation, participants received extra credit in a psychology course.

Procedure and Materials

The procedure and materials for Study 2 were identical to those of Study 1, with the following exceptions. First, no control group was included. Every participant read summaries that included the terms *homosexuals* and *heterosexuals*. Second, participants completed two additional measures.

Information seeking about an unrelated topic. After completing the discounting-unrelated assessment, participants completed a measure assessing information seeking about the death penalty on a separate page. This measure assessed, in a way different from the discounting-unrelated assessment, their discounting of scientific information to answer questions unrelated to stereotypes of homosexuality. Participants imagined that they had to make a judgment about whether or not the death penalty should be an option in the U.S. judicial system. The participants were asked to what degree they would seek out each of five different sources of information in order to inform their judgments on a 9-point scale ranging from 1 (*completely disagree*) to 9 (*completely agree*).

From the top of the page, the third option was “scientific research assessing various aspects of the death penalty (e.g., whether or not it reduces violent crime, whether it increases or decreases the cost to taxpayers).” The other four sources (two before and two after the scientific research option) were nonscientific information:

opinions from experts in crime and punishment like judges and prison wardens, opinions from experts of morality like religious leaders and philosophers, opinions from the families of murder victims, and essays on the topic written by supporters and opponents of the death penalty.

In addition, participants selected which of the five sources of information they would choose if they could only select one.

Belief change. For the final measure, participants indicated how much their specific beliefs about the validity of the homosexuality/mental-illness stereotype had changed as a result of reading the scientific abstracts. The measure used a 9-point scale ranging from -4 (*more belief that homosexuals are mentally ill*) to 0 (*no change*) to +4 (*more disbelief that homosexuals are mentally ill*).

Results

Design Overview

There were 16 participants who circled the midpoint of the initial stereotype assessment scale, so they were not included in any of the analyses. As in

Study 1, participants were categorized into either the confirming condition or disconfirming condition, depending on whether the summaries supported or opposed their pre-existing beliefs about the stereotype. There was no control group. All of the analyses reported here were conducted using initial stereotype (believers vs. nonbelievers) as an independent variable. However, with the exception of the belief-change measure, no main effects or interactions involving the initial stereotype variable were significant. Therefore, the analyses on the discounting and information-seeking measures reported here did not include initial stereotype as a variable.

Discounting of Scientific Methods for Topic of Summaries

The t test on the rating scale item from the discounting-topic assessment reveals a significant effect, $t(75) = -2.14$, $p < .05$. The disconfirming group ($M = 6.02$) reported more belief that scientific research could not effectively address the question of whether or not homosexuality is associated with mental illness than did the confirming group ($M = 4.81$).

Discounting of Scientific Methods for Unrelated Topics

The five items from the discounting-unrelated assessment were averaged to create one index ($\alpha = .57$). The t test on this index reveals a significant effect, $t(75) = -2.18$, $p < .05$. The results for the discounting-related assessment were consistent with the discounting-topic assessment. The disconfirming group ($M = 4.68$) reported more belief that scientific research could not effectively address the five unrelated topics than did the confirming group ($M = 4.09$).

Information Seeking About an Unrelated Topic

As an additional assessment of the degree to which participants discounted the use of scientific methods in providing information about a topic unrelated to stereotypes about homosexuality, an analysis was conducted on the items assessing information seeking about the death penalty. First, the four items representing nonscientific information were averaged to create a nonscientific information index ($\alpha = .74$). Second, a 2 (Belief-Study Consistency: confirming vs. disconfirming) \times 2 (Information Source: scientific research vs. nonscientific information) repeated-measures ANOVA with information source as a within-subjects variable was conducted.

The ANOVA reveals an information source main effect, $F(1, 75) = 15.97$, $p < .05$, whereby participants indicated greater agreement that they would seek scientific research ($M = 6.56$) than nonscientific information ($M = 5.74$). The main effect was qualified, however, by the significant Belief–Study Consistency \times Information Source interaction, $F(1, 75) = 4.55$, $p < .05$. While those in the confirming condition indicated greater agreement that they would seek scientific research ($M = 6.83$) than nonscientific information ($M = 5.57$), $t(35) = 3.95$, $p < .05$, no such difference was found for those in the disconfirming condition (scientific research, $M = 6.29$; nonscientific information, $M = 5.91$), $t(40) = 1.45$, $p < .16$.

Finally, the item assessing which source of information participants would select if forced to choose only one was analyzed using a chi-square test of independence. Only two sources were included: scientific research versus all other sources (i.e., nonscientific information). The chi-square test reveals a significant effect, indicating that the two variables were not independent of each other, $\chi^2(1, N = 76) = 7.15$, $p < .05$. For those in the confirming condition, 54.3% selected scientific information as the source of information they would choose if they could only choose one; while for those in the disconfirming condition, only 24.4% selected scientific information.

Belief Change

Unlike the discounting and information-seeking measures, which measured the intensity of agreement with statements, the belief-change measure employed a response scale in which the endpoints represented changing toward a specific belief position. Thus, it was necessary to include initial stereotype as a factor in a 2 (Belief–Study Consistency: confirming vs. disconfirming) \times 2 (Initial Stereotype: believer vs. disbeliever) ANOVA. The only significant factor was participants' initial beliefs in the stereotype, $F(1, 73) = 5.90$, $p < .05$. Believers reported shifting toward more belief in the stereotype ($M = -0.47$) than did nonbelievers ($M = 0.82$), who reported shifting toward less belief in the stereotype. This finding was not qualified by whether the participants had read belief-confirming or belief-disconfirming summaries.

Discussion

Consistent with the results of Study 1, Study 2 found support for both the scientific impotence discounting and scientific impotence generalization

hypotheses. Importantly, the scientific impotence generalization hypothesis was supported using multiple measures, including an information-seeking assessment on the topic of the death penalty, which is somewhat different from the discounting-topic assessment. Thus, the likelihood that the scientific impotence generalization results were caused solely by demand characteristics is decreased.

Additionally, Study 2 reveals support for Allport's (1954) notion of resistance. The belief-change measure reveals that, generally speaking, participants did not change their beliefs in the homosexuality stereotype. The means, in fact, show that believers reported more belief in the stereotype, and disbelievers reported less belief in the stereotype. This was true, regardless of whether participants had just read belief-confirming or belief-disconfirming abstracts.

General Discussion

The results of the current research suggest that, given the right situation, people discount scientific evidence that disconfirms an important belief by endorsing the idea that scientific methods are unable to address the topic. This process (i.e., scientific impotence discounting) also generalized to other topics that were unrelated to the original belief. In other words, being presented with belief-disconfirming scientific evidence may lead to an erosion of belief in the efficacy of scientific methods. Furthermore, the lack of belief change for people who just read belief-disconfirming information suggests the possibility that scientific impotence discounting might allow people to retain beliefs that are important to them, even in the face of contradictory scientific information.

The goal of the current research was to examine the existence of the scientific impotence excuse and to investigate whether scientific impotence discounting generalizes to other topics. Thus, there are questions that remain unanswered. The issue of spontaneity, for example, was not addressed by the current research. That is, does scientific impotence discounting occur spontaneously, or only as a result of the experimental prompting of the dependent measures?

This question is easily recognized by those familiar with research on causal attributions. While plenty of early research on causal attributions focused on the outcomes of the attribution process (McArthur, 1972, 1976; Orvis, Cunningham, & Kelley, 1975), Wong and Weiner (1981) suggested that it was also important to study the onset of the attribution process. They reasoned that because participants in outcome research were prompted to make attributions by the experimental methodology (e.g., responding to

rating scales), the question of whether or not people spontaneously engage in attributional processing remained unanswered.

Wong and Weiner (1981) employed measures that minimized experimental prompting and identified unexpected behaviors or negative behaviors as two general factors that prompt spontaneous attributional thought. Of course, attributional thought differs from scientific impotence discounting because it represents a type of thinking that could have many different outcomes. Scientific impotence discounting is a specific outcome. However, the Study 1 results suggesting that it is belief-disconfirming information and not belief-confirming information that produces variation from the baseline control group is consistent with Wong and Weiner's conclusion that unexpected or negative behaviors prompt spontaneous attributional thought. In the case of scientific impotence discounting, it is unexpected or negative scientific information (rather than behaviors of another). The scientific information is unexpected because it disconfirms the person's belief, and it may also be perceived negatively if it threatens a person's positive sense of self as an intelligent person who holds valid beliefs.

What unexpected or negative scientific information may prompt is a skepticism that initiates a search for any conclusion that would discredit the scientific information (Ditto, Munro, Apanovitch, Scepanisky, & Lockhart, 2003). This might lead to discounting the information based on methodological grounds, bias on the part of the researcher, the scientific impotence excuse, or any number of other conclusions. Tesser, Crepaz, Collins, Cornell, and Beach (2000) have proposed a *self-zoo* in which are housed a variety of processes that can be used, depending on the features of the specific situation, to protect the self-concept. There are certainly a number of avenues by which a person can resist scientific information (for a review, see MacCoun, 1998). Like the self-zoo, in defending a strong belief from belief-disconfirming scientific information, a person might engage in any number of techniques, depending on the specific features of the situation.

While the current research suggests that scientific impotence discounting can happen, future research could focus on the specific features of scientific information or the situation in which exposure to scientific information occurs that would make scientific impotence discounting likely to happen. The materials used in the current study, for example, were brief abstracts that provided little methodological information. This was done both to mirror many real-world reports of scientific evidence while also preventing the use of methodological critique as a means of discounting the evidence.

Because it would be difficult to refute on methodological grounds, scientific information with an undeniably strong methodology might also increase the likelihood of scientific impotence discounting. A fair test of this

prediction, however, might necessitate including an opportunity to critique the methodology. Unfortunately, inclusion of both a methodology evaluation and the scientific impotence discounting measures might simply lead participants to use whichever measure is presented first to refute the belief-threatening evidence (Gotz-Marchand, Gotz, & Irle, 1974). Thus, cognitive response measures (Greenwald, 1968), implicit measures (Cunningham, Preacher, & Banaji, 2001), or behavioral measures that do not prompt participants toward using a specific technique to refute belief-threatening information would better answer the question of which techniques people spontaneously use under different conditions.

In addition to scientific information with very strong methodologies, there may be other variables that increase the likelihood of scientific impotence discounting. If the scientific impotence excuse has been modeled by important others (e.g., political leaders, religious leaders) or if social norms supporting it exist, then its use might be increased. Certain kinds of topics might be more open to scientific impotence discounting. Social science topics, for example, might be targeted for this kind of discounting more than physical science topics. Finally, there may be individual-difference variables that would lead people to be more or less likely to engage in scientific impotence discounting. For example, one could hypothesize that scientists (or others with extensive training in the scientific method) would be less likely to use the scientific impotence excuse.

A second question that remains for further investigation concerns the mechanisms that might underlie scientific impotence discounting. There is accumulating evidence in the literature on biased assimilation (which generally uses measures of methodological quality) supporting an affective-motivational explanation of biased evaluations of scientific information (Cohen et al., 2000; Munro & Ditto, 1997; Munro et al., 2002; Zuwerink & Devine, 1996). Affective-motivational models like cognitive dissonance theory (Festinger, 1957), its more recent revisions that emphasize self-concept protection (Aronson, 1968, 1969; Higgins, 1987, 1989; Steele, 1988; Tesser, 1988), as well as models of motivated reasoning like the quantity of processing model (Ditto & Lopez, 1992) are all consistent with the idea that negative reactions (either emotional or self-esteem threatening) to belief-disconfirming scientific evidence motivate the cognitive search for alternative explanations like the scientific impotence excuse. Future research could use misattribution (Zanna & Cooper, 1974) and self-affirmation (Steele & Liu, 1983) manipulations to provide experimental tests of the degree to which negative affect and state self-esteem are important mechanisms in scientific impotence discounting.

The results of the current study are also consistent with purely cognitive, expectancy-disconfirmation models of bias (Lord, 1989, 1992). These models

do not include a role for negative affect. Belief resistance is purely an information-processing error caused by our attempts to reconcile unexpected information. It is quite possible that both models are correct, but apply to different beliefs. Research in the area of attitude strength suggests that there are a number of conceptually distinct attributes that differentiate strong attitudes (Krosnick, Boninger, Chuang, Berent, & Carnot, 1993), and that different attributes might inspire different resistance processes (Pomerantz et al., 1995). Attitudes that are particularly important because they are value-relevant or ego-involving, for example, are more resistant to change (Boninger, Krosnick, & Berent, 1995; Jacks & Devine, 2000; Zuwerink & Devine, 1996). It is quite possible that beliefs and belief resistance conform to findings in the attitude strength and resistance area.

A number of scientific issues (e.g., global warming, evolution, stem-cell research) have extended beyond the scientific laboratories and academic journals and into the cultural consciousness. Because of their divisive and politicized nature, scientific conclusions that might inform these issues are often met with resistance by partisans on one side or the other. That is, when one has strong beliefs about such topics, scientific conclusions that are inconsistent with the beliefs may have no impact in altering those beliefs. In fact, scientific conclusions that are inconsistent with strong beliefs may even reduce one's confidence in the scientific process more generally. Thus, in addition to the ongoing focus on creating and improving techniques that would improve understanding of the scientific process among schoolchildren, college students, and the general population, some attention should also be given to understanding how misconceptions about science are the result of belief-resistance processes and developing techniques that might short-circuit these processes.

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