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THEORETICAL ARTICLE

Déjà Vu All Over Again: Critical Misunderstandings Concerning Anxiety Sensitivity and Constructive Suggestions for Future Research

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Abstract—The debate concerning the relation between anxiety sensitivity (AS) and trait anxiety has been constructive for the field and has suggested a number of important directions for future research. Reiss' (1997) commentary on AS and trait anxiety in this journal, however, contains several serious factual misstatements and logical errors that confuse, rather than clarify, many of the central issues in this debate. These misunderstandings are corrected and the implications of the issues raised by Reiss are addressed here. The authors suggest that future research on AS (a) embed this construct within the context of broader temperamental and personality variables and (b) explicitly recognize the bidirectionality of emotional and cognitive influences. © 1998 Elsevier Science Ltd

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As a number of philosophers of science (e.g., Bartley, 1984; Popper, 1965) have noted, science at its best involves the maximization of criticism. In other words, scientific progress occurs when new concepts are subjected to searching and often intense scrutiny, and either emerge intact or require abandonment or modification. Thus, debate and controversy, so long as they are *ad rem* rather than *ad hominem*, are healthy for science and should be actively encouraged (see Kendrick & Funder, 1988).

In this context, the debate regarding the relation between trait anxiety and anxiety sensitivity (AS), a cognitive construct reflecting individual differences in beliefs concerning the harmful consequences of anxiety, has been constructive for the field (e.g., Lilienfeld, Turner, & Jacob, 1993; McNally, 1996; S. Taylor, 1995). In this debate, we raised the question of whether AS and trait anxiety are entirely distinct or independent constructs, and contended that the incremental validity of AS above and beyond trait anxiety required closer examination (Lilienfeld, Jacob, & Turner, 1989; Lilienfeld et al., 1993). In addition, we argued that a number of early findings relating AS to anxiety disorders were potentially attributable to the effects of trait anxiety and similar unmeasured variables (see Lilienfeld et al., 1989).

This debate now appears to have run its course. There is a consensus that AS, as operationalized by the Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986), correlates moderately with trait anxiety, although it contributes to the prediction of certain phenomena (e.g., panic attacks; anxiety responses to challenge procedures; McNally, 1989, 1996; cf. Brown & Cash, 1990) above and beyond trait anxiety. Like many controversies, this debate has clarified several important issues and suggested novel avenues for future research. For example, this debate has pushed researchers to examine the extent to which AS possesses incremental validity above and beyond trait anxiety in the prediction of anxiety disorders, including panic disorder (see McNally, 1996, for a review), and has spawned the development of new models of the relation between AS and trait anxiety. For example, Lilienfeld et al. (1993) (see also S. Taylor, 1995; Zinbarg, Barlow, and Brown, 1997) posited a hierarchical model in which AS is conceptualized as a lower-order facet of a higher-order trait anxiety construct. In addition, researchers are beginning to examine the extent to which AS is associated with personality dimensions related to trait anxiety, such as self-consciousness and other facets of neuroticism, as well to dimensions that are largely independent of trait anxiety, such as introversion and absorption (Borger, Cox, Feuntes, & Ross, 1996; Lilienfeld, 1997).

In a recent commentary in this journal, Reiss (1997) sharply took us to task for a number of criticisms and questions that we have raised concerning the conceptualization and measurement of AS. Reiss' comments appear to represent an attempt to prolong the AS-trait anxiety debate by reviving several straw-person issues that have long since been settled. In the present article, we argue that Reiss' commentary does not represent a constructive contribution to this

debate and, in fact, represents a step backward. In addition, we show that his commentary contains several serious factual misstatements and logical errors that confuse, rather than clarify, many of the central issues in the AS-trait anxiety debate.

REISS' MISUNDERSTANDINGS

Reiss' (1997) article contains at least five misunderstandings concerning the AS-trait anxiety debate. Although many of these misunderstandings have been addressed explicitly in several publications (e.g., Lilienfeld et al., 1993; Lilienfeld, 1996), Reiss reintroduced them with no apparent acknowledgment of previous clarifications. In the words of Yogi Berra, the baseball player known for his pithy witticisms, Reiss' arguments appear to be a case of "d  j   vu all over again." In the following section, we make one final effort to separate fact from fiction.

Misunderstanding #1

"The main point made by Lilienfeld et al. is that anxiety sensitivity is simply trait anxiety" (Reiss, 1997, p. 207); "Lilienfeld et al.'s position [is] that anxiety sensitivity and trait anxiety are the same construct" (Reiss, 1997, p. 208); "Lilienfeld et al. (1989, 1993, 1996) . . . have repeated various versions of [these] same criticisms over a period of 7 years" (Reiss, 1997, p. 207).

In an earlier article, Reiss (1991) asserted that "Lilienfeld, Jacob, and Turner (1989) hypothesized that anxiety sensitivity is trait anxiety" (p. 146). Reiss (1991) appears to have misinterpreted Lilienfeld et al.'s (1989) claim that "the ASI measures trait anxiety" (p. 101) to imply that "the ASI is a pure measure of trait anxiety." It is evident from other comments in our 1989 article that our assertion that "the ASI measures trait anxiety" was intended to mean that the ASI is saturated with trait anxiety, not that the ASI is a pure measure of this construct. Elsewhere in this article, for example, we noted that "the ASI contains reliable variance unrelated to trait anxiety measures" (p. 101), that "the ASI may be *contaminated* by trait anxiety" (p. 102), and that "proponents of the ASI (may have to) . . . revise their test to provide a purer measure of anxiety sensitivity *uncontaminated* by trait anxiety" (p. 102) (emphasis added).

In response to Reiss' (1991) misinterpretation of our 1989 article, we (Lilienfeld et al., 1993) subsequently made clear that we never intended to imply that AS and trait anxiety were isomorphic. We noted, for example, that "the distinguishability of AS and trait anxiety has never been in question" (p. 158) and referred to the claim that AS and trait anxiety are identical as "a point that seems to have been a source of persistent confusion in the literature" (p. 158) (see also Lilienfeld, 1996). Although Reiss' error might have been understandable prior to 1993, it is not understandable now. As a result of this misinterpreta-

tion, much of his article (pp. 207–210) is devoted to refuting a claim that has never been at issue.

Moreover, Lilienfeld et al.'s hierarchical model is logically inconsistent with the hypothesis that AS and trait anxiety are identical constructs, because a hierarchical model posits that lower-order constructs possess unique variance that is not shared with higher-order constructs (Watson, Clark, & Harkness, 1994). Reiss cannot simultaneously accuse us of arguing that (a) AS and trait anxiety are identical and (b) AS possesses variance that does not overlap with the higher-order trait anxiety factor.

Misunderstanding #2

Lilienfeld and colleagues “further suggested that anxiety sensitivity should be eliminated from the field on the grounds of parsimony” (Reiss, 1997, p. 207).

This assertion is incorrect. Instead, we (Lilienfeld et al., 1989) concluded that “the extant literature does not convincingly refute the rival hypothesis that the results of studies using the ASI can be explained by trait anxiety” (p. 102) and that in order to “refute the rival hypothesis that the results of studies using the ASI can be explained by trait anxiety . . . researchers should include a measure of trait anxiety in all investigations of the ASI” (p. 102). In none of our writings did we contend that this rival hypothesis had been conclusively corroborated or that the construct of anxiety sensitivity should be “eliminated from the field.” In our 1989 article and subsequent articles, we contended only that it is incumbent on researchers who have formulated a novel construct, and developed a measure of this construct, to demonstrate that this measure can predict important phenomena that extant measures cannot. This is the common-sense demand of incremental validity (Meehl, 1959; Sechrest, 1963), which falls on all developers of new measures. As Butcher, Graham, and Ben-Porath (1995) noted, “until such time as a scale’s incremental validity has been established, there is no foundation for recommending its use in clinical applications” (p. 326).

When the test manual for the ASI was published (Peterson & Reiss, 1987), many of the construct validation studies reported in this manual did not report data on trait anxiety or ascertain the incremental validity of the ASI above and beyond trait anxiety measures. Reiss’ comment misses the central point of our initial critique (Lilienfeld et al., 1989), which was not to argue for the dismissal of the AS construct, but to insist on a higher standard of evidence for the construct validation of the ASI and other AS measures. We are pleased that since the publication of our critique, an increasing number of researchers have included indices of trait anxiety and related constructs in their investigations of the ASI. Moreover, we concur with Reiss that the ASI has since demonstrated incremental validity above and beyond trait anxiety indices for a number of

clinically relevant phenomena, and urge researchers who use the ASI to continue to administer trait anxiety indices in their investigations.

Misunderstanding #3

“Lilienfeld et al. uncritically accepted Spielberger’s work and argued that it represents a standard against which other anxiety proneness concepts should be judged” (Reiss, 1997, p. 211).

To the contrary, we never endorsed Spielberger’s conception of trait anxiety over that of other researchers (e.g., J. A. Taylor, 1953). Instead, we defined trait anxiety in a theoretically neutral fashion as “the proneness to react anxiously to potentially anxiety-provoking stimuli” (Lilienfeld et al., 1993, p. 153). Reiss’ assertion is entirely without merit, as we never discussed Spielberger’s theorizing in any of our publications, nor advocated his State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Luchene, 1970) above other trait anxiety measures. Although the STAI is probably the most commonly used operationalization of trait anxiety, we have consistently discussed alternative operationalizations of trait anxiety, such as the Manifest Anxiety Scale (J. A. Taylor, 1953), in our reviews of the relation of trait anxiety to AS (e.g., Lilienfeld et al., 1989, p. 101).

More important, Reiss’ comment ignores a large and consistent body of literature on higher-order personality dimensions. Seventy years ago, Kelley (1927) coined the term *the jungle fallacy* to refer to the error of assuming that measures with different names necessarily assess different constructs. Neglect of the jungle fallacy, as witnessed by the proliferation of largely or entirely redundant measures, has resulted in widespread confusion in the personality and psychopathology literatures. The year before the first major manuscript on AS (Reiss & McNally, 1985) appeared, Watson and Clark (1984) demonstrated that a large number of personality indices that purport to assess substantially different constructs (e.g., trait anxiety, emotional maladjustment, sensitization, social undesirability) are highly saturated with the pervasive higher-order construct of Negative Affectivity (NA), a dimension reflecting a propensity to experience a wide variety of unpleasant emotions (Tellegen & Waller, 1994). As Watson and Clark showed, trait anxiety indices are excellent markers of NA. One implication of Watson and Clark’s review is that researchers who purport to assess a novel aspect of anxiety must demonstrate that their measure is not redundant with extant measures of NA, including measures of trait anxiety. This is all we asked for in our 1989 and 1993 articles, and Reiss’ objection to this demand is puzzling.

Reiss may well be correct that AS and TA are “compatible and not of an ‘either/or’ nature” (Reiss, 1997, p. 208); indeed, we had earlier raised this possibility in the context of our hierarchical model of AS and trait anxiety (Lilienfeld et al., 1993, pp. 171–172). But Reiss neglected to point out that in a

hierarchical model, higher- and lower-order dimensions can provide competing explanations for hypotheses (Watson & Clark, 1992). Thus, if a researcher proposes a hypothesis concerning the relation of a lower-order dimension to external criteria, but fails to include a measure of the higher-order dimension on which this lower-order dimension loads, the researcher may erroneously conclude that the hypothesis has been corroborated. But in fact, the observed relation may be attributable to the influence of the unmeasured higher-order dimension (e.g., see Watson & Pennebaker, 1989, for an illustration of how the relation between stressful life events and somatic complaints appears to be mediated by NA). As Watson and Clark (1992) noted, "To the extent that one level [in the hierarchy] is responsible for these effects, the importance of the other is diminished" (p. 499).

Again, this is not to imply that all of the empirical relations attributed to AS are due entirely to the influence of trait anxiety; they are not (McNally, 1996). But this line of reasoning underscores the continuing importance of administering indices of trait anxiety and NA in investigations of AS. Reiss was surely correct that our hierarchical model "does not resolve the historical issue of relating the construct of trait anxiety to behavior" (p. 211). This model does, however, point to important alternative explanations to be ruled out in investigations of the relations of trait anxiety and AS to behavior.

Misunderstanding #4

"The validity of Lilienfeld et al.'s [hierarchical] trait anxiety hypothesis is questionable. The nexted subfactors for trait anxiety might better be described as anxiety sensitivity, fearfulness, social anxiety, shyness, and depression" (Reiss, 1997, p. 211).

In his criticism of our hierarchical model, Reiss confused the construct of trait anxiety with its operationalization (specifically, the Trait Form of the STAI; Spielberger et al., 1970). He contended that inspection of the item content of the STAI leads one to the conclusion that trait anxiety comprises AS, fearfulness, shyness, and depression rather than the lower-order factors (AS, social evaluation sensitivity, injury sensitivity) we provisionally suggested in our 1993 article. But because some trait anxiety measures may assess constructs in addition to trait anxiety, inspection of their item content can result in misleading inferences concerning the trait anxiety construct. For example, the inclusion of depression items on the STAI appears to have resulted in a heterogeneous measure (Watson & Clark, 1984), because depression is a composite of high NA and low Positive Affectivity (PA) (Watson, Clark, & Carey, 1988). Indeed, this problem probably helps to explain why depression items were omitted from the revision of the STAI (Spielberger, 1983). Moreover, contrary to Reiss' assertions (p. 211), Watson et al. (1994) do not view depression as a lower-order factor of trait anxiety, but rather as a lower-order factor of NA that co-exists with trait anxiety at the same level in the hierarchy.

In addition, fearfulness, which Reiss posited as another lower-order marker of trait anxiety, instead appears to be a lower-order marker of the higher-order dimension of Constraint (Tellegen & Waller, 1994), which is a response inhibition dimension that bears important conceptual linkages to Gray's (1982) septo-hippocampal-frontal behavioral inhibition system (BIS) (see next section). Because Constraint is essentially orthogonal to NA (Tellegen & Waller, 1994), the extant data are inconsistent with Reiss' hypothesis that fearfulness loads on a trait anxiety factor. To the contrary, measures of fearfulness are virtually uncorrelated with trait anxiety indices (Tellegen & Waller, 1994; Watson & Clark, 1984), not moderately intercorrelated as suggested by Reiss (1997, p. 209).

Misunderstanding #5

The findings of Zinbarg and Barlow (1996) "do not support Lilienfeld et al.'s [hierarchical] model" (Reiss, 1997, p. 211).

Reiss misinterpreted the results of the study by Zinbarg and Barlow (1996), who conducted confirmatory factor analyses of a number of anxiety-related measures among both anxiety-disordered patients and individuals with no mental disorder. Zinbarg and Barlow reported that all ASI subscales loaded highly on a higher-order factor of NA along with measures of common fears, ruminations, obsessions, and social anxiety, but that the ASI subscales possessed variance not shared with NA. These findings are thus broadly consistent with Lilienfeld et al.'s (1993) hierarchical model, which posits that the ASI shares variance with NA but also possesses unique variance of its own. Nevertheless, these findings do not provide a direct test of our hierarchical model because indices of trait anxiety, as well as of other lower-order markers of NA (e.g., Alienation, Aggression; Tellegen & Waller, 1994), were not administered. Consequently, Zinbarg and Barlow's findings do not permit a test of the hypothesis (Lilienfeld et al., 1993) that the ASI loads on a trait anxiety factor, which in turn loads on a higher-order NA factor. In other words, the fact that Zinbarg and Barlow reported only two levels in their hierarchical structure in contrast to the four posited in Lilienfeld et al.'s (1993) model does not disconfirm the latter model, because Zinbarg and Barlow's study was not designed to test all the levels of this latter model (see Zinbarg et al., 1997, for a successful test of the lowest level of Lilienfeld et al.'s [1993] hierarchical model).

Yet Reiss (1997) dismissed the results of S. Taylor (1995), who administered indices of trait anxiety, AS, fear of negative evaluation, and injury sensitivity, the latter three of which we (Lilienfeld et al., 1993) posited to be lower-order components of trait anxiety. Taylor reported satisfactory fit of a confirmatory factor model in which these three constructs loaded on a higher-order trait anxiety factor. Because Taylor's findings provide a direct test of one level of our hierarchical model, it is unclear why Reiss elected to ignore them in favor of those of Zinbarg and Barlow, which do not provide a direct test.

CONSTRUCTIVE SUGGESTIONS FOR FUTURE AS RESEARCH

Although Reiss (1997) provided a useful overview of the theoretical underpinnings of earlier conceptions of neurotic, manifest, and trait anxiety, his cognitive conceptualization of AS is largely atheoretical in its absence of ties to important concepts in related domains, such as personality psychology, behavior genetics, and cognitive neuroscience (see also Reiss, 1991). Reiss' commentary contains little discussion of the developmental origins of AS or its links to broader temperamental and personality constructs. For example, he discussed in detail the question of how AS differs from trait anxiety (pp. 207–211), but only addressed in passing (p. 212) the equally important question of why AS and trait anxiety are correlated. Nor did he provide suggestions for future research on the etiology of AS or its relations to other dispositions.

In this context, one is reminded of Skinner's (1978) admonition regarding cognitive constructs. According to Skinner, many cognitive constructs simply reduplicate within the head of the organism what is already evident in the organism's responses to environmental contingencies, and get us no closer to the etiology of these responses (see also Beidel & Turner, 1986; Hawkins & Forsyth, 1997). This does not mean that we, like Skinner, disavow the causal role of personality traits and other internal dispositions. Nevertheless, we believe that Skinner's warning serves as a needed reminder to cognitive researchers in psychopathology. Even before the AS construct was formulated, we already knew that certain individuals respond more to their own anxiety and anxiety symptoms than others. To simply label this disposition "anxiety sensitivity" is not an end in itself, but is only the initial step in a research program aimed at examining this disposition's causes, developmental course, and correlates.

Further progress on AS will, we believe, be best served by embedding this construct within a broader nomological network (Cronbach & Meehl, 1955) incorporating temperamental and personality variables. One implication of our hierarchical model of AS is that many constructs, including AS, trait anxiety, and NA, may be tapping the same or similar personality dimensions, and that measures of these constructs may assess somewhat different aspects of these underlying dimensions. To examine this possibility, researchers should examine the links between AS and such higher-order personality dimensions as NA and Constraint (Tellegen & Waller, 1994), as well as such psychobiological dimensions as behavioral inhibition (Gray, 1982; Kagan, Reznick, & Snidman, 1987; see Turner, Beidel, & Wolff, 1996, for a review). These broad dimensions may, in conjunction with observational learning experiences, information concerning the adverse consequences of anxiety, and other environmental factors (Reiss et al., 1986), give rise to a more specific disposition to fear one's own anxiety and anxiety symptoms. Because many higher-order dimensions can be thought of as *source traits* (Cattell, 1950), that is, broad underlying dimensions that give rise to more specific *surface traits*, a better understanding of how AS relates to these dimensions may provide valuable clues to the etiology of AS. High-risk

longitudinal studies of children and adolescents with elevated levels of NA, Constraint, and/or behavioral inhibition should be especially helpful in elucidating the factors that contribute to elevated AS, and well as the factors, such as low levels of absorption, self-focused attention, or other personality traits (Lilienfeld, 1997) and latent inhibition resulting from a repeated history of benign experiences with potentially anxiety-eliciting body sensations (e.g., de Jongh, Muris, ter-Horst, & Duyx, 1995), that may buffer predisposed individuals from developing elevated AS.

Multivariate behavior-genetic designs, which allow researchers to partition the extent to which the covariation among traits is attributable to genetic, shared environmental, and nonshared environmental influences, should shed light on the causes of the overlap among AS, trait anxiety, and related dispositions (Lilienfeld, Turner, & Jacob, 1996). Moreover, the incorporation of direction-of-causation structural equation models into behavior genetic designs (Neale & Cardon, 1992) should clarify whether NA and trait anxiety give rise to AS, as suggested by the theorizing here, or whether AS and other traits (e.g., evaluation anxiety) give rise to trait anxiety, as suggested by Reiss (1997).

Finally, we believe that future researchers will need to examine the extent to which such cognitive variables as AS can be produced and influenced by emotional factors. Reiss (1997) implicitly treated the cognition-emotion relation as unidirectional (p. 210) and accorded the cognitions comprising the AS construct causal primacy over anxiety-related emotional reactions (e.g., panic attacks). But an increasing body of evidence suggests that emotional influences can operate independently of, and, in some cases, exert a causal effect on, cognitions (Izard, 1984; LeDoux, 1993; Zajonc, 1984). In other words, AS and related cognitive constructs may in some cases be influenced by affective factors. Parenthetically, it is worth noting that because many of the items on the ASI (e.g., "It scares me when I am nervous") refer to emotional reactions to anxiety symptoms, it is debatable whether this measure is best regarded as a pure index of cognitions (Lilienfeld et al., 1989). In our remaining remarks, however, we focus on the AS construct, rather than its operationalization in terms of the ASI.

Recent developments in cognitive neuroscience, we contend, bear potentially important implications for the conceptualization of the AS construct and the etiology of anxiety disorders. LeDoux (1995, 1996), for example, has demonstrated that fear conditioning in rats can take place in the absence of cortical pathways, a modern finding that replicates those of older studies. Moreover, he has shown that fear conditioning appears to occur along two separate pathways: a higher-level cortical pathway and a lower-level subcortical (thalamus-amygdala) pathway, the latter of which allows for more rapid, although less differentiated, responding to potentially threatening stimuli and which stores emotional memories largely in the form of somatic reactions to stimuli. Although such memories are not consciously accessible, they are expressed upon exposure to the feared stimulus and can then become consciously associated

with this stimulus. "Upon becoming aware of this bodily response [generated by the amygdala], the person attributes . . . the arousal to the most likely object and forms the memory that they are afraid of objects of that type" (LeDoux, 1996, p. 255).

LeDoux's work suggests that cognitive interpretations of stimuli are unnecessary for the development of some learned fear reactions. If his research proves to be applicable to the development of anxiety disorders in humans, which remains to be seen, it might imply that only a subset of anxiety reactions is triggered by cognitive factors (LeDoux, 1996, pp. 258–261). This research further implies that a longitudinal investigation of *low AS* individuals who develop anxiety disorders could help to elucidate alternative (i.e., noncognitive) pathways to the development of these disorders. Finally, LeDoux's work is consistent with the possibility that cognitions regarding the somatic consequences of anxiety, such as those comprising the AS construct, can in some (but probably not all; Schmidt, Lerew, & Jackson, 1997) cases be byproducts, rather than causes, of panic attacks and other anxiety reactions. If so, AS could be a useful marker of certain anxiety disorders even though it is not causally related to these disorders in all cases (Lilienfeld et al., 1996). For example, AS might prove useful as a measure of residual anxiety in treatment outcome studies of anxiety disorders.

Our central point is not to argue for the extrapolation of LeDoux's model or alternative models of the cognition-emotion relation to human anxiety disorders, as the applicability of these models to humans must remain conjectural pending further data. Instead, we argue that further research and theorizing concerning AS and similar cognitive constructs must begin to take the bidirectionality of emotion and cognition into account. The burgeoning field of cognitive neuroscience may provide a useful starting point for these empirical and conceptual advances.

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