

## Sensory-Processing Sensitivity and Its Relation to Introversion and Emotionality

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Over a series of 7 studies that used diverse samples and measures, this research identified a unidimensional core variable of high sensory-processing sensitivity and demonstrated its partial independence from social introversion and emotionality, variables with which it had been confused or subsumed in most previous theorizing by personality researchers. Additional findings were that there appear to be 2 distinct clusters of highly sensitive individuals (a smaller group with an unhappy childhood and related variables, and a larger group similar to nonhighly sensitive individuals except for their sensitivity) and that sensitivity moderates, at least for men, the relation of parental environment to reporting having had an unhappy childhood. This research also demonstrated adequate reliability and content, convergent, and discriminant validity for a 27-item Highly Sensitive Person Scale.

I believe in aristocracy, though—if that is the right word, and if a democrat may use it. Not an aristocracy of power . . . but . . . of the sensitive, the considerate. . . . Its members are to be found in all nations and classes, and all through the ages . . . there is a secret understanding between them when they meet. They represent the true human tradition, the one permanent victory of our queer race over cruelty and chaos. Thousands of them perish in obscurity, a few are great names. They are sensitive for others as well as themselves . . . considerate without being fussy, their pluck is not swankiness but the power to endure.

—E. M. Forster, *Two Cheers for Democracy*

Sensitive people . . . may have suffered much pain [in the concentration camps] (they were often of a delicate constitution), but the damage to their inner selves was less. They were able to retreat . . . to a life of inner riches and spiritual freedom. Only in this way can one explain the apparent paradox that some prisoners of a less hardy make-up often seemed to survive camp life better than did those of a more robust nature.

—V. Frankl, *Man's Search for Meaning*

Considering together the research on introversion in adults (e.g., Eysenck, 1991; Stelmack & Geen, 1992), inhibitedness in children (e.g., Kagan, 1994), what is called innate shyness in both (e.g., Cheek & Buss, 1981; Daniels & Plomin, 1985), and similar traits in at least some other species (e.g., for primates, Higley & Suomi, 1989; Stevenson-Hinde, Stillwell-Barnes, & Zung, 1980; Suomi, 1983, 1987, 1991; for canids, Bekoff, 1977; Fox, 1972; Goddard & Beilharz, 1985; MacDonald, 1983; Scott & Fuller, 1965; for rats, Blanchard, Flannelly, & Blanchard, 1986; Blizard, 1981; Cooper, Schmidt, & Barrett, 1983; for goats, Lyons, Price, & Moberg, 1988; for sunfish, Wilson, Coleman, Clark, & Biederman, 1993), there is strong

evidence for two strategies in the face of novel stimulation—either exploration or a quiet vigilance, which may lead to retreat. Although there is some disagreement as to whether this is a continuum or the latter strategy is a temperament category of about 15% to 25% (Kagan, 1994), the difference is well accepted. The idea that within a species there is more than one successful survival strategy—differences that are an end product of natural selection rather than its raw material—was first recognized for male and female members of a species. However, another individual organism difference coexisting in the same species, so-called timid versus bold mating, antipredatory, and foraging strategies (even differences in parasites), is now also being recognized (for a brief review of this literature and one example, see Wilson et al., 1993). In this article, we focus on a characteristic we call *sensory-processing sensitivity* that we think may be the underlying basis of this difference in strategy.

If one steps back to view the larger picture of personality and temperament research, one sees numerous physiological and physiologically related performance differences that have been associated with this strategy or characteristic in humans, however it is named. As an example, the broadest research base regarding this difference, the literature on human introverts and extraverts, has found introverts to evidence clear biochemical differences (e.g., in monoamine oxidase platelet activity, Klinteberg, Schalling, Edman, Orelund, & Asberg, 1987; in responses to experimentally induced changes in dopamine activity, Rammsayer, Netter, & Vogel, 1993) as well as greater activity in the right hemisphere (e.g., Berenbaum & Williams, 1994; Calkins & Fox, 1994; De Pascalis, 1993; Schmidt & Fox, 1994). They are differentially affected by caffeine, so that, for example, analgesics and caffeine together can increase pain sensitivity in introverts but not in extraverts (Haier, Reynolds, Prager, Cox, & Buchsbaum, 1991). This differential effect of caffeine occurs both in tonic and phasic arousal during tasks (e.g., Bullock & Gilliland, 1993; Gilliland, 1980; Revelle, Amaral, & Turriff, 1976; Smith, Wilson, & Davidson, 1984) and varies with time of day (Revelle, Humphreys, Simon, & Gilliland, 1980). (However, stressors and stimulants appear to differentially affect intro-

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verts' performance on verbal tasks only at lower levels of processing—that is, prelexical processing, decisions about nonconfusable words, or other tasks dependent on rapid but routine stimulus encoding that is stimulus driven rather than under strategic control [Harley & Matthews, 1992; G. A. Matthews & Harley, 1993].) Introverts evidence more lability in the Pavlovian sense (central nervous system capacity for rapid information processing; Mangan & Sturrock, 1988), greater electrodermal lability (Crider & Lunn, 1971), and a greater electrodermal orienting response at moderate levels of stimuli (Zahn, Kruesi, Leonard, & Rapoport, 1994). Overall, Patterson and Newman (1993), like Brebner (1980), noted that many of these attributes seem to serve to make introverts more reflective and stringent in their criteria for responses.

Again, research on what are called introverts is only an example. Kagan (1994; Kagan, Reznick, & Snidman, 1988) found similar broad physiological and cognitive differences between what he called inhibited and uninhibited children: The former evidenced less spontaneous talk and greater distance with an adult stranger and in free play with peers, less play with a new toy, and more unusual fears, sympathetic reactivity, muscle tension in the vocal cords, urinary norepinephrine and salivary cortisol, right hemisphere electroencephalogram activity and blood flow, and infant colic, constipation, insomnia, allergies, and irritability.

In the remainder of this introduction we consider previous conceptualizations of this basic psychobiological difference, our own view of it as fundamentally a variation in sensory-processing sensitivity, the relation of previous conceptualizations to sensory-processing sensitivity, and a tentative model of sensory-processing sensitivity.

### Previous Conceptualizations of the Psychobiological Difference

One of the first attempts to conceptualize this trait psychobiologically was Eysenck's (1957) theory of introversion as the result of the balance of inhibition and excitation—inhibition in this case referring to something like stimulus satiation, habituation, or boredom after repeated exposure to a stimulus, which is said to happen more slowly to introverts. As a result of being slow to inhibit, introverts were said to need to protect themselves from overexcitation, whereas extraverts, being quick to inhibit, seek to avoid boredom.

Eysenck revised his theory in 1967 (e.g., Eysenck, 1981) in terms of arousal level. Introverts were now said to avoid high levels of arousal. Somewhat ironically, at the same time that Eysenck tried to clarify the underlying biology, he downplayed it in his measurement. Because his measure of introversion–extraversion had been found to contain two factors, sociability and impulsivity, Eysenck eliminated the impulsivity items (those reflecting pleasure in high levels of risk or stimulation). With continued research, however, it has been impulsivity that has tended to correlate more with the biological differences he was trying to describe with his theory. This was one reason for Gray's (1981) proposal of an alternative theory, replacing Eysenck's two factors of introversion–extraversion and neuroticism–stability with two factors, degree of anxiety and degree of impulsivity, rotated so as to lie between Eysenck's two.

Gray's (1981, 1985, 1991) model, flowing out of the Eysenckian introversion tradition, has been widely appreciated, in part because of its careful grounding in biopsychological processes. On the basis of animal and human studies of brain physiology as well as current understanding of psychopharmacology, it proposed two systems in the brain as the cause of the most fundamental personality differences. One is the behavioral activation system (BAS), comprising the pathways sensitive to catecholaminergic action, especially dopamine. The BAS is said to be sensitive to reward and escape from punishment, the source of goal-directed behavior and positive feelings in the presence of cues of impending reward, and especially active in what were formerly termed neurotic extraverts (whom Gray termed impulsives) and relatively less active in stable introverts. In contrast, the behavioral inhibition system (BIS) comprises the septohippocampal system, its monoaminergic afferents from the brainstem, and its neocortical projection in the frontal lobe. The BIS is said to be sensitive to punishment, nonreward, and novelty; affected by medications alleviating anxiety; influenced more by serotonin; especially active in neurotic introverts (whom Gray termed anxious) and less active in stable extraverts. (In addition, Gray suggested the inheritance of some innate fears or unconditioned punishments and nonrewards, including social fears, which can initiate immediate fight or flight.)

Cloninger (1987) explained the classic personality variations and psychiatric disorders with a similar "biosocial" classification scheme of three brain systems: Gray's first two, plus a behavioral maintenance system that resists extinction and pursues what has been rewarding or has relieved punishment in the past. Other biopsychologists explaining the behavioral difference under discussion have simply posited a single brain-based tendency to be afraid, withdrawn, or inhibited rather than active in the face of the unfamiliar (e.g., Higley & Suomi, 1989; McGuire & Turkewitz, 1979), to evidence a defensive reduction of evoked potential (Buchsbaum, Haier, & Johnson, 1983), or to be less able to screen sensory input (Mehrabian, 1976, 1991).

However, many personality theorists, in part encouraged by the successes of the Big Five (McRae & John, 1993), continue to see this basic difference in terms of social extraversion–introversion. The study of sociability has been further advanced by the work on shyness. For this article's purposes, two distinctions will prove especially important: shyness that is acquired versus shyness that is inherited (Asendorpf, 1989; Cheek, 1989; Cheek & Buss, 1981; Daniels & Plomin, 1985), and shyness that is the result of low sociability versus shyness that involves actually preferring yet fearing social contact (e.g., Asendorpf, 1990; Briggs, 1988), or, in attachment style terms, shyness due to dismissive versus fearful or preoccupied attachment styles (Duggan & Brennan, 1994; Krasnoperova & Cheek, 1995). In pursuing both issues, Schmidt and Fox (1994) found a genetic or at least biological difference between low and high sociability, regardless of shyness. For example, the right hemisphere of the brain is more active in low sociable adults, just as it is in infants who will later be categorized as inhibited (Calkins & Fox, 1994). However, again, Calkins and Fox (1994) found that an insecure attachment style was also an important predictor of inhibitedness in infants (in the sense of fearful withdrawal from novel stimuli). Thus shyness researchers have developed a complex view of their subject matter, struggling to articulate this

interaction between environment, especially attachment, and a biological predisposition of some sort that leads to low sociability. What has been called shyness may involve preferring to be alone because of an avoidant attachment style, fearing but preferring to be with others due to an anxious attachment style, and some purely biological reasons for low sociability and shyness. It is to one of these potential reasons that we now turn.

### Fundamental Difference as Sensory-Processing Sensitivity

The model suggested in this article highlights an aspect of this cluster of much-studied but vaguely identified fundamental differences that seems thus far oddly underemphasized. There has been a consistent report of some sort of greater sensory-processing sensitivity in, for example, introverts. By *sensory-processing* we refer to a difference not in the sense organs per se but to something that occurs as sensory information is transmitted to or processed in the brain. Consistent evidence for this difference is almost always cited in reviews of the literature on introverts and extraverts—for example, in Koelega's (1992) meta-analysis, in Stelmack's (1990) and Stelmack and Geen's (1992) reviews, and in Kohn's (1987) discussion of arousability. Introverts have been found to be more sensitive to low auditory frequencies (Stelmack & Campbell, 1974; Stelmack & Michaud-Achorn, 1985), to pain (e.g., Barnes, 1975; Haier, Robinson, Braden, & Williams, 1984; Schalling, 1971), and to electrocutaneous (e.g., Edman, Schalling, & Rissler, 1979), olfactory (e.g., Herbener, Kagan, & Cohen, 1989), and visual thresholds (e.g., Siddle, Morrish, White, & Mangan, 1969). That the difference involves the central processing of stimulation is suggested by several lines of evidence. Introverts exhibit greater learning without awareness (Deo & Singh, 1973; this was unrelated to a measure of sociability). Also, distraction plays an important but complex role in this sensitivity: On simple tasks with distracting stimulation present, introverts' sensory sensitivity is higher than extroverts while the distraction is at a low level, but is about the same as extroverts when the distraction is at a high level (Geen, McCown, & Broyles, 1985; P. M. J. Shigehisa, Shigehisa, & Symons, 1973); on complex tasks, high levels of distraction may improve introverts' performance (Harley & Matthews, 1992; T. Shigehisa, 1974). (Still, the difference in sensory processing may not be entirely in central processing, given a shorter latency for the auditory brainstem evoked response [Stelmack & Wilson, 1982; for a review, see Stelmack, 1990].)

Research focusing on differences between introverts and extraverts in allocation of attention also supports the argument that the apparent difference in sensory-processing sensitivity is not based in the sense organs directly. Brebner (1980) characterized introverts as being geared to inspect stimuli more closely, especially as it increases in complexity. Similarly, Patterson and Newman (1993) found that introverts are not so much physiologically responsive to punishment, as Gray (1981) posited, but prefer to pause and reflect after it, "stopping to check it out" rather than "forging ahead" (Patterson & Newman, 1993, p. 720). Thus, at several levels in the processing of input, introverts seem to be more attentive, discriminating, or reflective.

Others besides introversion researchers have noted and stud-

ied sensory sensitivity as a fundamental individual difference. Thomas and Chess (1977), in their early work on childhood temperament, observed low sensory threshold as one of nine basic traits that distinguish children and found that, together with other traits such as social withdrawal, low sensory threshold described the "slow to warm up" child. Petrie's (1967) early work on *augmenters* of stimulation also captured the phenomenon well, but was probably lost as a useful concept because of the use (by Buchsbaum et al., 1983) of the opposite term, *reducers* (of evoked potentials), for the same phenomenon. Fine (1972, 1973) argued for differences in sensitivity as the best explanation for field dependence-independence, finding support for his view from differences in performance on color and weight discrimination tasks. Finally, there is the pioneering work of Mehrabian (1976, 1991; Mehrabian & O'Reilly, 1980), who developed a measure of low stimulus screening and arousability that assumed arousability to be an effect, not a cause, of having a greater openness, if not sensitivity, to stimulation.

Finally, Japanese psychologists (e.g., Nagane, 1990; T. Shigehisa, 1974) have been researching sensory sensitivity for some time and have taken the next step in model building: observing and describing sensitivity and its types. For example, Satow (1987) factor analyzed a 60-item questionnaire regarding sensitivity and found factors he termed lower sensory threshold, more rapid perception of a stimulus, and lower tolerance for intense or prolonged stimulation. Variations in these were said to lead to four types of sensitivity.

### Relation of Sensory-Processing Sensitivity to the Other Conceptualizations of This Basic Individual Difference

We have already mentioned the major understandings of the trait that have not emphasized sensory-processing sensitivity: Eysenck's views on introversion, Gray's on the inhibition system, and the description of shyness as innate low sociability versus attachment induced. It seems important at this point to relate these to the idea of sensory-processing sensitivity.

Eysenck (1981, 1991) saw introversion as the result of a greater cortico-reticular arousal, although a greater arousability may be more accurate (Stelmack, 1990). The lower sensory thresholds and greater vigilance of introverts has then been explained as being due to greater general arousal leading to lower thresholds of arousal. A general problem with the arousal model has been that this greater arousability is sometimes elusive—for example, varying with time of day. More important, there are several direct problems for the arousal model when it is used as the exclusive explanation for high sensitivity (even if it may prove true that greater arousability is typical of those who are more sensitive). Very high levels of arousal, being generally disorganizing, ought to interfere with sensory processing and decrease sensitivity. However, although the population under discussion may perform poorly at simple tasks when overaroused, at more complicated tasks, which should be more affected by arousal, as said before, they sometimes perform better (e.g., Harley & Matthews, 1992; T. Shigehisa, 1974). Furthermore, anyone familiar with a sensitive person knows that overarousal makes other stimulation more, not less, unpleasantly noticeable. Finally, greater arousability does not explain the lack

of a generally faster response set for introverts (Geen, 1986; Harkins & Geen, 1975). Indeed, again, Patterson and Newman (1993) characterized them as preferring to respond more slowly.

As for Gray's model, Gray (1981) himself recognized that his theory did not explain the "good" evidence "that (during working hours) sensory thresholds are lower in introverts" (p. 270). According to Gray, his theory would have to explain greater sensitivity as being due to a stronger BIS creating a greater awareness of the threat of punishment, but such an explanation would, in his words, "be tortuous, assuming it to be viable at all" (Gray, 1981, p. 270).

The resolution might lie in Gray's own (1985) underemphasized view of the "central task" of the BIS: "to compare, quite generally, actual with expected stimuli" (p. 8). To use his terms, this *checking* mode results in a temporary inhibition of activity, for which the system is named, unless there is a *mismatch*—the recognition of unexpected or aversive stimuli. Only then is there a complete cessation rather than a pause of the exploring behavior. For individuals with greater sensory-processing sensitivity, the checking task would have to be a more noticeable behavior, because processing would be more complex and discriminating, creating longer than average but still temporary pauses or inhibitions of behavior.

Perhaps what needs to be distinguished is a brief versus a complete behavioral inhibition along with a greater emphasis on the primary function of this system, which is the processing of novel stimulation. As for the clinically problematic issue of a complete inhibition of behavior, true fearfulness would be expected in a person with a strong BIS or "pause to check" system who has also had many aversive experiences in the past. Such a distinction needs to be made particularly in measurement; for example, the items on Carver and White's (1994) measure of BIS activity seem to tap a history of aversive experiences more than longer reflection in the face of novelty.

Work influenced by Gray's model that we see as having important links to sensory-processing sensitivity has been conducted by Kagan (1994), Gunnar (1994), and Patterson and Newman (1993). Kagan recognized the role of sensory-processing sensitivity when he said that inhibited children's reaction to novelty could arise from three potential individual differences: reactivity of the amygdala, degree of visceral feedback to limbic sites, and preparedness to detect subtle differences. However, he gave little attention to the last compared with his theorizing about fearfulness and also offered little comment on how aversive experiences might affect the reactivity of the amygdala and limbic sites.

The work of Gunnar and her associates (as reviewed in Gunnar, 1994) is important because it helps explain why those we describe as having sensory-processing sensitivity are often seen as mainly inhibited. These researchers have focused on the interaction of what they consider the innate trait with aversive experiences, emphasizing social support during early experiences of novelty. For example, they have found that 9-month-olds born with this trait react to novel stimuli only with an adrenaline response (but no cortisol response) unless they are with an unresponsive caretaker or a mother with whom they have an insecure attachment. The assumption is that, for those whom we call sensitive children, a novel experience is startling and requires checking out but leads to a sense of threat and fear-

fulness—becomes aversive—only when the child senses inadequate social resources. Without considering the greater influence on sensitive individuals of aversive experiences and degree of social support, it is easy to mistake the basic and presumably inherited trait with fearfulness, withdrawal, and more-than-temporary inhibition.

Patterson and Newman (1993) elaborated on Gray's model, comparing how introverts and extraverts process information, in a way that bears on our concept of sensory-processing sensitivity. These researchers concentrated on Gray's inhibition–disinhibition dimension (Gray's work emphasized the anxiety dimension). They saw nondisinhibited individuals (introverts) as having a greater interest in and reflectivity about the consequences of their next behavior. The process of inhibition, or profiting from aversive experiences, is said to have four steps. First, in the face of a reward, all individuals develop an approach set. Individual differences on the trait of interest are displayed in the intensity and persistence of this set and then in the amount of other environmental cues that will be noticed (a stronger approach set means less sensitivity to the rest of the environment). Second, presuming an obstacle or aversive event arises, this disruption of the approach pattern requires processing, and, at the same time, arousal increases. Here, past aversive experiences (leading to neuroticism and unusually high levels of arousal) have differing effects. In the disinhibited or neurotic extravert, they tend to increase response output, contributing to impulsivity; in the neurotic introvert, they increase stimulus input, contributing to inhibition. In the third stage, a coping response is selected according to the information gathered in stage two. This involves conscious reflection on alternatives, which requires further inhibition of behavior. Here the individual difference is in degree of inhibition or perseveration of the approach set. Disinhibited individuals persist in their dominant approach response set, which is often colored by emotion, especially anger. In the fourth stage, retrospective reflection on the experience, causal associations are made between behaviors and their consequences that will affect the next cycle through prospective reflection, or future ability to profit from aversive experiences. Throughout this process, introverts show a preference for predictability through information gathering rather than controllability through quick action, a preference that "promotes semantic depth and differentiation by means of reflection" (Patterson & Newman, 1993, p. 724).

Turning to the third model, explanations of the trait involving shyness, we find again a passing awareness of the potential role of sensory sensitivity, as when Cheek (1989) stated that "early-developing shyness occurs in people born with a highly sensitive nervous system" (p. 9). There is also the research on "love-shyness" by the sociologist Gilmartin (1987) that involved 500 men, including 100 who were over 35 and still virginal, prevented by shyness from fulfilling their strong desire for a heterosexual romantic relationship. Gilmartin was convinced of the role in his sample of a fundamental genetic trait, and also saw sensitivity as central to that trait. He found love-shy men to have a stronger startle response and far greater sensitivity to stimulation such as temperature extremes, loud or noxious noise, pain, scratchy clothing, bright sun, seasonal declines in ambient light, and subtle irritants such as a grain of sand in their shoe. They also had more allergies and skin irritations, as has been

found for inhibited children (Bell, 1992). Like the shyness researchers already discussed, Gilmartin found a negative family environment along with aversive experiences to be an important contributor to love-shyness, interacting with the inherited trait; for example, 89% of the non-love-shy men reported a happy or very happy family life during childhood, but only 31% of the love-shy men under 35 years of age and 19% of those over 35 reported such a family life.

As already noted, the openness of shyness researchers to a variety of explanatory models has contributed to a complex interplay of attachment, aversive experiences with novel stimuli, low-sociable behaviors arising from social fear, apparent social disinterest, and an inherited trait. To us, some of this interplay seems best explained by assuming that many shy or low-social people have inherited a trait that is neither low sociability nor shyness but sensitivity to stimulation. The reason for their low sociability would be its usefulness as a strategy for avoiding overstimulation. If they are chronically shy, they might have become so through many aversive social and attachment experiences, but they also might become shy through the following process. Being more sensitive to stimulation, they are easily overstimulated and overaroused. The social situations most associated with shyness are groups and meeting strangers, both of which usually involve high stimulation (i.e., high intensity, novelty, unpredictability, or complexity). Performing worse socially in such a situation (due to the high arousal resulting purely from high stimulation) would lead to even greater arousal and a poorer performance on the next occasion, and thus to a spiral into chronic shyness.

Low sociability, or introversion, in the sense of avoiding strangers and large groups, is an intelligent strategy for those born highly sensitive, but it suits others as well, for other reasons—for example, those with avoidant attachment styles. Thus we think shyness and introversion are useful terms for fearful and general low sociability, respectively, and would occur as secondary results of innate sensitivity in some, but not all, of those who are highly sensitive and in some who are not sensitive as well, for reasons such as attachment history. Perhaps the most interesting group for uncovering a trait of sensitivity separate from low sociability would be those who are sensitive but also sociable, through, for example, learning to see social relationships as familiar and a way to reduce arousal.

This summary of our view of the relation of sensory-processing sensitivity to other models of this fundamental trait—such as introversion, inhibitedness in Gray's sense, or shyness—obviously raises the possibility that personality research is being muddled by a confusion of what is basic and what is secondary. In particular, research on introversion, fearful inhibitedness, and shyness is too valuable in its own right and too important clinically to be hampered by such a confusion, if it exists. How might this confusion have occurred? We think it is due to sociability being central to our culture's concept of the ideal personality, and therefore central to our culture's thinking about personality. Kagan (1994), Mead (1935/1963), and Murphy (1947), among others, have noted that temperament traits can be ideal in some times and cultures and disparaged in others. Such cultural differences may explain, for example, the special involvement of Japanese psychologists in this topic and the finding by Chen, Rubin, and Sun (1992) that sensitive, quiet

elementary school children are respected and liked by their peers in China but not in Canada. The same culturally conditioned attitudes may also explain Western researchers' difficulty in perceiving sensitivity as a positive aspect of, or even as fundamental to, persons who have otherwise been described as weak (Pavlov, 1927), timid (Wilson et al., 1993), inhibited (Kagan, 1994), and so forth.

Sensory-processing sensitivity may itself prove to be a misleading approach, however. It is easy to forget that the behavioral consequences for the same genotype are highly variable and can even be the opposite depending on environment and social experiences (Bombar, 1996). For example, Simmel and Walker (1970) found that a strain of mouse inbred for passivity was in some circumstances more aggressive than the typically aggressive strains. Likewise, Wilson et al. (1993) observed that so-called timid foragers may sometimes dominate so-called bold ones, forcing the so-called bold fish to adapt to feeding in riskier environments, and that, at any rate, behavioral differences among sunfish disappeared after a period of isolation in the laboratory. However, the names we give an inherited trait clearly affect how we approach its study as well as how the culture values those who have inherited it—and the latter does matter. One can well imagine reasons for individuals with this trait being an especially functional subgroup of any population, given their low sensory thresholds and awareness of subtlety, their conscientiousness (Kochanska, 1993), and their tendency to reflect before acting (Patterson & Newman, 1993). Especially when given the right attention in childhood, in adulthood the unusually sensitive might prove to be the unusually valuable once their full range of behaviors is acknowledged.

### A Tentative Model of Sensory-Processing Sensitivity

Although we are not prepared to make specific predictions about areas of the brain involved in sensory-processing sensitivity, we suspect that the BIS is an adequate place to begin. It is the conceptualization of the primary function of this system, to inhibit, that we question. We agree with Patterson and Newman (1993) that those high in BIS functioning, whom they called nondisinhibited individuals, whom we call highly sensitive, are fundamentally more reflective rather than more fearful of punishment. However, we believe that a greater sensitivity to subtleties should be included in an understanding of that reflectivity as the cause and the result of (a) a preference for input over output and (b) a talent for retrospective and prospective reflection about consequences. In this light, one sees the parts of the BIS quite differently. Unusually active pathways through the brainstem indicate the characteristic greater arousability, yes, but this is due to a greater sensitivity to input. The differences in activity in the septohippocampal system gives rise to the characteristically lower impulsivity, allowing more time to process subtle input or reflect. However, besides these features of the BIS, which can easily be seen as the source of anxious, fearful, neurotic behavior (especially in individuals habitually vigilant because of aversive experiences and chronic high levels of cortisol), we emphasize the frontal cortex, also part of the BIS, with its especially active right hemisphere (typically less active in neurotics; Flor-Henry, 1969; Louks, Calsyn, & Lindsay, 1976). It is the activity of the frontal cortex that no doubt

contributes most to the characteristically more subtle processing and storing of information and the reflectivity observed by Patterson and Newman (1993) as well as perhaps a greater consciousness of self and environment.

When the so-called BIS is inherently more active, overall behavior and personality, health or pathology, still depends on many environmental factors (and perhaps depends on them even more). For example, several studies of sensitive or reactive children have found them to be less healthy when under stress but most healthy when in positive environments (Boice et al., 1995; Gannon, Banks, & Shelton, 1989), perhaps because their "heightened sensitivity to psychosocial processes" (Boice et al., 1995, p. 419) allows them to benefit more from "nurturing . . . conditions, in which social cues denote encouragement and acceptance" (Boice et al., 1995, p. 419). Similarly, so-called psychobiologically reactive rhesus monkeys reared in isolated, stressful conditions have exhibited far more anxious and depressed behavior under stress, but reactive monkeys reared in low-stress conditions with nurturing others have demonstrated accelerated development and are often at the top of adult dominance hierarchies (Higley & Suomi, 1989; Suomi, 1987, 1991). Again, whatever trait is interacting with the environment, it brings to mind for us something more fundamental than inhibition, shyness, reactivity, or low sociability.

In sum, there is reasonable evidence for some kind (or a variety of kinds) of greater sensory-processing sensitivity and depth of discrimination in a large minority of individuals. If this sensitivity exists, it would be expected to manifest itself as low sociability and high negative emotionality in some sensitive individuals—the former as a strategy to avoid overstimulation, and the latter as the result of an interaction of the trait with aversive or socially unsupported early experiences involving novel stimuli. However, it should be distinct from these as well and related to other variables and measures logically involving sensitivity.

To examine these suggestions, we conducted a series of seven studies that investigated the core defining characteristics of sensory-processing sensitivity and its association with and partial independence from social introversion and emotionality. In the process, we also examined the core construct's dimensionality, possible subgroupings, and potential relation to childhood experience. Finally, we attempted to develop a reasonably psychometrically sound self-report measure for use in future research.

We began with a qualitative investigation (Study 1), seeking to extract potential core characteristics from in-depth interviews with 39 individuals self-defined as highly sensitive. Studies 2–7 were quantitative studies that built on the findings of Study 1. Studies 2–4 used three diverse, moderately large samples: a local university sample (Study 2), samples from seven North American universities (Study 3), and a random-digit-dialing telephone survey of the general population in and around a small California city (Study 4). In each of these studies, we were able to examine the key issues and cross-validate findings across samples. Study 5 included Eysenck and Eysenck's (1968) Extroversion (E) Scale and Mehrabian's (1976) measure of stimulus screening and arousability, permitting us to examine the convergent and discriminant validity of our measures, to isolate differences between our conceptualization and that of previous theorists, and to cross-validate the basic findings of the previous

studies by using alternative measures. Study 6 focused on developing a measure for use in future research. Study 7 cross-validated findings regarding the measure developed in Study 6, examined sensitivity's relation to Big Five factors, and continued to examine sensitivity's relation to introversion, in particular by an analysis of correlations among it, Big Five Introversion, and Eysenck's introversion.

### Study 1

This initial study applied a qualitative interview approach to extract the basic characteristics of those self-identified as highly sensitive. It seemed important to begin somewhat inductively, allowing the phenomenon to identify itself to the extent possible. We also hoped that the interviews would reveal patterns, some of which might be initially unexpected, that we could then confirm in quantitative studies (Studies 2–7 in this article). Though rare in practice, this approach of first exploring a phenomenon with qualitative research as a basis for systematic quantitative studies has long been recommended by methodologists (e.g., D. T. Campbell, 1975; Reichardt & Cook, 1979).

### Method

Interviewees were recruited from psychology classes at the University of California at Santa Cruz (UCSC) and through announcements in a campus staff newsletter and a local arts association newsletter. In all cases, we asked to interview "highly sensitive people"—that is, those who are "either highly introverted (for example, preferring the company of one or two people) or easily overwhelmed by stimulation (such as noisy places or evocative or shocking entertainment)." (This announcement reflected our belief at the time that we might simply be studying introversion as it is subjectively experienced.) The notice in the newsletter also asked for "mature nonstudents."

About 10% of the psychology classes volunteered; response to the announcement in the newsletters was immediate. Those who seemed to have understood what we had intended in the announcement and felt that it applied to them (about 85%) were told that the interview would take 2–3 hrs and that they would be asked to talk about their lives, including personal material. No monetary inducement was offered, but we suggested that their participation would help advance understanding of this apparent characteristic. About 90% still desired to be interviewed. After recruiting the first 30 participants, we sought a more representative sample by giving some priority to certain ages and to men, artists (hence the art newsletter), and those who had careers deemed successful by conventional standards. Approximately 90% of those who set up appointments were interviewed. In all, 39 people were interviewed, of whom 12 were students, 17 were men, and 30 were single (of whom 8 were divorced). One of each gender explicitly stated they were homosexual. Ages ranged from 18 to 66, with at least 4 participants in each decade.

Interviews were conducted by Elaine N. Aron, who is trained as a clinical as well as a research psychologist. Interview technique was influenced by the suggestions of McCracken (1988) and Mishler (1986). For example, the respondent was viewed as a collaborator in the exploration of the concept, and both the interviewer and respondent were free to digress and explore particular issues. Respondents were told they did not have to answer all questions and could stop at any time (although all did complete the interview and reported enjoying or benefiting from it).

The interview protocol began with background data, then moved to general questions on what respondents had thought about the announcement's description of sensitivity and how they understood it for themselves. Questions then explored particular areas, moving from less per-

sonal (kinds of movies enjoyed, environmental preferences) to more personal (first memories, relations with parents, school life, friendships, dating and romance or marriage, creative activities, and philosophical and religious views). The protocol was revised halfway through the interviews, mainly by reducing the number of questions (especially those on leisure and aesthetic preferences, health, and health habits). After the interview, respondents answered a brief attachment-style questionnaire (Hazan & Shaver, 1987) and the Myers-Briggs Type Indicator (MBTI; Myers, 1962).

### *Results and Discussion*

About half the interviewees had already thought considerably about being highly sensitive; for others, the announcement brought their sensitivity into focus for the first time. (In three cases, the interviewer and interviewees came to the conclusion that the interviewee was not highly sensitive as the researcher was defining it; the data of these interviewees were not included in the results.)

Of the 35 interviewees who completed the MBTI, 24 were introverted intuitive, 7 were extraverted intuitive, and 4 were introverted sensing. Of the 38 who completed the attachment questionnaire, 12 chose the secure response, 15 the avoidant, and 4 the anxious ambivalent; 5 were undecided between secure and the other two options, 2 were undecided between anxious ambivalent and avoidant. The MBTI results corroborated the interviewer's surprise at finding apparent extraverts among the respondents, despite the notice's being explicitly biased toward introverts. One of the extraverts had been raised on a communal farm and found people, even strangers and large groups, to be calming rather than arousing. (She was, however, sensitive to city noise.) Her attachment style, and that of one other extravert, was secure. Two others seemed to have adopted an extraverted persona as a defense and under pressure from family dynamics (and responded as avoidants on the attachment style questionnaire). Three seemed to have adopted an extraverted attitude out of a kind of energetic, restless giftedness. (They were undecided in their attachment style between secure and insecure styles.)

Another impression from the interviews, corroborated this time by the attachment-style questionnaire, was that many respondents had had good childhoods but were still highly sensitive. These happy-childhood respondents were generally successful, either as students or in their careers, and saw many advantages to their sensitivity, although their lives had been considerably shaped by its demands. Their close-relationship histories were also better than those with troubled childhoods.

Many of those with difficult childhoods had done considerable psychotherapy, and these accounted for almost all of the respondents who were undecided between secure and the other two options on the attachment questionnaire. The others with unhappy childhoods evidenced fairly severe adjustment or personality problems in adulthood, but these problems were not necessarily related to their sensitivity (e.g., 2 had eating disorders). However, there was a sense in which their sensitivity also seemed more problematic, impacting school, career, and relationships much more and creating a sense in them of being vulnerable, handicapped, or flawed.

Other observations that held for over 70% of interviewees were their sense of being different, especially in regard to their

need to take frequent breaks during busy days; their conscious arrangement of their lives to reduce stimulation and unwanted surprises; the importance of their spiritual and inner lives, including dreams; the sense that difficulties not obviously the result of childhood experiences stemmed from fear of failing due to overarousal while being observed (e.g., while on the job), when they thought they were being socially judged (e.g., when dating or attending social functions), or when they had to compete (e.g., competitive school situations). All of these observations led to items on the questionnaires used in Studies 2–7.

### *Studies 2–4*

Having explored the phenomenon qualitatively with in-depth interviews, we next conducted three quantitative questionnaire studies involving diverse student and community samples. These studies focused on six issues: (a) the extent to which those themes that seemed in the Study 1 interviews to constitute a coherent core pattern were in fact consistently interrelated; (b) the relation of these core items (taken as a scale) to social introversion, (c) emotionality, and (d) social introversion and emotionality taken together; (e) the existence of any meaningful subgroupings of highly sensitive individuals; and (f) whether sensitivity moderated the relation of family environment to how childhood was experienced.

### *Method*

*Samples.* Study 2 participants were 319 undergraduates (200 women, 112 men, 7 gender not indicated) who completed anonymous questionnaires during regular class sessions at UCSC; of these, 206 were in classes in which they had recently completed the MBTI and were thus able to indicate their MBTI introversion–extraversion type. Study 3 participants were 285 undergraduates (168 women, 50 men, and 67 for whom the gender item was accidentally omitted) who completed anonymous questionnaires during regular class sessions at seven North American universities. The Study 3 data became available to us because a version of the questionnaire used in Study 2 was included as part of the instructor's manual for *Statistics for Psychology* (A. Aron & Aron, 1994). Instructors were encouraged to make copies of the questionnaire, administer it anonymously on the first day of class, then analyze these data as examples of the statistical techniques taught during the term. Instructors were offered the opportunity to send us the data to conduct the various analyses and receive back transparencies for class use based on the class's data. Study 3 is thus based on seven classes for which, at the time of this writing, we had obtained permission from their institutions to use the data for research purposes. In Studies 2 and 3, analyses were combined across classes, because within each study we found fewer significant effects and interactions for class than would be expected by chance.

Study 4 was a random-digit-dialing telephone survey conducted in Santa Cruz County, California. This area includes two small cities (one including the university) and a surrounding rural population. Telephone numbers were randomly selected from the Santa Cruz County residential telephone directory. Excluding fax and disconnected numbers and respondents who did not speak English or Spanish or were under 18, 37% of numbers dialed were reached and produced an individual who agreed to participate. (When no one at a particular number answered, we called again up to three times and left messages when there were answering machines.) This percentage somewhat qualifies the generalizability of our results (although it is not unusually low for telephone surveys).



Because the main purpose was to provide a community sample to complement the college-student samples of Studies 2 and 3, this response rate seemed adequate. Respondents included 165 women and 134 men who ranged in age from 18 to 91 ( $M = 43.4$ ), and professions of respondents were typical of the region; 92% of the interviews were in English, 8% were in Spanish. Calls were made on weekday evenings from 6:00 p.m. to 9:30 p.m. and on weekend days from 11:00 a.m. to 5:00 p.m. All interviewers were women. When a respondent answered, the interviewer introduced herself, gave her university affiliation, and explained that this was an anonymous survey of "people's personalities and their reactions to their physical environment."

*Questionnaire/interview schedule.* The questionnaires and interviews included items that were the beginning of what became, over the course of the various studies, a 27-item Highly Sensitive Person (HSP) Scale. The items were based on observations from Study 1 and previous theory and research that seemed relevant to the construct of sensory-

processing sensitivity. Table 1 shows these 27 items and which of the present studies used which items.

A number of items that are not part of the HSP Scale were also included. One small set of items (varying from two to four over the different studies) focused on social introversion, such as "Do you avoid crowds (at malls, carnivals, fairs, etc.)?" and "Do you 'recharge your batteries' by being alone rather than in the company of others?" Another set measured emotionality with three items, "Are you prone to fears?", "Are you a tense or worried person by nature?", and "Are you prone to depression?" (this last item was not included in Study 3).

Several other items assessed variables that seemed from our Study 1 interviews or previous research and theory to be related to, caused by, or perhaps even part of the core meaning of sensory-processing sensitivity, although we were less sure about these being part of the core meaning. We call these items measures of sensitivity-related variables. Examples are sensitivity to amount of daylight and being bothered by films the

Table 1  
*Highly Sensitive Person Scale Items Used in Studies 2-7*

Item	Study						
1. Are you easily overwhelmed by strong sensory input? (.56)	2	3	4	5	6	7	
2. Do you seem to be aware of subtleties in your environment? (.24)					6	7	
3. Do other people's moods affect you? (.38)	2			5	6	7	
4. Do you tend to be more sensitive to pain? (.55)	2		4	5	6	7	
5. Do you find yourself needing to withdraw during busy days into bed or into a darkened room or any place where you can have some privacy and relief from stimulation? (.64)	2	3	4	5	6	7	
6. Are you particularly sensitive to the effects of caffeine? (.40)	2		4	5	6	7	
7. Are you easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by? (.61)					5	6	7
8. Do you have a rich, complex inner life? (.25)						6	7
9. Are you made uncomfortable by loud noises? (.55)	2	3	4	5	6	7	
10. Are you deeply moved by the arts or music? (.30)						6	7
11. Does your nervous system sometimes feel so frazzled that you just have to get off by yourself? (.59)						6	7
12. Are you conscientious? (.24)						6	7
13. Do you startle easily? (.50)		3		5	6	7	
14. Do you get rattled when you have a lot to do in a short amount of time? (.62)		3		5	6	7	
15. When people are uncomfortable in a physical environment do you tend to know what needs to be done to make it more comfortable (like changing the lighting or the seating)? (.33)						6	7
16. Are you annoyed when people try to get you to do too many things at once? (.54)					5	6	7
17. Do you try hard to avoid making mistakes or forgetting things? (.53)						6	7
18. Do you make a point to avoid violent movies and TV shows? (.31)	2	3	4	5	6	7	
19. Do you become unpleasantly aroused when a lot is going on around you? (.55)					5	6	7
20. Does being very hungry create a strong reaction in you, disrupting your concentration or mood? (.36)					5	6	7
21. Do changes in your life shake you up? (.64)					5	6	7
22. Do you notice and enjoy delicate or fine scents, tastes, sounds, works of art? (.34)						6	7
23. Do you find it unpleasant to have a lot going on at once? (.62)					5	6	7
24. Do you make it a high priority to arrange your life to avoid upsetting or overwhelming situations? (.56)	2	3			5	6	7
25. Are you bothered by intense stimuli, like loud noises or chaotic scenes? (.64)					5	6	7
26. When you must compete or be observed while performing a task, do you become so nervous or shaky that you do much worse than you would otherwise? (.51)	2	3	4	5	6	7	
27. When you were a child, did parents or teachers seem to see you as sensitive or shy? (.37)						6	7

*Note.* Values in parentheses after each item are its loading on the first unrotated factor in Study 6 ( $N = 172$ ).



Table 2  
Correlations and Partial Correlations of Sensitivity and Social Introversion With  
Sensitivity-Related Variables, Studies 2-4

Variable	HSP Scale	Partial correlations				
		Social introversion			Social introversion	
		Our scale <sup>a</sup>	MBTI <sup>b</sup>	HSP Scale (social introversion) <sup>c</sup>	Our scale (HSP Scale)	MBTI (HSP Scale)
Study 2						
Cry easily	.36**	.12*	.17*	.46**	.03	.11
Daylight sensitivity	.32**	.11*	.01	.29**	-.02	-.04
Alcohol sensitivity	.39**	.11†	-.06	.37**	-.07	-.11
Prefer live country	.22**	.34*	.22**	.14†	.28**	.21**
Films affect next day	.31**	.22**	.05	.29**	.15**	.00
Love intensity	.26**	.10†	.01	.25**	.01	-.04
Feelings well up <sup>d</sup>	.28**	.29**	.15†	.23**	.21**	.10
Remember dreams <sup>e</sup>	.19*	-.02	.00	.18†	-.07	-.06
Intense dreams <sup>e</sup>	.19*	.19*	.19†	.05	.21*	.14
Time alone <sup>e</sup>	.22*	.34**	.15	.03	.33**	.13
Study 3						
Cry easily	.47**	.20**		.43**	.05	
Prefer live country	.15*	.27**		.06	.23**	
Films affect next day	.30**	.15*		.15*	.12*	
Love intensity	.23**	.06		.22**	-.01	
Study 4						
Prefer live country	.09*	.23**		.03	.23**	
Intense dreams	.19**	.07		.18**	.02	

Note. Study 2 included 313 University of California, Santa Cruz students; Study 3 included data from 285 North American college undergraduates; Study 4 included data gathered from 301 people in a random-digit-dialing community telephone survey. HSP = Highly Sensitive Person; MBTI = Myers-Briggs Type Indicator.

<sup>a</sup> Social introversion scale from our questionnaire.

<sup>b</sup> Myers-Briggs Type Indicator. Data available from 206 participants in Study 2.

<sup>c</sup> In Study 2, both the social introversion scale from our questionnaire and the MBTI are partialled out (thus the sample size is only 206 for Study 2 in this column).

<sup>d</sup> This item ("Do you have very strong feelings well up from inside for no apparent reason?") was completed by only 211 participants.

<sup>e</sup> These items were completed by only 107 participants.

\* $p < .05$ . \*\* $p < .01$ . † $p < .10$ .

next day (see Table 2 for a full list). Including these sensitivity-related variables made it possible to conduct crucial tests of the independence of sensory-processing sensitivity from social introversion and emotionality by looking for correlations of sensitivity with these variables after partialing out social introversion and emotionality. (Note that for this purpose it does not matter whether these variables are only related to the core variable, actually part of it, or alternative measures of it.) However, the potential association with sensitivity of many of these variables is also seen as important in its own right for deepening understanding of the construct that is the focus of this article. (The correlations and partial correlations of these variables with sensitivity are presented in tables throughout this article. However, to save space, we do not discuss the implications of these links other than in the context of discriminating sensitivity from social introversion and emotionality and in discriminating subtypes of highly sensitive individuals.)

Factor analyses of the sensitivity-related items (within studies) yielded only one consistently intercorrelated subset, a three-item group we labeled love intensity (e.g., "Do you tend to fall in love hard?"). Studies 3 and 4 did not use all the items developed in Study 2. The Study 3 items were selected for purposes of illustrating statistical principles and for ease of use by statistics instructors; Study 4 items had to be very brief and take into account the willingness of the general public to answer certain personal questions. (Because we were developing the

questionnaire as Study 2 proceeded, there was also variation among subsamples of the items with which they were presented.)

Finally, we developed two sets of childhood items. The first set, parental environment, included six items in Study 2: "Were you close to your father?", "Was your father involved in your family during your childhood?", "Were you close to your mother?", "Was your mother fond of infants and small children (liking to hold and cuddle them, have them around her)?", and "Was alcoholism a problem in your immediate family while you were growing up?" (the last two items were reverse scored). Study 3 (the North American student sample) did not include the last item; in Study 4 (the community sample telephone survey) we felt it necessary to further limit these highly personal items to only the first (close to father). The second set, unhappy childhood (i.e., the recalled subjective experience of growing up), included "Would you characterize your childhood as troubled?", "Were you prone to hide as a child (under beds or tables, in closets, bushes, etc.)?", and "During your childhood, were you dominated much of the time (by one or more siblings, parents, other relatives, friends, etc.)?" Some participants in Study 2 and all in Study 3 were not asked the last item; Study 4 participants were not asked the first.

In Studies 2 and 3, all items were answered on a 7-point scale that ranged from 1 (*not at all*) to 7 (*extremely*). In Study 4, respondents answered questions orally by using a 5-point scale of *extremely*, *quite*

a bit, moderately, not much, and hardly at all. (For purposes of the data analysis, these responses were coded as 7, 5.5, 4, 3.5, and 1, respectively, to make means roughly comparable to those in the 7-point scales used in the questionnaire studies.)

## Results and Discussion

**High sensitivity as an internally consistent construct.** Analyses of the core sensitivity items were conducted separately for the three classrooms used in Study 2 because the item sets were not identical. In each case, scree tests of principal factors factor analyses indicated a single factor solution was optimal (the first four eigenvalues for the three classrooms, respectively, were 1.70, 0.30, 0.18, 0.06; 1.81, 0.38, 0.31, 0.03; and 1.76, 0.31, 0.22, 0.12). Similar results were found in Studies 3 and 4 (Study 3, 2.17, 0.36, 0.12; Study 4, 1.47, 0.37, 0.02). In all studies, intercorrelations among the core sensitivity items were moderate to large. These were encouraging indications that these various ways of inquiring about greater sensitivity in processing low levels of stimulation and about being easily overaroused reflect a single underlying mechanism of the kind described earlier and suggested by the interviews. Thus we considered them the start of a unit-weighted HSP Scale. Alphas for the three classrooms in Study 2 were .64, .68, and .66; for the Study 3 sample, .75; for the Study 4 sample, .64. In all cases, there were no items that, if removed, increased alpha. We considered these alphas adequate for the initial exploratory analyses, especially because in most cases modest reliabilities yield conservative conclusions.

**Social introversion.** The HSP Scale had moderate positive correlations with our questionnaire's Social Introversion Scale ( $r$ s for the three studies = .32, .31, and .25, all  $p$ s < .05). These two measures use the same item structures and thus presumably share considerable method variance, inflating these correlations. However, the MBTI introversion-extraversion type measure (from Study 2) uses very different methods from the HSP Scale and was administered at a different time. Its correlation with the HSP Scale was only .14 ( $p$  < .10). These correlations suggest that sensitivity (as measured by the HSP Scale) may be somewhat related to social introversion but is clearly not identical with it. The HSP Scale's at least partial independence from social introversion is also supported by the correlation of .14 between the MBTI and the HSP Scale being significantly lower than the correlation (.32) of the MBTI with our Social Introversion Scale ( $Z$  for the difference in correlations = 3.95,  $p$  < .001).

As another way of examining the distinction between sensitivity and social introversion, we analyzed the pattern of correlations between social introversion and the various sensitivity-related variables discussed above (see *Method* section for Studies 2–4). As can be seen in Table 2, nearly all of these variables had significant zero-order correlations with the HSP Scale that remained significant or near significant and of about the same magnitude even after partialing out introversion (indeed, in Study 2, even after partialing out both introversion measures). This is an especially stringent test because, as already noted, our questionnaire's Social Introversion Scale and the HSP Scale use similarly constructed items. Thus, by controlling for our introversion measure, we removed overlapping method variance from these partial correlations. Further, to the extent that these

sensitivity-related items had significant zero-order correlations with social introversion, these correlations largely evaporated when the HSP Scale was partialled out. Finally, this pattern can not be attributed to our Social Introversion Scale's simply not being psychometrically strong enough to correlate with anything, because two variables that would seem, from their content, to be most closely related to social introversion (prefer live country and time alone) did indeed have significant correlations with social introversion, correlations that remained after partialing out the HSP Scale (whereas their correlations with the HSP Scale disappeared after partialing out social introversion).

**Emotionality.** The HSP Scale had large positive correlations with emotionality ( $r$ s = .52, .58, and .46 over the three studies; all  $p$ s < .01). Nevertheless, these correlations are clearly less than unity, even when disattenuated. Furthermore, some of this correlation may be due to shared method variance. Thus there is initial evidence over the three samples that emotionality is associated with, but not identical to, high sensitivity. As was the case with social introversion, another way of examining the distinction between high sensitivity and emotionality is to analyze their correlation with the sensitivity-related variables. As shown in Table 3, most correlations of the sensitivity-related variables with the HSP Scale remained significant or near significant after partialing out the emotionality measure. Once again, note that these partial correlations control for shared method variance. Also as with social introversion, this result for emotionality can not be explained as due to inadequate measurement of emotionality, because several appropriate variables (e.g., feelings well up) had unique or sole associations with emotionality. Thus, overall, the data from these three samples clearly support the partial independence of high sensitivity from emotionality.

**Social introversion and emotionality taken together.** Given that different variables correlated with social introversion and emotionality, it seemed plausible that the HSP Scale might simply represent a combination of social introversion and emotionality. (Correlations between social introversion and emotionality were .16, .22, and .16; all  $p$ s < .01.) The multiple correlations of the HSP Scale with both social introversion and emotionality were large (.56, .62, and .47; all  $p$ s < .01) but still far from unity (the strongest  $R$  leaves 62% of variances unaccounted for). Furthermore, most of the correlations of sensitivity-related variables with the HSP Scale remained significant or near significant even after controlling simultaneously for both social introversion and emotionality (and, once again, these partial correlations are free of any shared methods variance). (In Study 2, the partial correlations controlled for emotionality and both social introversion measures.)

We also considered the possibility that sensitivity might be explained by a multiplicative combination, an interaction, of social introversion and emotionality. However, there was no indication whatsoever of any such pattern. Of 38 analyses testing the interaction for predicting the variables in Studies 2–4, four approached significance at  $p$  < .10. Similarly, over all analyses, partialing out both social introversion and emotionality in Studies 2–4, parallel analyses also partialing out the interaction term yielded nearly identical results. For example, in no case did the significance level of the partial correlation change when the interaction term was also partialled out.

Table 3  
Correlations and Partial Correlations of Sensitivity and Emotionality With  
Sensitivity-Related Variables, Studies 2–4

Variable	HSP Scale	Emotionality	Partial correlations	
			HSP Scale (emotionality)	Emotionality (HSP Scale)
Study 2				
Cry easily	.36**	.38**	.21**	.24**
Daylight sensitivity	.32**	.26**	.25**	.11*
Alcohol sensitivity	.39**	.18**	.36**	-.03
Prefer live country	.22**	.08	.22**	-.04
Films affect next day	.31**	.23**	.23**	.10†
Love intensity	.26**	.30**	.14*	.19**
Feelings well up <sup>a</sup>	.28**	.30**	.18**	.17**
Remember dreams <sup>b</sup>	.19*	.03	.20†	-.08
Intense dreams <sup>b</sup>	.19*	.08	.18†	-.03
Time alone <sup>b</sup>	.22*	.07	.17†	-.05
Study 3				
Cry easily	.47**	.46**	.27**	.26**
Prefer live country	.15*	.10†	.11†	-.00
Films affect next day	.30**	.17**	.11†	.08
Love intensity	.23**	.16**	.17**	.03
Study 4				
Prefer live country	.09*	.07	.07	.03
Intense dreams	.19**	.05	.18**	-.03

Note. Study 2 included 313 University of California, Santa Cruz students; Study 3 included data from 285 North American college undergraduates; Study 4 included data gathered from 301 people in a random-digit-dialing community telephone survey. HSP = Highly Sensitive Person.

<sup>a</sup> This item ("Do you have very strong feelings well up from inside for no apparent reason?") was completed by only 211 participants.

<sup>b</sup> These items were completed by only 107 participants.

\* $p < .05$ . \*\* $p < .01$ . † $p < .10$ .

*Types of highly sensitive individuals.* To examine whether there are different types of highly sensitive individuals, in each of the three samples we conducted a cluster analysis on the data of participants who scored in approximately the top quartile on the HSP Scale (considering only those with no missing variables on any of the major variables). We used 25% as the cutoff because prior research has suggested that highly sensitive individuals make up about this percentage or less in the population (e.g., Kagan, 1994) and because inspection of the distributions of HSP Scale scores in the three studies showed "lumps" at the high end comprising about the top 25%. We clustered over all variables in Tables 2–4 that were given to the entire set of participants within a study (except the HSP Scale itself). We performed the analyses by using the SAS cluster procedure (SAS Institute, 1985) with Ward's minimum variance method and squared euclidean distances. (Analyses that used the average linkage method produced nearly identical results.)

A visual inspection of the dendrograms (Figure 1) revealed two clear clusters in each study, with the smaller cluster representing about one third of the participants in the analysis. As can be seen in Table 5, the general pattern is that those in the smaller cluster had significantly higher means than did those in the larger cluster on social introversion, emotionality, unhappy childhood, cry easily, prefer live country, films affect next day, and love intensity. The larger cluster was generally similar on these variables (or at least more similar) to those who are not highly sensitive. Nevertheless, individuals in both clusters were

clearly and about equally sensitive, and both clusters differed from the nonhighly sensitive to about an equal extent on the two more physical variables: daylight sensitivity and alcohol sensitivity. (The two clusters also had nearly identical gender distributions.) One possibility is that there are genes for emotionality that are often but not necessarily linked to high sensitivity. Another possibility, the special importance of early experience, is suggested by the following results.

*Sensitivity and childhood.* Theory, previous research (particularly that reviewed on shyness), and the Study 1 interviews already suggested that sensitivity might moderate the relation of parental environment and unhappy childhood, because any situation that is marginally problematic for the average child could be more disturbing to the highly sensitive child. The development of shyness is now well understood to be, in most cases, the result of a combination of an inherited trait, which we presume to be sensory-processing sensitivity, and a poor home environment (Cheek & Melchior, 1990, pp. 64–65; Plomin & Daniels, 1986). (At the opposite end of the spectrum, in a longitudinal study in Hawaii, Werner, 1989, found that certain adults were largely unaffected by extremely problematic childhoods.) This line of reasoning implies an interaction of sensitivity with parental environment in predicting unhappy childhood.

In Study 2, this interaction was obtained for the overall sample,  $t(306) = 7.71$ ,  $p < .01$ . The pattern of this interaction can be most clearly seen by dividing the sample into those in the top quartile (the same dividing point as used in the cluster

Table 4

*Correlations and Partial Correlations With Sensitivity-Related Variables of Sensitivity and the Set of Social Introversion and Emotionality Variables, Studies 2–4*

Variable	HSP Scale	<i>R</i> social introversion <sup>a</sup> and emotionality	Partial <i>r</i> HSP Scale (social introversion <sup>a</sup> and emotionality)	Partial <i>R</i> social introversion <sup>a</sup> and emotionality (HSP Scale)
Study 2				
Cry easily	.36**	.41**	.22**	.29**
Daylight sensitivity	.32**	.27**	.26**	.12
Alcohol sensitivity	.39**	.24**	.36**	.09
Prefer live country	.22**	.35**	.11†	.32**
Films affect next day	.31**	.29**	.18**	.17*
Love intensity	.26**	.32**	.15*	.21**
Feelings well up <sup>b</sup>	.28**	.38**	.11	.28**
Remember dreams <sup>c</sup>	.19*	.08	.20*	.09
Intense dreams <sup>c</sup>	.19*	.25†	.06	.22
Time alone <sup>c</sup>	.22*	.32**	.02	.29*
Study 3				
Cry easily	.47**	.47**	.25**	.28**
Prefer live country	.15*	.27**	.04	.25**
Films affect next day	.30**	.21**	.10†	.11
Love intensity	.23**	.16*	.18**	.03
Study 4				
Prefer live country	.09*	.24**	.02	.24**
Intense dreams	.19**	.08	.17**	.04

*Note.* Study 2 included 313 University of California, Santa Cruz students; Study 3 included data from 285 North American college undergraduates; Study 4 included data gathered from 301 people in a random-digit-dialing community telephone survey. HSP = Highly Sensitive Person.

<sup>a</sup> In Study 2, social introversion refers to both the social introversion scale from our questionnaire and the Myers-Briggs Type Indicator (MBTI) (and thus the sample size for these analyses is only 206, the number for whom data are available for the MBTI).

<sup>b</sup> This item ("Do you have very strong feelings well up from inside for no apparent reason?") was completed by only 211 participants.

<sup>c</sup> These items were completed by only 107 participants.

\*  $p < .05$ . \*\* $p < .01$ . †  $p < .10$ .

analyses) on the HSP Scale versus the remaining 75%. For the highly sensitive, the correlation of (positive) parental environment and unhappy childhood was  $-.53$ ; for the other three-quarters of the sample, the correlation was  $-.37$ . (The difference between these correlations is illustrative of the overall significant interaction, as noted above.) Figure 2 shows the regression lines for these two groups. When parental environment is optimal, there is little if any difference between those who are and are not highly sensitive; but when the parental environment is poor, the highly sensitive score higher on unhappy childhood.

In Studies 3 and 4, sensitivity's moderation of the parental environment–unhappy childhood link was qualified by a three-way interaction with gender; for Study 3,  $F(1, 210) = 7.84$ ,  $p < .01$ ; for Study 4,  $F(1, 290) = 3.79$ ,  $p = .05$ . Thus, in these two studies, the analysis of the interaction was done separately for women and men. The analysis for women did not yield a significant interaction; there were simply overall negative correlations of  $-.51$  (Study 3) and  $-.19$  (Study 4) between parental environment and unhappy childhood. However, the analyses for men, in spite of the small sample and the notoriously low power of regression interaction analyses, did yield the expected interactions; for Study 3,  $t(46) = 3.41$ ,  $p < .01$ ; for Study 4,  $t(130) = 1.34$ ,  $p = .09$  (conducting the Study 4 interaction analysis for men by using sensitivity as a dichotomous variable,  $t(130)$

$= 7.32$ ,  $p < .01$ ). The general patterns of these interactions, as shown in Figure 2, are the same as found for the overall sample in Study 2. When parental environment was optimal, there was little difference between those men who were and were not highly sensitive; when the parental environment was poor, highly sensitive men reported a much less happy childhood.

**Gender.** Women scored significantly higher than men on the HSP Scale in all three studies, with effect sizes ( $rs$ ) ranging from .21 to .37. However, over all the variables used in these studies, wherever sensitivity had a significant or nearly significant correlation, after partialing out gender, that correlation remained significant or nearly significant (and often increased in magnitude). Also, there were no significant differences between the genders in the overall correlations of the HSP Scale with other variables or in the composition of the two HSP clusters. Indeed, other than mean differences on the HSP Scale, the only major role of gender in any of the analyses presented in this article (including Studies 5–7) was in the childhood interactions (see above). Given this consistent pattern throughout the studies, except for mean differences on the HSP Scale, to save space we do not report gender effects in each of the later studies.

However, the tendency for women to score somewhat higher on the HSP Scale deserves comment. There is no evidence that at birth girls are more sensitive than boys (e.g., A. Buss, 1989;

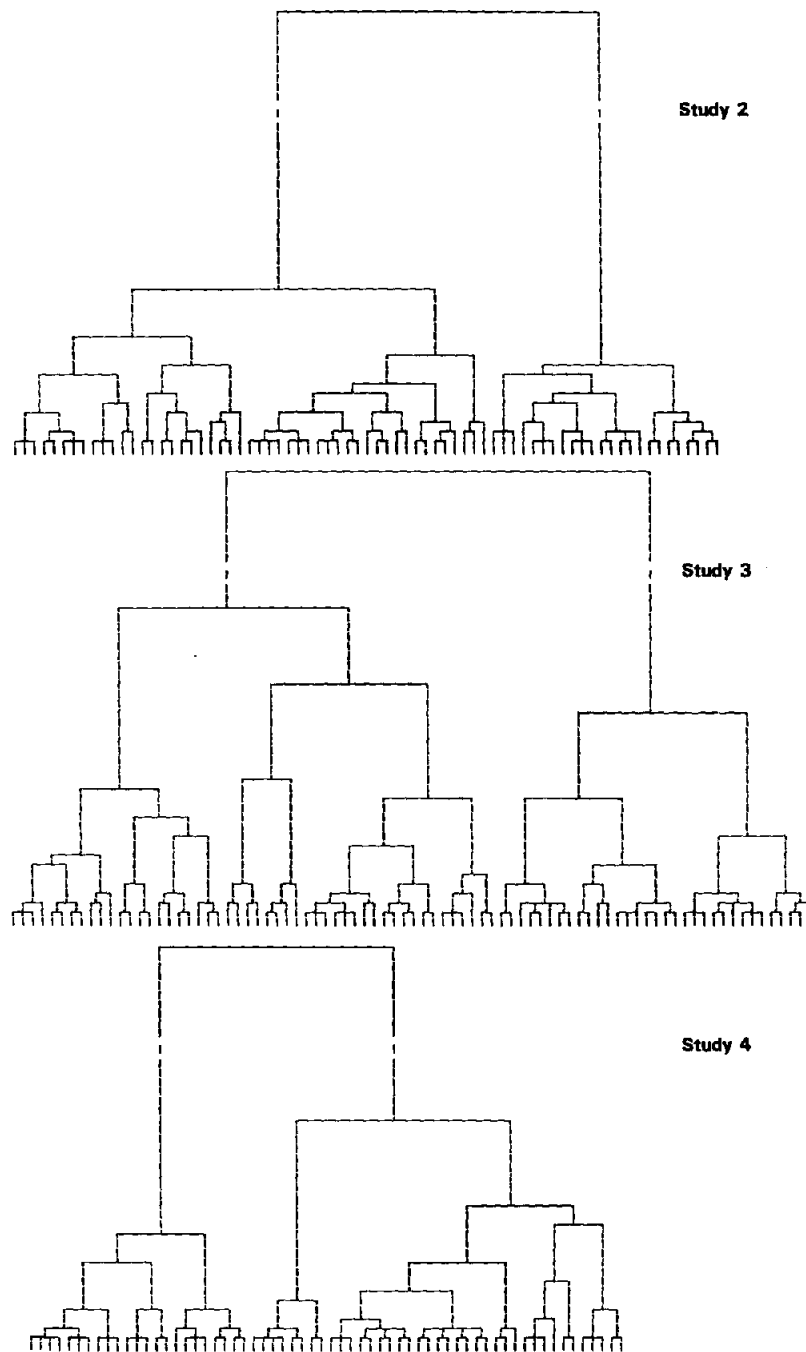


Figure 1. Dendrograms from hierarchical cluster analyses from Study 2, University of California, Santa Cruz students (top dendrogram; combined data,  $N = 329$ ); Study 3, North American student sample (middle dendrogram;  $N = 285$ ); and Study 4, random-digit-dialing community telephone survey (bottom dendrogram;  $N = 299$ ). Note in each case the clear suggestion of a two-cluster pattern.

Rothbart, 1989). Thus the gender differences on the HSP Scale with adults may reflect a Western cultural ideal for men not to be sensitive. Even if one writes items that seem to put being sensitive in the most flattering light and without any relation to gender, any set of items will bring to mind stereotypes of sensitive people, and identifying with that stereotype could (at least

in Western culture) lower a man's status and sense of well being. That fears of identifying with this stereotype underlie the gender difference is supported by our findings throughout the present series of studies of gender differences on some, but not others, of the sensitivity-related variables. Thus women scored higher on variables that seem likely to be especially affected more by

Table 5

*Means for Two Clusters of Highly Sensitive Individuals and for Nonhighly Sensitive Individuals, Studies 2–4*

Measure	Study 2			Study 3			Study 4		
	Cluster		Nonsensitives	Cluster		Nonsensitives	Cluster		Nonsensitives
	1	2		1	2		1	2	
HSP Scale	5.34 <sub>a</sub>	5.20 <sub>a</sub>	3.57 <sub>b</sub>	4.69 <sub>a</sub>	4.69 <sub>a</sub>	2.93 <sub>b</sub>	4.80 <sub>a</sub>	4.87 <sub>a</sub>	3.83 <sub>b</sub>
Social introversion	5.22 <sub>a</sub>	4.47 <sub>b</sub>	4.19 <sub>b</sub>	4.87 <sub>a</sub>	3.76 <sub>b</sub>	3.55 <sub>b</sub>	5.37 <sub>a</sub>	4.82 <sub>a</sub>	4.29 <sub>b</sub>
Emotionality	5.43 <sub>a</sub>	4.52 <sub>b</sub>	3.58 <sub>c</sub>	4.94 <sub>a</sub>	3.75 <sub>b</sub>	2.90 <sub>c</sub>	3.55 <sub>a</sub>	3.84 <sub>a</sub>	2.51 <sub>b</sub>
Parental environment	4.62	4.56	4.20	5.15	5.12	5.23	3.33 <sub>b</sub>	4.15 <sub>a,b</sub>	4.45 <sub>a</sub>
Unhappy childhood	4.73 <sub>a</sub>	3.16 <sub>b</sub>	2.89 <sub>b</sub>	3.62 <sub>a</sub>	2.74 <sub>b</sub>	2.32 <sub>b</sub>	4.03 <sub>a</sub>	2.91 <sub>b</sub>	2.21 <sub>c</sub>
Cry easily	6.04 <sub>a</sub>	3.68 <sub>b</sub>	3.57 <sub>b</sub>	5.94 <sub>a</sub>	3.44 <sub>b</sub>	3.05 <sub>b</sub>			
Daylight sensitivity	5.09 <sub>a</sub>	4.87 <sub>a</sub>	4.00 <sub>b</sub>						
Alcohol sensitivity	5.48 <sub>a</sub>	4.85 <sub>a</sub>	4.01 <sub>b</sub>						
Prefer live country	5.82 <sub>a</sub>	3.66 <sub>b</sub>	3.53 <sub>b</sub>	4.03	3.88	3.71	4.51	4.72	4.35
Films affect next day	6.30 <sub>a</sub>	5.28 <sub>b</sub>	4.73 <sub>b</sub>	5.70 <sub>a</sub>	4.86 <sub>b</sub>	4.52 <sub>b</sub>			
Love intensity	4.86 <sub>a</sub>	4.01 <sub>b</sub>	3.66 <sub>b</sub>	4.24 <sub>a</sub>	3.97 <sub>a,b</sub>	3.53 <sub>b</sub>			
Intense dreams							.62	.59	.69
<i>n</i>	24	48	235	33	50	201	23	39	234

Note. Within a study, means in the same row with different subscripts differ at  $p < .05$  using the Scheffé test. HSP = Highly Sensitive Person.

Western cultural ideas of proper gender behavior (such as cry easily), whereas there was little gender difference on variables that seem more directly biologically based (such as daylight sensitivity).

**Summary of Studies 2–4.** The results of these first three quantitative studies suggest that (a) the core variables associated with high sensitivity as we have conceptualized it are highly intercorrelated and unidimensional in structure; (b) sensitivity is not redundant with social introversion; (c) sensitivity is related to but not redundant with emotionality; (d) sensitivity is not redundant with a combination of social introversion and emotionality; (e) there seem to be two types of highly sensitive individuals, one having had an unhappy childhood and being more emotional; and (f) sensitivity appears to moderate the link between parental environment and experiencing one's childhood as unhappy, at least for men. These results were consistent over

three relatively large samples—one of undergraduates at UCSC, one of undergraduates from universities and colleges across North America, and one a community sample obtained through a random-digit-dialing telephone survey—and over both questionnaire and telephone interview methods.

### Study 5

Having identified several key patterns and cross-validated them over various samples, we focused in Study 5 on the links between sensitivity and two other measures based on related lines of thinking: Eysenck's (1981) work on extraversion and Mehrabian's (1976) work on low screening. This provided an opportunity to replicate our basic results (except for the cluster analysis and childhood interaction effect, which require a larger sample size)

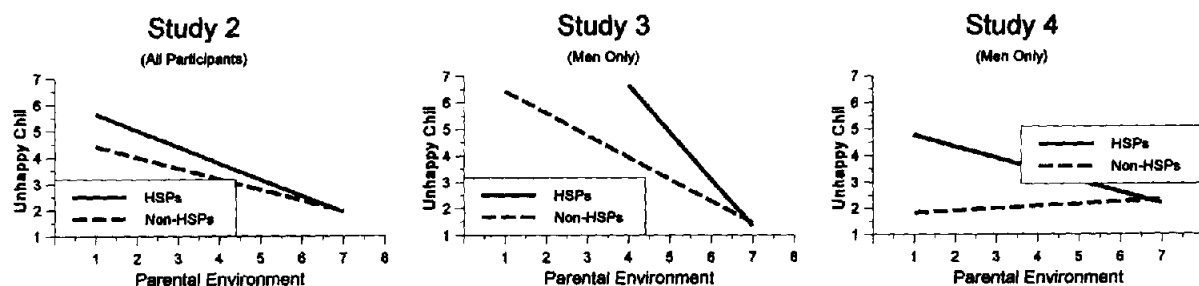


Figure 2. Regression lines for highly sensitive persons (HSPs) and nonhighly sensitive persons (Non-HSPs) for the regression of parental environment on unhappy childhood. Note the pattern of an overall negative association between (positive) parental environment and having experienced an unhappy childhood and that the strength of the negative association is stronger for the HSPs. This pattern was observed for all participants in Study 2 (the University of California, Santa Cruz sample,  $N = 329$ ). The pattern was qualified by significant gender interactions and observed only for men in Study 3 (the North American student sample;  $n = 50$  men) and Study 4 (the random-digit-dialing community telephone survey;  $n = 134$ men). Unhappy Chil = unhappy childhood.

by using these scales by others as alternative measures for two of our key concepts, sensitivity and social introversion.

### Method

Questionnaire packets were administered to 119 UCSC students attending a psychology course. Each packet included, in addition to background questions, a version of our questionnaire, the Mehrabian (1976) measure of stimulus screening, and the E Scale from the Eysenck Personality Inventory (EPI) (Eysenck & Eysenck, 1968). The order of the three questionnaires was counterbalanced, and the packets were randomly shuffled prior to distribution.

As indicated in Table 1, the HSP Scale in this study included 11 items from previous questionnaires and 8 new items. (Because 3 of the items were similar to those in Mehrabian's measure, in analyses involving both the HSP Scale and the Mehrabian measure, we computed HSP Scale scores excluding those three items.) All of the new items had substantial correlations with the scale total, and the overall alpha was .87 (.84 for the version excluding the 3 Mehrabian-like items). The scree test for the principal factors factor analysis suggested a single-factor solution (first four eigenvalues, 5.77, 1.24, 0.67, 0.66; a two-factor rotated solution was not obviously interpretable).

Most of the other items were taken from Studies 2-4: the four social introversion items, the three emotionality items, and six sensitivity-related variables. There were also three new sensitivity-related variables, bothered by heat, bothered by cold, and acute happiness (i.e., "When you are feeling happy, is the feeling sometimes really strong?").

To study the relation of the HSP Scale to Eysenck's Scale we used the E items from the older EPI (Eysenck & Eysenck, 1968), because, in the later version (Eysenck & Eysenck, 1975), the items on impulsivity and arousability were reduced when the P (Psychoticism) Scale was added. The Mehrabian (1976) measure is based on the hypothesis that "low screeners" do not impose a hierarchy of importance on the components of a complex situation and therefore are more arousable than nonscreeners and slower to habituate to intense stimuli in all of the various sense modalities. Mehrabian also expected low screeners to be

more common among the characteristically aroused and among women. For purposes of simplifying the presentation in this article (by keeping scoring for like dimensions in the same direction), we scored the Mehrabian measure so that high scores mean greater sensitivity and the Eysenck scale so that high scores mean greater introversion.

### Results and Discussion

**Relations among the scales.** In support of the convergent validity of the HSP Scale, we found it had a high correlation with the Mehrabian measure ( $r = .64$ ); in support of its discriminant validity, we found it had significantly ( $p < .05$ ) lower correlations with both measures of social introversion (.52 with our questionnaire measure, .27 with Eysenck's measure). As further evidence of its convergent and discriminant validity, the HSP Scale's correlation with the Mehrabian scale was unaffected by partialing out the two social introversion measures (nor was the correlation between the two social introversion measures reduced by partialing out the two sensitivity measures).

**Social introversion and emotionality.** Table 6 shows the multiple correlations between each of the sensitivity-related variables and the combination of the two sensitivity scales and between the combination of the two social introversion scales and emotionality. It also presents the partial multiple correlations for each of these two combinations, partialing out the other combination (i.e., these correlations are based on the difference in variance accounted for by the set of all five variables after subtracting the variance accounted for by the smaller subset; Cohen & Cohen, 1983). As can be seen from the table, the combined sensitivity measures had unique associations with all the variables that would be expected from theory and previous studies in this series to have unique associations with sensitivity.

Table 6

*Multiple Correlations and Partial Multiple Correlations of Sensitivity-Related Variables With the Set of Sensitivity Measures and the Set of Social Introversion and Emotionality Measures, Study 5*

Variable	Rs		Partial Rs	
	Sensitivity <sup>a</sup>	Social introversion <sup>b</sup> and emotionality	Sensitivity (social introversion and emotionality)	Social introversion and emotionality (sensitivity)
Cry easily	.54**	.33**	.45**	.12
Prefer live country	.42**	.51**	.26*	.40**
Films affect next day	.32**	.30*	.23†	.06
Love intensity	.31**	.24†	.25*	.15
Feelings well up	.34**	.54**	.06	.43**
Intense dreams	.35**	.43**	.20	.33*
Time alone	.29**	.41**	.06	.30*
Acute happiness	.50**	.30*	.49**	.30*
Heat bothers	.32**	.18	.31**	.14
Cold bothers	.48**	.37**	.36**	.19

Note.  $N = 119$ .

<sup>a</sup> Highly Sensitive Person Scale and Mehrabian's (1976) measure (scored so that high scores indicate high sensitivity).

<sup>b</sup> Our questionnaire's social introversion scale and the Eysenck Personality Inventory (Eysenck & Eysenck, 1968) Extraversion Scale (scored so that high scores indicate introversion).

\* $p < .05$ . \*\* $p < .01$ . † $p < .10$ .



(As would be expected from the previous studies, an analysis that used just the HSP Scale, partialing out the two social introversion measures and emotionality, yielded results similar to the analysis that used the HSP Scale and Mehrabian measure combined.)

*Differences between the HSP Scale and the Mehrabian measure.* In our opinion, Mehrabian (1976, 1991; Mehrabian & O'Reilly, 1980) first uncovered the variable that is the focus of this article through his study of low screeners. He measured the trait as the actual response to novel stimulation rather than confusing it with preferences (low sensation seeking) or strategies (social introversion), and the focus on arousability in his measure is well thought out. The only difficulties are, first, the assumption that low screeners can not filter out what is irrelevant, which seems to imply that there is some means, probably by taking the viewpoint of a high screener, for determining what is relevant. Low screeners may find all the subtle aspects of a situation very relevant. Also, like ourselves at the outset, Mehrabian's measure emphasizes arousability in response to novel or strong stimulation (with many items like "Sudden changes have an immediate and large effect on me"), without considering the detection of subtle stimulation (as would be measured by a type of item not on the Mehrabian scale, such as "Do you seem to be aware of subtleties in your environment?"). Mehrabian's measure does include heightened responsiveness to specific categories of stimuli, such as temperature and hardness-softness, but it gives little attention to responsiveness to subtle stimulation as a general characteristic. Thus, although the two measures correlate, we think the final version of the HSP Scale has broader content validity because it includes items tapping the subtle end of the continuum.

At the same time, the HSP Scale is more unified, as our own analysis found that the Mehrabian scale falls into two distinct (rotated) factors of arousability-emotionality and responsiveness to specific stimuli. When we attempted to force the HSP Scale into a two-factor solution, we could not identify any theoretically meaningful interpretation of the factors, even after trying both orthogonal and oblique rotations (the two factors did not, for example, fall into arousability and sensitivity to subtleties). Finally, the wording of any questionnaire measure of sensitivity can be made more or less gender and age related without adding any real understanding of the association between gender or age and the underlying variable being measured. We thought the Mehrabian measure to be particularly susceptible to influence of gender and age, emphasizing uncontrolled emotions in general (such as "I get excited easily") and being bothered by certain sensual specifics ("foul odors", the "hardness or softness of the furniture", "the feeling of leather or upholstery on my bare skin", and the "feel or textures of the clothes I wear"; 1976, pp. 40-41), which men and older individuals would seem less likely to report.

The HSP Scale was written to be minimally affected by differences in gender and age, and the correlations in this study for gender and age were .14 and -.06, respectively; neither correlation reached or approached significance (although in other studies in this series there were sometimes moderate correlations with gender). The corresponding correlations for the Mehrabian scale were .40 ( $p < .01$ ) and -.17 ( $p = .07$ ). Again, however, our writing a scale that minimizes such biases says little defini-

tive about the distribution of the underlying variable by age or gender.

## Study 6

Having considered in previous studies the construct validity of high sensitivity, in Study 6 we focused on the measure itself, developing the HSP Scale for use in future research. Study 6 had three goals: (a) to enhance content validity by augmenting the scale's coverage of heightened sensitivity to subtleties, (b) to provide more balance in terms of face desirability of items, and (c) to increase reliability. Thus, in this study, we used a version of the HSP Scale that included the 19 items used in Study 5 plus an additional 8 items constructed with these goals in mind. The full set of 27 items is shown in Table 1. We administered this enhanced version of the scale along with items used in previous studies and new sensitivity-related items included for exploratory purposes.

## Method

Questionnaires were administered to 172 students (109 women, 63 men) in an introductory psychology course at the State University of New York (SUNY) at Stony Brook. Questionnaires included the 27-item HSP Scale; the same social introversion, emotionality, and sensitivity-related items used in Study 5; and two new composite, exploratory sensitivity-related variables, notice what others miss and social/moral sensitivity, reflecting less acknowledged aspects of sensitivity as we conceptualize it: perception of the subtle (Koelega, 1992), deeper reflection (Patterson & Newman, 1993), and greater conscientiousness (Kochanska, 1993).

## Results and Discussion

*Unidimensionality and reliability of the 27-item HSP Scale.* In a principal factors factor analysis of the 27-item scale, the first factor accounted for 54% of the common variance, and a scree test suggested a single-factor solution (eigenvalues: 6.0, 1.6, 1.1, 0.8, 0.7; two-factor rotated solutions were not obviously interpretable—e.g., they did not break down by positive vs. negative items or by overarousal vs. sensitivity-to-subtleties items). Factor loadings on the first (unrotated) factor are shown in Table 1. Alpha was .87, and the overall mean was 4.28 ( $SD = 0.81$ ). There was a small gender difference,  $t(170) = 3.21$ ,  $p < .01$ ; means were 4.42 ( $SD = 0.81$ ) for women and 4.02 ( $SD = 0.76$ ) for men.

*Social introversion, emotionality, and their combination.* By using the 27-item HSP Scale, we found strong but, as usual, clearly-less-than-perfect associations with social introversion and emotionality ( $r = .45$  and  $.65$ , respectively). Although there were a few differences from the previous studies, overall the 27-item version had a typical pattern of unique effects with sensitivity-related variables over and above social introversion and emotionality (correlations with the two new composites were .23 and .38, respectively; after partials, the correlations were .14 and .33).

## Study 7

Study 7 used the new 27-item HSP Scale developed in Study 6 and related it again (as in Study 5) to the EPI E Scale

(Eysenck & Eysenck, 1968). Study 7 also related the HSP Scale to the Big Five personality factors (e.g., Goldberg, 1990). Thus Study 7 provided the opportunity to cross-validate the unidimensionality and reliability of the scale as well as to examine further the convergent and discriminant validity of high sensitivity in relation to other measures of social introversion (the EPI's E Scale and Big Five Extraversion/Surgency) and emotionality (Big Five Neuroticism).

### Method

A questionnaire was administered to 109 students (63 women, 46 men) in a psychology course at SUNY–Stony Brook; a different questionnaire was administered to 64 of these students (37 women, 27 men) who attended a class session 5 days later. (Respondents were not aware that the two questionnaire administrations were related; we matched questionnaires by having students indicate their birthdates and other demographic information.) The first questionnaire included the 27-item HSP Scale, the EPI E Scale, and three sensitivity-related variables. The second questionnaire was John, Donahue, and Kentle's (1992) Big Five Inventory (BFI), which consists of 54 short phrases (e.g., "Is talkative", "Does a thorough job") to which respondents indicate their agreement or disagreement on a 5-point Likert scale. John et al. reported levels of reliability comparable to other widely used (and longer) Big Five measures and strong correlations with appropriate scales in those measures. We scored the EPI and BFI Extraversion/Surgency so that higher scores meant greater social introversion.

### Results and Discussion

*Cross-validation of unidimensionality and reliability of the 27-item HSP Scale.* Once again, the 27-item HSP Scale appeared to be unidimensional. In the principal factors factor analysis, the first factor accounted for 47% of the common variance of the 27 variables, and a scree test suggested a single-factor solution (eigenvalues: 5.7, 1.9, 1.2, 0.9, 0.8; once again, two-factor rotated solutions were not obviously interpretable, nor did they match any two-factor solution in Study 6). Loadings of individual items on the first unrotated factor were virtually identical to those in Study 6. Alpha was .85. The overall mean was 4.38 ( $SD = 0.74$ ); the gender difference was not significant ( $t < 1$ ).

*Relation to social introversion.* The correlation between the EPI E Scale and Big Five Extraversion/Surgency was .58 ( $p < .01$ ). The correlation of the HSP Scale with these two measures was .29 ( $p < .01$ ) and .12 ( $ns$ ), respectively (the HSP–EPI correlation is nearly identical to that in Study 5). The multiple correlation of the HSP Scale with the two social introversion measures taken together was .31 ( $p < .05$ ). Once again, these data indicate that sensitivity was related to but clearly not identical with social introversion. Indeed, its relation to introversion in this study was with introversion as Eysenck originally conceived it, as measured by the EPI (as opposed to Eysenck & Eysenck's [1975] later EPQ). The E Scale of the EPI includes many items assessing arousability. The Big Five Extraversion/Surgency dimension, on the other hand, focuses almost entirely on social introversion. (This is true generally of Big Five Extraversion/Surgency, not just of John et al.'s [1992] scale as used here.)

*Relation to emotionality (Big Five Neuroticism) and other Big Five dimensions.* The correlation of the HSP Scale with

emotionality as measured by Big Five Neuroticism was .41 ( $p < .05$ ), a figure generally consonant with the level of association found between sensitivity and the measure of emotionality from our questionnaires used in Studies 2–6. None of the other three Big Five dimensions had significant or near significant correlations with the HSP Scale. The multiple correlation of all five scales with the HSP Scale was .54 ( $p < .01$ ). Although this association is clearly substantial, 71% of the variance was not accounted for by the Big Five, suggesting that sensitivity is not fully contained within the Big Five.

*Relation to social introversion and emotionality taken together.* The HSP Scale had significant zero-order correlations with the three sensitivity-related variables in this study ( $r_s = .21$  to  $.27$ ) that clearly remained (partial  $r_s = .22$  to  $.33$ ) after we partialled out the three-variable set of EPI E, Big Five Extraversion/Surgency, and Big Five Neuroticism.

### General Discussion

This series of seven studies that used diverse samples and measures identified a core variable of sensory-processing sensitivity and demonstrated its partial independence from introversion and emotionality, variables with which it had been confused or subsumed in most previous theorizing by personality researchers. We also explored subgroupings of those who are highly sensitive and sensitivity's role in moderating the effects of parental environment on experienced childhood. Six key findings emerged consistently over these studies: (a) The various themes expected from our conceptualization of sensitivity were in fact consistently intercorrelated and formed a unidimensional construct; (b) sensitivity was related to but not identical with social introversion; (c) sensitivity was related to but not identical with emotionality; (d) sensitivity was not merely the combination of social introversion and emotionality; (e) there appear to have been two distinct groups of highly sensitive individuals, a smaller group (about one third of the participants) who reported having had an unhappy childhood and who tended to have higher scores on social introversion, emotionality, and a variety of related sensitivities, and a larger group (the other two thirds of the participants) who differed little from the larger population of nonhighly sensitive individuals except in terms of their basic sensitivity; and (f) sensitivity seems to have moderated, at least for men, the relation of parental environment to reporting having experienced an unhappy childhood. In addition to these six findings, we also developed over these studies a 27-item measure of high sensitivity, the HSP Scale, that appears to have levels of reliability and content, convergent, and discriminant validity adequate for use in future research.

### *Sensitivity as a Unidimensional Construct Corresponding to Our Conceptualization*

This pattern was observed in the qualitative interviews and was supported over all six quantitative studies by strong intercorrelations among seemingly quite heterogeneous self-reported sensitivities, including sensitivity to subtleties, the arts, caffeine, hunger, pain, change, overstimulation, strong sensory input, others' moods, violence in the media, and being observed. Over all six quantitative studies, these diverse variables, along with self-

reports of a variety of indicators of being easily overaroused, showed a consistent unidimensional factor structure and consistently adequate alphas when taken as a unit-weighted scale. The latent commonality that appeared among these not obviously similar experiences is consistent with the theory that there is an underlying differentiating characteristic regarding how some individuals process stimuli, involving a greater sensory-processing sensitivity, reflectivity, and arousability. As pointed out earlier, the fundamental role of sensitivity is not an entirely new idea (e.g., Fine, 1973; Mehrabian, 1976; Petrie, 1967; Satow, 1987), nor is seeing it as a temperament category (Kagan, 1994; Thomas & Chess, 1977). However, in most cases, the emphasis has been on sensitivity leading to overarousability or on a narrow sense of sensory or pain sensitivity without an appreciation of the more discriminating or reflective processing that appears to give rise to much of the sensitivity or of the broad impact this processing difference would have (indeed would need to have if this sensitivity is a fundamental attribute of the nervous system).

### *Sensitivity Is Related to but Not Identical With Social Introversion*

This finding is particularly important because social introversion is the variable that has most often been seen as identical with or subsuming sensitivity in the sense in which we are using the term. However, beginning with the qualitative interviews (Study 1), it was clear that some who seemed by all respects highly sensitive did not show the profile of being socially introverted. In all six quantitative studies, we found the partial independence of social introversion and sensitivity by using four different measures of social introversion: the MBTI, various versions of our own questionnaire measure, Eysenck and Eysenck's EPI, and a measure of Big Five Extraversion/Surgency. Correlations with introversion were small to moderate, but all were clearly well below unity. In some studies more than one measure of introversion was used, and in each of these cases the correlations between the introversion measures were clearly higher than those between either introversion measure and the sensitivity measure. Yet another indication of the independence of sensitivity is that appropriate variables had unique correlations with sensitivity, even after partialing out introversion measures. Finally, the same partial independence of sensitivity from introversion was obtained in all of these ways, even when an alternative measure of sensitivity (Mehrabian's, 1976, scale) was used.

Not surprisingly, among the various measures of introversion, sensitivity was most related to Eysenck and Eysenck's (1968) older scale, which includes questions meant to tap arousability and impulsivity, Eysenck's understanding of the underlying reason for extraversion-introversion differences (these questions now make up much of Eysenck's [1991] P factor). Thus, for example, J. B. Campbell (1992) found, in breaking down Eysenck's measure of extraversion in this way, that noise sensitivity was as related to low impulsivity as it was to the low sociability aspect of the E Scale. (Campbell noted that impulsivity might have correlated even more with noise sensitivity if a more reliable measure of it had been used; or, we would add, had he used one designed to measure what may be the more

basic phenomenon, sensitivity, rather than a mere lack of impulsiveness.) Likewise, on a simple visual search task on which introverts are always found to excel, Newton, Slade, Butler, and Murphy (1992) found that low P was more associated with accuracy than was low E.

Because social interactions are a major source of stimulation, social introversion is a logical strategy for reducing stimulation. Thus we would expect some correlation between measures of social introversion and sensitivity (in our studies, the median was .29). However, it is quite clear from these data that many introverts are not highly sensitive, their introversion presumably arising from early or repeated unhappy social experiences (or some other mechanism other than sensitivity). Likewise, many highly sensitive individuals are not introverts. Again, in our interviews we found that some of these sensitive extraverts seemed to have been shaped toward extraversion by family norms, whereas others had come to experience groups and even strangers as nonarousing. Past research has to have been muddied by these very different subgroups. Particularly problematic are studies of physiological and cognitive differences between introverts and extraverts, such as the research on vigilance, sensory threshold, and the effect of caffeine. Even samples selected for their extreme scores on introversion-extraversion (especially as it is now usually measured, as sociability) should contain a substantial number of introverts who are not innately sensitive to stimulation and stimulants plus a smaller number of extraverts who are. To take one example, this lumping together of introverts who are and are not highly sensitive might be the reason for the failure of G. Matthews and Amelang (1993) to find stronger relationships among introversion, arousal, and performance.

In conclusion, we are well aware that introversion that excludes all relationships and fearful shyness are serious clinical problems deserving both theoretical and clinical research. However, for this very reason, introversion needs to be better differentiated from sensitivity, and a clinical approach to them should probably include assessments for sensory-processing sensitivity and for attachment problems so that treatment can be adapted appropriately.

### *Sensitivity Is Related to but Not Identical With Emotionality*

We have argued that sensitivity has been confused with neuroticism (e.g., Howarth, 1986), fearfulness (A. H. Buss & Plomin, 1984; Gray, 1991), reactivity (Strelau, 1983), or inhibitedness (Kagan, 1994), because in the face of novelty both the sensitive and the fearful will pause and possibly choose not to proceed. In addition, the sensitive do become fearful, overaroused, or more easily depressed through repeated aversive experiences while lacking social resources. In keeping with that understanding, these seven studies consistently supported the partial independence of sensitivity from negative emotionality. Indeed, like the parallel finding for introversion, this finding seems to be particularly solid. It was obtained consistently over all studies; it was observed in the qualitative interviews and was found in the quantitative studies by using two different measures of emotionality (our own measure and Big Five Neuroticism). The correlations of sensitivity with emotionality were substan-

tial ( $Mdn = .54$ ) but always far from perfect. Further, sensitivity was consistently uniquely associated with other variables after partialing out emotionality.

It seems quite reasonable that sensitive persons should be more emotional, as they are aware of more and are more easily overaroused. Overarousal experienced without a context seems rare, although from our interviews it seemed that sensitive persons did recognize such a state that was purely due to overstimulation. Still, it would seem that arousal could easily be relabeled as anger, fear (especially social fears or shyness; Brodt & Zimbardo, 1981), or even romantic attraction (Dutton & Aron, 1974). Yet we still think it is more useful to think of this characteristic as sensitivity rather than emotionality. In particular, we would like to clarify the confusion of sensitivity with negative emotionality or neuroticism. First, in Study 5 we found that highly sensitive persons were also more prone to intense positive emotions. However, second and more important are the findings discussed below about the two clusters of highly sensitive persons, those with and those without troubled childhoods, among other differences. It seems reasonable that individuals who, as children, experienced more subtleties, were more easily overaroused, and had an objectively more difficult childhood would be more prone to anxiety and depression as adults. Besides their childhood traumas, sensitive children are no doubt difficult to raise anyway, and much of the task of raising them probably involves helping them to contain and reframe their fears and sadness due to perceiving so much that is distressing and that goes unnoticed or unreflected on by other children.

### *Sensitivity Is Not Merely the Combination of Social Introversion and Emotionality*

In addition to finding that neither social introversion nor emotionality explained sensitivity, we also believed it was important to show that social introversion and emotionality together did not account for sensitivity. Indeed, in all six quantitative studies, the multiple correlation of sensitivity with these two variables was far from perfect, and correlations of other variables with sensitivity remained even after partialing out, simultaneously, both social introversion and emotionality (even when also including their interaction).

### *There Appear to Be Two Distinct Groups of Highly Sensitive Individuals*

In three quite different, moderately large samples, we found a pattern of two clear clusters of highly sensitive individuals. In each case, the smaller cluster, consisting of about one third of the highly sensitive individuals, reported childhoods that were substantially more troubled. In the two student samples, this smaller cluster also was more introverted and emotional. The larger cluster, on the other hand, although having virtually identical means on sensitivity, was much more similar to those who were not highly sensitive with regard to troubled childhood, introversion, and emotionality. Given the vagaries of cluster analysis, the degree of similarity over replications with three diverse samples is rather exceptional.

One interpretation of the cluster analysis solution is that, although all highly sensitive individuals have the same underly-

ing temperament, the implications of this temperament for the rest of their lives depends on environmental factors. A prime candidate for salient environmental factors is of course circumstances of childhood—as suggested by the centrality of reported unhappy childhood in differentiating the two clusters (indeed, in our samples, there were consistent, strong correlations between emotionality and unhappy childhood). Further, particularly among the students, many of the other variables that were more typical of the smaller cluster (e.g., cry easily, love intensity) and that seemed logically linked to emotionality or neuroticism also seemed easily explained by childhood experiences. The important impact of childhood experiences on adult neuroticism is suggested by the findings of Shaver and Brennan (1992), who found correlations between insecure attachment styles (anxious and avoidant) and Neuroticism on the Big Five, as well as the research cited at the outset on shyness in humans and on the impact of early trauma on reactive monkeys. Still, one might argue that infant irritability (the usual first sign of a sensitive temperament; Kagan, 1994; Rothbart, Derryberry, & Posner, 1994) is causal here: It leads to insecure attachments (a tentative finding by Van den Boom [1989] among lower class mother–infant dyads) unless extra efforts are made by the mother to help the infant feel secure. However, Main (1990) has argued convincingly that evolution makes it a high priority that infants adapt themselves to their caretakers, implying that infant temperament would be suppressed rather than actively creating a nonsecure attachment. Emotionality seems to be the result of insecure attachments in conjunction with sensitivity rather than the result of sensitivity alone.

Gunnar's (1994) research, discussed at the beginning of this article, has made particularly visible one process by which sensitive children might be more affected by poor parenting. The cortisol response they have when presented with novelty while attended by a nonresponsive caretaker and, in another study, while attended by their mother if that relationship is insecure, must certainly contribute to the development of neuroticism. For example, cortisol disturbs sleep, which leads to still greater vulnerability, in children especially (Weissbluth, 1989), no doubt leading to lower serotonin levels, depression, anxiety, and a general lack of trust in the world.

In any case, an important implication of these data for personality researchers (and also for clinical researchers) is that any overall association of emotionality/neuroticism with sensitivity or variables closely linked with it actually reflects two relatively distinct subpopulations. One value of this finding is that it may help undermine stereotypes of highly sensitive people as particularly emotional and neurotic, because it suggests that this characterization applies only to a minority. This finding may also clarify the issue of whether shy people are or are not especially creative or aesthetic in orientation (Cheek & MacMillan, 1993; Cheek & Stahl, 1986; Ziller & Rorer, 1985) and generally admirable and underrespected (Gough & Thorne, 1986) or are they narcissistically self-preoccupied (Cheek & Melchior, 1985; Wink, 1991) and overly self-conscious (A. Buss, 1980). In essence, as we found in our interviews in Study 1, sensitive individuals from home environments that support their temperament seem quite successful in their lives and adept at making their sensitivity an asset while avoiding shyness and over-self-consciousness.

*The Association Between Having a Good Parental Environment and Not Experiencing an Unhappy Childhood Appears to Be Stronger Among Highly Sensitive Individuals (at Least for Men)*

This interaction was obtained for all participants in Study 2, regardless of gender, but for men only in the North American student sample and in the random-digit-dialing telephone community survey. The consistency, at least among men, of this finding over all three of the samples with sample sizes sufficient to test it is rather remarkable, given that it represents a quite complex pattern obtained with ad hoc and relatively indirect measures. On the other hand, the finding does make sense theoretically. The overall link (as seen in the main effect in our sample) of parental environment with experienced childhood is of course no surprise at all. However, it also seems reasonable that those who are more sensitive to their environment will be more reactive to bad parenting.

That this finding was consistently replicated only for men is also of some interest. (Recall from the *Results and Discussion* in Studies 2–4 that throughout these studies we found virtually no other situations in which gender qualified a pattern of findings.) For women, the main effect of parental environment was strong, and being sensitive made little additional difference in two of our samples.

These weaker or nonexistent interaction results for women make sense in light of several points. First, among the parental environment items, the strongest contributor to the interaction was father's involvement (indeed, this was the only variable included for parental environment in the random-digit-dialing telephone survey). Perhaps this finding only held for men because in Western cultures fathers traditionally teach a child how to be in the world, and involved fathers probably make a special effort to do this with a sensitive son and perhaps make less effort with daughters generally and sensitive daughters in particular. Also, our only two items related to maternal behavior (mother's fondness for infants and mother's involvement) probably had mixed impacts on sensitive daughters—either helping a daughter to be more in the world or fostering her overprotection—that we failed to sort out with these questions. Further, girls have been found to be generally more affected by parental attitudes and behaviors of both of their parents (Cameron, 1977). Thus another way to understand the interaction for men and not for women would be that sensitive boys are like all girls in being more influenced by parental environment. Given that the rest of society tends to see sensitivity in men as particularly problematic, parental environment would undoubtedly have a greater influence on a sensitive boy, who probably has to rely on parents to supply the self-confidence that the outer world supplies to the nonsensitive boy, even one with a troubled home life.

In any case, even if the interaction applies only to men, it is quite a provocative result from a developmental and clinical perspective, suggesting that highly sensitive boys are particularly affected by poor parenting (or nonhighly sensitive boys are particularly resilient). This should be a fruitful avenue for future research on individual differences thought to be associated with childhood environment.

### *HSP Scale*

As part of this research program, we developed a 27-item questionnaire measure of high sensitivity that appears to have adequate psychometric properties for research applications. The 27-item version used in Studies 6 and 7 had internal consistency reliability (alphas) of .87 and .85, respectively. The measure has good content validity in terms of our conceptualization of high sensitivity as implying both high levels of sensitivity to subtle stimuli and being easily overaroused. Further, by including both types of items, we have also probably minimized social desirability bias compared to previous attempts at measuring constructs related to sensitivity. Finally, the measure's discriminant, convergent, and overall construct validity was supported by the entire set of studies, although especially by Studies 6 and 7, in which it was used in its precise final form.

This measure has obvious potential for the study of personality. Many findings based on extremes of introversion and extraversion in particular might benefit from replication with the HSP Scale, permitting researchers to sort out variance due to low sociability or an avoidant attachment style from that due to sensitivity as we have distinguished it in these studies. Although the scale was not designed for clinical applications (and has not been evaluated in that context), it would also seem to have potential in this area. The identification of highly sensitive individuals seems important, because in our experience these individuals benefit greatly from counseling around issues of the normalcy of their reactions to stimulation and their need to consider their sensitivity in regard to their vocation, relationships, health, and lifestyle (E. N. Aron, 1996).

### *Methodological Issues*

All of these results have limitations, of course. They involve no direct physiological study of this difference and no genetic research into its inheritance, separate from what has already been done on introversion, shyness, inhibitedness, and low sensation-seeking, which we have argued are not quite the fundamental phenomenon. In addition, the results suggesting that the parental environment has a different impact on sensitive individuals, at least men, is based on retrospective self-reports on a few items that were not really designed to explore the issue in depth, even retrospectively.

On the other hand, this research program has several methodological strengths that are relatively unusual in personality research. First, it exemplifies what many methodologists (e.g., Campbell, 1975; Reichardt & Cook, 1979) have described as an ideal model for integrating qualitative and quantitative research. Second, it used a rare diversity of samples for a single research program—samples of students from several universities who completed questionnaires under rather diverse conditions plus a random-digit-dialing telephone survey of the general public in a U.S. county that includes a small city and rural populations. Third, it used a variety of methods for supporting its key conclusions about the partial independence of the construct from introversion and emotionality: (a) correlations less than unity, (b) greater correlations among alternative measures of introversion than of either measure with sensitivity, and (c) partial correlations of appropriate variables with sensitivity remaining signifi-

cant after partialing out introversion and emotionality. Fourth, over the six quantitative studies, the measurement of key variables (sensitivity, introversion, and emotionality) all used at least two independent measures developed by different researchers. Fifth, sensitivity was explored by using procedures that are uncommon in personality research on a new construct but that clearly deepen understanding: examination of its subpopulations (the cluster analyses) and of its role as a moderator of relations among other relevant variables (the interaction analysis for childhood). Finally, and perhaps most important, the major findings of this study were replicated over a series of seven studies.

### Summary of Theoretical Implications

The key implications of this research are that there appears to be a unidimensional construct of high sensory sensitivity (and associated arousability) that is partially independent of introversion and emotionality. This is very important because introversion and emotionality are highly prominent, central variables in personality psychology, and the present data suggest that research and theory on these variables up to now has often confounded them with sensitivity as conceptualized here. Further, high sensitivity in itself appears to have broad implications for behavior and experience, as illustrated by the widely diverse variables that have unique correlations with it (ranging from sensitivity to daylight to moral-social sensitivity). Finally, the findings regarding the two clusters of highly sensitive individuals and the role of sensitivity as a moderator (at least for men) of the link of parental environment with childhood experiences suggest ways in which the environment may interact with temperament in structuring other personality differences.

### Some Practical Implications

There are also obvious practical implications of this research—too many to be discussed here. Although those studying temperament in children appear to see these implications for children (e.g., Kohnstamm, Bates, & Rothbart, 1989), the implications are often overlooked with regard to adults. For example, one must ask whether psychotherapy should be attempting to make a sensitive person as gregarious or stress resilient as a nonsensitive person or be searching for explanations in childhood for all of the reasons for individual differences. On the other hand, sensitive persons with troubled childhoods probably need and respond more to psychotherapy. However, psychotherapy ought to include what they surely did not receive in a troubled home: guidance in appreciating their attribute plus skill in coping with overarousal.

### Suggestions for Future Research

We intended the HSP Scale to further research on this concept, and we look forward to its development or revision as needed. The first task will certainly be to look for behavioral and physiological correlates of the scale and to explore its role (as a measured individual difference variable) in interaction with manipulated independent variables in experimental research, including replicating physiological and perception stud-

ies that used high and low extraversion in this way. We also look forward to research that sorts out the relationship among sensitivity and neuroticism, shyness (especially the somatic component; Cheek, 1989), private self-consciousness and private body awareness (A. Buss, 1980), narcissism (e.g., Wink, 1991), and attachment style. There will undoubtedly be many parental, family, and peer influences on childhood, as well as aversive adult experiences, that can interact with the sensitivity to cause more negative emotionality in adults with this trait. At the same time, explorations of the assets associated with the trait will be valuable, such as research on the relation of sensitivity, especially of the two clusters (with and without a troubled childhood and negative emotions), to creativity and aesthetic sense, parenting ability, and giftedness in various fields.

### Conclusion

In short, without quite promoting an aristocracy of the sensitive, we would like to side with Forster in our own way, by helping to restore sensitivity to a visible place in psychological research.

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