

BIASES IN PERCEPTION AND REPORTING FOLLOWING A PERCEIVED TOXIC EXPOSURE¹

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Summary.—Reactions to chemical exposures often include fears of future illness, cancerphobia, reports of multiple chemical sensitivity, and other ill-defined complaints. Frequently, these complaints occur at levels of exposure not known to cause physiological harm. Although frequently dismissed as hysterical or hypochondriacal reactions, these complaints, along with other indefinite symptoms, may be better understood in terms of biases in perception and reporting. In this paper, we outline various sources of perceptual and response biases including prior beliefs, the media, influential others, reconstructed personal histories, self-perceptions, and the forensic environment. It is recommended that a thorough understanding of symptom-reporting and psychological distress following a chemical exposure involves consideration of these issues.

When a social unit, whether it is a family, a group of workers, or an entire community, is disrupted by a verifiable toxic exposure, the members of that group may be affected physically and psychologically. It is not unusual for individuals to report symptoms ranging from skin irritation, headache, and nausea to uneasiness, anxiety, and sleep difficulties. Often these symptoms are direct results of a toxic substance and subsequently treated. However, many times there is no toxicological basis for such complaints (Alexander & Fedoruk, 1986; Baker, Greenland, Mendlein, & Harmon, 1988; Colligan & Smith, 1978; Dunne, Burnett, Lawton, & Raphael, 1990; Gamino, Elkins, & Hackney, 1989; Hefez, 1985; Kerckhoff & Back, 1968; Neutra, Lipscomb, Satin, & Shusterman, 1991; Roht, Vernon, Weir, Pier, Sullivan, & Reed, 1985; Small & Borus, 1983; Smith, Colligan, & Hurrell, 1978; Stahl & Lebedun, 1974). Symptoms are manifested in the absence of harmful toxic levels. In these cases, the reporting of such symptoms cannot be readily attributed to a toxic exposure, since no toxins exist in concentrations known to produce harmful effects. Often, these cases are dismissed as mass hysteria or hypochondriasis without reasonable investigation. Such dismissals out of hand are too simplistic. Many other factors should be considered to gain a thorough understanding of the causes and consequences of phantom symptom reporting.

One explanation is that established harmful levels for specific toxins may be an insufficient barometer of potential health risk. Given the varia-

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tion in susceptibility among human beings, exposure at any given level for one person may be perfectly harmless while at the same time causing great physical distress in another. Those individuals reporting symptoms in the absence of recognized harmful toxic levels may represent the end of the spectrum encompassing the highly susceptible or high risk members of the population. Our knowledge and understanding of toxins and human health is ever-changing and absolute values or definitive levels of toxicity only represent our current level of understanding. What is considered harmful today, with additional knowledge, may be considered safe tomorrow. Likewise, today's harmless levels may be regarded as toxic in the future.

Another explanation is that following a chemical exposure, individuals experience uncertainty and feel vulnerable. These feelings, combined with a healthy dose of skepticism regarding the willingness of chemical manufacturers to disclose the dangers of their products and the questionable veracity of government representatives, understandably may lead exposed individuals to feel stress regarding the potential outcomes of such an event. Likewise, dire warnings from doctors or lawyers may create stress whether the warnings are realistic or not. Such stresses probably lead to alterations in the immune system (Zakowski, Hall, & Baum, 1992) and, perhaps, ultimately affect health, although evidence to support such a relationship is presently lacking. Zakowski, *et al.* recognize that stress and certain immunological functions are related but note "many studies have reported changes in indices of (immune) function that should be good clinical indicators, but evidence of stress-induced immune changes mediating changes in health has not been reported" (p. 4).

A third explanation suggests that symptom reports are the result of a *perceived* toxic exposure, whereby the individuals believe they have been exposed to harmful levels of toxins despite evidence to the contrary. This paper will explore possible explanations for symptom reporting in perceived toxic exposures such as perceptual and reporting biases, and pose avenues for continued research. Further, we will consider the processes and actions which result in biases, including preconceived beliefs, media influences, actions of others, inaccurate recollections of personal history, information-gathering techniques, self-perceptions, and the forensic environment.

PERCEPTUAL BIASES

Perceptual biases are defined as beliefs, forces, or actions which influence an observer's perception of an event such that the observer's representation is inconsistent with the factual event. For example, spills of non-toxic chemicals may be perceived as hazardous because of biasing beliefs or influences, when in reality the event poses no danger. Misperception of the event leads to feelings of alarm, fearfulness, and victimization. For the individual involved, this biased perception becomes reality. This "social real-

ity based on social cognition" idea, or the phenomenon of creating individual reality based on individual perceptions, has been widely investigated, with much support. As Jussim (1991) details in a comprehensive analysis and reformulation of this social constructivist theory, many prominent theorists from the constructivist perspective make rather bold claims regarding social perception and social reality. A few examples he cites include:

. . . the hallmark of the cognitive perspective in social psychology is the constructive nature of social cognition (Markus & Zajonc, 1985, p. 213).

Constructivism asserts that we do not discover reality, we invent it (Hare-Mustin & Maracek, 1988, p. 455).

Social perception is a process dominated far more by what the Judge brings to it than by what he takes in during it (Gage & Cronbach, 1955, p. 420).

Events in the social world may be as much effects of individuals' beliefs as they are causes of these beliefs (Snyder, 1984, p. 294).

Several aspects of events may influence individuals to form an incorrect construction of a harmless event as harmful. For example, the presence of an unfamiliar or unpleasant odor can increase symptom reporting (Alexander & Fedoruk, 1986; Dunne, *et al.*, 1990; Neutra, *et al.*, 1991; Roht, *et al.*, 1985; Smith, *et al.*, 1978; Stahl & Lebedun, 1974). Noxious odors are more likely to be perceived as toxic. By selectively attending to this particular stimulus and giving unwarranted credibility to it as a correlate of toxicity, the perceptual process is slanted toward the erroneous conclusion that the experience indicates toxic material.

Preconceived notions regarding chemicals in general influence the perceptions of chemical exposures as well. Many hold the unjustified belief that most chemicals are hazardous to human health. Such notions can distort the perception of a chemical exposure, leading to false attributions of a dangerous quality to a harmless event. It has also been shown that strong opinions on environmental matters (Roht, *et al.*, 1985) and environmental worry (Neutra, *et al.*, 1991) are strong predictors of symptom reporting near hazardous waste sites.

Unfamiliar or novel situations provide no prior experience on which to base perceptions. Therefore, preconceived ideas and stereotypical notions serve as a framework for building current perceptions. The belief that most chemicals are harmful or that chemical companies and governmental officials are untrustworthy can influence perceptions as well. To the extent that these beliefs are accurate, such reliance serves as a valuable heuristic method for cognizing our environment (Jussim, 1991). However, when these preconceived beliefs are erroneous, inaccurate perceptions result.

Influence of the Media

Frequent sources of influence are the popular media and the beliefs of other relevant people. Hefez (1985), Wenger, Dykes, Sebok, and Neff (1975)

and Veltfort and Lee (1943) have implicated the media in influencing perceptions of disastrous events or perceived exposures. Roht, *et al.* (1985) suggest that symptom reporting following a perceived exposure is more likely to occur "when media coverage or civic concern has focused attention on health problems or on local environmental hazards" (p. 419). Likewise, McCombs and Gilbert (1986) have suggested that the news media play an important role in determining how much emphasis the public places on certain facts about public affairs by the manner and frequency with which those facts are presented. They state, "Considerable evidence has accumulated since 1972 that journalists play a key role in shaping our pictures of the world as they go about their daily task of selecting and reporting the news" (p. 3). Given that "over 75% of the potential news of the day is rejected out of hand and never transmitted to the audience" (McCombs & Gilbert, 1986, p. 4), editorial policies and decisions vastly influence our perceptions of the world. Research shows that the content of the nightly news dictates which issues we feel most strongly about and which we see as being of most importance (Iyengar & Kinder, 1987).

These perceptions need not mirror reality. As Funkhouser (1973) reports in an assessment of public opinion and media agenda setting, there is a substantial relationship between press coverage of specific events and public concern for these events, but not between either public opinion or media coverage and objective measures of reality. Public concern for and media coverage of three indices of 1960s social reality—the Vietnam war, campus protests, and urban unrest—peaked much earlier than objective measures of these indices, i.e., number of troops in Vietnam, number of campus demonstrations, and number of civil disturbances. That is, media coverage and public concern were consistent with each other but not with the objective measures of reality.

The media, then, can have a strong influence on the way we perceive our environment and how we behave. Pratkanis and Aronson (1992) explain how the media, specifically television, can have such a dramatic influence on our understanding of the world. They state that part of the reason television plays such a large role in shaping our perceptions of reality is that we rarely question the picture that is presented to us. We seldom ask, "Why is this news story being told and not some other one?" or "Is that chemical spill headlining the news really hazardous to the health of human beings?" Rather, we simply take it for granted that the images presented via television represent reality. They conclude, "Once accepted, the pictures we form in our heads serve as fictions to guide our thoughts and actions" (p. 55). Other researchers agree. Gerbner, Gross, Morgan, and Signorielli (1986), in a comprehensive review of prime time television programming from 1969 to 1984, suggest that television provides messages which are easily learned and form

the basis for a broader world view. They see television as "a significant source of general values, ideologies, and perspectives as well as specific assumptions, beliefs, and images" (p. 28). Therefore, if television presents certain ideologies, viewers can, and do, incorporate them into their beliefs and value systems.

Influence of Others

Likewise, the influence of similar others has been shown to affect individual perceptions and behaviors (Cialdini, 1984). Confronted with a condition of uncertainty, which is almost invariably the state of affairs following a chemical spill or toxic exposure, human beings look to similar others for clues as to how to react (Cialdini, 1984). Cialdini states, "Without question, when people are uncertain, they are more likely to use others' actions to decide how they themselves should act," and "we will use the actions of others to decide on proper behavior for ourselves, especially when we view those others as similar to ourselves" (pp. 140-142). Therefore, if other people whom we see as similar to ourselves react to a novel event such as a chemical spill with fear or symptomatic manifestations of illness, then we are more likely to respond in a similar fashion.

If doctors, lawyers, or the media introduce alarming interpretations of the ambiguous circumstances surrounding a chemical exposure, then the perception of that event as alarming and frightening is a predictable response. The experience becomes frightening, not on the basis of factual aspects of the occurrence, but on the basis of inaccurate perceptions of the occurrence. An important area for research is the extent to which these phenomenological experiences are social products of interactions with influential parties rather than rational responses to harmful situations.

REPORTING BIASES

Reporting bias has been characterized as an incomplete, distorted, or inaccurate representation of events (Dunne, *et al.*, 1990). Roht, *et al.* (1985) define reporting bias as the increased likelihood of reporting symptoms and illnesses following a *presumed* exposure [emphasis added]. Clinically, reporting bias is the tendency to present distorted or inaccurate representations of matters such as symptoms, illness, and disabilities, or the sources of symptoms, illness, and disabilities. Reporting bias can result from prejudicial recall of events or from selective attention to specific aspects of an event. For example, vividly detailing the positive aspects of a previous relationship while minimizing the negative aspects constitutes a reporting bias in describing that relationship. Reporting bias can result from conscious or unconscious mechanisms. It can range from subtle alterations in the recollection of personal histories to outright fraud. Possible explanations for reporting bias abound. They include concepts such as social desirability and motivated

self-presentation on the part of the respondent as well as features of the information-gathering process itself. Certain questioning procedures such as self-report questionnaires are more likely to induce a response bias than are others (Furnham, 1986). But no testing process is immune to the possibility of biased responses. As Furnham points out, "Nearly all test constructors have been concerned about response bias, particularly social desirability" (p. 386). Also, motivations of the respondents have been suggested as contributors to response bias (Eysenck, Eysenck, & Shaw, 1974; Michaelis & Eysenck, 1971).

Finally, the setting in which respondents find themselves at the time of reporting, including any social group affiliations, can bias responses. Research indicates certain social groups, particularly those who perceive themselves as having less social power and less economic advantage, learn to provide biased responses as an adaptive strategy (Ross & Mirowsky, 1984). An excellent example is the legal environment, which provides a setting wherein proper presentation and group identification are critical, particularly in mass toxic tort cases. Such a setting increases biased reporting.

Influence of Others

We have previously suggested that symptom reporting without medical justification by individuals following a perceived toxic exposure may be a manifestation of collective behavior consistent with the theory of emergent norms (Brown & Lees-Haley, 1992). Turner and Killian (1987) contend that collective behavior results from a variety of social influences whereby an unusual event (e.g., a perceived toxic exposure) is defined. This reconstructed definition of reality not only defines the situation but also outlines the appropriate responsive behaviors.

Thus, the perception that an event is toxic may be recognized as an appropriate response to an exposure, especially if that perception is suggested by individuals recognized as leaders. Turner and Killian explain, "The leader is important primarily as a keynoter, advancing suggestions that help to resolve the feelings of ambivalence experienced by many crowd members" (pp. 84-85). That is, these leaders help shape the perceptions of other members in the situation by providing their interpretations and serving as referents for the confused and uncertain group members. In cases of perceived toxic exposure, it is important to identify such influential others, their motivations, and the effect they have on the remaining members of the group. Kerckhoff and Back (1968) have demonstrated the importance of communication channels in the spread of hysterical symptoms among participants in a psychogenic epidemic. Likewise, communication among participants is an important component in the frequency and consistency of symptom reporting in a perceived toxic exposure.

It has been shown that physical symptoms of illness are more likely to

be reported in individuals living near hazardous waste sites (Dunne, *et al.*, 1990; Neutra, *et al.*, 1991; Roht, *et al.*, 1985). The tendency for higher symptom reporting persists despite the fact that there is no greater incidence of serious illness, cancer, or death in the communities near the waste sites (Dunne, *et al.*, 1990). In a review of five studies regarding hazardous waste sites, Neutra, *et al.* state, "The possibility of some kind of reporting bias has always seemed a credible hypothesis to explain the higher symptom rates" (p. 31). Dunne, *et al.* concur in suggesting reporting bias plays a role in higher symptom rates for Australian hazardous waste communities by concluding, "Such a bias is likely here" (p. 597).

Conscious Reporting Bias

Reporting bias may be consciously or unconsciously motivated. Consciously, subjects may fabricate symptoms which are allegedly the result of toxic exposure to achieve external goals such as financial compensation, time away from work, attention for a specific cause, or hardship for a certain company. Deception such as this cannot always be detected using standard psychological batteries. Furnham (1986, p. 397) states, "It should be pointed out that there is reasonable evidence to suggest that (some) people can fake questionnaires and spot what the items are measuring." Research indicates that untrained volunteers can successfully fake psychopathology on psychological inventories used in toxic exposure cases (Lees-Haley, 1989a, 1989b, 1989c, 1990). Lees-Haley told subjects "to fake a psychological disturbance in a manner calculated to convince the psychologist that they were psychologically disturbed and cancerphobic as a result of the litigated stressful experience" (Lees-Haley, 1989a, p. 1205). Analysis showed 75 to 96% effectiveness at faking psychopathology on various psychological measures.

Unconscious Reporting Bias

In contrast to consciously slanted reporting, biases in recall and reporting may also occur unconsciously. Responses may be influenced by the expectations of the attending doctor or attorney or by the manner in which these professionals pose their questions. Experimenter's expectations and motivations have been shown to be partial determinants of the results of behavioral research (Rosenthal, 1962). The same influences can be exerted by clinical professionals.

If a clinician or attorney precedes an individual's self-report by stating that specific symptoms are frequently reported among other individuals under similar conditions, those symptoms will more likely be reported. Kunda and Sanitioso (1989) showed that by indicating to subjects that certain attributes (introversion or extroversion) were more desirable (related to success), subjects came to see themselves as possessing more of that desired attribute. The exact symptoms need not be suggested to stimulate a biased response. It

has been noted that exposing individuals to positive or negative trait terms causes them to recall ambiguous events at a later time as either correspondingly positive or negative (Fiske & Taylor, 1984). Therefore, presenting individuals with images of disease, damage, or potential litigation following a toxic exposure may result in a more negative appraisal of the event than would otherwise result.

Reporting bias can also be the result of faulty causal attributions. Subjective physical and psychological complaints such as headaches, fatigue, marital stress, occupational dissatisfaction, or sleep difficulties may be more readily attributed to an external event such as a toxic exposure than to more internally based causes. However, blaming others can have deleterious effects. Research indicates a consistent association between blaming another person or entity and poor adjustment following a threatening event (Bulman & Wortman, 1977; Tennen & Affleck, 1990). Thus, the actions of doctors, lawyers, media, or others who encourage people to view themselves as helpless victims may very well be causing and perpetuating illness which would not otherwise have existed. Response biases may be motivated by self-serving causes (Bradley, 1978; Weary, 1979) or rational cognitive processes (Miller & Ross, 1975; Miller, 1978). Either way, the result is the same—a causal attribution of symptoms to a perceived toxic exposure.

Another explanation for reporting bias is that people tend to believe what they want to believe, regardless of facts to the contrary. Selectively attending to information in support of our beliefs is described by Kunda (1990), who states:

... people do not realize that the process is biased by their goals, that they are only accessing a subset of their relevant knowledge, that they would probably access different beliefs and rules in the presence of different goals, and that they might even be capable of justifying opposite conclusions on different occasions (p. 483).

By attending primarily to those bits of information consistent with our goals and motivations, we can more easily validate our positions and find support for our ideas. In another study, Kunda and her colleagues suggest,

People attempt to construct a rational justification for the conclusions that they want to draw. To that end, they search through memory for relevant information, but the search is biased in favor of information that is consistent with the desired conclusions. If they succeed in finding a preponderance of such consistent information, they are able to draw the desired conclusion while maintaining an illusion of objectivity (Sanitioso, Kunda, & Fong, 1990, p. 229).

Gilovich (1991) points out that our motivations influence our beliefs through the way we frame our questions. By framing a question in a leading manner, we direct the attention of the respondent toward confirmatory information and away from information which might contradict the desired conclusion. For the person who believes he is at risk of physical illness following a toxic exposure, the question, "Do you have any physical symptoms which

may be attributable to the toxic exposure?" increases the likelihood of supportive comments and decreases the likelihood of disconfirming responses. As Gilovich states, "When examining evidence relevant to a given belief, people are inclined to see what they expect to see, and conclude what they expect to conclude. Information consistent with our pre-existing beliefs is often accepted at face value, whereas evidence that contradicts them is critically scrutinized and discounted" (p. 50).

Further, by establishing a preference or value for certain traits, we can influence the facility with which those traits will be reported (Kunda & Sanitioso, 1989). This finding is especially salient in the light of specific behaviors by physicians, scientists, and attorneys following a perceived toxic exposure. Frequently, they employ symptom checklists to assess the health status of exposed individuals. These checklists are comprised of symptoms which would be expected to result following a toxic exposure, and in most cases are not scientifically validated instruments. By highlighting certain symptoms as expected, attending physicians and attorneys influence the frequency with which these symptoms are reported. Also, symptom checklists can bias the way individuals interpret their somatic sensations (Cioffi, 1991). As Cioffi states,

The use of symptom checklists as measures of somatic perception may present a pernicious problem: Many symptom labels are already biased toward a negative or pathological interpretation. . . . As measures of somatic awareness, symptom checklists may not allow persons to independently report what they feel and how they feel about it (p. 33).

Moreover, the manner of investigating symptom frequency by some groups virtually assures a finding of pathology. For example, surveyors from some political activist groups are guided to ignore negative findings but to report positive findings to residents and members of the media (Cohen, 1986). Operating by this principle, the only possible finding is that the patients indeed have a significantly greater incidence of expected symptoms. Findings of wellness are suppressed. Research such as this is calculated to lead to conclusions which are misleading and promote a reporting bias.

Reconstruction of Personal History

The ability of individuals to reconstruct their personal history to be consistent with their present goals and motivations is a phenomenon recognized as early as the 1930s. Greenwald (1980) notes that Bartlett (1932, p. 309) states, "Alike with the person and the group, the past is being continually re-made, reconstructed in the interests of the present." Bartlett also contends, "Recall is . . . a construction, made largely on the basis of an attitude, and its general effect is that of a justification of the attitude" (p. 207). Ross, McFarland, and Fletcher (1981) concur when they say that individuals appear to be revisionist historians with respect to their personal memories.

Likewise, Levine and Murphy (1943) suggest that individuals make note

of and remember information which supports their attitudes better than information which conflicts with them. Thus their recollection of past events is biased to be consistent with current attitudes. As Ross, *et al.* (1981, p. 632) state, "Individuals either reconstruct their actions in light of the attitude, or they focus on the subset of their behaviors that is consistent with the attitude." Therefore, if individuals maintain the attitude that they have been the victim of a toxic exposure and are subsequently suffering a multitude of physical and psychological symptoms as a result of this exposure, their recollection (or reconstruction) of their premorbid physical and psychological condition will be biased in accord with the conception that they have been victimized. It can be reasonably anticipated, therefore, that elevated levels of postexposure symptoms and deflated levels of pre-exposure symptoms will be reported in cases where individuals believe they have been victimized. Also, more favorable representations of premorbid functioning will likely be presented than actually existed.

The Forensic Environment

When a patient crosses the line between the clinical and forensic environments, a profound change occurs. The context of litigation alters patients' perceptions, test responses, self-report, and even the nature and extent of illness in psychological claims (Fox, *in press*; Lees-Haley, 1988; Lees-Haley & Fox, 1990; Weissman, 1990). As part of a litigating group, individuals are subjected to certain group dynamics that nonlitigating individuals do not experience—group identification as victims, powerlessness at the hands of attorneys and the legal system, and stressors of litigation. Such processes significantly alter the litigants' perceptions of the event.

Plaintiffs are encouraged to act out the role of victim and to maintain self-perceptions as disabled, helpless, or passive. Litigation sometimes encourages noncompliance and passivity with respect to recovery. Recovery can jeopardize pending litigation and be costly in terms of lost compensation for damages. Research indicates that recovery for psychological symptoms following an accident is more a function of time since litigation resolution than time since the accident occurred (Binder, Trimble, & McNiel, 1991). Weissman (1990) also found that involvement in litigation retards recovery. Weissman states, "Involvement in litigation renders plaintiffs susceptible to stressors and to influences that may lead to increased impairment, biased reportage, and retarded recovery" (p. 67). Further, with the lure of financial reward and other secondary gains, attorneys may encourage symptom reporting in people who otherwise would not perceive themselves as affected. Research indicates that patients seeking financial compensation following minor head trauma perform more poorly than patients not seeking financial compensation (Binder & Willis, 1991). Unpublished data by Lees-Haley indicate that the ratio of plaintiffs to defendants reporting mild brain injury in motor ve-

hicle accidents exceeds 100 to 1. How it is that plaintiffs consistently suffer mild brain injury as a result of the same accidents in which defendants suffer none remains unresolved. Clearly, motivations and social influences should be considered potential sources of reporting bias.

Subsequently, the idea of comparing the perceptions and reactions of litigants with nonlitigants, both of whom were exposed to the same chemical incident, is compelling. Investigations such as this warrant further exploration in an empirical setting.

CONCLUSION

In summary, many social and psychological variables affect perception and reporting of events following a chemical exposure. Our perceptions are influenced by our pre-existing beliefs, values, and points of view. In fact, social constructivists argue that our perceptions are not reflections of social reality, but rather our reality is created out of our perceptions. Although we do not accept this extreme position, the research clearly indicates that our perceived reality is profoundly influenced by subjective as well as objective information.

Scientists investigating the effects of a chemical spill must try to identify the prevailing influences on perceptions following the event. Many questions must be asked to recognize the primary sources of fear, discomfort, and anxiety subsequent to a perceived exposure. Are the popular media responsible for the fears caused by their decisions as to what is newsworthy by thrusting frightening images onto our televisions and into our consciousness with language and imagery selected for sensational value rather than balance and accuracy? Are the leaders of the community who respond with premature fear and alarm, guided by political aims, culpable for influencing community perceptions? Are the chemical companies at fault for failing to maintain a more thorough dialogue with the public? Are doctors and attorneys who solicit business by claiming that a danger exists the cause of biased perceptions? Or are the individuals themselves responsible for failing to assess and perceive the event on its objective merits? To what extent is perception a product of the ecological setting (e.g., see Barker, 1968) or collective social forces (e.g., see Turner & Killian, 1987)? There is no simple answer. However, before attributing responsibility to community leaders, chemical companies, media, activists, and others, scientists should accept responsibility for researching these questions and educating influential parties about our findings. A thorough understanding of the perceptions and experiences of people following a chemical exposure must include not only the objective information relative to the event itself, but also the subjective information the perceivers bring to the event and the influences which play a seminal role in their perception formation.

Biases in recall of events and reconstruction of personal histories must

be considered. The influences of interested third parties, their motivations, and the manner of testing must all be questioned. Finally, the influence of the respondents' role in a social context must be taken into account, for example in a forensic environment. The role of litigant, defendant, plaintiff, or victim can have dramatic effects on self-perceptions and perceptions of other people and events. Clearly, much investigation and research need to be performed before we can explain all the reasons individuals react, perceive, and feel as they do following a chemical exposure. In the interim, the knowledge of our ignorance should serve a careful reminder that hasty conclusions on our part may be the result of perceptual biases of our own.

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