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## MULTIDIMENSIONAL PERCEPTIONS OF ILLNESS AND INJURY

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### ABSTRACT

*This paper investigates the multidimensional nature of how we perceive physical illness and injury, and differences in those perceptions based on experience. Multidimensional scaling revealed that similarity judgments of 15 medical conditions made by registered nurses, undergraduate nursing students, and liberal arts students were based primarily on their functional impact to the individual (e.g., correctability and impact on long-term motor and sensory function). The less experienced students, however, also viewed the injuries more in terms of surface similarity (e.g., amputation, disfigurement, and sensory loss) than the registered nurses. The implications of the findings for decision making in personal injury cases are discussed.*

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### INTRODUCTION

How do people organize their perceptions of an accident victim's injury, make judgments about those injuries, and evaluate a condition's impact on the individual? Such perceptions and judgments operate in many areas of life (Goffman, 1963). For example, the nature of perceptions of an individual's physical condition is likely to have implications for the behavior of health care providers, employers, and ordinary people having ordinary encounters with persons who have suffered serious illnesses or injuries. In the context of personal injury litigation, lawyers, judges and juries are called upon to evaluate the extent of a person's pain and suffering resulting from an injury or illness and to translate those perceptions into dollars of compensation.

Early research has shown injury severity to be an important determinant of reactions to injury and illness (Shontz, 1964). Most researchers have used "severity" to mean how life-threatening the injury or illness is to the individual. Other researchers (e.g., Calabresi, 1970) have extended that conception based on Parsons' (1958) theories to include some consideration of how the injury might incapacitate and therefore "limit or inhibit the performance of accustomed tasks" (p. 167). In addition, determinations of how life-threatening or incapacitating a condition might be largely depend upon technological and medical advances as well as a perceiver's awareness of them. As a result, judgments of injury severity traditionally have been relatively unstable. To date, definitions of injury severity remain both condition- and situation-specific, varying from study to study and population to population.

While all indications are that definitions of severity are somewhat variable, at the same time injury severity has been one of the yardsticks used to judge injury similarity, especially in personal injury cases. In the tort litigation system, compensatory damages are sought to restore victims of tortious injury to the position they were in before the injury, at least to the extent that monetary damages can do so (ALI, 1979). The non-economic harms resulting from personal injury (including pain, suffering, and loss of enjoyment of life) have psychological and social aspects which can be measured only by social consensus.

Students of personal injury litigation have found that injury severity as a single dimension explains some but not all of the variability in non-economic damage awards (Balduis, MacQueen, & Woodworth, 1994; Bovbjerg, Sloan, & Blumstein). Predictability may be hampered because researchers have used a single-dimension conceptualization of injury severity, whereas decision makers may view severity along a variety of dimensions. For example, according to the NAIC's Severity of Injury Scale (1980), burns, surgical material left inside a patient, drug side-effects, and brain damage have identical severity ratings. It is easy to see that rational decision makers still may not view these conditions as equivalent. The present study aims to improve on the available tools for discerning the underlying logic in tort decisions primarily by beginning to map the multidimensional nature of the perceptions of illness and injury.

Additional sources of variability may come from individual differences between decision makers. Systematic differences may exist between decision makers because of their socio-demographic differences, roles they occupy, enduring attitudes, or their experience and skills. Numerous researchers have found that judgments made by novices tend to be based on surface features, whereas expert judgments tend to rely more on abstract principles (Hardiman, Dufresne, & Mestre, 1989; Schoenfeld & Herrmann, 1982). Therefore, a second question is whether persons with varying familiarity with such illnesses and injuries organize their perceptions differently from those for whom such conditions are more novel.

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## **METHOD**

Research participants were from three distinct groups: ten registered nurses with 2-8 years of nursing experience; ten upper-level undergraduate nursing students, each having spent a

cumulative five-month period in two different hospital units as part of their nursing education; and twenty undergraduate liberal arts students.

Participants were read pairs of injuries and illnesses and were asked to rate the similarity of each pair on a 10-point scale. The materials presented consisted of a random ordering of all 105 possible pairings of 15 different injuries and illnesses. The injuries and illnesses consisted of: amputation of one arm above the elbow, amputation of one leg above the knee, amputation of both legs above the knee, severe and chronic back pain, severe cuts on trunk and limbs, severe burns over 25 percent of the body, severe and permanent brain damage, terminal cancer, death, severe facial cuts, fractured ribs and leg, total and permanent loss of hearing, permanent paralysis from the waist down, permanent paralysis from the neck down, and, finally, total and permanent loss of sight. These were selected because they were representative, and displayed the range, of those found in personal injury litigation (see Baldus, MacQueen & Woodworth, 1994).

## **RESULTS**

We conducted multidimensional scaling of each group's reactions to these paired stimuli in order both to try to discover the underlying structure of their perceptions and to compare the different groups' structures to each other. The data submitted to the multidimensional scaling program consisted of a triangular matrix of 105 similarity judgments. The Kruskal method was used for computation; there were no missing values (Kruskal & Wish, 1978). Substantive issues such as interpretability were the primary guides to dimension selection.

It was found that the registered nurses (RNs) tended to judge similarity on functional impairment grounds, e.g., "severe brain damage is the functional equivalent of death." The registered nurses judged death, severe brain damage, quadriplegia, and terminal cancer to be very similar to each other, and dissimilar to fractures. The RNs judged these four most serious conditions to be more similar to each other than did the nursing students who, in turn, saw them as more similar than did the undergraduates. This held for all possible comparisons involving these four conditions with only one exception (the nursing students rated "brain damage and quadriplegia" as less similar than the undergraduates). The undergraduate nursing and liberal arts students were less extreme in their evaluations than the RNs and seemed to judge the conditions based on their surface similarity. For example, the nursing students judged arm amputation and leg amputation as the most similar conditions, and the undergraduates judged sight loss and hearing loss, and paraplegia and amputation of both legs, as the most similar.

The mean similarity ratings for each group were then subjected to a nonmetric multidimensional scaling technique to systematically identify the latent structure of how these injury pairs were perceived. We were particularly interested in the number of dimensions each group used to describe these 105 injury pairs.

### **REGISTERED NURSES**

The following data are based on the 105 similarity judgments averaged across the 10 registered nurses. The stress values for the one- to four-dimensional solutions were .23, .13, .09, and .06, respectively. The largest stress reduction occurred in moving from one to two dimensions; the

most prominent "elbow" occurred at two dimensions. The three- and the four-dimensional solutions did not add interpretable dimensions.

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Based on our selection criteria, the two-dimensional solution was the most appropriate model. The first dimension is anchored by fractured ribs and leg (1.27), severe and chronic back pain (1.17), and amputation of one arm above the elbow (1.12) at one end, and severe and permanent brain damage (-1.57), death (-1.47), quadriplegia (-1.29), and terminal cancer (-1.27) at the other. With the exception of chronic back pain, this dimension seems to be the injuries' CORRECTABILITY, or the extent to which treatment, rehabilitation or prostheses can correct, reverse or minimize the effects of the injury or illness.

The second dimension is anchored by total and permanent loss of sight (1.46) and amputation of one leg above the knee (1.22) at one end and fractured ribs and leg (-2.24), severe cuts on trunk and limbs (-1.22), and severe facial cuts (-1.01) at the other end. This dimension appears to reflect the injuries' impact on long-term motor and sensory function, though hearing loss did not appear as prominently on the dimension as might have been expected. In addition, the ratings for amputation of two legs, arm amputation, and paraplegia are on the expected pole of the dimension, but are not the most extreme ratings. Nonetheless, the dimension seems to represent the injuries' MOTOR/SENSORY IMPAIRMENT.

## **NURSING STUDENTS**

The following data are based on comparable similarity judgments averaged across the 10 undergraduate nursing students. The stress values for the one- to four-dimensional solutions were .23, .15, .10, and .07, respectively. The largest stress reduction occurred in moving from one to two dimensions; the most prominent "elbow" occurred at two dimensions. Each of the four dimensions was interpretable on conceptual grounds and the three- and four-dimensional solutions further reduced the stress.

Accordingly, the four-dimensional solution was the most appropriate model. Anchoring the first dimension are fractured ribs and leg (1.33), severe cuts on trunk and limbs (1.16), and severe facial cuts (1.11) while at the other end are death (-1.88), severe and permanent brain damage (-1.58), permanent paralysis from the neck down (-1.17), and terminal cancer (-1.00). This dimension seems to be the injuries' CORRECTABILITY.

The second dimension is anchored by amputation of one leg above the knee (1.72), one arm above the elbow (1.59) and both legs above the knee (1.03) and fractured ribs and leg (-2.12) and severe brain damage (-1.06) at the opposite end. This dimension appears to represent AMPUTATION.

The third dimension is anchored by severe facial cuts (1.58), severe body cuts on trunk and limbs (1.10), and permanent paralysis from the waist down (1.10) at one end, and fractured ribs and leg

(-1.60), permanent paralysis from the neck down (-1.26), and severe and chronic back pain (-1.15) at the other end. This appears to reflect DISFIGUREMENT.

The fourth dimension is anchored by total and permanent loss of hearing (1.79) and total and permanent loss of sight (1.69) at one end and severe and chronic back pain (-1.55), severe burns (-1.29), and death (-1.03) at the other end. This seems to represent SENSORY LOSS.

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## **UNDERGRADUATE STUDENTS**

The following data are based on the 105 judgments of injury similarity averaged across 20 undergraduate students. The stress values for the one- to four-dimensional solutions were .20, .11, .07, and .05, respectively. The largest stress reduction occurred in moving from one to two dimensions; the most prominent "elbow" occurred at two dimensions. The four-dimensional solution did not add an interpretable dimension, although the three-dimensional solution further reduced the stress.

Based on our selection criteria, the three-dimensional solution was the most appropriate model. The first dimension is anchored by severe cuts on trunk and limbs (1.37), fractured ribs and leg (1.19), severe and chronic back pain (1.13), and severe facial cuts (1.00) at one end and death (-1.49), severe and permanent brain damage (-1.40), terminal cancer (-1.40), and permanent paralysis from the neck down (-1.05) at the other end. With the exception of chronic back pain, this dimension seems to reflect the injuries' CORRECTABILITY.

The second dimension is anchored by amputation of one leg above the knee (1.75), amputation of one arm above the elbow (1.54), and amputation of both legs above the knee (1.14) at one end, and fractured ribs and leg (-2.01), death (-1.22), and back pain (-1.00) at the other end. This appears to represent AMPUTATION.

The third dimension is anchored by total and permanent loss of hearing (1.85), total and permanent loss of sight (1.63), and severe and chronic back pain (1.24) at one end and severe burns (-1.32), fractured ribs and leg (-1.24), and severe facial cuts (-1.01) at the other. This dimension appears to be the extent to which the condition produces SENSORY LOSS.

## **DISCUSSION**

The major contributions of our study are that we provide evidence for the multidimensional organization of perceptions of illness and injury and show that experience affects the way those perceptions are organized. Our data provide both descriptive labels and rank orderings of illnesses and injuries that allow for a more vivid depiction of the defining attributes of each dimension. In fact, our data show (1) that what earlier researchers have called "severity" might be more accurately labeled as "correctability" (the extent to which treatment, rehabilitation or prostheses can correct, reverse or minimize the effects of the injury or illness) and, thus, similar

to Calabresi's (1970) construct have a broader conception than "life-threatening," and (2) that conceptions of severity are based on multiple dimensions.

Our research implies that multiple criteria are used to organize perceptions of injury and illness in cognition. This finding could explain some or much of the apparent difficulty encountered in predicting jury awards for pain and suffering. Most efforts to predict those awards rely on unidimensional notions of severity (e.g., Bovbjerg et al., 1989; NAIC, 1980). But if perceptions of pain and suffering occupy, instead, a multidimensional psychological space -- and for amateurs that space is even more complex than it is for professionals, as our data suggest is the case -- then it would not be surprising that unidimensional efforts fail to achieve greater predictability. By developing multi-dimensional prediction models, the ability to predict such jury awards might improve substantially. And those improvements could have repercussions throughout the system of personal injury litigation and beyond -- affecting settlement negotiations, law reform directed at the jury system, decisions whether to develop and market certain products, whether to practice defensive medicine, and so on.

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The between-group findings add to the research on expert-novice decision-making differences. In fact, each of the three groups of respondents organized the injuries and illnesses along partially overlapping, yet separate dimensions. Consistent with research in other settings (e.g., Chi, Feltovich, & Glaser, 1981; Hardiman et al., 1989; Schoenfeld & Herrmann, 1982; Shanteau, 1988, 1992), we found that experienced personnel judged injury similarity in a more abstract manner, based on the functional impact on the individual, compared to less experienced respondents who relied on the surface features of the conditions. That is, after the first dimension, more experienced registered nurses judged injury and illness similarity along fundamentally different dimensions than did less-experienced respondents.

Further, compared to the two student populations, the registered nurses organized the conditions along fewer dimensions and made more extreme ratings of the similarity or difference of the conditions, suggesting they had greater confidence in their judgments. It has been argued that what distinguishes an expert from a novice on a judgmental task is not the quantity of the information on which each group's judgments are based, but rather the way the information is used (Shanteau, 1992). Experts do not necessarily use more information, nor do experts combine information in a more complicated way, but experts are better able to separate the "wheat from the chaff." However, it is possible that our observed expert-novice differences in perception result not only from differences in expertise, but they also may be influenced by other subject variables (e.g., ability, age, aptitude, attention levels, cohort group, maturity).

An alternative explanation for these findings is that those participants more fully socialized into the medical community may have more fully adopted the medical model of illness and injury. Under this model, the individual is assumed to be the agent of the illness and/or injury; that is, the cause rests within the individual. Other models, notably more "sociological" ones, assume that the disability is a function of the interaction between the individual's physiological needs and an environment which fails to accommodate individuals with different capabilities (c.f. Hahn, 1984). Consequently, the registered nurses would be more likely to focus on the

physiological components and treatability of the individual's illness or injury, while nursing students or lay people would think less in terms of the medical model. Thus, the differences may be due to the registered nurses adopting a different perspective on injury and illness instead of or in addition to their greater degree of experience with these conditions.

We conclude by noting that individuals with stigmatizing conditions are susceptible to negative stereotypes, are generally devalued in the society, and encounter disproportionately negative interpersonal interactions. Many injuries, illnesses, and other traumatic events can potentially produce stigmatizing results, at least temporarily. How these conditions are perceived is important for understanding how people with these conditions might be treated socially, professionally, and legally.

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## **REFERENCES**

- ALI, American Law Institute (1979). Restatement of the law of torts second. St. Paul, MN: Author.
- Baldus, D., MacQueen, J., & Woodworth, G. (1994). Improving judicial oversight of jury damage assessments: A proposal for the comparative additur/Remittitur review of awards for nonpecuniary harms and punitive damages. Unpublished report. Washington, DC: State Justice Institute.
- Bovbjerg, R., Sloan, F. A., & Blumstein, J. F. (1989). "Valuing life and limb in tort: Scheduling 'pain and suffering'." *Northwestern University Law Review* 83:908.
- Calabresi, G. (1970). *The Cost of Accidents: A Legal and Economic Analysis*. New Haven: Yale University Press.
- Chi, M. T. H., Feltovich, P. J., & Glaser, R. (1981). "Categorization and representation of physics problems by experts and novices." *Cognitive Science* 5:121-152.
- Goffman, E. (1963). *Stigma: Notes on the Management of Spoiled Identity*. Englewood Cliffs, NJ: Prentice-Hall.

Hahn, H. (1984). "Reconceptualizing disability: A political science perspective. Special Issue: Social science perspectives on vocational rehabilitation." *Rehabilitation Psychology* 31:13-25.

Hardiman, P. T., Dufresne, R., & Mestre, J. P. (1989). "The relation between problem categorization and problem solving among experts and novices." *Memory & Cognition* 17:627-638.

Kruskal, J., & Wish, M. (1978). *Multidimensional Scaling*. Beverly Hills, CA: Sage.

National Association of Insurance Commissioners (1980). *NAIC malpractice claims: Final compilation*. Brookfield, Wis: Author.

Parsons, T. (1958). "Definitions of health and illness in the light of American values and social structure." In E. G. Jaco (Ed.). *Patients, Physicians, and Illness; a Source Book in Behavioral Science and Health*. NY: Free Press.

Schoenfeld, A. H., & Herrmann, D. J. (1982). "Problem perception and knowledge structure in expert and novice mathematical problem solvers." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 8:484-494.

Shanteau, J. (1988). "Psychological characteristics and strategies of expert decision makers." *Acta Psychologica* 68:203-215.

Shanteau, J. (1992). "How much information does an expert use? Is it relevant?" *Acta Psychologica* 81:75-86.

Shontz, F. (1964). *Body-part Size Judgment*. Final report, VRA project No. 814. University of Kansas, Lawrence, Kansas.

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