Special Section

CONTRIBUTIONS OF COGNITIVE THEORY TO NEW BEHAVIORAL TREATMENTS

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Abstract—*Although clinical, social, and cognitive psychologists all use the concept of 'cognition,' they often use it in different ways to refer to different phenomena We offer a heuristic framework for distinguishing among three general uses of the word* cognition, *and apply this framework to an evaluation of the* experiential avoidance *concept presented by Hayes and Gifford (this issue) While acknowledging the promise of such work, we raise concerns about its possible limitations We recommend that clinical applications of the cognition concept be grounded in the theories and methods of contemporary cognitive and neural sciences In support of our recommendation, we present three examples from experiments from our own research*

Mirroring the cognitive *zeitgeist* that has transformed psychology over the past two decades, Hayes and Gifford (this issue) devote their article to a new cognitive construct, *experiential avoidance,* defined as the attempt "to avoid certain private experiences that are construed as negative, such as particular feelings, memories, behavioral predispositions, or thoughts" (p 170) According to Hayes and Gifford, experiential avoidance derives from two aspects of human language—the acquired stimulus-equivalence function of verbal symbols and the behavioral control exerted by verbally mediated rules Hayes and Gifford assert that experiential avoidance underlies many clinical problems and that it probably accounts for the resistance of such problems to therapeutic efforts The implication is that research on experiential avoidance may lead to new, more effective clinical interventions (see Hayes, Wilson, Gifford, Follette, & Strosahl, 1996)

THREE FACES OF COGNITION

Although Hayes and Gifford highlight the similarities between experiential avoidance and previous theoretical concepts, we regard the apparent similarities as superficial and misleading The different concepts reflect competing and incompatible views of "cognition," with nontrivial differences in their theoretical and methodological implications Such differences should be sharpened, rather than blurred Employing cognitive constructs ambiguously fosters an illusion of consensus that impedes the rigorous testing of competing theoretical constructs Sharpening, as opposed to leveling, the differences should promote empirical tests of the relative scientific merits of the competing models Ultimately, the perspective that prevails should be the one that best accounts for the available evidence, offers the riskiest predictions, and survives the most stringent experimental tests Thus, we begin our analysis of Hayes and Gifford's article by offering a heuristic framework for differentiating among three distinct meanings of cognition as a thing, an event, or a process We then use this framework to examine critically the concept of experiential avoidance

- *Cognition as a thing* When cognition is treated as a thing, it is reified as an object It is something discrete that one has or holds It is assumed to be accessible via introspective methods of assessment Cognition-objects typically are represented linguistically as nouns (e g , aspirations, attitudes, attributions, beliefs, biases, distortions, expectations, goals, perceptions, reasons, schemata, thoughts)
- *Cognition as an event* As an event, cognition is treated as an experience It is transient, discrete, and phenomenological It is contextually dependent—something that happens to persons as a consequence of internal or external events Again, it is assumed to be accessible primarily through self-reports of subjective experience Cognition-experiences usually are represented linguistically either by verb forms of cognition (e g , to aspire, attribute, believe, distort, expect, perceive, reason, think) or by adjectival forms of clinically relevant cognitive-emotional states (e g , anxious, depressed, frightened, obsessed, stressed worried)
- *Cognition as a process* When treated as a process, cognition refers to the ongoing, dynamic operation of a complex system the organism's acquisition, organization, regulation, and transformation of the continuous flow of internal and external stimulus information Such activities are characteristic of all living humans, at all times They are not assumed to be accessible or verifiable through introspection, instead, they are accessed through objective, quantitative measures of observable performance in standardized information processing tasks Although cognitive processes usually are represented linguistically as nouns, they are not objects, rather, their names identify facets of the unfolding activities of the organism as it engages its world (e g , automatic vs controlled processing, categorization, classification, feature detection, perceptual organization, recall, recognition, response choice)

Although these three views of cognition are incompatible and competing, too often they are used indiscriminately, as though they were interchangeable or complementary For example, Wegner (1994, this issue) explicitly presents his theory of the ironic effects of thought suppression as a "process" theory, nevertheless, he sometimes treats cognition as a thing Thoughts intrude on persons, are difficult to suppress, tend to have minds of their own, and seem prone toward oppositional and defiant behavior [1]

Some theorists simply do not specify their view of cognition For example, in Pennebaker's (this issue, Petrie, Booth, Pennebaker,

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1 Wegner (1994) said 'Our attempt at mental control falls short so often that we may stop to wonder whether there is some part of our mind an imp of the perverse, that ironically strives to compel our errors The theory of ironic processes of mental control makes precisely this claim" (p 34)

Davison, & Thomas, 1995) experimental treatment paradigm, cognition is treated ambiguously Perhaps it is a process or object, but it seems most like an experiential event Persons who cognitively reexperience the most traumatic and upsetting experiences of their lives through a brief writing experience subsequently improve on various self-report, behavioral, and physiological indices of physical and mental health The positive effects of this treatment could be interpreted alternatively as providing metaphorical support to cognitive, experiential, or even cathartic theories of psychotherapy [2]

Generally, Hayes and Gifford treat experiential avoidance more as a process than as an object or event For example, they describe the processing capacity of human subjects to derive and organize the relations among complex stimulus sets, using the stimulus-equivalence function of language Subjects can trace these relationships through long pair-wise chains of equivalent and nonequivalent stimuli (e g , tracing the stimulus series A → B → C → D to derive unaided the relationship between A and D) Hayes and Gifford also discuss the role verbal rules may play in these processes, and argue that—in the extreme—the language-based processes responsible for experiential avoidance underlie a variety of clinical problems, and have important therapeutic implications (Hayes et al , in press) But Hayes and Gifford are inconsistent, sometimes treating the rules, feelings, meanings, and thoughts associated with experiential avoidance as things, and treating experiential avoidance itself as an event

All views of cognition are not created equal We regard the process view as the most promising The object and event views of cognition tend to be modern reincarnations of introspectionist psychology, suffering from the same conceptual and methodological limitations that led earlier psychologists to abandon introspectionism In contrast, treating cognition as the dynamic operation of a complex information processing system not only is a novel approach to the study of clinical phenomena, but also is consistent with contemporary theories and methods in cognitive and neural sciences, and potentially could spark the development of revolutionary clinical interventions [3]

EVALUATION OF EXPERIENTIAL AVOIDANCE

Hayes and Gifford's effort to study cognition more directly as a measurable process is a significant departure from the prevailing tendency among clinical and social psychologists to treat cognition as an inferred thing or event This is a promising step in the right direction We also applaud Hayes and his colleagues for broadening and extending the traditional scope of behavior analysis through their research on derived stimulus relations, on bidirectional effects and their implications for behavior change, and on the relationships between individual differences in cognitive processes and response to treatment These represent important and long-overdue enhancements of the behavior-analytic framework

Despite the promise of such work, however, we also see some limitations that must be addressed if the work is to achieve its full potential First, it is not clear how the concept of experiential avoidance differs from the myriad of similar concepts (e g , repression, conditioned emotional responses, avoidance learning) introduced by Freud, Dollard and Miller, Mowrer, and numerous other theorists over the past century Although Hayes et al (1996) draw comfort from the obvious similarities, we regard the lack of differentiation as a serious limitation New constructs, to be worthwhile, must demonstrate incremental validity and utility Hayes et al must differentiate their construct from others, and document its superior explanatory and predictive powers

Second, Hayes and Gifford propose that experiential avoidance underlies a wide variety of clinical problems, accounts for the prevalence of treatment failures, and explains the efficacy of treatments that work But constructs that account for almost everything seldom explain anything well To establish experiential avoidance as a valid and useful scientific construct, one must go beyond offering post hoc, confirmatory support, one must specify a priori both the conditions to which the construct applies and those to which it does not The construct must lead to specific, novel, risky, theoretical predictions that can be subjected to rigorous empirical efforts at falsification

Third, although we share Hayes and Gifford's interest in humans' capacity to process and organize stimulus information, we regard the focus on language and verbal rules as too narrow and limiting (cf Hayes & Hayes, 1992, p 1391) Language is important, but not all clinically important rule-based processes are verbal It also seems unnecessarily limiting to study long, pair-wise chains of stimulus relationships, as Hayes does, when these might be studied more fruitfully within a multidimensional framework Perhaps Hayes's focus on verbal behavior and pair-wise relationships is an artifact of his roots in the behavior-analytic tradition Employing the tools of contemporary cognitive science, however, he could observe the contextualized processes by which humans operate on complex stimuli without restricting his focus to verbally mediated processes

Finally, Hayes and Gifford fail to explain how experiential avoidance relates to any of the well-developed, carefully investigated processes at the heart of contemporary cognitive science (e g , category learning classification, recognition) Such cognitive constructs represent rich research traditions focused on many of the same phenomena that are of interest to Hayes and his colleagues Indeed, much of contemporary cognitive science is concerned with understanding the processes by which humans organize and utilize large, complex, multidimensional stimulus sets It seems wastefully parochial and self-handicapping to ignore the impressive array of conceptual and methodological tools that cognitive scientists have developed for measuring and analyzing subjects' rule-based judgments of stimulus relationships With these tools, it now is possible to develop models of subjects' judgments based purely on performance samples, without presuming any role for verbal mediation (e g , Ashby, 1992, Macmillan & Creelman, 1991)

CONTRIBUTIONS FROM COGNITIVE SCIENCE: THREE EXAMPLES

In our own work, we have found that the concepts and methods of cognitive science provide a rigorous, quantitative, direct, and parsimonious approach to understanding how humans organize and use complex stimulus information, how cognitive processing varies between and within individuals under different conditions, and how such processing, in turn, may be related to clinically relevant behavior We offer three brief examples

2 We still need to know the procedure s limits Is disclosure critical? Is talking as effective as writing? Is it as beneficial to focus on positive experiences as on traumatic experiences? Always? For everyone?

3 Exactly what treatments will emerge cannot be foreseen Who can count the apples in a seed?

Cognition's Contributions

With our cognitive-science collaborators, Robert Nosofsky, James Townsend, and David MacKay, we have used methods from cognitive science to map individual differences in the perceptual organization subjects impose on clinically relevant stimulus sets [4] Specifically, we have used deterministic multidimensional scaling (MDS) techniques (Davison, 1983, Nosofsky, 1992b) to generate parsimonious representations of stimulus relationships underlying classification MDS not only models the interrelationships among large numbers of stimuli with a small number of parameters, but also provides excellent predictions of relationships among the processes of classification, memory, identification, and category learning (Nosofsky, 1992a, Nosofsky, Kruschke, & McKinley, 1992)

In one study, we asked undergraduate women—some reporting subclinical bulimic behavior, some not—to rate the similarity of all possible pairs of photographs in a stimulus set depicting other women MDS analyses of subjects' similarity ratings revealed clinically relevant individual differences "Normal" subjects' similarity ratings were organized around two major implicit stimulus dimensions in the photos women's affect (positive-negative) and their body size (heavy-thin) Bulimic-prone subjects' similarity ratings, in contrast, were organized primarily around a single dimension body size Group membership and the emergent organization of subjects' perceived-similarity ratings were predictive, in turn, of subjects' performance on a classification task Like Hayes, we were studying derived stimulus relations, propagation to related stimuli, and rule-governed behavior; however, our approach, borrowed from cognitive science, offers the advantage of quantitative, multidimensional models that do not require assumptions about verbal mediation In fact, subjects' introspective estimates of how much body size and affect influenced their similarity ratings neither correlated with estimates based on MDS analyses nor discriminated between groups

As an added benefit, these quantitative modeling techniques allowed us to employ ecologically relevant stimuli, instead of artificial stimuli relevant only in the laboratory, to study subjects' perceptual processing For example, in a second photo-rating study, we used MDS analyses of pair-wise similarity ratings to "map" the perceptual order undergraduate men imposed on a stimulus set of women's photos taken from magazines With these maps, we identified subjects whose implicit perceptual processing of the photos was dominated either by the stimulus dimension of affect (positive-negative) or by the dimension of physical exposure (exposed-unexposed) These individual differences in perceptual processing, in turn, were predictive of subjects' performance in two category-learning tasks one based on affect, the other based on exposure Subjects learned more quickly the category structure that was congruent with the stimulus dimension dominant in their own perceptual processing Affect-dominant subjects were superior on the affect task, exposure-dominant subjects were superior on the exposure task We assume that subjects' perceptual processing is not fixed or static, but is dynamic, varying predictably as a function of changing conditions Thus, we currently are assessing how different doses of alcohol affect men's perceptual processing of women's photos

Finally, we assume that these perceptual processes do not operate solely at a cortical level This assumption received support in a classical eyeblink conditioning study conducted in collaboration with neuroscience colleagues, Joseph Steinmetz and Donald Katz Photographs of women who varied on the dimension of body size were displayed prior to the presentation of a conditioned stimulus (CS) tone When body size and CS were correlated (as opposed to being paired randomly), eyeblink conditioning was facilitated Thus, the perceptual organization subjects imposed on photos of other women influenced not only complex category learning, but also conditioning processes that occur mainly at a subcortical level and that tend to be disrupted by attempts at conscious control

Hayes and his colleagues have brought behavior analysis to the brink of embracing modern cognitive science (Hayes & Hayes, 1992, p 1393) We advocate taking the final step Using three examples from our research, we have shown how the concepts and methods of cognitive science provide investigators with powerful new tools for studying ecologically relevant stimuli within a multidimensional framework that integrates verbal and nonverbal processes We encourage clinical scientists to explore the potential contributions of contemporary cognitive science to the development of new behavioral treatments

4 Clinical scientists typically study ecologically valid stimuli to see how individual differences relate to clinical phenomena cognitive scientists typically study highly constrained stimuli in search of general laws and regard individual differences as ' noise However conjoining these divergent research traditions can yield important reciprocal and complementary contributions to knowledge

REFERENCES

Ashby F G (Ed) (1992) *Multidimensional models of perception and cognition* Hillsdale NJ Erlbaum

Davison J L (1983) *Multidimensional scaling* New York Wiley & Sons

Hayes S C & Hayes L J (1992) Verbal relations and the evolution of behavior analysis *American Psychologist 47* 1383–1395

Hayes S C Wilson K G Gifford E V Follette V M & Strosahl K (1996) Emotional avoidance and behavioral disorders A functional dimensional approach to diagnosis and treatment *Journal of Consulting and Clinical Psychology 64* 1152–1168

Macmillan N A & Creelman C D (1991) *Detection theory A user s guide* Cambridge England Cambridge University Press

Nosofsky R M (1992a) Exemplar-based approach to relating categorization identification and recognition In F G Ashby (Ed) *Multidimensional models of perception and cognition* (pp 363–393) Hillsdale NJ Erlbaum

Nosofsky R M (1992b) Similarity scaling and cognitive process models *Annual Review of Psychology 43* 25–53

Nosofsky R M Kruschke J K & McKinley S C (1992) Combining exemplar based category representations and connectionist learning rules *Journal of Experimental Psychology Learning Memory and Cognition, 18* 211–233

Petrie K J Booth R J Pennebaker J W Davison K P & Thomas M G (1995) Disclosure of trauma and immune response to a hepatitis B vaccination program *Journal of Consulting and Clinical Psychology 63* 787–792

Wegner D M (1994) Ironic processes of mental control *Psychological Review 101* 34–52