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Implicit Theories of Intelligence, Creativity, and Wisdom

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A prestudy and four experiments were conducted in order to understand the nature and use of people's implicit theories of intelligence, creativity, and wisdom. In the prestudy, a brief questionnaire was sent out to professors in each of the fields of art, business, philosophy, and physics, and was also given to laypersons. The questionnaire asked subjects to list behaviors characteristic of an ideally intelligent, creative, or wise person in one's field of endeavor, or in general, for laypersons. In Experiment 1, individuals from the same populations rated, on a 9-point scale, the extent to which each of the behaviors listed at least twice in the Prestudy was characteristic of an ideally intelligent, creative, or wise individual. In Experiment 2, a subset of the behaviors from the prestudy was sorted by subjects in order to yield a multidimensional space characterizing the subjects' implicit theories for each of intelligence, creativity, and wisdom. In Experiment 3, subjects rated themselves on a subset of the behaviors from the prestudy, and these ratings were correlated with "ideal prototype" ratings to yield a measure of resemblance to the prototype. Resemblance scores were then correlated with scores on standardized ability tests. In Experiment 4, subjects rated hypothetical individuals described in simulated letters of recommendation in terms of their intelligence, creativity, and wisdom. The results revealed that people have systematic implicit theories of intelligence, creativity, and wisdom, and that they use these implicit theories accurately both in evaluating themselves and in evaluating hypothetical others. Moreover, the implicit theories for each of the constructs show at least some convergent-discriminant validity with respect to each other.

That Solomon was wise, or Picasso, creative, no one doubts. Perhaps it would be unwise to do so, no matter how creative the reasons for doubt might be. But if one were to ask just what psychological attributes made Solomon wise, or Picasso, creative, most psychologists would either shrug their shoulders, or throw up their hands in despair. In any event, Solomonic pronouncements probably would not be forthcoming.

Theories of psychological constructs such as wisdom, creativity, and intelligence can be partitioned in any of a number of ways, but one partitioning is particularly useful for understanding these three constructs and how they interrelate—the partitioning between explicit and implicit theories of psychological constructs.

Explicit theories are constructions of psychologists or other scientists that are based on or at least tested on data collected from people performing tasks presumed to measure psychological functioning. Although investigators working with explicit theories of psychological constructs might disagree as to the nature of the constructs, using, for example, factors, components, schemata, or some other kind of psychological construct, they would agree that the data base from which the proposed constructs should be isolated should consist (directly or indirectly) of performance on tasks requiring intelligent functioning.

Explicit theories have dominated the literature on intelligence. For example, psychometric theories such as Spearman's (1927) two-factor theory or Guilford's (1967, 1982) structure-of-intellect model; cognitive theories such

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as Sternberg's (1981, 1983) componential theory or Hunt's (1980) distributed-memory theory; and genetic-epistemological theories such as Piaget's (1972) theory of equilibration, are all explicit theories of intelligence. Explicit theories have also played the major role in conceptualizing creativity. These theories, too, have been of different kinds. Guilford's (1950) theory is psychometric, Getzels's (1975) theory is cognitive (see also Getzels & Csikszentmihalyi, 1976), Barron's (1965, 1968) theory is clinical, and Amabile's (1983) theory is social-psychological. The theories have in common, however, their drawing on data based on the exercise of what the theorists allege is creative psychological process. The literature on wisdom is much sparser, and much of it is outside the psychological tradition (see review of literature in Clayton & Birren, 1980). There are scattered psychological attempts to deal with wisdom within an explicit-theoretical framework (e.g., Erikson, 1959), but such attempts appear to be rare.

Even a cursory review of the literature will reveal a monotonic decreasing trend in the amount of explicit-psychological theorizing regarding intelligence, creativity, and wisdom, respectively. There might be any number of reasons for this trend, but one of these reasons is almost certainly the ability of psychologists to generate either a conceptual or an operational definition of the construct under investigation. There have existed, for many years, and continue to exist to this day, serious differences among psychologists in their views on the nature of intelligence (see "Intelligence and its Measurement," 1921; Sternberg, 1982), but these differences seem to be systematic (Sternberg, 1985). Moreover, despite these differences, the psychometric intelligence test has received a great deal of acceptance, if grudging, as an operational definition of intelligence, albeit a highly limited one.

The disagreements over what an intelligence test should test are minor compared with those over what a creativity test should test (Amabile, 1982). Whereas most investigators of intelligence would agree that intelligence tests measure at least some limited aspect of intellectual functioning (Cronbach, 1984), many investigators of creativity would question whether creativity tests such as those of Torrance (1966) and Guilford (1967) measure anything even coming close to creativity (Amabile, 1982; Gruber, in press; Sternberg & Davidson, in press). In the domain of wisdom, there do not even exist any tests with sufficient acceptance to generate disagreement.

When fields of psychological endeavor, such as those of intelligence and especially of creativity and wisdom, are at a loss for even definitions of constructs on which to base explicit theories, implicit theories can be useful for providing a conceptual framework for the development of explicit theories.

Implicit theories are constructions by people (whether psychologists or laypersons) that reside in the minds of these individuals. Such theories need to be discovered rather than invented because they already exist, in some form, in people's heads. Discovering such theories can be useful in helping to formulate the common-cultural views that dominate thinking about a given psychological construct, whether the culture be one of people, in general, or of psychologists, in particular. Understanding implicit theories can also help us understand or provide bases for explicit theories, because explicit theories derive, in part, from scientists' implicit theories of the construct under investigation. The data of interest in the discovery of people's implicit theories are people's communications, in whatever form, regarding their notions as to the nature of the psychological construct under investigation.

Intelligence, creativity, and wisdom have all been subject to at least some study through the vehicle of understanding people's implicit theories. Consider each of these constructs in turn.

By far, the largest number of studies of implicit theories has been done for intelligence. Perhaps the most direct way of discovering such theories is simply to ask people what they are. For example, the editors of the *Journal of Educational Psychology* asked experts in the field of intelligence their views of intelligence ("Intelligence and its Measurement," 1921), and received 14 responses, such as "the ability to carry on abstract thinking" (Terman) and "ability to adapt oneself adequately to relatively new situations in life" (Pintner). Sternberg, Conway, Ketron, and Bernstein (1981) did a rather more elaborate study involving both experts and laypersons. Lists of intelligent and unintelligent behaviors were collected, and then these behaviors were rated for their char-

acteristicness in an ideally intelligent person, and for their importance in defining the concept of intelligence. The results of experts and laypersons were surprisingly similar. Factor analyses of their ratings revealed three basic factors for the laypersons (and similar factors for the experts): Practical Problem-Solving Ability (e.g., reasons logically and well, identifies connections among ideas, sees all aspects of a problem); Verbal Ability (e.g., speaks clearly and articulately, is verbally fluent, converses well); and Social Competence (e.g., accepts others for what they are, admits mistakes, displays interest in the world at large). Subjects not only used these three factors to form abstract characterizations, but also appeared to use them to rate their own intelligence, as well as to evaluate the intelligence of others. Related studies have been carried out by Siegler and Richards (1982), Yussen and Kane (1985), Cornelius (1984), and Berg and Sternberg (in press), looking at developmental aspects of the nature of intelligence over the life span.

The consensus obtained in all these studies gives credence to Neisser's (1979) view that the concept, *intelligent person,* is a prototypically organized concept according to which a person is viewed as intelligent to the extent he or she resembles some implicit prototype of what people imagine an intelligent person to be. Although a consensus seems to exist for the concept of intelligence, it is important to point out that this consensus is culturally limited and that quite different prototypes for intelligence exist in other cultures (Wober, 1974).

The implicit-theories approach has also been applied to the study of creativity. For example, MacKinnon (1964) had architects of three levels of estimated creativity rate both themselves and an ideal self on the Gough (1961) Adjective Check List. The results suggested those attributes most characteristic of highly creative and less creative individuals. Adjectives that best distinguished the top from bottom groups of architects (high scores for more creative architects) were: *inventive, determined, independent, individualistic, enthusiastic, industrious, artistic, progressive,* and *appreciative.* Adjectives that best distinguished the bottom from the top group (higher scores for less creative architects) were: *responsible, sincere, reliable, dependable, clear-thinking, tolerant, understanding, peaceable, good-natured, moderate, steady, practical, logical.* Barron (1968) used a Q-sort technique to distinguish attributes of creative writers, and obtained five items that were particularly distinctive of the highly creative writers: *appears to have a high degree of intellectual capacity, genuinely values intellectual and cognitive matters, values own independence and autonomy, is verbally fluent—can express ideas well, enjoys aesthetic impressions—is aesthetically reactive.* Similar studies have been done for creative mathematicians by Helson (1980).

Very little systematic psychological work of any kind has been done on wisdom, with the notable exception of the work of Clayton (1982; Clayton & Birren, 1980). Clayton multidimensionally scaled words potentially related to wisdom for three samples of adults differing in age (younger, middle-aged, older). In her earliest study (Clayton, 1975), the terms that were scaled were: *experienced, intuitive, introspective, pragmatic, understanding, gentle, empathetic, intelligent, peaceful, knowledgeable, sense of humor, observant.* In a later study, she added three more terms: *wise, aged, myself.* In each study, subjects were asked to rate similarities between all possible pairs of words. The main similarity in the results for the age cohorts for whom the scalings were done was the elicitation of two consistent dimensions of wisdom, which Clayton referred to as an "affective" dimension and a "reflective" dimension. There was also a suggestion of a dimension relating to age. The greatest difference among the age cohorts is that mental representations of wisdom seemed to become more differentiated with increases in the age of the subjects. Further developments of this line of work are currently being conducted by Dittmann-Kohli and Baltes (in press).

The present study seeks to understand (a) implicit theories of intelligence, creativity, and wisdom in different subpopulations, (b) how people use these implicit theories in making judgments of themselves and others, (c) how people's judgments of the resemblance between themselves and a prototype relate to scores on psychometric tests, and (d) how people view these three constructs as interrelated. Four experiments were carried out for these purposes, each of which used a different methodology to help illuminate people's implicit theories. A prestudy involved professors of art,

business, philosophy, and physics, and laypersons, specifying behaviors characteristic of intelligence, creativity, and wisdom. The first experiment involved analysis of ratings of the importance of various behaviors for defining intelligence, creativity, and wisdom, as perceived by professors in the four fields noted and by laypersons. The second experiment used multidimensional scaling to obtain perceived dimensions of intelligence, creativity, and wisdom as perceived by laypersons. The third experiment involved people rating themselves on questionnaires assessing behaviors derived from laypersons' implicit theories of intelligence, creativity, and wisdom, and then our correlating the people's prototype-resemblance scores (r) on the questionnaires with scores on psychometric tests that might plausibly relate to the prototype-based scores derived from the self-ratings. The fourth experiment involved people's rating the intelligence, creativity, and wisdom of hypothetical people for whom "letters of recommendation" were provided, with the behaviors listed in the letters derived from the implicit theories. Subjects were never given prior definitions of intelligence, creativity, or wisdom in any of the experiments.

Prestudy

A brief questionnaire was filled out by 25, 26, 20, and 26 professors in the fields of art, business, philosophy, and physics, respectively, at a variety of U.S. universities (representing a return rate of 17% on questionnaires sent out). The questionnaire was also given to 17 laypersons (nonstudent adult residents of New Haven who answered a newspaper advertisement). The questionnaire asked respondents to spend a few minutes listing whatever behaviors they could think of that were characteristic of an ideally intelligent, creative, or wise person in their respective fields of endeavor (or, in the case of laypersons, in general). The response rate for the mailed questionnaires was 17%, and was practically the same across fields. Those behaviors listed at least twice served as a basis for the subsequent investigations. The total numbers of behaviors obtained were 119 for art, 131 for business, 107 for philosophy, 138 for physics, and 156 for laypersons.

Although the response rate for the professionals was low, it appears to have been quite enough to generate large numbers of behaviors. Indeed, the perfect response rate for the laypersons yielded only a small number of additional unique behaviors over those generated by the professionals. The reason for this small difference is that the large majority of responses obtained were redundant across subjects. Thus, the returns appear to have been adequate to generate a large pool of behaviors (over 100 for each population) to serve as bases for ratings in the subsequent experiments.

Experiment 1

Method

Two hundred professors in art, business, philosophy, and physics were asked to rate the characteristicness of each of the behaviors obtained in the prestudy from the corresponding population with respect to their ideal conception of each of an ideally intelligent, creative, or wise individual in their occupation. The wording was that of the prestudy subjects, with slight editing to provide some uniformity of style. Laypersons (nonstudent adult residents of New Haven) also provided these ratings, but for a hypothetical ideal individual without regard to occupation. Ratings were on a 1 (low) to 9 (high) scale, with a rating of 1 meaning "behavior extremely uncharacteristic" and a rating of 9 meaning "behavior extremely characteristic." There were 65 respondents for the art questionnaire, 70 respondents for the business questionnaire, 65 respondents for the philosophy questionnaire, 85 respondents for the physics questionnaire, and 30 subjects for the laypersons' questionnaire. These numbers of respondents represented return rates of 32.5% for art, 35% for business, 32.5% for philosophy, and 42.5% for physics. These return rates are quite respectable for a mailed questionnaire. Apparently, the use of a structured questionnaire generated more respondents than the use of the unstructured questionnaire in the Prestudy. The return rates are comparable across professions, but the fact that they are all well less than 100% does raise the possibility that there may have been some unknown sampling bias as a function of who chose to return the questionnaire.

Each participant provided all three ratings (of intelligence, creativity, and wisdom). However, order of ratings was counterbalanced in a Latin square arrangement in questionnaires sent out, so that the ratings of each attribute occurred approximately equally often in the first, second, and third positions.

Results

Table 1 presents the basic statistics for the ratings. Means are for individual items, averaged over subjects within each population. As can be seen, ratings were approximately equal in mean values across occupations, with no means differing significantly across groups.

Table 1
Basic Statistics

Group	*M*	*SD*	*n* (items)	Subject reliability	Item reliability
			Intelligence		
Art	6.3	1.1	119	.84	.93
Business	6.3	.8	131	.88	.96
Philosophy	6.6	1.1	107	.94	.88
Physics	6.4	1.0	138	.92	.90
Laypersons: Ideal	6.3	1.2	156	.93	.88
			Creativity		
Art	6.3	1.3	119	.88	90
Business	5.8	1.2	131	.81	.96
Philosophy	6.4	1.1	107	.93	.91
Physics	6.4	1.1	138	.93	.95
Laypersons: Ideal	5.9	1.1	156	.90	.94
			Wisdom		
Art	6.3	1.2	119	.86	.89
Business	6.4	1.0	131	.92	.97
Philosophy	7.1	1.2	107	.95	.89
Physics	6.6	1.1	138	.94	.95
Laypersons: Ideal	6.4	1.5	156	.96	.92

Ratings were highly reliable, both from the standpoint of split halves of subjects (subject reliability) and of split halves of items (item reliability).

Table 2 presents the intercorrelations between the three ratings for each of the separate groups for the master list of behaviors for each occupation. Correlations are for pairs of ratings of attributes for each set of behavioral items, averaged over subjects. Thus, the number of observations contributing to each correlation is equal to the number of behavioral items (not the number of subjects). Because each group received a different set of behaviors, based on the sets of behaviors generated in the Prestudy, correlations could not be computed across groups. In all cases except for the philosophers, intelligence is seen as more highly related to wisdom than either of intelligence or wisdom are seen as related to creativity. All correlations are significantly positive, except for the correlation between creativity and wisdom for the business professors, which was significantly negative! In all cases, the relation between creativity and wisdom is the weakest one of the three. Thus, intelligence and wisdom are perceived as more similar to each other than either is perceived as similar to creativity.

Discussion

Several aspects of the results are worthy of note. First, the behavioral listing procedure of the Prestudy seems to have worked about equally well for each group: There is relatively little range among the mean ratings of behaviors for intelligence, creativity, and wisdom, respectively, across occupational groups. The fact that all 15 means are above 5—the middle of the 9-point scale—indicates that for the most part, the behaviors that were listed were ones that were quite characteristic of intelligent, creative, or wise individuals in each of the groups.

Second, the ratings are highly reliable across both subjects and items: The range of subject reliabilities was from .81 to .96 with a median of .92; the range of item reliabilities was from .88 to .97 with a median of .92. The high degree of internal consistency across subjects (subject reliability) indicates that there is considerable agreement within each population as to what constitutes behaviors that are more or less characteristic of a particular attribute (intelligence, creativity, or wisdom). The high degree of internal consistency across items (item reliability) indicates that the set of items within

each attribute constitutes a coherent set of behaviors, rather than a grab-bag of unrelated behaviors. Thus, at least within population, intelligence, creativity, and wisdom constitute fairly tightly organized prototypes.

Third, it is clear that without regard to population, intelligence and wisdom are believed to be most similar to each other and creativity and wisdom least similar to each other, among the three possible pairs of attributes. These implicit theories are clearly inconsistent with views such as Guilford's (1967), according to which creativity is an aspect of intelligence. Rather, they are consistent with views synthesized by Cronbach (1984), according to which at least in the higher ranges of ability, intelligence and creativity are distinct entities.

The design of this experiment does not allow direct comparisons of implicit theories among occupational groups. There are both theoretical and practical reasons for such a design in studies of this kind.

At a theoretical level, it is important to recognize the domain-specificity of abilities, and especially creative abilities, in various domains of adult endeavor (Chi, Glaser, & Rees, 1982; Cronbach, 1984; Keil, 1984; Larkin, McDermott, J. Simon, & D. P. Simon, 1980). Performance in various occupational groups, like performance in various cultural groups, requires *emic* rather than *etic* measurement—that is, measurement that is appropriate for the group in which it is being conducted. As in cross-cultural studies, presenting each group with the same items often does not make sense. For example, art professors would probably find it meaningless to rate a behavior such as "comes up with novel business services or products" for its relevance to creativity in art; similarly, business professors would probably find it meaningless to rate a behavior such as "recognizes the aspects of physical phenomena that are the underlying concepts of physics" for creativity in business. To be interpretable, characteristicness ratings require relevance of the behavior to the domain under consideration. With behaviors such as those noted here, characteristicness ratings would not make sense, because the behaviors are simply irrelevant to the given field of endeavor.

Table 2
Intercorrelations of Ratings of Behaviors on Master List for Each Occupation

Measures	Intelligence	Creativity	Wisdom
	Art		
Intelligence	1.00	.55	.78
Creativity		1.00	.48
Wisdom			1.00
	Business		
Intelligence	1.00	.29	.51
Creativity		1.00	−.24
Wisdom			1.00
	Philosophy		
Intelligence	1.00	.56	.42
Creativity		1.00	.37
Wisdom			1.00
	Physics		
Intelligence	1.00	.64	.68
Creativity		1.00	.14
Wisdom			1.00
	Laypersons: Ideal		
Intelligence	1.00	.33	.75
Creativity		1.00	.27
Wisdom			1.00

At a practical level, it would have been difficult to convince busy college professors to spend the close to 4 hrs that would be needed to rate behaviors from all fields. Using alternate forms so that professors would have had to rate only half the behaviors would have still required 2 hrs, and an extremely large number of subjects. Thus, it seemed practically as well as theoretically preferable to employ emic (within-occupation) rather than etic (between-occupation) questionnaires.

Experiment 2

Method

In this experiment, 40 Yale College students were asked to sort three sets of 40 behaviors into as many or as few piles as they wished on the basis of which behaviors are "likely to be found together" in a person. These behaviors were from the listings for intelligence, creativity, and wisdom, respectively, from Experiment 1. Only the top 40 behaviors (in terms of laypersons' characteristicness ratings from Experiment 1) were used in each sorting task. Order of sortings for behaviors from the intelligence, creativity, and wisdom lists was counterbalanced in a Latin square arrangement. Subjects were not told in advance what the behaviors had in common (i.e., considered characteristic of intelligence, creativity, or wisdom).

Results

Results of the scalings of intelligence, creativity, and wisdom are shown in Tables 3–5, respectively. All scalings were nonmetric and done with ALSCAL using Stress Formula 1 and the primary method of resolving ties. All scalings are principal-axis solutions. Hence, each dimension accounted for the maximum possible variance, controlling for earlier dimensions, if any. Dimensions are extracted in order of strength (variance accounted for in the data).

Table 3 shows the multidimensional scaling for intelligence. Three dimensions accounted for 82% of the variance in the data, with a Stress of .15. Because the scaling was a principal-axis solution, it tended to yield bipolar dimensions in which the positive and negative polarities lent themselves to separate but related interpretations.

The first dimension yielded two interpretations: *practical problem-solving ability* for the positive polarity (e.g., tends to see attainable goals and accomplish them; has ability to change directions and use another procedure; is able to apply knowledge to particular problems) and *verbal ability* for the negative polarity (e.g., can converse on almost any topic; has demonstrated a good vocabulary; has a good command of language).

The second dimension also lent itself to two interpretations. The positive polarity of this dimension was labeled *intellectual balance and integration* (e.g., has the ability to recognize similarities and differences; listens to all sides of an issue; is able to grasp abstract ideas and focus his or her attention on those ideas), and the negative polarity was labeled *goal orientation and attainment* (e.g., tends to obtain and use information for specific purposes; possesses ability for high achievement; is motivated by goals).

The third dimension yielded two interpretations, *contextual intelligence* for the positive polarity (e.g., learns and remembers and gains information from past mistakes or successes; has the ability to understand and interpret his or her environment; knows what's going on in the world), and *fluid thought* for the negative polarity (e.g., has a thorough grasp of mathematics, good spatial ability, or both; has a high IQ level; thinks quickly).

Table 4 displays the results of the nonmetric multidimensional scalings for the sortings of the creativity behaviors. Four dimensions accounted for 93% of the variance in the data with a stress of .08.

The first dimension yielded two interpretations, *nonentrenchment* for the positive polarity (e.g., makes up rules as he or she goes along; has a free spirit; is unorthodox), and *integration and intellectuality* for the negative polarity (e.g., makes connections and distinctions between ideas and things; has the ability to recognize similarities and differences; is able to put old information, theories, and so forth together in a new way).

The second dimension was also interpreted in terms of two polarities: *Aesthetic taste and imagination* for the positive polarity (e.g., has an appreciation of art, music, and so forth; can write, draw, compose music; has good taste) and *decisional skill and flexibility* for the negative polarity (e.g., follows his or her gut feelings in making decisions after weighing the pros and cons; has ability to change directions and use another procedure).

The third dimension was interpreted in terms of *perspicacity* for its positive polarity

(e.g., questions societal norms, truisms, assumptions; is willing to take a stand) and of *drive for accomplishment and recognition* for its negative polarity (e.g., is motivated by goals; likes to be complimented on his or her work; is energetic).

Table 3
Nonmetric Multidimensional Scaling Solutions for Behaviors: Intelligence

Scaling solutions	Weight
Dimension 1	
Positive polarity: Practical problem-solving ability	
Tends to see attainable goals and accomplish them	1.72
Acts within own physical and intellectual limitations and knows them	1.68
Is good at distinguishing between correct and incorrect answers	1.56
Has good problem-solving ability	1.55
Has ability to change directions and use another procedure	1.54
Has rationality: ability to reason clearly	1.53
Able to apply knowledge to particular problems	1.36
Has the unique ability to look at a problem or situation and solve it	1.26
Has a logical mind	1.18
Negative polarity: Verbal ability	
Can converse on almost any topic	−1.66
Attaches importance to ideas	−1.62
Is inquisitive	−1.61
Studies and reads quite a lot	−1.59
Has demonstrated a good vocabulary	−1.58
Expresses broad concepts concisely	−1.40
Has a good command of language	−1.25
Has a huge store of information	−1.22
Attaches importance to well-presented ideas	−1.07
Dimension 2	
Positive polarity: Intellectual balance and integration	
Has the ability to recognize similarities and differences	1.64
Makes connections and distinctions between ideas and things	1.53
Listens to all sides of an issue	1.42
Is able to grasp abstract ideas and focus his or her attention on those ideas	1.37
Is able to see through things—read between the lines	1.32
Is perceptive	1.23
Has the ability to integrate information	1.17
Has the ability to grasp complex situations	1.12
Negative polarity: Goal orientation and attainment	
Tends to obtain and use information for specific purposes	−1.71
Possesses ability for high achievement	−1.64
Seeks out information, especially details	−1.48
Is motivated by goals	−1.47
Is inquisitive at an early age	−1.42
Sees opportunities and knows when to take them	−1.27
Dimension 3	
Positive polarity: Contextual intelligence	
Learns and remembers and gains information from past mistakes or successes	1.36
Has the ability to understand and interpret his or her environment	1.18
Knows what's going on in the world	1.14
Negative polarity: Fluid thought	
Has a thorough grasp of mathematics, or good spatial ability, or both	−1.40
Has a high IQ level	−1.25
Thinks quickly	−1.24

Note. Stress (Formula 1) = .15, R^2 = .82.

Table 4
Nonmetric Multidimensional Scaling Solutions for Behaviors: Creativity

Scaling solutions	Weight
Dimension 1	
Positive polarity: Nonentrenchment	
Makes up rules as he or she goes along	2.34
Is impulsive	2.13
Takes chances	2.02
Tends not to know own limitations and tries to do what others think is impossible	1.92
Is emotional	1.89
Has a free spirit	1.69
Builds castles in the sky	1.51
Is a nonconformist	1.49
Is unorthodox	1.47
Negative polarity: Integration and intellectuality	
Makes connections and distinctions between ideas and things	−2.10
Has the ability to understand and interpret his or her environment	−2.05
Has the ability to recognize similarities and differences	−1.96
Is able to grasp abstract ideas and focus his or her attention on those ideas	−1.82
Is productive	−1.80
Has a high IQ level	−1.58
Attaches importance to ideas	−1.56
Possesses ability for high achievement	−1.52
Is always thinking	−1.49
Is able to put old information, theories, and so forth together in a new way	−1.16
Dimension 2	
Positive polarity: Aesthetic taste and imagination	
Has an appreciation of art, music, and so forth	1.90
Likes to be alone when creating something new	1.82
Can write, draw, compose music	1.82
Has good taste	1.80
Uses the materials around him or her and makes something unique out of them	1.58
Is in harmony with the materials or processes of expression	1.40
Is imaginative	1.24
Negative polarity: Decisional skill and flexibility	
Follows his or her gut feelings in making decisions after weighing the pros and cons	−1.94
Has ability to change directions and use another procedure	−1.13
Dimension 3	
Positive polarity: Perspicacity	
Questions societal norms, truisms, assumptions	1.48
Is perceptive	1.32
Is willing to take a stand	1.21
Negative polarity: Drive for accomplishment and recognition	
Is motivated by goals	−1.89
Likes to be complimented on his or her work	−1.73
Is energetic	−1.73
Has a sense of humor	−1.48
Dimension 4	
Positive polarity: Inquisitiveness	
Is inquisitive at an early age	1.21
Is inquisitive	1.19
Negative polarity: Intuition	
Has intuition	−1.04

Note. Stress (Formula 1) = .08, R^2 = .93.

The fourth and weakest dimension was interpreted in terms of *inquisitiveness* (positive polarity) and *intuition* (negative polarity). This dimension was weak, and did not have many salient weights on either polarity.

Table 5 presents the scaling results for the

Table 5
Nonmetric Multidimensional Scaling Solutions for Behaviors: Wisdom

Scaling solutions	Weight
Dimension 1	
Positive polarity: Reasoning ability	
Has the unique ability to look at a problem or situation and solve it	2.77
Has good problem-solving ability	2.42
Has a logical mind	2.09
Is good at distinguishing between correct and incorrect answers	2.00
Is able to apply knowledge to particular problems	1.84
Is able to put old information, theories, and so forth, together in a new way	1.73
Has a huge store of information	1.58
Has the ability to recognize similarities and differences	1.30
Has rationality: ability to reason clearly	1.20
Makes connections and distinctions between ideas and things	1.04
Negative polarity: Sagacity	
Displays concern for others	−1.95
Considers advice	−1.67
Understands people through dealing with a variety of people	−1.67
Feels he or she can always learn from other people	−1.57
Knows self best	−1.44
Is thoughtful	−1.40
Is fair	−1.32
Is a good listener	−1.27
Is not afraid to admit making a mistake, will correct the mistake, learn, and go on	−1.17
Listens to all sides of an issue	−1.12
Dimension 2	
Positive polarity: Learning from ideas and environment	
Attaches importance to ideas	1.78
Is perceptive	0.94
Learns from other people's mistakes	0.88
Negative polarity: Judgment	
Acts within own physical and intellectual limitations	−1.62
Is sensible	−1.61
Has good judgment at all times	−1.54
Thinks before acting or making decisions	−1.43
Is able to take the long view (as opposed to considering only short-term outcomes)	−1.34
Thinks before speaking	−1.27
Is a clear thinker	−0.97
Dimension 3	
Positive polarity: Expeditious use of information	
Is experienced	1.60
Seeks out information, especially details	1.38
Has age, maturity, or long experience	1.35
Learns and remembers and gains information from past mistakes or successes	0.96
Changes mind on basis of experience	0.78
Negative polarity: Perspicacity	
Has intuition	−1.63
Can offer solutions that are on the side of right and truth	−1.13
Is able to see through things—read between the lines	−0.86
Has the ability to understand and interpret his or her environment	−0.81

Note. Stress (Formula 1) = .14, R^2 = .87.

sortings of the behaviors pertaining to wisdom. Three dimensions accounted for 87% of the variance in the data, with a Stress of .14.

The first dimension yielded two interpretations, *reasoning ability* for the positive polarity (e.g., has the unique ability to look at a problem or situation and solve it; has good problem solving ability; has a logical mind) and *sagacity* for the negative polarity (e.g., considers advice; understands people through dealing with a variety of people; feels he or she can always learn from other people; is fair).

The second dimension also yielded two interpretations, *learning from ideas and environment* for the positive polarity (e.g., attaches importance to ideas; is perceptive; learns from other people's mistakes) and *judgment* for the negative polarity (e.g., acts within own physical and intellectual limitations; is sensible; has good judgment at all times; thinks before acting or making decisions).

Finally, the third dimension also yielded two interpretations, *expeditious use of information* for the positive polarity (e.g., is experienced; seeks out information, especially details; learns and remembers and gains information from past mistakes or successes) and *perspicacity* for the negative polarity (e.g., can offer solutions that are on the side of right and truth; is able to see through things—read between the lines; has the ability to understand and interpret his or her environment).

Discussion

Several aspects of these data are worthy of note. First, the fits of the multidimensional scaling model to the data, with proportions of variance accounted for equaling .82, .93, and .87 for intelligence, creativity, and wisdom, respectively, are quite respectable, indicating that the scaling data were reliable and that the model extracted most of the variance from the proximity data with only small numbers of dimensions. Thus, one can have a reasonably high degree of confidence that the dimensions obtained reflect something other than random fluctuations of the data.

Second, the dimensions obtained for intelligence replicate, but also expand on, those obtained by Sternberg et al. (1981) using a different methodology (factor analysis of the characteristicness ratings), a different set of subjects, and a different (but related) set of behaviors. The two polarities of the first dimension replicate the first two factors for laypersons of Sternberg et al. (Practical Problem-Solving Ability and Verbal Ability) and the positive polarity of the second dimension is close to the Social Competence dimension obtained as a third factor by Sternberg et al. For example, some of the behaviors in the Sternberg et al. study that showed high loadings on the Verbal Ability factor—converses well, displays a good vocabulary, is verbally fluent, is knowledgeable about a particular field—are very similar to behaviors from the present study. The same is true for the other factors. Thus, to the extent that there are past precedents for any of the data sets, the present data are consistent with the previous ones.

Third, the substantive dimensions are consistent with the earlier statistical data (from Experiment 1) indicating that of the implicit theories for the three possible pairs of attributes, the greatest similarity is between the implicit theories for intelligence and wisdom, whereas the least similarity is between the implicit theories for creativity and wisdom. Consider, for example, the positive polarity of the first (and hence strongest) dimension in each of the principal-components scaling solutions. The positive polarities of the first dimensions for intelligence and wisdom—practical problem-solving ability and reasoning ability, respectively—are quite similar. Indeed, 5 of the 9 behaviors with the highest positive loadings on the first dimension for intelligence also are among the 10 behaviors with the highest positive loadings on the first dimension for wisdom. In contrast, the positive polarity of the first dimension for creativity—nonentrenchment—is wholly different in its behavioral composition from the comparable polarities for intelligence and wisdom. Looking at the sets of dimensions as a whole reveals that wisdom is indeed more similar to intelligence than it is to creativity, whereas the relation between intelligence and creativity is intermediate between that of intelligence and wisdom, on the one hand, and that of creativity and wisdom, on the other.

Fourth and perhaps most important, the dimensions do seem to capture quite well people's intuitions about the nature of intelligence, creativity, and wisdom. The purpose of a multidimensional scaling procedure such as that used here is not to go beyond "what we all

Table 6
Correlations of Prototype Scores With Ability Tests

Test	Intelligence	Creativity	Wisdom	*M*	*SD*
Cattell and Cattell Test of *g*	.48**	.17	−.01	21.31	7.99
Embedded Figures	.54***	.04	−.14	8.78	6.35
George Washington Social Intelligence Test	−.06	−.06	.38*	97.92	20.27
Chapin Social Insight Test	.43**	.19	.46***	21.03	5.15

* $p < .10$; ** $p < .05$; *** $p < .01$.

know," but rather to bring what we all know into the open for scientific inspection. Often, when we characterize someone as "intelligent," or "creative," or "wise," we are asked what we mean by the use of these terms. The data presented here give a fairly clear picture of what it is that we do, in fact, mean.

Experiment 3

Method

Some New Haven area adults were administered four psychometric tests ($n = 30$): the Cattell and Cattell (1963) Test of *g*, the Group Embedded Figures Test (Oltman, Raskin, & Witkin, 1971), the George Washington Social Intelligence Test (Moss, Hunt, Omwake, & Woodward, 1949), and the Social Insight Test (Chapin, 1967). These tests have been widely used in psychometric investigations of cognitive and social intelligence and have been shown to have reasonable construct validity (see Sternberg, 1985). The cognitive intelligence tests were included because of their expected overlap with implicit theories of intelligence; the social intelligence tests were included because of literature, going back to the Book of Solomon, suggesting that wisdom derives, at least in part, from the considered application of intelligence in social contexts. Paper-and-pencil creativity tests were not used because of the view of the investigator, as well as of many other investigators in the field (e.g., Amabile, 1983; Cronbach, 1984; Feldman, 1980; Simonton, 1984) that such tests capture, at best, only the most trivial aspects of creativity. In addition, subjects were asked to fill out all three of the questionnaires from Experiment 1—those for intelligence, creativity, and wisdom—as they pertained to themselves (rather than as they pertained to an ideal individual, as in Experiment 1). The same subjects filled out all three questionnaires in counterbalanced order. Only those questionnaire items were retained that had received first principal-component loadings of .50 or greater in Experiment 1. These items were the ones that best measured what each scale as a whole measured. Subjects used a 1–9 rating scale, where 1 indicated a behavior that was extremely uncharacteristic of the individual, and 9 indicated a behavior that was extremely characteristic of the individual. Subjects were given as long as they needed to complete the questionnaires.

Results

Questionnaires were scored by correlating each subject's response pattern on the given questionnaire he or she completed (intelligence, wisdom, or creativity) with the prototype questionnaire obtained from the laypersons in Experiment 1. The prototype contained the set of ratings for the hypothetical ideal individual, with respect to either intelligence, creativity, or wisdom. Thus, the correlation measured the degree of resemblance between the actual individual in this experiment and the hypothetical ideal individual emerging from Experiment 1. A higher correlation thus indicated greater correspondence to the hypothetical ideal, whereas a lower correlation indicated lesser correspondence to the ideal. A negative correlation would indicate an inverse relation to the ideal.

Table 6 presents correlations between the psychometric measures derived from explicit theories and the questionnaire measures derived from implicit theories. The strongest correlations were obtained for intelligence. A correlation of .48 was obtained with the Cattell and Cattell Test of *g*, which is a nonverbal intelligence test. This result replicates the correlation with the verbal Henmon-Nelson Mental Ability Test obtained by Sternberg et al. (1981), which was just slightly higher (.52). The intelligence prototype-correlation measure thus measures characteristics that overlap with intelligence tests, although the prototype also measures social-competence aspects of intelligence that are not measured by most traditional psychometric tests of intelligence. Significant correlations were also obtained with the Embedded Figures test (a measure of field independence that tends to correlate with spatial ability) and with the Chapin Social In-

sight test (a measure of social intelligence/competence). No significant correlations were obtained for creativity, but then, there were no creativity tests included in the battery because of the lack of adequate available batteries. Meaningful correlations were obtained for the wisdom prototype scores with the George Washington and Chapin tests. Thus, the wisdom scale seems to come closest to measuring skills that are traditionally measured by tests of social intelligence (or social competence).

Discussion

A question that inevitably arises in studies of implicit theories of psychological constructs is whether such theories have any external validity. Put simply, what if people's conceptions are wrong? The external-validation procedures in this experiment specifically address this issue. Correlations of scores from implicit-theory-based measures with scores from explicit-theory-based measures showed both convergent and discriminant validity: The prototype scores correlated with the psychometric tests with which they were supposed to correlate, and did not correlate with the psychometric tests with which they were not supposed to correlate. Thus, implicit theories of intelligence and wisdom *do* correspond substantially to explicit theories. (There was no basis for making a similar determination for creativity.) If the implicit theories are off-base, then so are the explicit theories that constitute the basis for current psychological research and measurement on intelligence and wisdom. The correspondence makes sense: After all, explicit theories derive largely from implicit theories of the psychological theorist! Of course, it is quite possible that both explicit theories and implicit theories are wrong. But if this is the case, the problem is not one that applies uniquely to this particular study, but rather to all studies in the field of human abilities.

Experiment 4

Method

In this experiment, 40 subjects, all of whom were New Haven area adults, were presented with 54 simulated letters of recommendation. Examples of two typical letters are as follows:

Gerald:
He possesses ability for high achievement.
He has the ability to grasp complex situations.
He has good problem-solving ability.
He attaches importance to well-presented ideas.

Doris:
She is motivated by goals.
She questions societal norms, truisms, and assumptions.
She thinks quickly.
She is not materialistic.
She is totally absorbed in study.

Descriptions were generated so as to vary predicted levels of intelligence, creativity, and wisdom. Each description was either four, five, or six sentences in length, and was paired equally often with names of males and with names of females. A given subject saw a given description only once—either with a male name or with a female name. The subjects' task was to rate the intelligence, creativity, and wisdom of each of the described subjects. The ratings were made in a Latin-square order across subjects, so that each rating occurred equally often in each ordinal position. Ratings were made on a 9-point scale, where 1 indicated that the individual to be rated was not at all (intelligent, creative, wise), and 9 indicated that the individual was extremely (intelligent, creative, wise). It was possible to obtain predicted ratings for intelligence, creativity, and wisdom by summing up the ratings of laypersons from Experiment 1 on each attribute for each subject, and then dividing by the number of attributes given for the hypothetical individual. Averages rather than sums of ratings were used because the number of behaviors was not the same for each of the descriptions.

Suppose, for example, that five behaviors were given for Susan. The predicted intelligence rating would be the mean of the characteristicness ratings for intelligence in Experiment 1 (plus a constant). The predicted creativity rating would be the mean of the first experiment's ratings for creativity (plus a constant). The predicted wisdom rating would be the mean of the first experiment's ratings for wisdom (plus a constant). Thus, the more closely the description of the hypothetical individual resembles the ideal (of Experiment 1) on each of the three attributes (intelligence, creativity, wisdom), the higher should be the rating that hypothetical individual receives in the present experiment.

Results

Table 7 presents the results for this experiment. The main results are presented in three successive panels of data.

As can be seen in the first panel, the mean rating for intelligence was the highest, and the mean for creativity was the lowest. Ratings were highly reliable, across split halves of both subjects and items.

Consider next the correlational pattern presented in the second panel. As would be expected from Experiment 1, involving ratings of abstract ideals, the highest correlation be-

tween pairs of ratings was that between intelligence and wisdom. Correlations with creativity were lower. Also as would be expected from the first experiment, the lowest correlation was between the ratings of creativity and wisdom. Thus, the ratings of hypothetical-described individuals in this experiment showed the same pattern as the ratings of hypothetical ideal individuals in Experiment 1. Note that the correlations between items across genders for names were all in the mid- to high- 90s. Thus, the pattern of ratings was very similar, regardless of the sex of the hypothetical individual being rated. Moreover, mean ratings were the same for the two genders to the nearest tenth of a point. Hence, levels of ratings as well as patterns were the same across the genders of the hypothetical individuals.

If the implicit theories are functioning as they ought to, then the correlations of the predicted and observed ratings for the hypothetical individuals should show convergent and discriminant validity. Such validity would be shown if the correlation between predicted and observed values was higher within-attribute than between-attributes. In other words, the best predictor of the observed intelligence ratings should be the predicted intelligence ratings. The best predictor of the observed creativity ratings should be the predicted creativity ratings. And the best predictor of the observed wisdom ratings should be the predicted wisdom ratings. Lack of convergent-discriminant validity would be shown if, for example, predictions for the creativity score correlated higher with the observed intelligence

Table 7
Results for "Letters of Recommendation" Study

Measure	*M*	*SD*	Subject reliability	Item reliability
		Basic statistics		
Intelligence	5.8	1.7	.98	.84
Creativity	5.0	1.7	.97	.93
Wisdom	5.3	1.8	.98	.85

	Intelligence	Creativity	Wisdom	Male–Female names
		Intercorrelations of ratings		
Intelligence	1.00	.69	.94	.97
Creativity		1.00	.62	.94
Wisdom			1.00	.95

	Predicted		
Observed	Intelligence	Creativity	Wisdom
	Simple correlations between predicted and observed ratings		
Intelligence	.89***	.46***	.88***
Creativity	.48***	.89***	.54***
Wisdom	.87***	.40**	.96***

		Standardized regression coefficients		
Dependent variable	R^2	Intelligence	Creativity	Wisdom
	Multiple regression of observed ratings on predicted ratings			
Intelligence	.85***	.64***	.27**	.42**
Creativity	.87***	−.20	1.24***	.42***
Wisdom	.92***	.06	.16*	.98***

* $p < .05$. ** $p < .01$. *** $p < .001$.

score than did the predictions for the intelligence score. If the results do indeed show both convergent and discriminant validity, then one would expect correlations between predicted and observed values to be highest in the main diagonal of the third panel. In other words, the ratings of Experiment 1 for, say, intelligence, should best predict the ratings of Experiment 3 for intelligence, as opposed to creativity or wisdom. The corresponding pattern should hold for the ratings of creativity and wisdom. As can be seen in the third panel, the correlation in the main diagonal is, in every case, the highest correlation in each row and column. However, the ratings of intelligence and wisdom were close, and not clearly distinguishable, especially for the predictions of wisdom and intelligence with respect to the actual ratings of the intelligence of the described hypothetical individuals. These results are consistent with the earlier results suggesting that intelligence and wisdom are perceived to be more closely related to each other than is either in relation to creativity.

Finally, multiple regression was used to predict the ratings of Experiment 4 via the predictions for intelligence, creativity, and wisdom deriving from Experiment 1. In these regressions, one would expect the highest standardized regression coefficient for that behavior in the prediction that corresponds to the observed behavior. Thus, the regression weight in predicting the intelligence ratings should be higher for the intelligence prediction than for either of the creativity or wisdom predictions, and similarly for the other sets of weights. Again, as above, the values in the main diagonal are the highest ones in each row and column, supporting this prediction. The implicit theories thus show both convergent and discriminant validity.

Discussion

Implicit theories would not be of much interest if they merely resided statically in people's heads, or if they were merely created at time of test to suit the needs of experimenters doing studies on such theories. The results of the present study show not only that people have such theories, but that they *use* such theories in their evaluations of others. Despite the seeming omnipresence of standardized tests in our society, by far the largest proportion of evaluations of people's abilities are informal and observational rather than formal and psychometric: Most judgments of people's intelligence, creativity, and wisdom result from interpretations of face-to-face interactions, letters of recommendation, comments received second-hand from third parties, and the like. Psychometric tests tell us nothing about how these informal evaluations are made. The results of this experiment show that the implicit-theoretical tests do. People use their implicit theories to make these judgments, and thus the judgments can be predicted from such theories, as was done here.

As would be expected on the basis of the results of the previous experiments, people have the most difficulty in distinguishing intelligence and wisdom in such judgments. But they are able to distinguish intelligence from creativity, and creativity from wisdom, quite well in these judgments. To the extent we are concerned, therefore, with how judgments of abilities are actually made in the everyday world, the study of implicit theories has at least as much relevance as does the study of explicit theories, and perhaps even more relevance.

General Discussion

This study sought to discover the nature and use of people's implicit theories of intelligence, creativity, and wisdom. A prestudy and four experiments were conducted in order to fulfill this goal. The prestudy served merely to provide a comprehensive list of behaviors associated with intelligence, creativity, and wisdom in each of four fields, as well as in general.

Principal Experimental Outcomes

Experiment 1 showed that, in general, intelligence, creativity, and wisdom are perceived as positively correlated attributes in people, although intelligence and wisdom are more closely related than is either of these two constructs to creativity. Ratings did not differ significantly across groups in terms of mean levels of particular attributes.

Experiment 2 revealed dimensions of implicit theories of intelligence, creativity, and wisdom in nonspecialists. Because principal-axis solutions were used in nonmetric multidimensional scaling, bipolar dimensions

emerged. Separate interpretations were given to the positive and negative polarity of each dimension. For intelligence, these interpretations were: practical problem-solving ability, verbal ability (Dimension 1); intellectual balance and integration, goal orientation and attainment (Dimension 2); contextual intelligence, fluid thought (Dimension 3). For creativity, the interpretations were: nonentrenchment, integration and intellectuality (Dimension 1); aesthetic taste and imagination, decisional skill and flexibility (Dimension 2); perspicacity, drive for accomplishment and recognition (Dimension 3); inquisitiveness, intuition (Dimension 4). For wisdom, the interpretations were: reasoning ability, sagacity (Dimension 1); learning from ideas and environment, judgment (Dimension 2); expeditious use of information, perspicacity (Dimension 3). On the whole, the dimensions seem to be plausible, and to fit intuitively with commonsense notions of intelligence, creativity, and wisdom, respectively.

In Experiment 3, subjects rated themselves on a subset of the entire list of behaviors generated in the Prestudy. These ratings were correlated with the ideal-prototype ratings from Experiment 1 to yield a measure of resemblance (r) between the actual individual and the ideal prototype. These correlations were then correlated with scores on psychometric tests of ability. The prototype measure for intelligence showed its greatest correlations with psychometric tests of cognitive intelligence, whereas the prototype measure for wisdom showed its greatest correlations with psychometric tests of social intelligence. The creativity prototype measure did not correlate with either kind of test, but because of doubts about their appropriateness as measures of creativity, psychometric tests of creativity were not used. The correlations for intelligence and wisdom, at least, showed convergent-discriminant validation with respect to the psychometric measures used.

In Experiment 4, subjects were presented with simulated letters of recommendation for hypothetical individuals. Subjects had to rate the intelligence, creativity, and wisdom of each hypothetical individual. Results were of the same pattern and at the same level, regardless of whether a given description was paired with a male name or a female name. Predictions based on ratings from Experiment 2 showed high correlations with observed ratings in this experiment. Moreover, the results again showed convergent and discriminant validity, with the predictions for intelligence better predicting observed ratings of intelligence than of creativity or wisdom, and with comparable results for the other two constructs.

Contents of and Comparisons among Implicit Theories

Laypersons. A major goal of this study was to attain some sense of just how laypersons' implicit theories of intelligence, creativity, and wisdom are similar to and different from each other. The results of the experiments, and especially of Experiment 2, were useful in attaining a sense of the similarities and differences.

People's conceptions of intelligence overlap with, but go beyond, the skills measured by conventional intelligence tests. Thus, the problem-solving (fluid ability) and verbal comprehension (crystallized ability) skills measured by intelligence tests appear most prominently in the dimensions of the derived implicit theory of intelligence. Thus, the intelligent individual is perceived to solve problems well, reason clearly, think logically, show a good vocabulary, and draw on a large store of information—just the kinds of things conventional intelligence tests measure. But also embedded within people's conceptions of intelligence are a person's ability to balance information, to be goal-oriented and to aim for achievement of one's goals, and to show one's intelligence in worldly, as opposed to strictly academic, contexts. People thus seem to be more concerned with the practical and worldly side of intelligence than are intelligence testers.

Conceptions of creativity overlap with those of intelligence, but there is much less emphasis in implicit theories of creativity on analytical abilities, whether they be directed toward abstract problems or toward verbal materials. For example, the very first dimension shows a greater emphasis on nonentrenchment, or the ability and willingness to go beyond ordinary limitations of self and environment and to think and act in unconventional and even dreamlike ways. The creative individual has a certain freedom of spirit and unwillingness to

be bound by the unwritten canons of society, characteristics not necessarily found in the highly intelligent individual. Implicit theories of creativity encompass a dimension of aesthetic taste and imagination that is absent in implicit theories of intelligence, and also encompass aspects of inquisitiveness and intuitiveness that do not seem to enter into the implicit theories of intelligence. Implicit theories of creativity go far beyond conventional psychometric creativity tests. A person's ability to think of unusual uses of a brick, or to form a picture based on a geometric outline, scarcely does justice to the kind of freedom of spirit and intellect captured in people's implicit theories of creativity.

Finally, the wise individual is perceived to have much the same analytical reasoning ability that is found in the intelligent individual. But the wise person has a certain sagacity not necessarily found in the intelligent person: He or she listens to others, knows how to weigh advice, and can deal with a variety of different kinds of people. In seeking as much information as possible for decision making, the wise individual reads between the lines as well as makes use of the obviously available information. The wise individual is especially able to make clear, sensible, and fair judgments, and in doing so, takes a long-term as well as a short-term view of the consequences of the judgments made. The wise individual is perceived to profit from the experience of others, and to learn from others' mistakes, as well as from his or her own. This individual is not afraid to change his or her mind as experience dictates, and the solutions that are offered to complex problems tend to be the right ones. It is not surprising that the correlations between creativity and wisdom are the lowest of the three possible pairs (intelligence–creativity, intelligence–wisdom, creativity–wisdom), and in one case, the correlation is even negative: Whereas the wise person is perceived to be a conserver of worldly experience, the creative person is perceived to be a defier of such experience.

Specialists. Implicit theories of intelligence, creativity, and wisdom differ as a function of the field of endeavor by whom and for whom the implicit theory is being assessed. (There was no separation in the relevant experiment—Experiment 1—between who was making the ratings and for whom they were made. Thus, physicists, for example, were not asked their conceptions of intelligence or creativity as they apply to philosophers, or vice versa. Measurement of cross-field conceptions would more likely tap conceptions created on the spot than to tap conceptions previously present in individuals' thinking, and would probably be of doubtful validity. Moreover, such assessment would have resulted in the need for data collection on a scale that exceeded our capabilities!) Consider each of intelligence, creativity, and wisdom in turn.

Whereas the professors of art emphasize knowledge and the ability to use that knowledge in weighing alternative possibilities and in seeing analogies, the business professors emphasize the ability to think logically, to focus on essential aspects of a problem, and both to follow others' arguments easily and to see where these arguments lead. The emphasis on assessment of argumentation in the business professors' implicit theories is far weaker in the artists' implicit theories. The philosophy professors emphasize critical and logical abilities very heavily, and especially the ability to follow complex arguments, to find subtle mistakes in these arguments, and to generate counterexamples to invalid arguments. The philosophers' view very clearly emphasizes those aspects of logic and rationality that are essential in analyzing and creating philosophical arguments. The physicist, in contrast, places more emphasis on precise mathematical thinking, the ability to relate physical phenomena to the concepts of physics, and to grasp quickly the laws of nature. In sum, although there is considerable agreement across fields, there are also emphases in each field on the kinds of intelligent thought that are needed particularly for success in the given discipline. This specialization in parts of the implicit theories of intelligence is absent from the implicit theories of the laypersons.

Implicit theories of creativity in the specialized fields were highly overlapping across fields and also overlapped highly with the implicit theories of laypersons; nevertheless, there were some differences worthy of note. Professors of art placed heavy emphasis on imagination and originality, as well as upon an abundance of and willingness to try out new ideas. The creative artist is a risk-taker, and

persists in following through on the consequences of risks. Such a person thinks metaphorically, and prefers forms of communication other than strictly verbal ones. Business professors also emphasize the ability of the creative individual to come up with new ideas and to explore these ideas, especially as they relate to novel business services or products. The creative individual escapes traps of conventional thinking, and can imagine a possible state that is quite different from what exists. Philosophy professors emphasize the ability to toy imaginatively with notions and combinations of ideas, and to create classifications and systematizations of knowledge that differ from the conventional ones. Creative individuals never automatically accept the "accepted," and when they have novel hunches, these hunches pay off. The creative person is particularly well able to generate insights regarding connections between seemingly unrelated issues, and to form useful analogies and explanations. The physics professors share many of these same ideas about the creative individual, but show a particular concern with inventiveness, the ability to find order in chaos, and the ability to question basic principles. The physicists emphasize creative aspects of problem solving, such as the ability to approximate solutions, the ability to find shortcuts in problem solving, and the ability to go beyond standard methods of problem solving. Finally, the physicist looks in a creative person for the ability to make discoveries by looking for reasons why things happen the way they do. Such discoveries may result from the perception of physical and other patterns that most others simply overlook. As was the case for intelligence, the implicit theories of the laypersons seem to be an amalgamation of these different views without the specializations that appear in the implicit theories of individuals from particular fields of endeavor.

Implicit theories of wisdom show considerable overlap across fields of specialization. Nevertheless, there are some differences in implicit theories. Art professors emphasize insight, knowing how to balance logic and instinct, knowing how to transform creativity into concepts, and sensitivity. These aspects of wisdom would seem quite relevant in the mature appreciation and evaluation of art. Business professors emphasize maturity of judgment, understanding of the limitations of one's actions and recommendations, knowing what one does and does not know, possession of a long-term perspective on things, knowing when not to act as well as when one should act, acceptance of reality, good decision making, the ability to distinguish substance from style, and appreciation of the ideologies of others. These aspects of wisdom would seem particularly relevant in making and evaluating business decisions. Philosophy professors emphasize balanced judgment, nonautomatic acceptance of the "accepted" wisdom, concentration on fundamental questions, resistance to fads, looking for fundamental principles or intuitions behind a viewpoint, concern with larger purposes, openness to ideas, ability to use facts correctly, avoidance of jargon, possession of a sense of where future progress is possible, unwillingness to become obsessed with a single theory, attention to both detail and scope, and a sense of justice. All of these talents would seem relevant to the construction and evaluation of philosophical arguments. Finally, physicists emphasize appreciation of the various factors that contribute to a situation, familiarization with previous work and techniques in the field, knowing if solving a problem is likely to produce important results, awareness of the important problems in the field, knowledge of the human and political elements of scientific work, contemplation, and recognition of the aspects of physical phenomena that underlie the concepts of physics. These skills would seem to be helpful in attaining a deep understanding of the nature of physics and its place both in science and in the world.

The Role of Implicit Theories in Psychological Research

The present study suggests that implicit theories can provide a useful way of gaining a "lay of the land" in the search for understanding of the constructs of intelligence, creativity, and wisdom. The results were construct-valid in terms of convergent and discriminant validity, and also were consistent with but more detailed than previous results from studies of implicit theories. For example, the nonmetric

multidimensional scaling results for intelligence were an elaboration of the factor-analytic results of Sternberg et al. (1981). The results are also in good agreement with many explicit theories of intelligence (e.g., Guilford, 1967; Sternberg, 1985), especially those that expand the notion of intelligence to include social and practical competencies as well as academic ones. The scaling results for wisdom also confirmed and elaborated on those of Clayton and Birren (1980), using the same technique but a very different method for generating behaviors. Our reasoning polarity closely resembles Clayton and Birren's reflective dimension, and our sagacity polarity closely resembles their affective one. Although there have been no comparable multivariate studies of creativity, per se, our results are in accord with those of MacKinnon (1964) and others who have used Q-sorts and self-ratings for creative individuals. Indeed, all of the adjectives that characterized MacKinnon's highly creative sample seem classifiable in terms of our multidimensional space.

Although I have emphasized the role of implicit theories as precursors to explicit theories and as useful in setting the groundwork for explicit theories, I believe that implicit theories are also of interest in their own right. Implicit theories of intelligence, creativity, and wisdom are of interest in their own right because (a) the terms—*intelligence, creativity, wisdom*—are frequently used in everyday discourse as well as in psychological discourse with no or minimal definition, and it is useful to know what people mean when they use these terms; (b) people evaluate the intelligence, creativity, and wisdom of themselves and others with some regularity, and it is worthwhile to know the psychological bases on which these evaluations are made; (c) as people make these judgments, it is helpful to know to what extent they correlate with measures derived from explicit theories, such as psychometric tests; and (d) the implicit theories may eventually help us broaden and change our explicit theories, as we come to realize those aspects of cognition or affect that the current explicit theories of intelligence, creativity, and wisdom do not encompass, but possibly, should encompass. Thus, the study of implicit theories is not merely an easy substitute for the formation and study of explicit theories of psychological constructs. Implicit theories deserve to be studied in their own right, and such study is complementary to the study of explicit theories.

Although understanding of implicit theories is important, both for its own sake and for the sake of developing better explicit theories, it is important not to confuse implicit theories with explicit ones. The test of an account of implicit theories, such as this account, is whether it accurately and fully reflects the notions people have in their heads, and the ways in which these notions are systematized. The test of an explicit theory is whether it can account for observable performance generated by the psychological construct under investigation. People could be wrong, underinclusive, or overinclusive in their notions of psychological constructs. Hence, investigations of implicit theories must be supplemented and related to investigations motivated by explicit theories.

Although any study such as this has numerous limitations, it is worth pointing out three particularly important ones. First, the study is not developmental in its study of implicit theories. Yet, the work of Yussen and Kane (1985), Berg and Sternberg (in press), Cornelius (1984), and others shows that implicit theories of intelligence change over the life span. The work of Csikszentmihalyi and Robinson (in press), Gruber (in press), and others shows changes over the life span in the nature of creativity, and the work of Clayton and Birren (1980) and of Dittmann-Kohli and Baltes (in press) shows changes in the nature of wisdom. Hence, the present results may apply readily only to early and middle adulthood. Second, the study is fixed at a moment in time. Conceptions of constructs such as intelligence, creativity, and wisdom may change over the years, so that a study done at one time can be confidently interpreted as accurately reflecting implicit theories only for the time period in which it was done. Finally, the study is limited to one particular culture, rather than being cross-cultural. Although the present results may apply fairly broadly within our own mainstream culture, there is good evidence to suggest that conceptions of constructs such as intelligence, creativity, and wisdom differ cross-culturally (Sternberg, in press).

In conclusion, people have implicit theories

of intelligence, creativity, and wisdom, and they use these theories both in judging themselves and in judging others. They seem to use these theories quite well and systematically. At least in the domains of creativity and wisdom, and possibly in that of intelligence as well, it remains to be seen whether we can obtain as good measurement through measures based on explicit theories as we can obtain from measurements based on implicit ones.

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