Abstract

This article presents a theory of successful intelligence. The theory is substantially broader than conventional theories of intelligence. It defines intelligence in terms of the ability to achieve one's goals in life, within one's sociocultural context. The article is divided into four major parts. The article opens with a consideration of the nature of intelligence. The second part discusses measurement of intelligence. Next it discusses how people can be intelligent but foolish. Finally it draws conclusions.

Keywords: Successful intelligence; analytical intelligence; creative intelligence; practical intelligence.

The Theory of Successful Intelligence

Robert J. Sternberg
Tufts University, Medford, USA

Conventional views of intelligence favor individuals who are strong in memory and analytical abilities (e.g., Carroll, 1993; Cattell, 1971; Jensen, 1998). They disfavor most other individuals. The result is that individuals who may have the talents to succeed in life may be labeled as unintelligent, whereas some of those labeled as intelligent may be less endowed with such talents. This article presents a broader theory of intelligence that is more encompassing, but that is nevertheless rigorously validated. The theory is the theory of successful intelligence (Sternberg, 1997).

The history of the theory presented here has been documented, to some extent, in two earlier theoretical articles (Sternberg, 1980b, 1984). In the first article (Sternberg, 1980b) a theory of components of intelligence was presented. The article made the argument arguing that intelligence could be understood in terms of a set of elementary information-processing components that contributed to people's intelligence and individual differences in it. In the second article (Sternberg, 1984) the theory was expanded to include not just the analytical aspect of intelligence, which had been the emphasis of the earlier article, but the creative and practical aspects of intelligence as well.

The definition of intelligence is typically defined in terms of a person's ability to achieve meaningful and coherent set of goals, and dispositions to reach those goals. One may be a statesperson, another, a scientist, and still another, an artist. Others may decide on careers in athletics, plumbing, politics, or whatever. The question typically is not so much what one is seeking in life; and, c) moving a substantial distance along the path toward reaching those goals.
everything or bad at everything. People who are the positive intellectual leaders of society have identified their strengths and weaknesses, and have found ways to work effectively within that pattern of abilities.

There is no single way to succeed in a job that works for everyone. For example, some lawyers are successful by virtue of their very strong analytical skills. They may never argue in a courtroom, but they can put together an airtight legal argument. Another lawyer may have a commanding presence in the courtroom, but be less powerful analytically. The legal profession in the United Kingdom recognizes this distinction by having separate roles for the solicitor and the barrister. In the United States, successful lawyers find different specializations that allow them to make the best use of their talents. Unsuccessful lawyers may actually attempt to capitalize on weaknesses, for example, litigating cases when their legal talent lies elsewhere.

This same general principle applies in any profession. Consider, for example, teaching. Educators often try to distinguish characteristics of expert teachers (see Sternberg & Williams, 2001), and indeed, they have distinguished some such characteristics. But the truth is that teachers can excel in many different ways. Some teachers are better in giving large lectures; others in small seminars; others in one-on-one mentoring. There is no one formula that works for every teacher. Good teachers figure out their strengths and try to arrange their teaching so that they can capitalize on their strengths and at the same time either compensate for or correct their weaknesses. Team teaching is one way of doing so, in that one teacher can compensate for what the other does not do well.

Item 3 recognizes that intelligence broadly defined refers to more than just “adapting to the environment,” which is the mainstay of conventional definitions of intelligence. The theory of successful intelligence distinguishes among adapting, shaping, and selecting.

In adaptation to the environment, one modifies oneself to fit an environment. The ability to adapt to the environment is important in life, and is especially important to individuals entering a new program. Most of them will be entering a new environment that is quite different from the one in which they

(See also the discussion in this textbook.) Clearly, adaptability is a key skill in any definition of intelligence. An intellectual leader ought to have the ability to adapt to a variety of environments.

In life, adaptation is not enough, however. It needs to be balanced with shaping. In shaping one’s environment to fit what one seeks to accomplish, one is modifying oneself to fit the environment. The skills required in any field are not just adaptors; they are shapers as well. They recognize that they cannot change everything, so they must decide what if they want to have an impact on the world, they have to change some things. Part of success involves deciding what to change, and then how to shape it.

When an individual enters an institution, the individual will not only adapt to the environment and then also fails in shaping it in a way that makes it a better place. Selection committees will wish to look for evidence of a candidate’s engagement in a variety of activities. Shaping has a kind of impact (see Sternberg, 2003a).

Sometimes, one attempts unsuccessfully to adapt to an environment and then also fails in shaping it. No matter what one does to try to make things work out, nothing in fact seems to work. In such cases, the action may be to select another environment.

Many of the greatest people in any one field are people who started off in another field and found it was not really the one in which they had the greatest talent. Rather than spend their lives doing something not to match their pattern of strengths and weaknesses, they had the sense to find something else to do. They had a contribution to make.

Item 4 points out that successful intelligence involves a broader range of abilities than is typically noted in intellectual and academic skills. Most of us primarily or exclusively memory and analytical skills during the school years and in later life.

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translate strategies to solve these problems exists in any culture.

Metacomponents, or executive processes, plan what to do, monitor things as they are being done, and evaluate things after they are done. Examples of metacomponents are recognizing the existence of a problem, defining the nature of the problem, deciding on a strategy for solving the problem, monitoring the solution of the problem, and evaluating the solution after the problem is solved.

Performance components execute the instructions of the metacomponents. For example, inference is used to decide how two stimuli are related and application is used to apply what one has inferred (Sternberg, 1977). Other examples of performance components are comparison of stimuli, justification of a given response as adequate although not ideal, and actually making the response.

Knowledge-acquisition components are used to learn how to solve problems or simply to acquire declarative knowledge in the first place (Sternberg, 1985). Selective encoding is used to decide what information is relevant in the context of one’s learning. Selective comparison is used to bring old information to bear on new problems. And selective combination is used to put together the selectively encoded and compared information into a single and sometimes insightful solution to a problem.

Although the same processes are used for all three aspects of intelligence universally, these processes are applied to different kinds of tasks and situations depending on whether a given problem requires analytical thinking, creative thinking, practical thinking, or a combination of these kinds of thinking. In particular, analytical thinking is invoked when components are applied to relatively novel kinds of tasks or situations. Practical thinking is invoked when the components are applied to experience to adapt to, shape, and select environments. One needs creative skills and dispositions to generate ideas, analytical skills and dispositions to decide if they are good ideas, and practical skills and dispositions to implement one’s ideas and to convince others of their worth (Sternberg, 1999b).

More details regarding the theory can be found in Sternberg (1981), with response times or error rates decomposed to yield a factor score such as that for “inductive reasoning.” For example, problems where the judgments to be made are of a fairly abstract nature.

The Assessment of Intelligence

Analytical intelligence is involved in problems, such as analogies or syllogisms (Sternberg, 1980a) were one elementary performance components. The goal of such research is to: a) specify an information processing model, so that each information-processing component is assigned a mathematical parameter corresponding to its error rate or reaction time (and another corresponding to its error rate or reaction time); and, c) construct syllogisms (Sternberg, 1980a) were elementary performance components. The assessment of intelligence is not smart. Rather, one should merely look at test scores as one indicator among many of a person's intelligence.

The Assessment of Intelligence

Our assessments of intelligence revolve around the analytical, creative, and practical aspects of it. We discuss those assessments here.

Analytical Intelligence

Analytical intelligence is involved in the solving of various kinds of problems, such as analogies or syllogisms (Sternberg, 1980a) were elementary performance components. The assessment of intelligence is not smart. Rather, one should merely look at test scores as one indicator among many of a person's intelligence.
reasoning) (A to C); 4) application, the amount of time needed to apply the relation as inferred (and sometimes as mapped) to a new set of stimuli (A to B to C to ?); 5) comparison, the amount of time needed to compare the validity of the response options (D1, D2, D3, D4); 6) justification, the amount of time needed to justify one answer as the best of the bunch (e.g., D1); and 7) preparation-response, the amount of time needed to prepare for problems solution and to respond.

Studies of reasoning need not use artificial formats. In a more recent study, and a colleague and I looked at predictions for everyday kinds of situations, such as when milk will spoil (Sternberg & Kalmar, 1997). In this study, the investigators looked at both predictions and postdictions (hypotheses about the past where information about the past is unknown) and found that postdictions took longer to make than did predictions.

Research on the components of human intelligence yielded some interesting results. Consider some examples. First, execution of early components (e.g., inference and mapping) tends exhaustively to consider the attributes of the stimuli, whereas execution of later components (e.g., application) tends to consider the attributes of the stimuli in self-terminating fashion, with only those attributes processed that are essential for reaching a solution (Sternberg, 1977). Second, in a study of the development of figural analogical reasoning, it was found that although children generally became quicker in information processing with age, not all components were executed more rapidly with age (Sternberg & Rifkin, 1979). The encoding component first showed a decrease in component time with age and then an increase. Apparently, older children realized that their best strategy was to spend more time in encoding the terms of a problem so that they later would be able to spend less time in operating on these encodings. A related, third finding was that better reasoners tended to spend relatively more time than do poorer reasoners in global, up-front metacompositional planning, when they solve difficult reasoning problems. Poorer reasoners, on the other hand, tended to spend relatively more time in local planning (Sternberg, 1981). Presumably, the better reasoners recognize that it is better to invest more time up front so as to be able to process a problem more efficiently later on. Fourth, it also was found in a study of the development of verbal analogical reasoning multiple sources of individual and developmental differences.

The three main sources were in known components, use of context clues, and use of mediating variables. For example, in the sentence, “The blen rises in the east and sets in the west,” the knowledge component of selective comparison is knowledge about a known concept, the unknown word (neologism) in the sentence, “blen.” Such words appear in the sentence, such as the fact that it rises in the east and that it sets, and the information about when it appears in the sentence. The mediating variable is that the information can occur after the presentation of the unknown word.

We did research such as that described above because they believed that conventional psychometric research sometimes incorrectly attributed individual and developmental differences in knowledge to psychometric abilities. First, in the studies of inductive reasoning (Sternberg, 1977; Sternberg & Gardner, 1983), it was found that although individual differences in vocabulary tended to be obtained only for encoding of verbal stimuli (Sternberg, 1977, Sternberg & Gardner, 1983). Moreover, third, significant correlations with tests of perceptual speed (Sternberg, 1977; Sternberg & Gardner, 1983). Fourth, in a study of the development of figural analogical reasoning, it was found that although differences in vocabulary, they would need to understand that some children had much more frequent and better opportunities to learn word meanings than did others.

In the componential-analysis work described above, correlations were computed between component scores of individuals and scores on tests of conventional psychometric abilities. First, in the studies of inductive reasoning (Sternberg, 1977; Sternberg & Gardner, 1983), it was found that although individual differences in vocabulary tended to be obtained only for encoding of verbal stimuli (Sternberg, 1977, Sternberg & Gardner, 1983), it was found that although inference, mapping, and application, comparison, and justification of early components of the proposed (mixed linguistic-spatial) model that were supposed to correlate with verbal ability, did not correlate with verbal ability. In other words, it was possible successfully to validate the proposed model of line-
ar-syllogistic reasoning not only in terms of the fit of response-time or error data to the predictions of the alternative models, but also in terms of the correlations of component scores with psychometric tests of verbal and spatial abilities (Sternberg, 1980a). Fifth and finally, it was found that there were individual differences in strategies in solving linear syllogisms, whereby some people used a largely linguistic model, others a largely spatial model, and most the proposed linguistic-spatial mixed model. Thus, sometimes, less than perfect fit of a proposed model to group data may reflect individual differences in strategies among participants.

Creative Intelligence

Intelligence tests contain a range of problems, some of them more novel than others. In some of the componential work we have shown that when one goes beyond the range of unconventionality of the conventional tests of intelligence, one starts to tap sources of individual differences measured little or not at all by the tests. According to the theory of successful intelligence, (creative) intelligence is particularly well measured by problems assessing how well an individual can cope with relative novelty. Thus it is important to include in a battery of tests problems that are relatively novel in nature.

We presented 80 individuals with novel kinds of reasoning problems that had a single best answer. For example, they might be told that some objects are green and others blue; but still other objects might be grue, meaning green until the year 2000 and blue thereafter, or bleen, meaning blue until the year 2000 and green thereafter. Or they might be told of four kinds of people on the planet Kyron, the young; the old; the young, who are born old and die young; the old, who are born young and die old; and the die old, who are born old and die young (Stemberg, 1982; Tetensky & Sternberg, 1986). Their task was to predict future states from past states, given incomplete information. In another set of studies, 60 people were given more conventional kinds of inductive reasoning problems, such as analogies, series completions, and classifications, but were told to solve them. But the problems had premises preceding them that were either conventional (dancers wear shoes) or novel (dancers eat shoes). The participants had to solve the problems as though the counterfactuals were true (Stemberg & Gastel, 1989a, 1989b).

In the tacit-knowledge studies, we have found, first, that practical intelligence as embodied in tacit knowledge increases the ability to cope with novelty. For example, in the relatively novel problems were componentially more conventional kinds of inductive reasoning problems, such as analogies, series completions, and classifications, but were told to solve them. But the problems had premises preceding them that were either conventional (dancers wear shoes) or novel (dancers eat shoes). The participants had to solve the problems as though the counterfactuals were true (Stemberg & Gastel, 1989a, 1989b).

Practical Intelligence

Practical intelligence involves individual abilities to the kinds of problems that people encounter in daily life, such as on the job or in the home. It involves applying the components of intelligence so as to: a) adapt to, b) shape, and, c) select.

Adaptation is involved when one changes environments. Shaping involves using the environment to suit oneself. And selecting involves one decides to seek out another environment to suit oneself. And selecting involves a person’s ability to cope with novelty.

Much of our work on practical intelligence has been based on data from the concept of tacit knowledge. We typically have measured tacit knowledge in the form of production of “if-then” statements that describe situations in various kinds of everyday situations.

We have measured tacit knowledge in the form of production of “if-then” statements that describe situations in various kinds of everyday situations. We have measured tacit knowledge for sales people, the test-taker makes a phone call to a supposed sales person, the sales person at a supposed salesperson has become overstocked. The examinee is asked to rate the inexpensive machine is not moving out of the show room and the expensive machine is moving out of the show room. The examinee is asked to predict future states from past states, given incomplete information. In another set of studies, 60 people were given more conventional kinds of inductive reasoning problems, such as analogies, series completions, and classifications, but were told to solve them. But the problems had premises preceding them that were either conventional (dancers wear shoes) or novel (dancers eat shoes). The participants had to solve the problems as though the counterfactuals were true (Stemberg & Gastel, 1989a, 1989b).

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with experience, but it is profiting from experience, rather than experience per se, that results in increases in scores. Some people can have been in a job for years and still have acquired relatively little tacit knowledge. Second, we also have found that subscores on tests of tacit knowledge — such as for managing oneself, managing others, and managing tasks — correlate significantly with each other. Third, scores on various tests of tacit knowledge, such as for academics and managers, are also correlated fairly substantially (at about the .5 level) with each other. Thus, fourth, tests of tacit knowledge may yield a general factor across these tests. However, fifth, scores on tacit-knowledge tests do not correlate with scores on conventional tests of intelligence, whether the measures used are single-score measures of multiple-ability batteries. Thus, any general factor from the tacit-knowledge tests is not the same as any general factor from tests of academic abilities (suggesting that neither kind of g factor is truly general, but rather, general only across a limited range of measuring instruments). Sixth, despite the lack of correlation of practical-intellectual with conventional measures, the scores on tacit-knowledge tests predict performance on the job as well as or better than do conventional psychometric intelligence tests. In one study done at the Center for Creative Leadership, we further found, seventh, that scores on our tests of tacit knowledge for management were the best single predictor of performance on a managerial simulation task. In a hierarchical regression, scores on conventional tests of intelligence, personality, styles, and interpersonal orientation were entered first and scores on the test of tacit knowledge were entered last. Scores on the test of tacit knowledge were the single best predictor of managerial simulation score. Moreover, these scores also contributed significantly to the prediction even after everything else was entered first into the equation. In recent work on military leadership (Hedlund et al., 2003; Sternberg et al., 2000; Sternberg & Hedlund, 2002), it was found, eighth, that scores of 562 participants on tests of tacit knowledge for military leadership predicted ratings of leadership effectiveness, whereas scores on a conventional test of intelligence and on a tacit-knowledge test for managers did not significantly predict the ratings of effectiveness.

Even stronger results have been obtained overseas in a study in Usenge, Kenya, near the town of Mathare, where we were interested in school-age children’s ability to adapt to their indigenous environment. We devised a measure of practical intelligence for adaptation to the environment (see Sternberg & Grigorenko, 1997; Sternberg, Nokes, Okatcha, Bundy, et al., 2001). The test of practical intelligence measured children’s informal tacit knowledge of medicines that the villagers believe can be effective against various types of infections. At least some of these medicines to be effective and most villagers certainly believe in their efficacy, as shown by the fact that children use them in mediating themselves and others. Thus, the children’s knowledge of these medicines constitute effective measurement of practical intelligence as defined by the villagers in their life circumstances in their environment. Middle-class Westerners might find it quite a challenge to thrive in the contexts of urban ghettos often dominated by makeshift, uncomfortable homes.

We measured the Kenyan children’s ability to identify medicines, where they come from, what they are used for, and how they are dosed. Based on work we had done elsewhere, we expected that scores on this test would be underpredicted by scores on conventional tests of intelligence because we hypothesized that this hypothesis, we also administered to the children a comparable test of vocabulary in their home language. The Dholuo language is spoken in the schools.

We did indeed find no correlation between scores on an indigenous tacit knowledge and scores on the conventional tests. But to our surprise, we found statistically significant negative correlations of the tacit-knowledge tests with the conventional abilities. The correlations, however, were not very strong. In other words, the higher the children scored on their tacit-knowledge, the lower they scored, on average, on conventional measures of intelligence and ability. Indians can have been in a job for years and still have acquired relatively little tacit knowledge.
the environments in which they will really live. Children who spend their time learning the indigenous practical knowledge of the community generally do not invest themselves heavily in doing well in school, whereas children who do well in school generally do not invest themselves as heavily in learning the indigenous knowledge — hence the negative correlations.

The Kenya study suggests that the identification of a general factor of human intelligence may tell us more about how abilities interact with patterns of schooling and especially Western patterns of schooling than it does about the structure of human abilities. In Western schooling, children typically study a variety of subject matters from an early age and thus develop skills in a variety of skill areas. This kind of schooling prepares the children to take a test of intelligence, which typically measures skills in a variety of areas. Often intelligence tests measure skills that children were expected to acquire a few years before taking the intelligence test. But as Rogoff (1990) and others have noted, this pattern of schooling is not universal and has not even been common for much of the history of humankind. Throughout history and in many places still, schooling, especially for boys, takes the form of apprenticeships in which children learn a craft from an early age. They learn what they will need to know in order to succeed in a trade, but not a lot more. They are not simultaneously engaged in tasks that require the development of the particular blend of skills measured by conventional intelligence tests. Hence it is less likely that one would observe a general factor in their scores, much as the investigators discovered in Kenya. Some years back, Vernon (1971) pointed out that the axes of a factor analysis do not necessarily reveal a latent structure of the mind but rather represent a convenient way of characterizing the organization of mental abilities. Vernon believed that there was no one “right” orientation of axes, and indeed, mathematically, an infinite number of orientations of axes can be fit to any solution in an exploratory factor analysis. Vernon’s point seems perhaps to have been forgotten or at least ignored by later theorists.

We have considered each of the aspects of intelligence separately. How do they fare when they are assessed together?

All Three Aspects of Intelligence Together

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THE THEORY OF SUCCESSFUL INTELLIGENCE

In another study, conducted with 3252 students in the U.S., Finland, and Spain, we used the multiple-choice section of the Testing-and-Scoring Aptitude Tests (TAST) to assess the internal validity of the theory. Three hundred sixty high school students, primarily from diverse parts of the United States, took the test, which comprised 12 subtests in all. There are three separate factor-analytic studies to support the internal validity of the theory of successful intelligence. In one study (Sternberg, Grigorenko, Ferrari, & Clinkenbeard, 1999), we used the so-called Sternberg Triarchic Factor-Analytic Studies to investigate the internal validity of the theory of successful intelligence. The Kenya study suggests that the identification of a general factor of human intelligence may tell us more about how abilities interact with patterns of schooling and especially Western patterns of schooling than it does about the structure of human abilities. In Western schooling, children typically study a variety of subject matters from an early age and thus develop skills in a variety of skill areas. This kind of schooling prepares the children to take a test of intelligence, which typically measures skills in a variety of areas. Often intelligence tests measure skills that children were expected to acquire a few years before taking the intelligence test. But as Rogoff (1990) and others have noted, this pattern of schooling is not universal and has not even been common for much of the history of humankind. Throughout history and in many places still, schooling, especially for boys, takes the form of apprenticeships in which children learn a craft from an early age. They learn what they will need to know in order to succeed in a trade, but not a lot more. They are not simultaneously engaged in tasks that require the development of the particular blend of skills measured by conventional intelligence tests. Hence it is less likely that one would observe a general factor in their scores, much as the investigators discovered in Kenya. Some years back, Vernon (1971) pointed out that the axes of a factor analysis do not necessarily reveal a latent structure of the mind but rather represent a convenient way of characterizing the organization of mental abilities. Vernon believed that there was no one “right” orientation of axes, and indeed, mathematically, an infinite number of orientations of axes can be fit to any solution in an exploratory factor analysis. Vernon’s point seems perhaps to have been forgotten or at least ignored by later theorists.

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STAT to compare five alternative models of intelligence, again via confirmatory factor analysis. A model featuring a general factor of intelligence fit the data relatively poorly. The triarchic model, allowing for intercorrelation among the analytic, creative, and practical factors, provided the best fit to the data (Sternberg, Castejón, Prieto, Hautakami, & Grigorenko, 2001).

In a further study, we (Grigorenko & Sternberg, 2001) tested 511 Russian school children (ranging in age from 8 to 17 years) as well as 490 mothers and 328 fathers of these children. They used entirely distinct measures of analytical, creative, and practical intelligence. Consider, for example, the tests used for adults. Similar tests were used for children.

Fluid analytical intelligence was measured by two subtests of a test of nonverbal intelligence. The Test of g: Culture Fair, Level II (Cattell & Cattell, 1973) is a test of fluid intelligence designed to reduce, as much as possible, the influence of verbal comprehension, culture, and educational level, although no test eliminates such influences. In the first subtest, Series, individuals were presented with an incomplete, progressive sequence of figures. The participants’ task was to select, from among the choices provided, the answer that best continued the series. In the Matrices subtest, the task was to complete the matrix presented at the left of each row.

The test of crystallized intelligence was adapted from existing traditional tests of analogies and synonyms/antonyms used in Russia. We used adaptations of Russian rather than American tests because the vocabulary used in Russia differs from that used in the USA. The first part of the test included 20 verbal analogies (KR20 = 0.83). An example is circle—ball = square—? (a) quadrangular; (b) figure, (c) rectangular; (d) solid, (e) cube. The second part included 30 pairs of words, and the participants’ task was to specify whether the words in the pair were synonyms or antonyms (KR20 = 0.74). Examples are latent-hidden, and systematic-chaotic.

The measure of creative intelligence also comprised two parts. The first part asked the participants to describe the world through the eyes of insects. The second part asked participants to describe who might live and what might happen on a planet called Priamhilava. No additional information on the nature of the planet was specified. Each part of the test was scored in three different ways to yield three different scores. The first score was for originality (novelty); the second was for the response being for outstanding work. Each vignette was accompanied by five choices and participants had to choose the best response as the keyed answer. To the extent that this response was suboptimal, this suboptimality would work against the researchers in subsequent analyses related to this test to other predictor and criterion measures.

In this study, exploratory principal-component analyses both children and adults yielded very similar factors. Both varimax and oblimin rotations yielded distinct factors for the tests. For example, a different method of analysis (exploratory versus confirmatory analysis) again supported the theory of successful intelligence.

The analytical, creative, and practical tests the investigators employed were used to predict mental and physical health among the Russian adults. Mental health and physical health was measured by self-report. Mental and physical health was measured by self-report. Analytical intelligence as a predictor of mental and physical health came third. All three contributed to prediction, however. Thus, the researchers argued for a theory of intelligence encompassing all three elements. All three measures of creative intelligence provides better prediction of success in life, comprising just the analytical element.

In a recent study supported by the College Board (Sternberg & the Rainbow Project Team, 2002), we used multiple-choice tests on 1015 students at 15 different institutions (13 colleges and 2 high schools). Our goal was to devise tests that would not only measure skills that this test does not measure, but also the multiple-choice STAT tests described in the previous section. Additional measures of creative skills and practical skills.

Creative skills. The three additional measures of creative skills included the following titles:

1. Cartoons: Participants were given five cartoons, spending about 15 minutes on each, choosing from five choices and participants had to select the best one.

2. Written Stories: Participants were given stories for originality, complexity, emotional evocativeness, and descriptiveness. These stories were based on work originally published in popular Russian magazines in the context of discussion of successful intelligence. The second part had 4 vignettes, based on themes that appeared in this study. The Octopus’s Sneakers and Beyond the Edge were used.

3. Vignettes: Participants were given three different ways to yield three different scores. The first score was for originality (novelty); the second was for the response being for outstanding work. Each vignette was accompanied by five choices and participants had to choose the best response as the keyed answer. To the extent that this response was suboptimal, this suboptimality would work against the researchers in subsequent analyses related to this test to other predictor and criterion measures.

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2. Written Stories: Participants were given stories for originality, complexity, emotional evocativeness, and descriptiveness. These stories were based on work originally published in popular Russian magazines in the context of discussion of successful intelligence. The second part had 4 vignettes, based on themes that appeared in this study. The Octopus’s Sneakers and Beyond the Edge were used.

3. Vignettes: Participants were given three different ways to yield three different scores. The first score was for originality (novelty); the second was for the response being for outstanding work. Each vignette was accompanied by five choices and participants had to choose the best response as the keyed answer. To the extent that this response was suboptimal, this suboptimality would work against the researchers in subsequent analyses related to this test to other predictor and criterion measures.

In this study, exploratory principal-component analyses both children and adults yielded very similar factors. Both varimax and oblimin rotations yielded distinct factors for the tests. For example, a different method of analysis (exploratory versus confirmatory analysis) again supported the theory of successful intelligence.

The analytical, creative, and practical tests the investigators employed were used to predict mental and physical health among the Russian adults. Mental health and physical health was measured by self-report. Mental and physical health was measured by self-report. Analytical intelligence as a predictor of mental and physical health came third. All three contributed to prediction, however. Thus, the researchers argued for a theory of intelligence encompassing all three elements. All three measures of creative intelligence provides better prediction of success in life, comprising just the analytical element.
done to measure creativity (Sternberg & Lubart, 1995), which is described further below.

3. Oral Stories. Participants were presented with five sheets of paper, each containing a set of pictures linked by a common theme. For example, participants might receive a sheet of paper with images of a musical theme, a money theme, or a travel theme. The participant then chose one of the pages and was given 15 minutes to formulate a short story and dictate it into a cassette recorder. The dictation period was not to be more than five minutes long. The process was then repeated with another sheet of images so that each participant dictated a total of two oral stories. Six judges were trained to rate the stories for originality, complexity, emotional evocativeness, and descriptiveness.

Practical skills. The three additional tests were as follows:

1. Everyday Situational Judgment Inventory (Movies). This video-based inventory presents participants with seven brief vignettes that capture problems encountered in general, everyday life, such as determining what to do when one is asked to write a letter of recommendation for someone one does not know particularly well.

2. Common Sense Questionnaire. This written inventory presents participants with 15 vignettes that capture problems encountered in general business-related situations, such as managing tedious tasks or handling a competitive work situation.

3. College Life Questionnaire. This written inventory presents participants with 15 vignettes that capture problems encountered in general college-related situations, such as handling trips to the bursar’s office or dealing with a difficult roommate.

We found that our tests significantly and substantially improved upon the validity of the SAT for predicting first-year college grades (Sternberg & the Rainbow Project Collaborators, 2005; Sternberg, The Rainbow Project Collaborators, & University of Michigan Business School Project Collaborators, 2004). The test also improved equity: Using the test to admit a class would result in greater ethnic diversity than would using just the SAT or just the SAT and grade point average. This test is now going into Phase-2 piloting, where it will be tried out on a larger sample of individuals.

Instructional Studies

In one condition, participants were given 15 minutes to formulate a short story and dictate it into a cassette recorder. In a second condition, they were taught via the program, per se. In a third condition, they were taught using mediating variables. In a fourth condition, they were taught using knowledge-acquisition component process. In a fifth condition, they were taught using context cues. In a sixth condition, they were taught using insight skills. In a seventh condition, they were taught using instruction of whichever kind, all children received instruction on insight skills. We found that children taught using knowledge-acquisition component process gained more from pretest to posttest than did students who were not so taught (Davidson & Sternberg, 1990). We have also evaluated the program in a variety of settings (Gardner et al., 1994; Sternberg, Okagaki, Williams et al., 1996; Krechevsky, Sternberg, & Okagaki, 1999; Williams et al., 2002). We have evaluated the program in a variety of settings (Gardner et al., 1994; Sternberg, Okagaki, Williams et al., 1996; Krechevsky, Sternberg, & Okagaki, 1999; Williams et al., 2002). We have evaluated the program in a variety of settings (Gardner et al., 1994; Sternberg, Okagaki, Williams et al., 1996; Krechevsky, Sternberg, & Okagaki, 1999; Williams et al., 2002). We have evaluated the program in a variety of settings (Gardner et al., 1994; Sternberg, Okagaki, Williams et al., 1996; Krechevsky, Sternberg, & Okagaki, 1999; Williams et al., 2002). We have evaluated the program in a variety of settings (Gardner et al., 1994; Sternberg, Okagaki, Williams et al., 1996; Krechevsky, Sternberg, & Okagaki, 1999; Williams et al., 2002). We have evaluated the program in a variety of settings (Gardner et al., 1994; Sternberg, Okagaki, Williams et al., 1996; Krechevsky, Sternberg, & Okagaki, 1999; Williams et al., 2002).
conventional framework of analytical tests based on standard psychometric models do not seem likely greatly to expand our predictive capabilities (Schmidt & Hunter, 1998).

We view intelligence as a form of developing expertise (Sternberg, 1998a, 1999a, 2003a). Indeed, some of our tests may seem more like tests of achievement or of developing expertise (see Ericsson, 1996; Howe, Davidson, & Sloboda, 1998) than of intelligence. But it can be argued that intelligence is itself a form of developing expertise — that there is no clear distinction between the two constructs (Sternberg, 1998a, 1999a). Indeed, all measures of intelligence, one might argue, measure a form of developing expertise.

An example of how tests of intelligence measure developing expertise emanates from work we have done in Tanzania. A study done in Tanzania (see Sternberg & Grigorenko, 1997; Sternberg, Grigorenko, et al., 2002) points out the risks of giving tests, scoring them, and interpreting the results as measures of some latent intellectual ability or abilities. We administered to 358 school children between the ages of 11 and 13 years near Bagamoyo, Tanzania, tests including a form-board classification test, a linear syllogisms test, and a Twenty Questions Test, which measure the kinds of skills required on conventional tests of intelligence. Of course, we obtained scores that they could analyze and evaluate, ranking the children in terms of their supposed general or other abilities. However, we administered the tests dynamically rather than statically (Brown & Ferrara, 1985; Budoff, 1968; Day, Engelhardt, Maxwell, & Bolig, 1997; Feuerstein, 1979; Grigorenko & Sternberg, 1998; Guthke, 1993; Haywood & Tzuriel, 1992; Lidz, 1987, 1991; Sternberg & Grigorenko, 2002a; Tzuriel, 1995; Vygotsky, 1978). Dynamic testing is like conventional testing in that individuals are tested and inferences about their abilities made. But dynamic tests differ in that children are given some kind of feedback in order to help them improve their scores. Vygotsky (1978) suggested that the children's ability to profit from the guided instruction the children received during the testing session could serve as a measure of children's zone of proximal development (ZPD), or the difference between their developed abilities and their latent capacities. In other words, testing and instruction are treated as being of one piece rather than as being distinct processes.

They were tested again. Because the instruction lasted only about 5-10 minutes, one would not expect dramatic gains. Yet, on average, the gains were statistically significant in the experimental group, and statistically significant in the control group. In the control group, pretest and post-test scores were correlated at the .8 level. In the experimental group, the correlation was .83, suggesting that when testing is unbalanced in other directions as well. One school Elena attended emphasized upon the development of creative abilities — much more so than on the development of analytical abilities. While on this trip, they were told of yet another school — catering to the children of Russian business families. Children there were told that, eventually, they would be working for their classmates who were practically oriented, children were not practically oriented, and who were not practically oriented were told that, eventually, they would be working for their classmates who were excellently oriented.

The investigators used the Sternberg Test, as described above, in some of our studies. The test was administered to 326 children in the United States and in some other countries who were identified by their teachers as being gifted by any standard whatsoever. Children were treated as being of one piece rather than as being distinct processes.
The Theory of Successful Intelligence

Analytical, creative, or practical instruction. For example, in the memory condition, they might be asked to describe the main tenets of a major theory of depression. In the analytical condition, they might be asked to compare and contrast two theories of depression. In the creative condition, they might be asked to formulate their own theory of depression. In the practical condition, they might be asked how they could use what they had learned about depression to help a friend who was depressed.

Students in all four instructional conditions were evaluated in terms of their performance on homework, a midterm exam, a final exam, and an independent project. Each type of work was evaluated for memory, analytical, creative, and practical quality. Thus, all students were evaluated in exactly the same way.

Our results suggested the utility of the theory of successful intelligence. This utility showed itself in several ways.

First, we observed when the students arrived at Yale that the students in the high creative and high practical groups were much more diverse in terms of racial, ethnic, socioeconomic, and educational backgrounds than were the students in the high-analytical group, suggesting that correlations of measured intelligence with status variables such as these may be reduced by using a broader conception of intelligence. Thus, the kinds of students identified as strong differed in terms of populations from which they were drawn in comparison with students identified as strong solely by analytical measures. More importantly, just by expanding the range of abilities measured, the investigators discovered intellectual strengths that might not have been apparent through a conventional test.

Second, we found that all three ability tests — analytical, creative, and practical — significantly predicted course performance. When multiple-regression analysis was used, at least two of these ability measures contributed significantly to the prediction of each of the measures of achievement. Perhaps as a reflection of the difficulty of deemphasizing the analytical way of teaching, one of the significant predictors was always the analytical score. (However, in a replication of our study with low-income African-American students from New York, Deborah Coates of the City University of New York found a different pattern of results. Her data indicated that the practical ability was the best predictor of course performance.)

A follow-up study (Sternberg, Torff, & Grigorenko, 1998b) examined learning of social studies by third-graders and eighth-graders. The 225 third-graders and 432 eighth-graders were from a very low-income neighborhood in North Carolina. The 142 eighth-graders were from the middle to upper-middle class in Baltimore, Maryland, and Fresno, California. In the analytical group, students were taught triarchially (through multiple-choice assessments) in an analytical, creative, and practical way.

As expected, students in the successful-intelligence (analytical, creative, practical) condition outperformed other students in terms of the performance assessments. One could argue that this result merely reflected the way they were taught. Nevertheless, the result suggested that these kinds of thinking succeeded. More important, however, was the result that children in the successful-intelligence condition outperformed the other children even on the multiple-choice memory tests. In other words, to the extent that one's goal is just to maximize children's memory for the information taught, that one has maximized children's learning. It enables children to capitalize on their strengths, correct or to compensate for their weaknesses, and to encode material in a variety of ways.

We have now extended these results to reading curricula at the middle-school and the high-school level of middle-school students and 432 high school students in Baltimore, Maryland, and Fresno, California. In this study, students were largely middle to upper-middle class studying in Baltimore, Maryland, and Fresno, California. In this study, students were taught triarchially (through multiple-choice assessments) in an analytical, creative, and practical way.
The first is unrealistic optimism with respect to the long-term consequences of what they do. They may believe themselves to be so smart that they believe that, whatever they do, it will work out all right. They may overly trust their own intuitions, believing that their brilliance means that they can do no wrong.

The second is egocentrism. Many smart people have been so highly rewarded in their lives that they lose sight of the interests of others. They start to act as though the whole world revolves around them. In doing so, they often set themselves up for downfalls, as happened to both Presidents Nixon and Clinton, the former in the case of Watergate, the latter in the case of MonicaGate.

The third characteristic is a sense of omniscience. Smart people typically know a lot. They get in trouble, however, when they start to think they “know it all.” They may have expertise in one area, but then, start to fancy themselves experts in practically everything. At that point, they become susceptible to remarkable downfalls, because they act as experts in areas where they are not, and can make disastrous mistakes in doing so.

The fourth characteristic is a sense of omnipotence. Many smart people find themselves in positions of substantial power. Sometimes they lose sight of the limitations of their power, and start to act as though they are omnipotent. Several U.S. presidents as well as presidents of other countries have had this problem, leading their countries to disasters on the basis of personal whims. Many corporate chieftains have also started to think of themselves as omnipotent, unfortunately, cooking the books of their corporations at will.

The fifth characteristic is a sense of invulnerability. Not only do the individuals think they can do anything; they also believe they can get away with it. They believe that either they are too smart to be found out or, even if found out, they will escape any punishment for misdeeds. The result is the kind of disasters the United States has seen in the recent Enron, Worldcom, and Arthur Andersen debacles.

Conclusions

Some psychologists will believe that the theory of successful intelligence departs too much from the conventional theories, and those who will continue the theory enough (Gardner, 1983). But there is typically some value to replication after the point where a point is established. Those who wish to preserve this and related older theories, and those who will continue to produce papers than to produce breakthroughs.

The educational systems in many other countries place great emphasis on instruction and assessment of two important skills: memory and, to a lesser extent, analysis. Students who are adept at these two skills in the educational system, because the ability and achievement tests we use all largely measure processes emanating from these two kinds of problem, however, namely, that children who have been in other kinds of skills may be shortchanged. These children might learn and test well on tests given an opportunity to play to their strengths rather than their weaknesses.

Our societies can create closed systems that advantage certain types of children and that disadvantage others. Children who excel in memory and analysis and end up doing well on ability tests and achievement tests, and hence find the doors of opportunity open to them, who excel in other abilities may end up doing poorly on tests, and find the doors shut. By treating alternative patterns of abilities as losers, our society is creating harmful self-fulfilling prophecies. What societies need is a broader conception of intelligence. The theory of successful intelligence provides one such conception.
THE THEORY OF SUCCESSFUL INTELLIGENCE


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