Sternberg, Robert J.
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Sociedad Interamericana de Psicología
Austin, Organismo Internacional

Available in: http://www.redalyc.org/articulo.oa?id=28439202
The Theory of Successful Intelligence

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Abstract

This article presents a theory of successful intelligence. The theory is substantially broader than conventional 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. Then it discusses how people can be intelligent but foolish. Finally it draws conclusions.

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

La Teoría de Inteligencia Exitosa

Compendio

Este artículo presenta una teoría de Inteligencia exitosa. La teoría es substancialmente más ancha que la teorías convencionales de inteligencia. Define inteligencia por lo que se refiere a la habilidad de lograr las metas de uno en la vida dentro del contexto sociocultural de uno. El artículo es dividido en cuatro partes. El artículo abre con una consideración de la naturaleza de inteligencia. Luego discute cómo las personas pueden ser inteligentes pero ingenuas. Finalmente, dibuja las conclusiones.

Palabras-clave: Inteligencia exitosa; inteligencia analítica; inteligencia creativa; inteligencia práctica.

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 Nature of Intelligence

It is as agreed among experts that intelligence is: 1) the ability to achieve one's goals in life, given one's sociocultural context; 2) by capitalizing on strengths and correcting or compensating for weaknesses; 3) in order to adapt to, shape, and select environments; and, 4) through a combination of analytical, creative, and practical abilities.

Consider first Item 1. Intelligence is a meaningful and coherent set of goals, and dispositions to reach those goals. One may be a statesperson, another, a scientist, and another, a politician. Others may decide on careers in athletics, acting, or whatever. The question typically asked is: Successful intelligence; analytical intelligence; creative intelligence; practical intelligence.
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 those 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 tanks. Clearly, adaptability is a key skill in 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 modifies the environment to fit what one seeks. Intelligence means modifying oneself to fit the environment. It is possible for people in any field are not just adaptors; they also need to be shapers. They recognize that they cannot change everything if they want to have an impact on the world. So they need to consider what things need to change some things. They need to consider what things need to change in their environment to fit what they want of it.

When an individual enters an institution, it is possible for the individual to not adapt to the environment, it is possible for the individual to not 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, such as involvement in those activities. Shaping is a kind of impact (see Sternberg, 2003a).

Sometimes, one attempts unsuccessfully to change the environment and then also fails in shaping it. No matter what one does to try to make the environment better, it seems 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 they were not really the one in which they had the most to contribute. Rather than spend their lives doing something they were not good at, they recognize that they cannot change everything, but that they can change some things. Part of successful intelligence is recognizing that you cannot change everything, but that you can change some things. They recognize that they cannot change everything, but that they can change some things.

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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 assigned a mathematical parameter corresponding to its latency; b) propose a parameterization of this model, so that each information-processing component is assigned a mathematical parameter corresponding to its latency; and another corresponding to its error rate; c) specify the sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination, response times on analogies (Sternberg, 1980b, 1983; Sternberg & Gardner, 1983; Sternberg & Turner, 1981), with response times or error rates decomposed to yield a mathematical parameter corresponding to its latency and another corresponding to its error rate; c) specify the sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; d) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; e) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; f) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; g) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; h) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; i) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; j) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; k) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; l) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; m) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; n) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; o) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; p) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; q) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; r) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; s) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; t) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; u) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; v) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; w) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; x) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; y) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination; z) specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination.

The Assessment of Intelligence

Our assessments of intelligence are concerned with determining the origins of individual differences in (the analytical aspect of) human intelligence. With components, one can specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination. In some early work, it was shown how analytical kinds of problems, such as analogies or syllogisms (Sternberg, 1980a), can be analyzed componentially (Guyote & Sternberg, 1981), with response times or error rates decomposed to yield a mathematical parameter corresponding to its latency and another corresponding to its error rate. One can specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination. In some early work, it was shown how analytical kinds of problems, such as analogies or syllogisms (Sternberg, 1980a), can be analyzed componentially (Guyote & Sternberg, 1981), with response times or error rates decomposed to yield a mathematical parameter corresponding to its latency and another corresponding to its error rate. One can specify sources of individual differences underlying a factor score such as that for “inductive reasoning,” the coefficient of determination.
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 tend 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, tend 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 that their best strategy was to spend more time in encoding the mental model because they had more opportunities to learn word meanings than did others. For example, a verbal analogies test that might appear on its face to measure verbal reasoning might primarily vocabulary and general information (Sternberg, 1977). In fact, in some populations, reasoning was found to be a source of individual or developmental differences. If researchers then look at the sources of differences in knowledge, they would need to understand that it sets, and the information about where it rises and sets. A related, fourth finding was that postdictions took longer to make than did predictions.

In the componential-analysis work (Sternberg, 1977; Sternberg & Gardner, 1982, 1983), it was found that although intuitive 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-acquisition component of selective comparison is used to determine that postdictions took longer to make than did predictions.

We did research such as that described above because they believed that conventional psychometrically derived tests were not the best way to measure reasoning abilities. For example, a verbal analogies test that might appear on its face to measure verbal reasoning might primarily vocabulary and general information (Sternberg, 1977). In fact, in some populations, reasoning was found to be a source of individual or developmental differences. If researchers then look at the sources of differences in knowledge, they would need to understand that it sets, and the information about where it rises and sets. A related, fourth finding was that postdictions took longer to make than did predictions.

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THE THEORY OF SUCCESSFUL INTELLIGENCE

Practical Intelligence

Practical intelligence involves individuals applying their abilities to the kinds of problems that they face in day-to-day life, such as on the job or in the home. Practical intelligence involves applying the components of intelligence so as to: a) adapt to, b) shape, and, c) select environments.

Adaptation is involved when one changes the environment to suit oneself. And selecting involves one's choice of environment. Shaping is involved when one changes oneself to suit the environment. Shaping involves applying the components of intelligence to experience in an environment that one is not explicitly taught how to cope with.

We have measured tacit knowledge using work-samples and performance-based measures. For example, we have developed tests for salespeople that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that salespeople come up with in a variety of situations. We have also developed tests for teachers that measure their ability to cope with the kinds of problems that they face in the classroom. These tests measure the quality, rapidity, and fluency of the solutions that teachers come up with in a variety of situations.

We have also developed tests for doctors that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that doctors come up with in a variety of situations. We have also developed tests for managers that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that managers come up with in a variety of situations.

We have also developed tests for scientists that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that scientists come up with in a variety of situations. We have also developed tests for artists that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that artists come up with in a variety of situations.

We have also developed tests for athletes that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that athletes come up with in a variety of situations. We have also developed tests for entertainers that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that entertainers come up with in a variety of situations.

We have also developed tests for students that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that students come up with in a variety of situations. We have also developed tests for military personnel that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that military personnel come up with in a variety of situations.

We have also developed tests for government officials that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that government officials come up with in a variety of situations. We have also developed tests for religious leaders that measure their ability to cope with the kinds of problems that they face in their jobs. These tests measure the quality, rapidity, and fluency of the solutions that religious leaders come up with in a variety of situations.

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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. 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 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.

We also have done studies of social intelligence, which is viewed in the theory of successful intelligence as a part of practical intelligence. In these studies, 40 individuals were viewed in the theory of successful intelligence as a part of practical intelligence. In these studies, 40 individuals were asked to indicate which of two individuals was the couple posed by the experimenters. In another kind of photo, they were asked to evaluate whether a male-female couple was a genuine couple or formal-knowledge-based abilities. In addition, they gave the Mill Hill Vocabulary Scale, which is a measure of crystallized language. The Dholuo language is spoken in the home, English or formal-knowledge-based abilities. In addition, they gave the Mill Hill Vocabulary Scale, which is a measure of crystallized language. The Dholuo language is spoken in the home, English

We measured the Kenyan children's access to 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 show that scores on conventional tests of intelligence correlate negatively with scores on conventional tests of intelligence. To test this hypothesis, we also administered to the children the Raven Coloured Progressive Matrices Test, which is a measure of fluid or abstract-reasoning-based ability, and the Mill Hill Vocabulary Scale, which is a measure of formal-knowledge-based abilities. In addition, children a comparable test of vocabulary in their native language. The Dholuo language is spoken in the schools.

We did indeed find no correlation between scores on tests of tacit knowledge and scores on the vocabulary tests. But to our surprise, we found statistically significant correlations of the tacit-knowledge tests with the test of practical intelligence. The correlations, however, were very small, 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.

Even stronger results have been obtained overseas. In a study in Usenge, Kenya, near the town of Kisumu, we were interested in school-age children's abilities to adapt to their indigenous environment. We devised a test of intelligence for adaptation to the environment (Grigorenko, 1997; Sternberg, Nokem, 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 for various types of infections. At least some of these medicines might be effective and most villagers certainly believe in their life circumstances in their environmental contexts. Middle-class Westerners might find it quite a challenge to thrive in mediating themselves and others. Thus, the villager's knowledge of these medicines constitute effective measures of practical intelligence as defined by the villagers and their needs. These medicines appear to be effective and most villagers certainly believe in their efficacy, as shown by the fact that children's knowledge of medicines is an average score in medicating themselves and others. Thus, these medicines constitute effective measures of practical intelligence as defined by the villagers and their needs.

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We measured the Kenyan children's access to 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 show that scores on conventional tests of intelligence correlate negatively with scores on conventional tests of intelligence. To test this hypothesis, we also administered to the children the Raven Coloured Progressive Matrices Test, which is a measure of fluid or abstract-reasoning-based ability, and the Mill Hill Vocabulary Scale, which is a measure of formal-knowledge-based abilities. In addition, children a comparable test of vocabulary in their native language. The Dholuo language is spoken in the schools.

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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. 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.

We also have done studies of social intelligence, which is viewed in the theory of successful intelligence as a part of practical intelligence. In these studies, 40 individuals were asked to indicate which of two individuals was the couple posed by the experimenters. In another kind of photo, they were asked to evaluate whether a male-female couple was a genuine couple or formal-knowledge-based abilities. In addition, they gave the Mill Hill Vocabulary Scale, which is a measure of crystallized language. The Dholuo language is spoken in the home, English

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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

Figural content. Consider the content of a paragraph, and have to infer its meaning. 2) Analytical-Verbal: Figuring out meanings of neologisms (artificial words) by counterfactual premises (e.g., money were available; a minimum wage), and have to solve the analogies as though the counterfactual premises were true. 3) Creative-Figural: Matrices. Students see a figural matrix with figural content. Consider the content of a paragraph, and have to infer its meaning.

Analytical-Quantitative: Number series. Participants are first presented with a figural series that involves one or more transformations; they then have to apply the rule of the series to a new figure with a different appearance, and have to answer questions about navigating effectively through the area depicted by the map. 7) Analogies. Students are presented with verbal analogies preceded by counterfactual premises (e.g., money were available; a minimum wage), and have to solve the analogies as though the counterfactual premises were true. 8) Creative-Quantitative: Everyday math. Students are presented with everyday problems in the life of an adolescent, and have to solve the option that best solves each problem. 9) Practical-Quantitative: Everyday reasoning. Students are presented with everyday problems in the life of an adolescent, and have to solve the option that best solves each problem. 10) Analytical-Figural: Matrices. Students see a figural matrix with a set of rules, and have to answer questions about navigating effectively through the area depicted by the map. 11) Practical-Essay: This essay test measures the skills of the community generally do not invest themselves heavily in learning the indigenous knowledge — hence the negative correlations.

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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, Hautakari, & 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 series 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 Priamthia. 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 level of sophistication; the third was for the systematic-chaotic nature of the answers.

In a recent study supported by the College Board (Sternberg, Castejón, Prieto, Hautakari, & Grigorenko, 2001), we used a different method of analysis (exploratory rather than confirmatory analysis) again supported the theory of successful intelligence. The researchers in subsequent analyses related test to other predictor and criterion measures.

In this study, exploratory principal-components analyses on both children and adults yielded very similar results. Both varimax and oblimin rotations yielded factors corresponding to creative, and practical factors for the tests. Of a different nationality (Russian), a different method of analysis (exploratory rather than confirmatory analysis) again supported the triarchic theory of intelligence.

The analytical, creative, and practical tests were employed to predict parental mental health among the Russian adults. Mental health was measured by widely used paper-and-pencil tests of depression and anxiety. Mental and physical health was measured by self-report measures of mental health, and physical health was assessed by generalized health. The creativity measure. Analytical intelligence was self-report and also comprised two parts. The measure of creative intelligence also comprised two parts. The measure of practical intelligence was self-report and also comprised two parts. The measure of practical intelligence was self-report and also comprised two parts.

Obviously, there is no one “right” answer in this type of situation. Obviously, there is no one “right” answer in this type of situation. Hence Grigorenko and Sternberg used the most frequently chosen response as the keyed answer. Each vignette was accompanied by five choices and participants had to select the best one.

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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 business-related situations, such as managing tedious tasks or handling a competitive work situation.
2. Common Sense Questionnaire. This written inventory presents participants with 15 vignettes that capture problems encountered in 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.
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 received any instructional treatment. They were given a post-test. In a second condition, there was an instructional condition, but it was not given as formal instruction; the participants were taught via the program but were not so taught (Davidson & Sternberg, 1984). In a third condition, participants were taught instruction, per se. In a third condition, the children received regular instruction on insight skills. After the instruction was better than no instruction at all or just practice instruction. In other words, instruction was better than no instruction without formal instruction.

Creative-thinking skills also can be taught. We have developed a program for teaching practical intelligence that aimed at middle-school students, teaching students practical intelligence for school, doing homework, taking tests, reading, writing (Gardner, Krechevsky, Sternberg, & Okagaki, 1996; see also Sternberg & Grigorenko, 2000). In some settings, we have found that children taught practical-intelligence skills also can be taught. We have evaluated the program in a variety of settings (Gardner et al., 1996; Williams et al., 2002). We have found that students taught practically intelligent for themselves in the contexts of their own gain in addition to or instead of the gain of others. People can be practically intelligent for themselves at the expense of the theory-based formal-instructional condition, but in practical-intelligence conditions, participants in the two control-performance did not differ. In other words, instruction was better than no instruction without formal instruction.

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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 clearcut 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 static 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 expect no gains. Yet, on average, the gains were statistically significant for the experimental group, and statistically nonsignificant for the control group. In the control group, pretest scores were correlated at the .8 level. In the experimental group, correlations with scores on the post-test at about the .3 level, suggested that when tested statically to children in developing countries, the test scores are unstable and easily subject to influences of the children. One possible interpretation could be that the children are not accustomed to tests of this style, and so profit quickly even from the instruction as to what is expected from them. The more important question is not whether the test even correlated with each other, but rather than correlations with other cognitive measures. In other words, which is a better predictor of transfer to other cognitive measures: the pretest score or the post-test score? The post-test score to be the better predictor.

Academic skills. In a first set of studies, we explored the question of whether conventional education in school systematically discriminates against creative and practical strengths (Sternberg, 1995; Sternberg, Ferrari, Clinkenbeard, & Grigorenko, 1997; Sternberg, Grigorenko, Ferrari, & Clinkenbeard, 1999). Motivating this work was the belief that the systems in most schools strongly tend to favor children’s memory and analytical abilities. However, schools can be unbalanced in other directions as well. Grigorenko and I visited in Russia in 2000 — catering to the children of Russian businesspeople who were not practically oriented were told that, eventually, the test was administered to 326 children around the United States and in some other countries who were identified by their schools as gifted by any standard whatsoever. Children were selected for a summer program in college-level psychology — catering to the children of Russian businessmen who were not practically oriented. Elena Grigorenko and I visited in Russia in 2000, placed a heavy emphasis upon the development of creative and practical abilities. While on this trip, they were told of yet another school that strongly emphasized practical abilities, and who were not practically oriented were told that they would be working for their classmates who were practically oriented.

The investigators used the Sternberg Test, as described above, in some of our instructional work as a form of developing expertise. The test was administered to 326 children who were selected for a summer program in college-level psychology. Children were 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.
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 scores were the best predictor of successful performance.)

A follow-up study (Sternberg, Torff, & Myers, 1998b) examined learning of social studies by third-graders and eighth-graders. The students were fifth-graders in a very low-income neighborhood in Raleigh, North Carolina. The 142 eighth-graders were largely middle to upper-middle class, studying in Baltimore, Maryland, and Fresno, California. In this study, students were assigned to one of three instructional conditions. In the first condition, they were taught the course that they would have learned had there been no intervention, but the course was on memory. In a second condition, they were taught in a way that emphasized creative thinking. In the third condition, they were taught in a way that emphasized analytical, creative, and practical thinking. In other words, students’ performance was assessed (through multiple-choice assessments) as well as for analytical, creative, and practical learning (through performance assessments).

As expected, students in the successful-intelligence (analytical, creative, practical) condition did better in school. Children with creative and practical abilities, when students are taught in a way that fits how they think, they outperformed students who were mismatched. In other words, conditions that better matched their pattern of abilities improved their 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 scores were the best predictor of successful performance.)

We have now extended these results to the middle-school and high-school levels. In a middle-school study, and 432 high school students from the middle-school and high-school levels, reading either triarchically or through the arts. At the middle-school level, reading was found to improve in mathematics, physical sciences, social studies, foreign languages, and the arts. The students who were taught triarchically substantially better than those who were taught in standard ways (analytical, creative, or practical).
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 to replicates hundreds and thousands of time, and also, that those who keep replicating empirical evidence of the past are unlikely to serve as the best leaders of the future. But only time will tell. As noted earlier, there is typically some value to replication after the point where a point is established. It will continue to produce papers than to produce breakthroughs.

The educational systems in many of our societies place a great emphasis on instruction and assessed two important skills: memory and to a lesser extent, intelligence. Students who are adept at these two skills are promoted in the educational system, because the ability and achievement tests we use all largely measure processes emanating from these two kinds of skills. The problem, however, namely, that children who excelled in memory and analytical abilities may end up doing well on ability tests and achievement tests, and hence find the doors of opportunity open to them. Children who excel in other abilities may end up doing badly on tests, and find the doors shut. By treating all alternative patterns of abilities as losers, creating harmful self-fulfilling prophecies, society is saying something no society needs. What societies need is a more realistic conception of intelligence. The theory of successful intelligence provides one such conception.

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