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Intelligence cannot be fully or even meaningfully understood outside its cultural context. Work that seeks to study intelligence acontextually risks the imposition of an investigator's view of the world on the rest of the world. Moreover, work on intelligence within a single culture may fail to do justice to the range of skills and knowledge that may constitute intelligence broadly defined and risks drawing false and hasty generalizations. In this article, we consider the relevance of culture to intelligence and its investigation, assessment, and development. We describe studies from diverse continents, based on the theory of successful intelligence, that show the importance of understanding intelligence in its cultural context and conclude that intelligence must be understood in such context.

Keywords: culture; intelligence; successful intelligence; cultural intelligence

Howard Dean is currently a candidate for nomination by the Democratic Party for president of the United States. The startling success of this erstwhile little known candidate derives, in part, from his willingness—unique among the Democratic candidates—to criticize the current government of President Bush, a Republican. His behavior is intelligent in the sense that it is moving him toward his stated goal of getting elected. In another country, the same behavior might get a candidate assassinated. It would not move the candidate toward election but, rather, toward an early death.

What is considered intelligent clearly differs from one place to the next. Is it smart or fatally stupid to criticize the existing regime publicly, for example? Yet researchers often do their research as though culture does not matter. This research continues despite pervasive evidence that people in different cultures think and act differently (e.g., Greenfield, 1997; Laboratory of Comparative Human Cognition, 1982; Nisbett, 2003; Serpell, 2000; Super & Harkness, 1986). Earley and Ang (2003) proposed a distinct *cultural intelli-*

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gence to account for differences across cultures. We seek to account for these differences in terms of a theory of "successful intelligence" (Sternberg, 1997). Successful intelligence is the ability to achieve what one seeks in life, within one's sociocultural context, through a combination of adapting to, shaping, and selecting environments, by a mix of analytical, creative, and practical abilities. Successful intelligence is relevant across cultures because in any cultural environment one has to figure out to adapt, shape (or select out), and figure out how to achieve one's goals within the sociocultural context. Successful intelligence is typically defined within a culture. Cultural intelligence, in turn, applies more across cultures. Someone could be successfully intelligent within a culture but not across cultures. Someone could be relatively successful across cultures but not highly successfully intelligence within any one of those cultures. Indeed, as Berry (1974) pointed out, what is intelligent in one culture may be very different from what is intelligent in another.

The theory of successful intelligence considers implicit and explicit theories of intelligence.

LAY IMPLICIT THEORIES OF INTELLIGENCE AROUND THE WORLD

In some cases, Western notions about intelligence are not shared by other cultures. For example, at the mental level, the Western emphasis on speed of mental processing (Sternberg, Conway, Ketron, & Bernstein, 1981) is not shared in many cultures. Other cultures may even be suspicious of the quality of work that is done very quickly.

Yang and Sternberg (1997a) reviewed Chinese philosophical conceptions of intelligence. The Confucian perspective emphasizes the characteristic of benevolence and of doing what is right. As in the Western notion, the intelligent person spends a great deal of effort in learning, enjoys learning, and persists in life-long learning with a great deal of enthusiasm. The Taoist tradition, in contrast, emphasizes the importance of humility, freedom from conventional standards of judgment, and full knowledge of oneself as well as of external conditions.

The difference between Eastern and Western conceptions of intelligence may persist even in the present day. Yang and Sternberg (1997b) studied contemporary Taiwanese Chinese conceptions of intelligence and found five factors underlying these conceptions: (a) a general cognitive factor, much like the *g* factor in conventional Western tests; (b) interpersonal intelligence

(i.e., social competence); (c) intrapersonal intelligence; (d) intellectual self-assertion; and (d) intellectual self-effacement.

The factors uncovered in Taiwan differ substantially from those identified in U.S. people's conceptions of intelligence by Sternberg et al. (1981)—(a) practical problem solving, (b) verbal ability, and (c) social competence—although in both cases, people's implicit theories of intelligence seem to go quite far beyond what conventional psychometric intelligence tests measure. Of course, comparing the Chen (1994) to the Sternberg et al. (1981) study simultaneously varies in language and culture.

Studies in Africa, in fact, provide yet another window on the substantial differences. Ruzgis and Grigorenko (1994) argued that, in Africa, conceptions of intelligence revolve largely around skills that help to facilitate and maintain harmonious and stable intergroup relations; intragroup relations are probably equally important and at times more important. It is difficult to separate linguistic differences from conceptual differences in cross-cultural notions of intelligence. In our own research, we use converging operations to achieve some separation; that is, we use different and diverse empirical operations to ascertain notions of intelligence. So we may ask in one study that people identify aspects of competence, in another study, that they identify competent people, and in a third study, that they characterize the meaning of "intelligence," and so on.

The emphasis on the social aspects of intelligence is not limited to African cultures. Notions of intelligence in many Asian cultures also emphasize the social aspect of intelligence more than does the conventional Western or IQ-based notion (Azuma & Kashiwagi, 1987; Lutz, 1985; Poole, 1985; White, 1985).

It should be noted that neither African nor Asian notions emphasize exclusively social notions of intelligence. These conceptions of intelligence much more emphasize social skills than do conventional U.S. conceptions of intelligence, at the same time that they recognize the importance of cognitive aspects of intelligence. In a study of Kenyan conceptions of intelligence (Grigorenko et al., 2001), it was found that there are four distinct terms constituting conceptions of intelligence among rural Kenyans—*rieko* (knowledge and skills), *luoro* (respect), *winjo* (comprehension of how to handle real-life problems), *paro* (initiative)—with only the first directly referring to knowledge-based skills (including but not limited to the academic).

It is important to realize, again, that there is no one overall U.S. conception of intelligence. Indeed, Okagaki and Sternberg (1993) found that different ethnic groups in San Jose, California, had rather different conceptions of what it means to be intelligent. For example, Latino parents of schoolchil-

dren tended to emphasize the importance of social-competence skills in their conceptions of intelligence, whereas Asian parents tended rather heavily to emphasize the importance of cognitive skills. White parents also emphasized cognitive skills. Teachers, representing the dominant culture, emphasized cognitive- more than they did social-competence skills. The rank order of children of various groups' performance (including subgroups within the Latino and Asian groups) could be perfectly predicted by the extent to which their parents shared the teachers' conception of intelligence. In other words, teachers tended to reward those children who were socialized into a view of intelligence that happened to correspond to the teachers' own. Yet, as we argue later, social aspects of intelligence, broadly defined, may be as important as or even more important than cognitive aspects of intelligence in later life. Some, however, prefer to study intelligence not in its social aspect but in its cognitive one.

EXPLICIT-THEORETICAL INVESTIGATIONS OF INTELLIGENCE AROUND THE WORLD

Many times, investigations of intelligence conducted in settings outside the developed world can yield a picture of intelligence that is quite at variance with the picture one would obtain from studies conducted only in the developed world. In a study in Usenge, Kenya, near the town of Kisumu, Sternberg and his colleagues were interested in schoolage children's ability to adapt to their indigenous environment. We devised a test of practical intelligence for adaptation to the environment (see Sternberg & Grigorenko, 1997; Sternberg et al., 2001). The test of practical intelligence measured children's informal tacit knowledge for natural herbal medicines that the villagers believe can be used to fight various types of infections. At least some of these medicines appear to be effective (F. Okatcha, personal communication, 1999), and most villagers certainly believe in their efficacy, as shown by the fact that children in the villages use their knowledge of these medicines an average of once a week in medicating themselves and others. Thus, tests of how to use these medicines constitute effective measures of one aspect of practical intelligence as defined by the villagers as well as their life circumstances in their environmental contexts. Middle-class Westerners might find it quite a challenge to thrive or even survive in these contexts, or, for that matter, in the contexts of urban ghettos often not distant from their comfortable homes.

We measured the Kenyan children's ability to identify the 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 not correlate with scores on conventional tests of intelligence. To test this hypothesis, we also administered to the 85 children the Raven Coloured Progressive Matrices Test (Raven, Court, & Raven, 1992), which is a measure of fluid or abstract-reasoning-based abilities, as well as the Mill Hill Vocabulary Scale (Raven et al., 1992), which is a measure of crystallized or formal-knowledge-based abilities. In addition, we gave the children a comparable test of vocabulary in their own Dholuo language. The Dholuo language is spoken in the home, English in the schools.

We did indeed find no correlation between the test of indigenous tacit knowledge and scores on the fluid-ability tests. However, to our surprise, we found statistically significant correlations of the tacit-knowledge tests with the tests of crystallized abilities. The correlations, however, were negative. In other words, the higher the children scored on the test of tacit knowledge, the lower they scored, on average, on the tests of crystallized abilities. This surprising result can be interpreted in various ways; however, based on the ethnographic observations of the anthropologists on the team, Geissler and Prince, we concluded that a plausible scenario takes into account the expectations of families for their children.

Many children drop out of school before graduation, for financial or other reasons, and many families in the village do not particularly value formal Western schooling. There is no reason they should, as the children of many families will for the most part spend their lives farming or engaged in other occupations that make little or no use of Western schooling. These families emphasize teaching their children the indigenous informal knowledge that will lead to successful adaptation in 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. However, 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.

We have found related although certainly not identical results in a study we did among Yup'ik Eskimo children in southwestern Alaska (Grigorenko et al., 2004). We assessed the importance of academic and practical intelligence in rural and urban Alaskan communities. A total of 261 children were rated for practical skills by adults or peers in the study: 69 in Grade 9, 69 in Grade 10, 45 in Grade 11, and 37 in Grade 12. Of these children, 145 were girls and 116 were boys, and they were from seven different communities, six rural and one relatively urban. We measured academic intelligence with conventional measures of fluid and crystallized intelligence. We measured practical intelligence with a test of tacit knowledge as acquired in rural Alaskan Yup'ik communities. The urban children generally outperformed the rural children on a measure of crystallized intelligence; however, the rural children generally outperformed the urban children on the measure of Yup'ik tacit knowledge. The test of tacit knowledge was superior to the tests of academic intelligence in predicting practical skills of the rural children (for whom the test was created), but not of the urban ones.

The test of practical intelligence developed for use in Kenya, as well as some of the other practically based tests described in this article, may seem more like tests of achievement or of developing expertise (see Ericsson, 1996) than of intelligence. However, it can be argued that intelligence is itself a form of developing expertise—that there is no clear-cut distinction between the two constructs (Sternberg, 1998, 1999). Indeed, all measures of intelligence, one might argue, measure a form of developing expertise.

An example of how tests of intelligence measure developing expertise rather than some fixed quantity emanates from work Sternberg, Grigorenko, and their colleagues have done in Tanzania. A study in Tanzania (see Sternberg & Grigorenko, 1997, 2002; Sternberg 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 schoolchildren between ages 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; Grigorenko & Sternberg, 1998; Sternberg & Grigorenko, 2002; Tzuriel, 1995; Vygotsky, 1978). Dynamic testing is similar to conventional static testing in that individuals are tested

and inferences about their abilities made. However, dynamic tests differ in that children are given some kind of feedback 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. This integration makes sense in terms of traditional definitions of intelligence as the ability to learn ("Intelligence and Its Measurement," 1921; Sternberg & Detterman, 1986). What a dynamic test does is directly measure processes of learning in the context of testing rather than measuring these processes indirectly as the product of past learning. Such measurement is especially important when not all children have had equal opportunities to learn in the past.

In the assessments, children were first given the ability tests. Then they were given a brief period of instruction in which they were able to learn skills that would potentially enable them to improve their scores. Then they were tested again. Because the instruction for each test lasted only about 5 to 10 min, one would not expect dramatic gains. Yet, on average, the gains were statistically significant. More important, scores on the pretest showed only weak although significant correlations with scores on the post-test. These correlations, at about the 0.3 level, suggested that when tests are administered statically to children in developing countries, they may be rather unstable and easily subject to influences of training. The reason could be that the children are not accustomed to taking Western-style tests and so profit quickly even from small amounts of instruction as to what is expected from them. Of course, the more important question is not whether the scores changed or even correlated with each other, but rather how they correlated with other cognitive measures. In other words, which test was a better predictor of transfer to other cognitive performance, the pretest score or the posttest score? We found the posttest score to be the better predictor.

In interpreting results, whether from developed or developing cultures, it is always important to take into account the physical health of the participants one is testing. In a study we did in Jamaica (Sternberg, Powell, McGrane, & McGregor, 1997), we found that Jamaican schoolchildren who suffered from parasitic illnesses (for the most part, whipworm or Ascaris) did more poorly on higher level cognitive tests (such as of working memory and reasoning) than did children who did not suffer from these illnesses, even after controlling for socioeconomic status. Why might such a physical illness cause a deficit in higher level cognitive skills?

Ceci (1996) showed that increased levels of schooling are associated with higher IQ. Why would there by such a relation? Presumably, in part, because schooling helps children develop the kinds of skills that are measured by IQ tests, and that are important, in turn, for survival in school. Children with whipworm-induced illnesses and related illnesses are less able to profit from school than are children without these illnesses. Every day they go to school, they are likely to be experiencing symptoms such as listlessness, stomachache, and difficulties in concentrating. These symptoms reduce the extent to which they are able to profit from instruction and, in turn, reduce their ultimate performance on higher level cognitive tests.

The ideas studied in Kenya can be extended elsewhere. In one set of studies, Grigorenko and Sternberg (2001) tested 511 Russian schoolchildren (ranging from age 8 to 17 years) as well as 490 mothers and 328 fathers of these children. We 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.

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 "Priumliava." 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 amount of development in the plot (quality); and the third was for creative use of prior knowledge in these relatively novel kinds of tasks (sophistication).

The measure of practical intelligence was self-report and also comprised two parts. The first part was designed as a 20-item, self-report instrument, assessing practical skills in the social domain (e.g., effective and successful communication with other people), in the family domain (e.g., how to fix

household items, how to run the family budget), and in the domain of effective resolution of sudden problems (e.g., organizing something that has become chaotic). The second part had four vignettes, based on themes that appeared in popular Russian magazines in the context of discussion of adaptive skills in the current society. The four themes were, respectively, how to maintain the value of one's savings, what to do when one makes a purchase and discovers that the item one has purchased is broken, how to locate medical assistance in a time of need, and how to manage a salary bonus one has received for outstanding work. Each vignette was accompanied by five choices, and participants had to select the best one. Obviously, there is no one so-called right answer in this type of situation. Hence, Grigorenko and Sternberg (2001) used the most frequently chosen response as the keyed answer. To the extent that this response was suboptimal, this suboptimality would work against the researchers in subsequent analyses relating scores on this test to other predictor and criterion measures.

In this study, exploratory principal-component analysis for children and adults yielded very similar factor structures. Varimax and oblimin rotations yielded clear-cut analytical, creative, and practical factors for the tests. Thus, a sample of a different nationality (Russian), a different set of tests, and a different method of analysis (exploratory rather than confirmatory analysis) again supported the theory of successful intelligence.

In this same study, the analytical, creative, and practical tests we employed were used to predict mental and physical health among the Russian adults. Mental health was measured by widely used paper-and-pencil tests of depression and anxiety and physical health was measured by self-report. The best predictor of mental and physical health was the practical-intelligence measure. (Or, because the data are correlational, it may be that health predicts practical intelligence, although the connection here is less clear.) Analytical intelligence came second, and creative intelligence came third. All three contributed to prediction, however. Thus, we again concluded that a theory of intelligence encompassing all three elements provides better prediction of success in life than does a theory encompassing just the analytical element.

In addition to studying intelligence in context abroad, we have also studied managers in the United States using measures of practical intelligence (see Sternberg et al., 2000, for a comprehensive description of these research projects). In a typical study, we measured tacit knowledge using work-related problems that present problems one might encounter on the job. We have measured tacit knowledge for children and adults, and among adults, for people in over two dozen occupations, such as management, sales, academia, teaching, school administration, secretarial work, and the military. In a

typical tacit-knowledge problem, people are asked to read a story about a problem someone faces and to rate, for each statement in a set of statements, how adequate a solution the statement represents. For example, in a paper-and-pencil measure of tacit knowledge for management, we might ask examinees how to deal with difficult subordinates, obtaining contracts, or with their own tendency to procrastinate.

In the tacit-knowledge studies, we have found, first, that practical intelligence as embodied in tacit knowledge increases with experience; however, 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 0.5 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 (Sternberg et al., 2000), 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 (see Sternberg et al., 2000), 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.

CONCLUSION

Intelligence cannot be understood outside its cultural context. People from developed countries, and especially Western ones, can show and have shown a certain kind of arrogance in assuming that concepts (such as implicit theories of intelligence) or results (such as of studies based on explicit theories of intelligence) obtained in one culture—usually, their culture—apply anywhere. In all likelihood, they do not. Or at least, it cannot be assumed they do until this assumption is tested.

Many of the results we described here are at variance with results typically obtained in Western countries. Other investigators as well have obtained results that differ dramatically from those obtained in the developed West. We believe, therefore, that cultural views of intelligence helps us understand intelligence in a broad, not narrow way.

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