Intelligence Measurement: Recommendations for a Research based Strategy in Employment Testing

Sangeetha Rajan

The concept of intelligence has long been a point of great interest for researchers and practitioners asa predictor of work performance and other achievements. Simonton (2006) found that individual differences in intelligence were consistently related to leader performance, including assessed performance of the Presidents of the United States. Reports such as these indicate the importance mental ability assumes in our dailylives.

The history of research on mental ability is loaded with controversies - technical disagreements on what can and cannot be measured, theoretical differences on the nature of intelligence as well as ethical issues on what should constitute the content of the intelligence test. This article discusses some of the major conceptual positions regarding intelligence and evaluates their everyday utility in the Indian business context. It is intended for human resource practitioners who make decisions about mental ability measurement. In the course of my work with corporate clients, I have observed that these decisions are often based on cost considerations, on the convenience that a tool or a consulting company selling a tool offers, on reputation of a tool, a researcher or a consulting firm, and several other criteria, which, though important, may not be central to serving the main purpose - that of choosing candidates who are likely to do well on the job.

In the first part, what we know about mental ability and intelligence is reviewed by outlining the general intelligence argument. Next, some alternate theories of intelligence and their applicability at the workplace are studied. The Indian view of intelligence is also described as it forms a context for those practicing in India.Lastly a strategy for applying what we know about intelligence to occupational selection in India is recommended.

The General Intelligence Argument

Briefly, around a hundred years of research, debate and experimentation have been invested in studying the variable called intelligence. Although there has been a lot of fine tuning, especially in the matter of culture fair tests and controlling racial and other biases in intelligence testing, the mainstream psychology view of intelligence has remained by and large unchanged since the work of Spearman and Binet in the early 1900s. Charles Spearman (1904) first coined the term General Intelligence (g) and held that when branches of intellectual activity are dissimilar, the correlations between them can be explained entirely by a common fundamental factor - what he called the law of Universal Unity of the Intellective Function. The differences between these diverse branches of intellectual function, he claimed, can be explained by specific intelligences (s). Alfred Binet (1905) studied the mental state of children to make decisions about their appropriate academic

Placement, whether within a regular classroom or special education for retarded individuals. An especially useful aspect of their revised 1908 Binet-Simon scale was that they provided for the possibility of expressing the mental level of a child in relation to the age group whose average performance he/ she matched. This later came to be known as mental age. Once more, a unitary view of mental capacity is represented by this early theory.

In the western conception of intelligence, theories about intelligence and measures of mental ability have developed side-by-side so that the theoretical history of intelligence is intertwined with advances in statistics and psychometrics. Factor analysis especially became important to the vision of mental ability as conceptualized by leading psychologists in the western world. Spearman's two factor theory was the first major theory about intelligence in the twentieth century. Lewis Terman is famous for his revision of the Binet-Simon scale (known as the Stanford-Binet Tests) and for formulating the concept of Intelligence Quotient (IQ). Dr. Arthur Sinton Otis, who trained under Terman,

adapted the test to create the Army Alpha and Army Beta tests in the 1920s for recruiting soldiers to fight in World War I. This was the first time that a group testing format was used. A slight departure from the entirely monolithic view of intelligence occurred with L.L. Thurstone's (1938) Theory of Primary Mental Abilities, according to which intelligence consists of seven major factors - Verbal Comprehension, Verbal Fluency, Inductive Reasoning, Spatial Visualization, Number, Memory and Perceptual Speed. The next twenty odd years were essentially spent researching better ways to measure intelligence and the focus was more on psychometric concerns rather than conceptual issues. The Wechsler scales, developed originally in the 1930's and 1940's, are particularly famous and the revised versions continue to be in use even today to test the mental ability of children and adults. Wechsler defined intelligence as the, "aggregate or global capacity of the individual to act purposefully, think rationally and deal effectively with the environment". Despite their being several factors of intelligence brought into the mix by this time, definitions such as Wechsler's still emphasize the supremacy of g. Another popular measure of general intelligence, that made its appearance for the first time in the 1930's, is Raven's Progressive Matrices, a set of non-verbal tests presented in the multiple choice format. These tests too continue to be in use today. The late 60's and early 70's saw the emergence of some more models of intelligence - such as Guilford's Structure of Intellect Model, Vernon's Hierarchical Theories, the concepts of Fluid and Crystallized Intelligence as proposed by Cattell, and Jensen's Level I and Level II abilities.

Two main controversies surrounding research around intelligence have been firstly, whether g is a psychological entity or a mathematical abstraction, and secondly, whether it is innate or learnt (Lohman, 1989). While some scientists expanded the definition of intelligence (e.g. Thurstone's 1938 Primary Mental Abilities), statistically there were still overlaps between g and other forms of intelligence which suggested that this was merely an extension and validation of the theory surrounding the g factor. In fact, the more the research that went into intelligence, the more the importance that was gained by g. Hernstein and Murray (1994) examine the role of IQ in social and economic differences in the United States. They indicate that general intelligence correlates negatively with many other variables such as unemployment, divorce, having illegitimate children, poverty, incarceration and school dropout rates, and positively with variables such as income and socio-economic status. Gottfredson (1998) says that the g factor explains most the differences in performance between individuals on a diverse range of mental tests. In essence, she puts g at the apex of what she calls a "hierarchy of mental abilities" and argues that it is mostly inherited. She also defends Hernstein and Murray's work and insists that researchers and practitioners need to acknowledge the fact of individual differences in intelligence rather than soft-pedaling the issue. While the data cannot be ignored and certainly Hernstein and Murray's book The Bell Curve made people sit up, it is probably due to such research that the concept of g has faced its share of criticism through the ages, and alternative models have been proposed (e.g. McClleland 1973, Gould 1981, Sternberg 1985, 2004, Gardner 1983, 2003), some of which we consider in the next segment.

While there is no doubt that there are individual differences in mental ability, the issues have been around how these are manifest, how they should be treated/ measured and what conclusions can be drawn. As a recruiter, how should I view the data before me? Should I reject a candidate with suitable experience based on his/ her poor intelligence test score? Gottfredson (1997, 1998) says that no other single predictor measured to date has more predictive validity for job performance. She claims that not only does g exist but that it is very important in the practical affairs of life. According to her, the average predictive validity across jobs in the US economy ranges from 0.3 to 0.5 (on a scale of 0 - 1.0). She also quotes research by Hunter (1986) which suggests that validities are higher if work sample is used as a criteria rather than supervisor ratings, and goes on to argue that the more complex the job, the more important g is in predicting performance. Behling (1998) quotes the instance of several employers hiring people based on general intelligence. He also says that g is probably of more import when jobs require individuals

to learn quickly rather than depend on the already held knowledge, when the job requires a great deal of problem solving, and when autonomy is high. Even so, the correlation with performance during the training period seems to be higher than between intelligence and on-the-job performance. According to Sternberg (2001) however, validity estimates for g accounts only for 20-25% of variance in performance leaving 75-80% unexplained. The dialogue around mental ability testing eventually led to several alternate theories and models, some of which are also useful at the workplace. A few of these are discussed in the following segment.

Alternate Models of Mental Ability

While most psychologists and researchers until the 1980's were won over by the unitary model of mental ability offered by the concept of g, there were a few who conceptualized human intelligence differently. Lev Vygotksy and Jean Piaget in 1970s proposed separate developmental theories of cognition and reasoning. Although there is some evidence to link Piaget's model to general intelligence (e.g. Humphreys, Rich and Davey [1985]), both theories were developed to explain the mental development of children and subsequent research also concentrates on children. The interesting thing about Piaget's theory is that he conceptualized intelligence as primarily functional in nature having an operational component responsible for dealing with the transformational aspects of reality and a figurative component responsible for dealing with the static aspects of reality. For Vygotsky, learning always comes before development. Both theories therefore assume that mental ability is more dynamic in nature than suggested by the general intelligence argument.

In the 1980's there was a surge of interest in looking at intelligence as multi-faceted. Howard Gardner and Robert J Sternberg both proposed theories of intelligence that spoke of non-unitary view of mental ability. Gardner's (1983) theory of multiple intelligences gained a lot of popularity in the educational setting since it was easy to understand, more inclusive and provided solutions for all-round development of children. There is research that validates the theory by linking scores on the various intelligences to occupational choice/ stream of work (Shearer [1997, 2006], Preito et al [2005], Harris and Sykes [undated]), but there seems to be hardly any research linking scores to performance in a corporate environment. The theory is an attractive one, but the measurement of multiple intelligences is still a major problem since they cannot be captured by paper-pencil tests (Armstrong, 2009). As on date, therefore, its utility in an occupational context is limited.

Sternberg's (1985) theory is more promising. Briefly, he suggested three main aspects to intelligence - Analytical intelligence which accords with the traditional idea of "book smarts", Creative intelligence which has to do with dealing with novel situations or finding new approaches to solve a problem, and Practical intelligence using which individuals create a fit between themselves and their environment. Sternberg and Grigorenko (2001) define practical intelligence as "the ability to find a more optimal fit between the individual and the demands of the environment through adapting to the environment, shaping or changing it, or selecting a new environment in the pursuit of personally valued goals". It can be characterized as "street smart" or "common sense," and it supplements academic intelligence or "book smart." Practical intelligence encompasses the abilities one needs to succeed in everyday life, including in one's job. They suggest that the best way to measure practical intelligence is through simulations including in-basket exercises, situational interviews, and situational judgment tests (SJTs). They report correlations of 0.13-0.37 between SJTs and performance ratings for various jobs, which is encouraging from a human resources point of view. The authors further explore the relationship between tacit knowledge and practical intelligence, and say that Tacit Knowledge tests (TK tests) are useful in the work context because they measure something more than g. They quote, among others, an earlier study (Wagner and Sternberg, 1985) on bank managers where the obtained significant correlations between TK tests and performance criteria, such as percentage of merit-based salary increase ($r=0.48$, $p < 0.05$) and generating new business for the bank ($r=0.48$, $p < 0.05$). This kind of data suggests that it might be well worth our while to consider evaluating practical intelligence in the employment context. Both Gardner's

and Sternberg's theories have come in for a lot of criticism from the g camp for their non-psychometric origins (e.g. Klein [1997], Gottfredson [2003], Visser et al [2006]) , but with research around the globe strengthening these perspectives they acquire greater relevance to employment testing.

The discussion this far has centered on theories of intelligence that have all originated in the western world. When considering the Indian employment context, it is also necessary to assimilate the Indian view of intelligence and its impact on employment screening.

The Indian View of Intelligence

Discussing intelligence in the Indian context is a little confusing. There is the traditional view of intelligence as expressed by the Indian texts. And apart from the Sanskrit philosophic traditions, there are other linguistic traditions to consider which may have their own views about the definition and place of intelligence in worldly affairs. In addition, the perspective of the lay person of today could be quite different. So when we say the Indian view on intelligence, we could be speaking of any of these perspectives.

The Sanskrit-Indian view of intelligence/ mental ability/ wisdom has always described it as varied, contextual as well as constant, and encompassing much more than just the ability to deal with words or numbers. Traditionally, the ability to discriminate or 'viveka' is considered the hallmark of intelligence. The Sanskrit word 'buddhi'is the closest translation of the word intelligence. Buddhi derives from Budh (to be conscious of) plus ti a suffix indicating act, state or fact (Baral and Das in Sternberg Eds. 2004, Tripathi and Babu in Misra Eds., 2009). The mind is to be analyzed, trained and developed to explain and obtain the goal of enlightenment and release from rebirth. Intelligence is almost only discussed in the context of knowledge that will enable this enlightenment. The first meaning of intelligence is therefore awareness/ consciousness. Buddhi includes determination, mental effort, and even feelings and opinions in addition to such processes as knowledge, discrimination and decision making. The realization of Buddhidepends on one's own effort, persistence and motivations. This is not to say that the hereditary component of intelligence is overlooked. In the Indian view, the child can inherit karma (loosely defined as the benefits or costs incurred by earlier thought or deed) from his ancestors and mental ability is also viewed as a family trait. This rather flexible, practical and inward view of intelligence can be found in religious and moral texts too.

As per the Vedic view, cosmic intelligence is the basis of all life and pervades everything animate and inanimate as per the limitations of the physical manifestations of body and mind. In plants there is a capacity of feeling; in animals, sensations, memory and, even to some extent decision making, is to be seen. In humans, there is, as per this view, the additional power of discrimination, or intelligence that allows the individual itself to realize its oneness with the universal consciousness. Rao (2008) says that in contrast to the Western bio-centric view, Indian psychology has consciousness as its core concept, its defining characteristic irreducible to brain states.

In the Bhagvad Gita (Chapter 2), Arjuna asks Krishna to describe the man of settled intelligence who is steadfast in spirit and firmly founded in wisdom. Krishna answers by saying that when one puts away desire and the spirit is content in itself, a person is considered stable in intelligence. When a man dwells on the objects of the senses, attachment to them is produced. From attachment springs desire, from desire comes anger, from anger rises bewilderment and from bewilderment comes loss of memory and that destroys intelligence. When the mind runs after the roving senses, says Krishna, it carries away understanding, even as a ship is carried off-course by the wind. Those of disciplined mind, who move among the objects of sense with the senses under control, have pure spirit and also the power of concentration so that they experience peace and happiness.

The Indian view of intelligence can also be explored by examining Indian lore. One story from the Panchatantra describes the lion that sprang to life. Four friends were walking through a forest - three of them were very learned and had just completed their education. The fourth was a simpleton. On the way, they came upon the remains of a lion that had died. One of the scholars

displayed his knowledge by reconstructing the bones of the lion, another scholar added flesh and blood, and the third was about to breathe life into the form when the simpleton intervened. He reasoned that it was dangerous to bring a lion to life and tried to dissuade his friends. But they merely laughed at his fears and seeing that he was not able to convince them, the simpleton climbed a tree to await the inevitable. The third scholar brought the lion to life which promptly attacked and killed all three of them. Another story describes the fish ShataBuddhi and Sahasrabuddhi, and their friend, the frog Ekabuddhi. Both the fish were handsome and intelligent, and knew many tricks to escape any trap. When they overheard fishermen saying that they would be casting their net in that pond, the fish were unconcerned since they knew so many ways to escape. The frog however, knew only one thing, and that was to avoid danger. So he escaped the net by leaving the pond well in time while his two fish friends were caught by the fisherman's net. Countless similar tales abound in Indian lore - the cunning hare that brought about the end of the foolish lion, the scholar who could not swim, the stories of Tenali Raman (from South India) or Birbal (North India) or Gopal the jester (Bengal) who solved problems for their respective kings using their quick wit, humor and creative thinking. Together these stories underline the belief that the highest form of intelligence is that which can be practically applied. They agree that wisdom is not the product of book learning alone. Intelligence has very many manifestations and the gifts of an individual need not be typical, academic or for that matter, unitary.

Srivastava and Misra (2007) conducted a study to understand the amount of congruence between the traditional views of intelligence and the contemporary Indian perspective. Their analysis of Sanskrit suktis (sayings, proverbs) revealed four dimensions of intelligence - Cognitive competence, Social competence, Entrepreneurial competence and Emotional competence. Of the sub-factors, the most important were Control of emotions (especially anger), Sensitivity to context and Hard work. Their analysis of Hindi proverbs also led to the same four factors, delineating intelligence as plastic, adaptiveand real. Hard work once more emerged as an important and distinguishing characteristic. Intelligence, as per this analysis, was not confined to the success of the individual alone. Rather it aims at achieving the common good. Srivastava and Misra, as part of the same study, also interviewed 1885 men and women at rural and urban locations across India and found the same dimensions of intelligence in their definitions. Social competence was more important in lay people's understanding compared to textual content, but it was still the same four factors that emerged showing a great deal of alignment between the textual definitions of intelligence and the common person's view of intelligence in India.

Putting What We Know about Intelligence to Work

Theoretical debates aside, many of the points discussed in this article have an immediate bearing on the decisions surrounding employment testing. Informed by an understanding of the key issues, it is possible to create an extremely functional strategy around the use of ability tests in the Indian business context.

Intelligence is a deeply researched concept and a wide choice of tools is available today which can give us an approximation of an adult's mental ability. If a tool is chosen after checking its credentials, it is likely to give us a good range of test performance scores on which to base our decisions. Workplaces in India are becoming more like workplaces anywhere else in the world, especially for the English-speaking managerial cadres, so that the objection that the test is designed abroad becomes less of a problem as the years pass. The tests also tend to be designed in a more culture-fair manner so that bridging the gap between east and west on this count is easier.

The concept of g has come in for a lot of criticism on the grounds of perpetuating racial and class differences, which is a point that cannot be ignored. When an intelligence test is used for a relatively homogenous mainstream educated, predominantly urban population in India, it is not a problem. But if we need it to perform more inclusively, we could run into a host of difficulties. India is home to more than 1000 languages and dialects and for most Indians, English is not a first language (in fact it may not even be a second or third language). IQ

tests loaded with verbal content in English therefore tend to perform poorly in non-metro locations in India. A high investment option is to design tests in a variety of languages - it would involve not only translation, but finding parallel question content that is applicable in the context surrounding that particular language. Recruiters therefore tend to fall back on the non-verbal and/or numerical segment scores to indicate intelligence. Unless the test is so designed (such as Raven's Progressive Matrices which are entirely non-verbal), the interpretation arising from this proceeding might be faulty. Further, during the course of my doctoral research applying the multiple intelligences framework in a qualitative study, I discovered indications that scores in verbal and numerical tests may be subject to the effects of learning, practice and exposure. For example, in the case of math, there were individuals who confessed to a fear of numbers (math phobia). It is not that they are unable to make sense of numbers in the course of their work, but that they experience an aversive response when compelled to take a test involving mathematical operations. On the other hand, there were individuals who were ostensibly good with numbers (given their educational track record involving degrees in engineering, science and architecture), but did not prefer to apply logic to solve problems. Their test scores therefore do not reflect their real ability with numbers. In a study on third year undergraduates I found many Statistics majors reporting that they did not like math because of the way it was taught. It is evident that scores on these tests are influenced by a variety of factors. It is important that the decision-maker carefully examines the content of the test to ensure that it is relevant to the population being tested as well as to the job or set of jobs, and this is apart from reviewing the reliability and validity coefficients provided in the manual. As Frost (1993) puts it, "how quickly a man can add or subtract becomes meaningless in a practical sense when both the accountant and engineer will inevitably use a calculator or desktop computer which performs arithmetic operations a million times faster than any human." When this due diligence is done and a test chosen, the results can be fairly accurate.

In general, traditional tests of g or mental ability batteries are appropriate for entry level management positions or for those entering an organization with two-three years of experience. In service and knowledge oriented industries such as banking, telecom, IT etc., they can be used well even at the non-managerial level if suitably designed. g is a strong predictor of learning which is what is required in the initial phase of the employee's career. Many organizations are doing exactly this, but their reasons are different. In practice I have observed that the more distanced managers get from the test-taking process, the lower their scores on traditional mental ability tests. That is, at higher managerial levels where employees took their last test perhaps eight or ten years ago, they tend to score very poorly on speeded tests. Additionally, in India where formal learning and test-taking are not a life-long phenomenon for most people, test motivation suffers a good deal. HR managers then tend to eschew testing for mental ability at a senior level either because senior level candidates just refuse to take tests or try to negotiate around them, or because scores of experienced candidates become quite low and render meaningful interpretation impossible. My point is that the practice of using mental ability tests at entry level is correct, but clarifying the why will help create an overall better strategy for employment testing. Additionally, even when used at the entry level, a mental ability test is more useful as a filter to screen out entirely unsuitable applicants rather than a tool to assist in a choice between two suitable applicants. To explain, when recruiting from a large pool of applicants, HR managers could use ability tests to narrow down the list of candidates who will go on to the next step in the selection process. But the decision to select cannot be based on the test score. While a threshold level of mental ability is required for most jobs, beyond a point it loses its predictive power. For more experienced candidates, a different kind of assessment is probably called for such as Sternberg's suggestion of testing for practical intelligence/ tacit knowledge using simulations. In some domains, there are gaming options, usually as part of assessment centers that provide a proxy for a mental ability test. Case studies requiring complex decision-making and moving away from the multiple-choice-single-answer format may help make a better selection

decision. There are two challenges associated with this method - one that case studies or similar open-ended assessments require experienced assessors to evaluate the candidate correctly, and second, that they have to be specially designed to approximate job-related decisions as closely as possible since they are context specific. However, the investment may be justified by the superior rigor of such a testing process. Further, the Indian view of mental ability accords well with the idea of practical intelligence or a non-unitary view so that such measures may have greater face validity, thereby improving test motivation and reducing resistance even when used for internal promotions or reassignments.

One last point which has not come up in the literature around mental ability testing for employment is that despite claims by researchers in the g camp about the predictive power of intelligence, other factors too may play an important role in job performance, such as personality traits. The Big Five personality traits of Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism (emotional stability) have received a lot of attention as predictors of job performance. Of the traits, Conscientiousness has been consistently linked to job performance (Jimoh [2008], Rothman and Coetzer [2003], Mount, Barrick and Strauss [1999], Barrick, Mount and Strauss [1993], Behling [1998]) and many practitioners in India swear by Raymond Cattell's 16PF and Saville and Holdsworth's OPQ (a later derivative of the 16PF specially designed for occupational use) for their utility in predicting performance. Other popular tools include the FIRO-B and the DISC. David McClleland and his colleagues have similarly done a lot of work to promote the use of competencies instead of intelligence in selection practices. While this article is not about personality assessment, I bring in this aspect to give a perspective to the role of mental ability assessment in employment testing. While assessing mental ability can help make a better decision about selection / promotion / placement, it cannot be the only factor guiding the decision.

Conclusion

In sum, what is recommend as a strategy is using a judicious mix of methods based on an understanding of the options and the concerns surrounding each kind of assessment. In the Indian context, where social competence, hard work and emotional control are seen as components of intelligence, it may be necessary to evaluate personality along with measures of cognitive ability. An important concept not covered in this article is that of Daniel Goleman's (1996) Emotional Intelligence which resonates well with the Indian concept of intelligence. Given the importance of the interpersonal dimension in the Indian vision of the intelligent individual, the personal interview is also a critical source of information. Measures of general cognitive ability used at the entry level as a filter and measures of practical intelligence at more senior levels will work well for large organizations which have the size and scale to afford the investment. There is no doubt that mental ability is important to work performance. It is consistent with general wisdom as also supported by scientific research. The more HR managers are familiar with the issues discussed and are able to make informed decisions about how to use mental ability measurement, the better they would be able to add value to the selection decision.

References

Armstrong, Thomas. (2009). *Multiple Intelligences in the Classroom (3rd Ed)* ASCD: Alexandria, VA, USA.

Barrick Murray R, Mount Michael K, and Strauss Judy P (1993) Conscientiousness and Performance of Sales Representatives: Test of the Mediating Effects of Goal Setting. *Journal of Applied Psychology,* 78(5), 715-722.

Behling Orlando. (1998). Employee Selection: will intelligence and conscientiousness do the job? *Academy of Management Executive,* 12(1), 77-86 Bhagvad Gita, Chapter 2, Verse 54-68.

Binet, Alfred. (1905). New Methods for the Diagnosis of the Intellectual Level of Subnormals. *L'AnnéePsychologique,* Vol. 12, pp 191-244. Translation by Kite, Elizabeth S (1916) In *The development of intelligence in children.* Vineland, NJ: Publications of the Training School at Vineland.

Frost, C.F. (1993). The Changing Face of Intelligence. Gift of Fire, Issue No. 59-A, May 1993. Available on the official website of the Prometheus Society http://216.224.180.96/~prom/oldsite/articles/changingface.htmlAccessed on September 23, 2012Gardner Howard (2003) Multiple Intelligences After Twenty Years. *Paper presented at the American Educational Research Association, Chicago, Illinois,* April 2003.

Gardner, Howard. (1983). *Frames of Mind: The Theory of Multiple Intelligences.* Basic Books: New York.

Goleman, D. (1996). Emotional Intelligence. Bantam Books: New York.

Gottfredson Linda S. (1997). Why g Matters: The Complexity of Everyday Life. *Intelligence,* 24(I), 79-132.

Gottfredson Linda S. (1998). The General Intelligence Factor. *Human Intelligence,* ExploringIntelligence, 24-29.

Gould Stephen J. (1981). The Mismeasure of Man. Norton and Co: New York.

Harris, Kevin A and Sykes Eric W: Professional Predispositions: Assessing Multiple Intelligences Theory in Undergraduates. http://kaharris.iweb.bsu.edu/ProfWritings.htm - accessed August2010

Herrnstein Richard J and Murray Charles. (1994). *The Bell Curve: Intelligence and Class Structure inAmerican Life.* Simon and Schuster Inc: New York.

Humphreys, L.G., Rich, S.A. & Davey, T.C. (1985).A Piagetian Test of General Intelligence. *Developmental Psychology,* 21, 872-877.

Jimoh, A.M (2008) Emotional Labour, Conscientiousness And Job Tenure As Predictors Of Job Performance Among University Administrative Workers In Southwestern Nigerian. *International Journal of African and American Studies,* 7(2), 27-38.

Lohman David F (1989) Human Intelligence: An introduction to Advances in Theory and Research. *Review of Educational Research,* 59(4) (Winter 1989), 333-373.

Lohman David F (2001) Fluid intelligence, inductive reasoning and working memory: Where the theory of multiple intelligences falls short. *Paper presented at the annual meeting of theAmerican Educational Research Association in Seattle,* WA, March 2001.

McClelland David C. (1973) Testing for Competence rather than for "Intelligence". *American Psychologist,* January 1973, 1-14.

Misra, Girishwar (Eds.) (2009). Psychology in India (Volume I): *Basic Psychological Processes and Human Development.* ICSSR: New Delhi

Mount Michael K, Barrick Murray R and Strauss Judy P (1999). The Joint Relationship ofConscientiousness and Ability with Performance: Test of the Interaction Hypothesis.

Preito L, Bermejo R, Ferrando M, Ferrandiz C (2005). Multiple Intelligences and Exceptional Children. *Paper presented at the European Conference on Educational Research,* Dublin, Sept 2005.

Rao, K.R, Paranjpe A.C, and Dalal A.K (2008). *Handbook of Indian Psychology.* Cambridge University Press: New Delhi.

Rothman S and Coetzer E.P (2003). The Big Five Personality Dimensions and Job Performance. *Journal of Industrial Psychology* 2003. 29(1), 68-74.

Shearer Branton (2006). Towards an integrated model of Triarchic and Multiple Intelligences. http://www.miresearch.org/reports_and_papers.html

Shearer, C. Branton (1997). Reliability, Validity and Utility for a Multiple Intelligences Assessment for Career Planning. *Paper presented at the annual meeting for the American Psychological Association,* Chicago.

Simonton DK (2006). Presidential IQ, Openness, Intellectual Brilliance, and Leadership: Estimates and Correlations for 42 U.S. Chief Executives. *Political Psychology,* 27(4) (Aug., 2006), 511-526.

Spearman, C (1904) "General Intelligence", objectively determined and measured. *American Journal of Psychology,* 15, 201-293. Available inhttp://psychclassics.yorku.ca/Spearman/

Srivastava A.K and Misra G (2007). *Rethinking Intelligence: Conceptualizing Human Competence ina Cultural Context.* Concept Publishing Company: New Delhi.

Sternberg R. J (1985). *Beyond IQ: A Triarchic Theory of Intelligence.* Cambridge University Press: Cambridge

Sternberg R. J (2004). *International Handbook of Intelligence.* Cambridge University Press: Cambridge.

Sternberg Robert J and Grigorenko Elena L (2004). Successful intelligence in the classroom.*Theoryinto Practice,* 43(4) (autumn 2004), 274-280.

Sternberg, Robert J and Grigorenko, Elena L (2001). Practical Intelligence and the Principal.Research report published by the U.S. Department of Education. Available at http://tv.isg.si/site/ftpaccess/elogedusavoir/Practical%20Intelligence%20and%20the%20Principal.pdf accessed on September 23, 2012

Terman, Lewis M (1916). The Binet Scale and the Diagnosis of Feeble-Mindedness. *Journal of theAmerican Institute of Criminal Law and Criminology,* 7(4), (Nov, 1916), 530-543.

Thurstone L. L. (1946) Theories of Intelligence. The Scientific Monthly, 62(2), (Feb 1946), 101-102.

Thurstone, L. L. (1938) *Primary Mental Abilities.* University of Chicago Press: Chicago.

Visser B.A, Ashton M.C, and Vernon P.A (2006). g and the Measurement of Multiple Intelligences: A Response to Gardner. *Intelligence,* 34, 507-510.

Sangeetha Rajan is a psychologist, management consultant, trainer and educator and is a visiting faculty at IIM-Indore. She holds a doctoral degree awarded by the Tata Institute of Social Sciences for researching the mental profile of artists. This paper on intelligence measurement is an outcome of twelve years of work as a management professional applying psychometrics in the organizational context and research work done towards her dissertation.