Chapter 2

Artistic ability in research: Review of literature

2.1 Overview

The aim of this research is to understand artists better, especially to understand if there are specific patterns that can describe the mind of the artist. Scholars have generally agreed that there is a major cognitive component to art. According to Adorno (1970: 282), ‘Art is directed toward truth….by its relation to truth, art is knowledge…’ Srinivasan (1980) says that music has been traditionally classified as vidya (knowledge) as well as kala (artistic skill), thus addressing both the cognitive and aesthetic aspects of music. Eisner (1980) argues for a broader view of intellectual ability including artistic ability and the use of representational systems other than words or numbers. Young (2001) in his essay on Art and Knowledge attempts a defense for Keats’s popular assertion that beauty is truth. He argues that all art has cognitive value and that all arts provide knowledge. Describing the mind of the artist therefore requires an understanding of human mental processes. Searching for literature linking human cognitive ability and art, I found a fair amount of research through the ages linking art to mental ability, specifically, intelligence. However, while there is a large body of research devoted to intelligence and even to creativity, attempts to research artistic ability have been sporadic.

Clark and Zimmerman (1984) review the research that has gone into artistic ability from the late nineteenth century to the late twentieth century and state that one of the reasons artistic ability has not been inquired into as much as intelligence or other intellectual abilities is a lack of research instruments. Since the beginning of the twentieth century, there have always been tests to approximate intelligence and other scholastic abilities such as the Stanford-Binet tests, the Wechsler scales, Raven’s matrices, several of which are still in use today. In the later part of the twentieth century there were also several tests for creativity, especially focusing on divergent thinking such as Torrance tests of creative thinking, Guilford’s divergent thinking tests, the Wallach and Kogan tests, etc. Clark and Zimmerman state that these tests of creativity were only nominally related to the arts and question whether art ability (especially visual art ability) can be predicted with these tests. Another reason for the lack of focus on artistic ability they say is the confounding of the terms ‘gifted’, ‘talented’, and ‘creative’ in research literature.

The difficulty is that these are in fact overlapping terms. ‘Talent’ was a term initially used to describe artistic or special skills, but now includes social skills, work skills, leadership skills, academic skills and much more. Similarly, ‘creative’ could refer to innovative thinking in any domain. Because of this, the literature covered in this chapter includes varied terminologies such as ‘gifted’, ‘creative’ and ‘artistic’. What is important is how the authors define the term in each
case. How I position my understanding of the various terms is as follows: the term ‘gifted’ refers to anyone with substantial, out of the ordinary ability in any domain. The term ‘talented’ is closely associated with giftedness and describes exceptional ability in any domain. The term ‘artistic’ refers to those talented in/ practicing any of the fine and performing arts. For a definition of ‘creative’, I refer to Csikszentmihalyi’s (1996) two kinds of creativity – the Creativity with a capital C that is domain changing, and creativity with a small c that is everyday creativity. To define the term ‘intelligence’ I use Gardner’s (1993) definition, that intelligence is ‘the ability to solve problems or create products that would be valued in at least one culture’. Although these are not necessarily the same definitions used by all researchers in the literature review covered and though the research covered appears to stray into several (related) areas the spotlight is on artistic ability.

A lot of the research quoted is western research. Psychology as a discipline in India has been largely informed by western traditions of thought and practice, and views on mental ability have a similar theoretical lineage. The Indian view of intelligence is quite different, and considers intelligence as more practical, context specific and varied rather than unitary (e.g. Srivastava and Misra 2007). This is covered a little later in the literature review. The resonance between the Indian view and Gardner’s (1983) theory of multiple intelligences (MI theory) was one of the factors that led to the choice of MI theory as a frame of reference in this research. It is also one of the theories that include artistic ability in its model of mental ability as against the more unitary views of intelligence. This chapter therefore covers the linkages between artistic ability and mental ability, the evolution of the research view on artistic thinking, discusses implications of the research with regard to different views of mental ability including the Indian perspective and describes in detail Gardner’s MI theory.

2.2 Research linking artistic ability with mental ability

Artistic ability has received some attention in research although the body of work is in no way comparable to the research available on creativity or intelligence. Interestingly, a lot of the existing research on artistic ability links it to intelligence or at least mental ability. It was always perceived as a part of or related in some way to mental capacity although not really captured in any of the traditional definitions of intelligence. A summary of the research outlined is captured in Table 2.1.
## Table 2.1: Summary of literature on artistic ability

<table>
<thead>
<tr>
<th>Research concern/ focus</th>
<th>Prominent authors and what their research says</th>
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| 1 Measurement of artistic ability: Defining artistic ability, locating manifestations of it, and exploring whether it was possible to get an estimate of an individual’s ability in artistic tasks | - Binet and Henri (1896) included artistic and aesthetic tasks in their tests, but later dropped these  
- Seashore (1919/1940) - measures of musical ability  
- Meier (1926/1942) - measures of visual art ability  
- Clark and Zimmerman (1984) state that the 1920s, 1930s and 1940s were a period of active interest in developing tests for artistic ability |
| 2 Linkages between artistic ability and cognitive variables: These links were explored in different ways from very early on. A lot of these studies used experimental designs with control groups and reported correlations between artistic ability and intelligence, but were unable to delve into the nature of the relationship (causality) or how exactly the correlation can be explained (e.g. through an executive function) | - Bearne (1908) - all geniuses have some artistic ability  
- Lewerenz (1928) - intelligence a necessary but not sufficient condition for artistic ability  
- Tiebout and Meier (1936) - relationship between aesthetic quality of drawing and intelligence  
- Lansing (1963) - art could make students more creative  
- Buttall (1971) - specific musical tasks linked to mathematical ability and mastering a foreign language  
- Simon and Ward (1973) - correlation between general intelligence and creativity in a drawing test  
- Vernon, Adamson and Vernon (1977) - most children with high IQ are talented and most talented children have high IQ  
- Hanna (1983) - major cognitive component of dance  
- Hermelin and O’Connor (1990) – intelligence related to drawing accuracy but not artistic merit of the drawing |
| 3 Art as a window to the mind: the instrumental nature of arts training became important in the 90’s and more carefully designed studies were able to establish several non-art benefits. | - Raucher (1999) - music training consistently impacts spatial-temporal reasoning but not spatial recognition  
- Keinonen, Hetland and Winner (2000) - dance related to reading and visual-spatial skills but limited generalizability  
- Vaughn and Winner (2000) - relationship between SAT scores and number of years of art lessons  
- Schellenberg (2004, 2005, 2011) – music training leads to increases in IQ providing evidence for a modest, but widespread intellectual benefit from music |
| 4 Non-cognitive components of artistic thinking: research riddled with caveats about problems with the design, definitions of constructs or profile of research participants*. One of the issues that might have contributed to the lack of consistency in findings across studies is that there is more than cognition in artistic ability.** | - Rossman and Horn (1972) - factor indicating Rule-bound versus Intuitive orientation was an important distinction between persons who elect science-technology as against artistic fields for creative endeavor.  
- Emery (1989) - belief is a pivotal component of artistic thinking  
- Furnham and Chamorro-Premuzic (2004) - intelligence was related to art judgment; art judgment may comprise cognitive and non-cognitive elements  
- Ruthsatz and her colleagues (2008) - summative effect of general intelligence, domain-specific music skills and practice on musical achievement |

*This especially refers to the reasoning that it was high IQ students who would in the normal course of things take art lessons because they went to better schools that encouraged extracurricular activities or because they came from homes where the parents were more educated and earning more so that they could afford art lessons.

**The other reason discussed is the definition of intelligence itself which traditionally is unitary and not inclusive of artistic thinking.
2.2.1 Observations of a relationship between artistic ability and mental ability. One of the earliest studies on the artistic temperament by Bearne (1908) says that, though someone gifted with artistic ability may not be a genius, all those who are geniuses definitely have some measure of artistic ability. Interestingly, Binet and Henri, pioneers of the intelligence movement had included artistic and aesthetic tasks as part of their research on abilities as early as 1896, but these tasks got abandoned and artistic ability got dissociated from intelligence (Clark and Zimmerman 1984). Several later studies have looked at this “quality” in a person that leads to artistic insights, appreciation of things from an aesthetic angle, to artistic products or even to products created artistically. Lewerenz (1928) conducted a very comprehensive study of 939 pupils from the third grade to the twelfth and concluded by saying that “it is probably true that anyone who succeeds exceptionally well in art will also rank rather high on an intelligence test. However a high intelligence score does not bring necessarily a corresponding ability in art.” Some of the earliest attempts to measure artistic ability were made by Carl Seashore. His (1919/1940) test of musical ability is one of the most oft used tools in research on musical talent. In his book he describes the musical mind, which according to him includes a sensory capacity to differentiate pitch, tone, etc., musical imagination, musical feeling, musical performance and musical intelligence. Intelligence he says is musical when ‘...its background is a storehouse of musical knowledge, a dynamo of musical interests, an outlet in musical tasks, and a warmth of musical experiences and responses’ (Seashore 1938: p8). His colleague Norman Meier similarly developed a series of tests to capture (visual) art judgment in the 1920s (Meier 1926/1942).

Burkhart (1958) quotes Tiebout and Meier (1936) who held that a closer relationship between aesthetic quality of drawing and intelligence was observable in lower grades as compared to higher grades among school students. Lansing (1963) makes a case for the inclusion of art in the curriculum for gifted children by saying that giftedness has been traditionally associated with high IQ and artistic ability with talent. But he further concludes that the two are related and that exposure to art could help people become more creative. Buttall (1971) found that specific musical abilities could be linked to mathematical ability and the ability involved in mastering a foreign language. For example, mathematical ability would reveal itself in the child’s greater grasp of rhythm while the linguistically gifted child might display a greater capacity for playing by ear. Simon and Ward (1973) found evidence to correlate general intelligence to creativity in a drawing test as rated by a panel of art judges. However, the correlation between intelligence and creativity as measured by Cattell and Cattell’s High School Personality Questionnaire was not significant and neither was the correlation between the two different measures of creativity. They conclude that a positive relationship exists between intelligence and creativity, but the strength and nature of the relationship seems to depend on the specific intelligence test used and the way creativity is defined. Vernon, Adamson and Vernon (1977) claimed that most children with high IQ are talented and that most talented children have high IQ.
While evidence for a linkage between the arts and intelligence was mounting, there was still a lot of confusion about the nature of the relationship between intelligence and artistic ability. It was as yet unclear whether artistic ability was an expression of general intelligence, whether there was a causal relationship between the two concepts one way or the other, whether creativity as a concept needed to be brought in to explain the link between artistry and intelligence, or whether artistic abilities such as musical abilities or visual art abilities were in fact distinct intellectual capacities. Further, the variety of methodologies used in the studies made it difficult to generalize the conclusions.

According to Clark and Zimmerman (1984) the 1920s, 1930s and 1940s were a period of active interest in developing tests for the artistic ability, some of the most prominent names such as Meier, Seashore and Munro being associated with this effort, but none of the tests developed then have been satisfactory and eventually testing in the arts came to a halt and interest turned to creativity and self-expression in the latter part of the twentieth century. Despite this, a relatively smaller number of researchers continued inquiring into the links between arts and cognition. For example, Hanna (1983) argued that there was a major cognitive component to dance. The study examined how dance got separated in people’s perception from what was intellectual due to historical/ socio-cultural factors, but that in fact, dance is an intellectual exercise. Hermelin and O’Connor (1990) did a comparative study of graphically gifted idiot-savants and artistically able normal children and concluded that while drawing accuracy was related to intelligence (the normal children scored higher on this factor), the artistic merit of the drawing was not as ratings for artistic merit did not differentiate the two groups. But more importantly, around this time, there was a surge of interest in the non-art benefits of art and scores of studies were carried out to determine whether artistic training led to improvement in other cognitive/ academic areas.

2.2.2 Art as a window to the mind: the instrumentality of training in the arts. There were several possible explanations that had surfaced in the literature to explain the correlation between artistic ability and intelligence, especially IQ. One of the strongest arguments was that it was high IQ students who would in the normal course of things take art lessons because they went to better schools that encouraged extra-curricular activities or because they came from homes where the parents were more educated and earning more so that they could pay for art lessons (Winner 2001). Another line of thought was around the structured training that art students go through, concentrating in classes, engaging in elaborate practice and mastering new symbol systems; all of which might transfer to and reflect in performance in other areas as well including intelligence tests. However, finding evidence for transfer to other cognitive areas was far from simple. For example, Oreck, Baum and Owen (1997) studied the specific learning behaviors (self-regulatory skills) that students used to be successful in the arts and assessed the extent to which these behaviors transferred to the academic classroom. Their study showed a large difference in self-regulatory behavior in the arts and non-arts groups, but transferring the behavior into an academic
situation was fraught with difficulties. They argued that one of the reasons for lack of significant differences between the two groups on the end-of-lessons content test was the difficulty of translating learning from symbol systems in the musical or kinesthetic domain into verbal form. The authors also said that when students lack the opportunity to utilize their effective learning behaviors in the classroom (due to the instruction pedagogy or other factors), they are unlikely to demonstrate any evidence of transfer.

Hence, it became important to disentangle these issues and the focus shifted to the direct causal relationship between artistic ability and other mental abilities. Raucher (1999) demonstrated through repeated experimental interventions (1993, 1994, 1997, and 1999) that music training consistently impacts spatial-temporal reasoning but not spatial recognition. The authors conclude that the effects are found for children of five years old or even older, that just one year of instruction is probably insufficient for long-term enhancement of spatial reasoning and that the transfer could possibly have to do with the temporal processes of music knowledge. Keinanen, Hetland and Winner (2000) performed a meta-analysis of studies linking dance and cognitive skill. The studies that they covered declared some evidence for improved reading skills through learning dance, but the authors state that the generalizability of the (very limited number of) studies is a problem. The results from a few studies that link dance instruction with visual-spatial skills are also interpreted with caution.

A lot of publicity has been given repeatedly in the media to a possible relationship between SAT scores and taking art lessons during high school. The SAT is a widely used screening test for college entrance in the United States and although the College Board (the non-profit organization that owns the test) claims that the SAT measures reasoning and not intelligence research has indicated a strong correlation between SAT scores and other measures of intelligences (Frey and Detterman [2003], Beaujean and colleagues [2006]). Vaughn and Winner (2000) analyzed College Board data for the years 1987-1998 to formally investigate the link between SAT scores and music lessons during high school. The found that there is a linear relationship between composite SAT scores and art lessons for 0-3 years and then a sharp jump in scores for those who took more than four years of lessons. The same pattern was repeated for verbal SAT scores and math SAT scores separately. Over the years, the highest verbal scores were obtained by students taking acting lessons and the highest math scores were obtained by students taking acting lessons or music lessons and in both cases, the lowest scores (among art students) was obtained for those taking dance lessons (which was still significantly higher than the no-arts students). The authors limit the inferences possible from the data by saying that it is after all purely correlational and does not allow causal inference. They also temper their findings by quoting other research by Elliot Eisner (1999/2000) to say that although there is a link between SAT scores and the arts, the link between SAT scores and similar study of academic subjects is stronger.
Schellenberg (2004), attempting to establish direct causal linkages conducted an experiment to test whether in fact music makes children smarter. The study done on 132 six year olds randomly assigned the participants to one of four groups – Standard keyboard lessons, Kodaly voice lessons, Drama lessons and No lessons, who underwent training for one year. Results showed that compared to the control groups (drama and no lessons) the music groups had reliably larger increases in full scale IQ with increases on each of the five subtests providing evidence for a modest, but widespread intellectual benefit from music. The drama group showed a marked improvement in social behavior test compared to the three other groups. This kind of evidence for far transfer from music lessons to IQ is rather rare. Similar results were reported by Schellenberg in 2005 and again in 2011. Schellenberg (2011) tried to take the study forward by explaining the link between musical training and improved intelligence by means of an executive function, but the evidence did not support the hypothesis and the author concluded by saying that the association between music lessons and intelligence is complex and establishing causality is very problematic.

2.2.3 Conceptual issues with establishing a causal link between artistic ability and other mental abilities. One of the possible reasons for the equivocal findings could be the presence of non-cognitive factors that impact both intelligence and artistic ability. Rossman and Horn (1972) suggest that creativity and intelligence are probably separate constructs. Their study tapped a number of ability and non-ability indicants of both creativity and intelligence and using correlation analysis and factor analysis, the found three factors that were most indicative of creativity – that is, Broad fluency, Dominant, competitive, receptive playful originality, and Careful calculated risk-taking, resourceful self-sufficiency. Further, a factor indicating Rule-bound versus Intuitive orientation was an important distinction between persons who elect science-technology as against artistic fields for creative endeavor. Emery (1989) based on an in-depth case study of 10 children to study the artistic thinking process concluded that belief is a pivotal component of artistic thinking. Furnham and Chamorro-Premuzic (2004) using the Graves Maitland Design Test, the Wonderlic intelligence measure and NEO FFI (personality measure) along with an art experience questionnaire found that Openness to Experience was significantly related to art experience, but intelligence was related to art judgment. In another study published the same year (Chamorro-Premuzic and Furnham 2004) they claimed that possibly art judgment may comprise cognitive and non-cognitive elements. While intelligence was a modest predictor of art judgment, so was interest and neuroticism and introversion were also related to art judgment. Ruthsatz and her colleagues (2008) studied the multiple factors that predict musical achievement in two groups – a sample of high school band members and a group of conservatory musicians and concluded that there is a summative effect of general intelligence, domain-specific music skills and practice on musical achievement. In the high school group, they found a statistically significant correlation between general intelligence and musical achievement ($r=0.20$) and the
predictive power of the equation increased substantially by adding domain skills and practice. The mean scores of the conservatory musicians on intelligence, domain skills and practice was significantly higher, but the summative equation failed to pan out in this group. Intelligence was not significantly correlated to musical achievement in this group and neither was musical ability. Practice was the only variable that correlated significantly. The attribute these results to the attenuating effects of a very select sample (the conservatory musicians) where variables that are important to elite musical achievement fail to discriminate between group members.

Another explanation could lie in the conceptualization of mental ability itself. 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 there being 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’). Binet and Simon (1905) intended to study the mental state of children so that decisions could be made about their appropriate academic placement whether within a regular classroom or special education for retarded individuals. An especially useful aspect of their revised 1908 scale was that they provided for the possibility of expressing the mental level of the child in relation to the age group whose average performance he/ she matched. This later came to be known as mental age. The Binet-Simon tests eventually came to be adapted by Terman and his colleagues, rechristened the Stanford-Binet tests and intelligence came to be expressed as a single score – the intelligence quotient (IQ). This unitary view of mental ability has remained quite dominant over the last hundred years and the more the research went into it, the more the importance gained by g and IQ.

Hernstein and Murray (1994) examined 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 drop out rates and positively with variables such as income and socio-economic status. Towers (1988) listed out the correlates of intelligence that have emerged through the ages including achievement motivation, income, learning ability, leadership, logical ability, moral reasoning, occupational status, creativity/ fluency, extra-curricular attainments, musical preferences and abilities and even artistic preferences and abilities.

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 similar research that a lot of controversy has arisen around the study of intelligence. Two main controversies surrounding the 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). Gottfredson (1997) 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. She says that
the g factor most explains differences in performance between individuals on a diverse range of mental tests. In essence, Gottfredson puts g at the apex of what she calls a “hierarchy of mental abilities” and argues that it is mostly inherited (Gottfredson 1998). Behling (1998) quotes the instance of several employers hiring people based on general intelligence. He also says that g is probably more important 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. A more recent analysis by Furnham (2008) reviews some of the major studies that have linked intelligence to the workplace to suggest that IQ or g can indeed predict job performance. According to Schmidt and Hunter (2008) general mental ability (GMA) can predict occupational level attained as well as performance in one’s chosen occupation better than any ability, trait, disposition or even job experience.

There is no doubt that the g camp is still going strong with a century of research to back it. But the general intelligence model does not account for artistic ability. It is insufficient to explain the conditional relationship that research has continually highlighted between arts and intelligence. Some researchers even argue that there is no relationship between IQ and artistic ability. For example, Winner (2001) claims that IQ and artistic ability are two completely different constructs. She says that the existence of savants is evidence for the independence of visual or musical arts from intelligence. Savants are individuals who are retarded, autistic or both. Their IQ usually ranges between 40 and 70. Very few of them (fewer than a 100 have ever been reported), have a single exceptional ability. Nadia, an astonishing visual artist, at the chronological age of five and a half, autistic, and with the mental age of three years and three months could draw horses and riders with absolute clarity with no trouble capturing their proportions. Tom, a blind and retarded child, could at four years of age listen to any piece of piano music once and play it back perfectly, retaining all accents and precise rhythm. By citing these examples she counters Gottfredson’s view that wherever high ability is to be found, it correlates well with IQ. While such evidence is anecdotal, it is still powerful and cannot be ignored. Possibly because most studies of the ones quoted here investigating the link between mental ability and the arts have used traditional measures of IQ such as the Wonderlic test or Raven’s matrices, it is difficult to find clear answers to the question, ‘what is the link between mental ability and artistic ability?’ How some theorists have addressed this issue whether intentionally or inadvertently is by broadening the concept of mental ability itself so that it includes artistic ability or at least creativity within its structure. A few of these theories are outlined in the following sub-section.

2.2.4 Theoretical perspectives that include artistic ability within the paradigm of mental ability. Thurstone (1938) was one of the first to say that intelligence comprises of multiple
factors. His Theory of Primary Mental Abilities, states that intelligence consists of seven major factors – Verbal Comprehension, Verbal Fluency, Inductive Reasoning, Spatial Visualization, Number, Memory and Perceptual Speed. An early article describes the ‘Problem of Melody’ (Thurstone 1920), but it talks more about perception and the physical manifestations of music such as pitch, rhythm, etc. A focus on creativity as a part of cognitive ability came with J.P. Guilford’s Structure of Intellect Model. Guilford (1967, 1968) proposed that three dimensions of intelligence were required for an accurate description of human mental ability. He proposed six kinds of Operations, four Content areas where these operations would be applied and six Product areas which involve applying the operation to specific contents. Through an interaction of these three dimensions, his original model was comprised of 120 components. Divergent production – the ability to generate multiple solutions to a problem was one of the operations proposed. This could be applied to any of the content areas – Figural, Symbolic, Semantic or Behavioral, and to any of the products. His conceptualization led to the development of divergent thinking tests which were widely used, but there is no specific mention of artistic ability within his framework of creativity.

Robert Sternberg (1985) postulated the triarchic model of intelligence where he says that successful intelligence comprises a balanced leveraging of three components:

a. Analytical/ Componential intelligence - The ability to complete academic or problem solving tasks that are more structured often with only a single correct answer. It covers what is traditionally measured as intelligence including verbal, mathematical and logical reasoning.

b. Creative or synthetic intelligence - a sort of creative intelligence used to deal successfully with unusual situations, may require seeing things from a different perspective, divergent thinking and generation of new ideas

c. Contextual/ Practical intelligence or the ability to adapt to everyday life, ability to apply knowledge to the real world, what is commonly known as “street smarts”

Sternberg and Grigorenko (2004) administered the Sternberg Triarchic Abilities Test to 326 gifted students admitted into a college level psychology program. The students were randomly assigned to experimental teaching conditions that each emphasized a different form of intelligence – memory, analytical, creative or practical. The results supported the theory in several ways. Firstly, those high in the creative and practical intelligence groups were from more diverse racial, ethnic, socio-economic and educational backgrounds, thus making a case for expanding the definition of intelligence. Secondly, students placed in teaching conditions that matched their pattern of intelligence outperformed others, emphasizing the utility of the theory for educational purposes.

The thing that sets Sternberg’s theory apart from the others is that it includes the contextual aspect of intelligence. Most other theories consider intelligence an independent quantity. That
intelligence of the same person can vary from one context to the other is the new thought that Sternberg introduces.

However, all the three theories – Guilford’s, Cattell’s and Sternberg’s speak of creativity. And although it might be possible to conceptualize artistry as a part of creativity, the authors themselves do not necessarily see it as such. Sternberg (1985) held the view that artistic abilities are not related to intellectual capabilities and Torrance (1963), a major name in creativity research, is himself said to have reported that creative achievements in writing, science, medicine and leadership are more easily predicted than creative achievements in music, visual arts, business or industry. Further, Haroutounian (2002) advised that general creativity tests, aptitude or IQ tests not be used for identifying artistically talented students since they are not suitable for this purpose and may exclude potentially talented art students (Zimmerman 2004).

We therefore come to Gardner’s MI theory which speaks of intelligences that can easily be applied equally to artistic or non-artistic ends. Like the triarchic model, MI theory is also more inclusive, but since it has its genesis in an inquiry into the role of art in education, it is more appealing as a framework to apply with artists. While the multiple intelligences that are described are most definitely cognitive, Gardner clearly states that intelligence comprises of a know-that as well as know-how making the boundaries between the cognitive and non-cognitive a little less impervious. The main tenets of MI theory, its strengths and potential problems, and its applicability in the current context are discussed in the following segment.

2.3 Gardner’s MI Theory

Gardner (1983) challenged the traditional view of intelligence as a unitary capacity that could be measured by traditional IQ tests. Instead, he says that intelligence is ‘the ability to solve problems or create products that would be valued in at least one culture’. Gardner identified eight independently functioning mental abilities or intelligences: Linguistic, Musical, Logical-mathematical, Visual-spatial, Bodily-kinesthetic, Interpersonal, Intrapersonal and Naturalist. A description of the intelligences is given in Table 2.2.

The origin of the theory according to Gardner (2003) lay in his effort to find a place for the arts in developmental and cognitive psychology, which led to his becoming a founder-director of Project Zero, a research group at Harvard School of Education dedicated to researching the use of art in society. He also found support for his theory in his work with individuals suffering partial brain damage, which helped him study the organization of the brain. The reason we enter into a description of the origins of Gardner’s MI theory is that they were non-psychometric, contrasting with the existing models and tests for understanding and measuring intelligence. When developing the concept of general intelligence discussed earlier, researchers were heavily guided by advances in statistics, especially factor analysis, which became pivotal to the vision of mental
ability. In case of MI theory, however, initial support was almost entirely anecdotal. Drawn from his book ‘Frames of Mind’ (1983), the criteria for inclusion of an independently functioning intellectual capacity in his survey of intelligences are as follows:

i. Potential isolation by brain damage (study of lesions and their impact on mental capacities)

ii. The existence of idiots savants, prodigies and other exceptional individuals (unequal development of various mental faculties – extreme cases)

iii. An identifiable core set of operations (neural mechanism which is genetically programmed to be triggered by certain types of information)

iv. Distinctive developmental history along with clear end-states of expert performances

v. An evolutionary history and evolutionary plausibility

vi. Support from experimental psychological tasks

vii. Support from psychometric findings (that tasks that measure the same intelligence should correlate together more than tasks that are supposed to measure different intelligences)

viii. Can be encoded in a symbol system? In fact symbol systems may have evolved in just those cases where there exists a computational capacity ripe for harnessing by a culture

He goes on to say that intelligence is a potential, a capacity and may not always represent application of that capacity. He also says that intelligence is more a “know how” (procedural knowledge) rather than a “know that” (propositional knowledge) although the latter also needed especially at higher levels of mastery of any intelligence. A detailed description of each of the intelligences and the rationale provided by Gardner for identifying an intelligence as such is discussed next

2.3.1 The eight intelligences. In his book Frames of Mind (1983) Gardner originally only spoke of seven intelligences – Linguistic, Logical-mathematical, Visual-spatial, Musical, Kinesthetic, Interpersonal and Intrapersonal. Each of these intelligences has been defined based on case study, experimental evidence, and theoretical possibility. Later on, he added an eighth intelligence – Naturalist intelligence and is currently contemplating adding a ninth Existential intelligence. A description of the intelligences and the rationale for delineating each as an intelligence is outlined in this sub-section. A brief description of the eight intelligences is given in Table 2.2.

Linguistic Intelligence: Comprises of phonology, syntax, semantics and pragmatics, with syntax and phonology being more “core” to language. Biologically, Gardner traces phonology and syntax to processes in the left hemisphere and also cites evidence to show that development of these aspects of linguistic intelligence occur best in early life. Learning of linguistic components in later life seems to be restricted to the semantic and pragmatic aspects of language and can be done with the right hemisphere also. He quotes evidence from decorticated patients to support this
idea and also the case study of Genie, a severely abused child who altogether did not learn to speak until later in life. That linguistic intelligence is a separate intelligence, he construes from a study of aphasic patients, who while losing ability in language, continue to retain ability in other areas, operating as musicians, visual artists or engineers, thus providing a confirmation through negation as it were. His reference to the use of language across cultures, even in pre-literate societies suggests the importance given to linguistic intelligence across the world.

**Table 2.2: Description of the multiple intelligences**

<table>
<thead>
<tr>
<th>Intelligence</th>
<th>Core functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Linguistic</td>
<td>Language, syntax, phonology, semantics, pragmatics</td>
</tr>
<tr>
<td>2 Musical</td>
<td>Pitch, rhythm, timbre</td>
</tr>
<tr>
<td>3 Logical-mathematic</td>
<td>Number, categorization, relations</td>
</tr>
<tr>
<td>4 Visual-spatial</td>
<td>Accurate mental visualization, mental transformation of images</td>
</tr>
<tr>
<td>5 Bodily-kinesthetic</td>
<td>Control of one’s own body, control in handling objects</td>
</tr>
<tr>
<td>6 Interpersonal</td>
<td>Awareness of other’s feelings, emotions, goals, motivations</td>
</tr>
<tr>
<td>7 Intrapersonal</td>
<td>Awareness of one’s own feelings, emotions, goals, motivations</td>
</tr>
<tr>
<td>8 Naturalist</td>
<td>Care of plants, animals, enjoyment of the natural world, classification of flora, fauna and other natural elements</td>
</tr>
</tbody>
</table>

**Musical intelligence:** Comprises at the most basic level of pitch, rhythm and timbre, but also includes more subjective aspects such as the feeling that a particular musical piece inspires, and the ability to express/ discern that feeling. Gardner argues that just like linguistic intelligence, musical intelligence is also a separately existing entity. He describes how there is much more variety in the way musical intelligence manifests itself. For most children learn at least at a basic level to recognize and imitate certain sound patterns and melodies, but except in unusual environments, the development of this competence eases off once they enter the school years, simply because the broader western culture does not prize this intelligence as much as linguistic ability which continues to develop through school. As in the case of linguistic intelligence, he cites bio-neural as well as experimental evidence that suggests that music has to do primarily with the right hemisphere of the brain, quite distinct from other functions. While evolutionary links from other species are not very clear, music does manifest itself in nature (e.g. bird song) satisfying to an extent the criteria of evolutionary history. Ties between music and other abilities such as bodily language/ spatial intelligence and mathematics have been explored, but the correlations according to Gardner are not enough to explain musical competence purely through the lens of the other intelligence. Hence musical intelligence is included in the list.

**Logical-mathematical intelligence:** Can be seen in some exceptional individuals in their ability to remember great quantities of numbers or do impossible calculations, but that is not the core of this intelligence. At a most basic level, logical-mathematical intelligence begins in the interaction of the individual with objects in the physical world. He acts upon these objects –
counts, adds, subtracts, multiplies, divides, etc to understand the most basic principles of mathematics/logic. From here it is a quick journey into abstraction with symbols taking the place of objects and then relationships between symbols becoming more important, until the entire scheme is ideas derive from each other rather than anything remotely physical. Gardner draws heavily upon the work of Jean Piaget to outline the development of the stages of logical thought. He examines the connections between mathematics, logic and science and concludes that while the motivation of each and the applications that the discoveries are put to varies, essentially all three are concerned with the same core set of operations – that of discovering and solving new problems. To understand whether logical-mathematical intelligence is indeed separate from other intelligences, Gardner once more turns to evidence from aphasic and other exceptional individuals as well as experimental/anecdotal evidence. However, biologically, operating in this realm does not seem to be as localized in the brain as in the case of linguistic or musical intelligence. The ability to count, operate with numbers, make logical assertions and discover new truths seem to draw on different areas of the brain making it a more generalized function than the two earlier intelligences.

Spatial intelligence: Comprises several loosely related abilities – such as being able to recognize an object seen from different angles, ability to imagine movement or change to the object and even the ability to imagine different scenarios when the body orientation of the observer itself changes. Central to this intelligence is the ability to perceive things in the visual world correctly, perform transformations or modifications on the initial experience and even recreate a visual experience in the absence of any physical stimuli. Just as linguistic or musical intelligence is not entirely dependent on the sense of hearing; spatial ability is not entirely dependent on the sense of sight, as it can develop quite well even in blind people. That is it a distinct or special form of intelligence has been held by Thurstone and many other psychometricians. There is enough evidence concludes Gardner, from factor analysis done on intelligence test results to suggest that this is indeed a distinct human ability. Just like logical-mathematical intelligence, Gardner draws on Piaget’s work to explain the growth of spatial intelligence, which seems to develop along similar lines – from the concrete world of objects to abstractions and imagined relations between objects. While very high forms of this ability can be found in scientific and artistic realms, there are many practical applications too – such as reading maps and finding your way about or playing chess.

Bodily-kinesthetic intelligence: The core of this form of intelligence is the capacity to control one’s own bodily motions and the capacity to handle objects skillfully. Usually, society regards mental activities as separate from the physical, but Gardner argues that this is not so. To prove that bodily skill is also a manifestation of a special intelligence, he describes how skilled performances require a well honed sense of timing and how the final performance is a result of a constant flow of signals from the environment, their interpretation by the mind and suitable action
by the body. Tracing the early development of bodily intelligence he refers to Piaget’s sensori-motor development and looks to dancing in its many forms as a pinnacle of this form of intelligence. While bodily intelligence gets influenced by other intelligences especially when it acquires a representational aspect, he still says that it is distinct as supported by neuropsychological evidence.

**Personal intelligences:** Gardner conceptualized personal intelligence as two-fold; one facing inward and the other outward. Intrapersonal and interpersonal intelligences are treated together only because their development in many cultures is often inter-mingled. Although each one is distinct in the way it works, neither can develop fully without the other. He offers plenty of biological evidence to support the idea of a personal intelligence isolating it to the frontal lobes of the brain and even postulating the existence of multiple consciousnesses in the two hemispheres of the brain. It is clear when studying human development that there are several stages to achieving knowledge of self and other right from the infant to the mature adult. While the manifestations of this form of intelligence probably have the maximum variance across cultures compared to the other intelligences, Gardner still says that this is a distinct intellectual capacity based on a lot of experimental and anecdotal evidence. For example, patients with Alzheimer’s disease which primarily attacks the posterior parts of the brain, while losing their computational and linguistic abilities, remain well groomed, socially appropriate and continually apologetic about their waning powers. In contrast, those suffering from Pick’s disease which is more focused on the frontal lobes show a rapid loss of social appropriateness. Through this kind of evidence Gardner builds the case for an independently operating intelligence.

**Naturalist intelligence:** In a similar vein as the first seven intelligences, Gardner later conceptualized an eighth intelligence which has to do with nature. There are broadly two aspects to this intelligence. The first is the care of plants, animals and other beings and the second part concerns identifying and classifying types of trees, plants, animals, etc in the environment. This intelligence however has not been described in as much detail as the preceding seven and is still being researched.

A ninth intelligence – existential intelligence is currently being considered, but there is not as yet enough evidence to satisfying all the criteria for inclusion amongst the intelligences. Gardner (2003) says that it is quite possible that new intelligences get added to the list of the original seven that he proposed as an inquiry into the multiple facets of the human mind deepens.

### 2.3.2. Support for MI theory: Validity and Application

It is significant that most support for MI theory comes from educators and other practitioners because it validates what they already observe in day-to-day experience. However, empirical support as defined by the psychometric model is sparse at best. The empirical and project-based studies described here are summarized in Table 2.3. Shearer (1997) the author of probably the only psychometrically constructed measure of MI called the Multiple Intelligences Development Assessment Scale (MIDAS), provides
support in traditional statistical terms for the concept of MI as well as for the utility of the
MIDAS. On a sample of 349 students, factor analysis revealed a grouping of the items as
predicted into the seven subscales with alphas in the region of 0.80 or more, supporting the
validity of the framework. He also gives evidence for the concurrent and predictive validity of the
scales as well as supporting data using contrasted groups. For example, in a study of 400 adults in
different professions, he found that the mean score on musical intelligence for musicians was 73,
but for firemen was 34, similarly mathematical-logical intelligence mean score for engineers was
68 and for elementary teachers was 44. This research strongly supports the concept of multiple
intelligences and explores its use in career development. Preito et al. (2005) while exploring the
validity of the MI model on 294 students between the ages of 5-8, found support for MI using
preliminary factor analysis. The scores of the students grouped together as expected according to
Gardner’s model. The saturation coefficients for each of the intelligence were between 0.73 for
musical intelligence and 0.8 for visual-spatial intelligence. Another study which tested the MI
framework in relation to undergraduates’ professional career choices using the MIDAS was
conducted by Harris and Sykes (2010), who found that students of social science, humanities and
law scored significantly higher than everyone else on verbal-linguistic intelligence. Business
majors scored highest on logical-mathematical intelligence, and natural science majors scored
highest on naturalist intelligence. But since the results showed up in only 35% of the majors
assessed in the survey, he concludes that the effect of the different intelligences is only emerging
as students progress in their education.

Most other studies using MI validate the concept through its application in classrooms around
the world. Research indicates that using an MI approach in the classroom helps students develop
increased responsibility, self-direction and independence, reduce discipline problems, improve
their cooperative learning skills, develop and apply new skills, and even improve academic
achievement on standardized tests above state and national averages (Campbell, 1991). Further,
MI schools report reduced difference in academic achievement between black and white students,
and great amounts of academic success at the elementary, middle level and high school levels
(Campbell and Campbell, 1999).

Project Spectrum was founded in 1984 to develop an MI based innovative approach to
assessment and curriculum delivery for pre-schoolers. By the end of a 1990 classroom program
under Project Spectrum, where children were provided with different stimulating materials in
each of eight disciplines, teachers were able to accurately identify definite strength areas for 13
out of 15 students considered at risk for school failure (Gardner, Feldman and Krechevsky 1998).
By understanding the strengths of the students, teachers were able to engage them better with
educational content. Over the years, several programs conducted under the banner of Project
Spectrum have worked to introduce children to different domain areas, to assess their areas of
strength and even to create bridges between things that they enjoy/ or are good at and regular
curricular content. In a replication of the Spectrum project in Lebanon, Hasan and Maluf (1999) sought to investigate whether Lebanese kindergarten children will exhibit a definite profile of strengths and weaknesses using the MI framework, whether there will be a statistically significant correlation between the activities defined for each intelligences and, whether there will be a difference in mean teachers’ ratings at the year end between the control group and the experimental group. While they found distinct profiles emerging for children and correlations for activities within each intelligence, the study did not report substantial difference in year end teachers’ ratings of performance. They conclude that one year, the period over which the study was implemented was too short to yield substantial results while most projects that do report differences in achievement were conducted over a longer period of time. One factor related to the duration of the project is the comfort and competence of the teachers with the Spectrum method. Although they were trained, it probably takes many years of regular practice with support from all stakeholders before proper implementation can take place. They also say that the measure that was used (teacher’s ratings) was possibly too subjective. They did however find low correlations between intelligences which supports Gardner’s views about several autonomously functioning intelligences.

Hunter (2001) experimented with MI as a way to teach mathematics to her class of adult learners in a preparatory math class. At the start of the course, learners were apprehensive especially as most of them had earlier experienced failure in learning math. Notably, logical-mathematical intelligence was not the preferred intelligence for any of the group members. By using a mix of activities designed to appeal to people with different intelligences such as group work and videos, and innovatively contextualizing problems to appeal to other intelligences than only logical-mathematical (e.g. Premature baldness is one of the greatest fears carried by men. By 30 years of age 30% of men are balding, by 40 years, 40% and so on…draw a graph to represent this relationship between age and percentage of balding men…), Hunter achieved good results with many of the students achieving high distinctions (over 85%) marks. Ferro (2004) applied MI theory in her Spanish classroom to understand what kind of learning activities were preferred by her students. Interestingly, she observed that almost 90% of her students found the individual writing assignments useful while their MI profiles showed that almost 80% of them scored high on intrapersonal intelligence. Similarly, they also reported finding other intrapersonal activities useful. Another study by Hall Haley (2001) found that using an MI-based instructional strategy in a foreign/ second language classroom had great positive impact on instructors’ as well as students’ motivation to learn and students’ feelings towards the teachers using a variety teaching methods.

A research project – ‘Talent beyond words’ identified students who were talented in music, dance or other arts, but were academically at risk due to various reasons. Using an arts-integrated MI approach over a period of three years (1994-1996) general achievement level for the at-risk
group improved substantially and the gap between the at risk group, another group of talented but not at risk students and a third group of neither especially talented nor at risk students, reduced substantially (Baum, Viens and Slatin 2005). More recently, Castejon, Perez and Gilar (2010) conducted a confirmatory factor analysis of Project Spectrum activities on a sample of 393 kindergarten and first grade children in Spain, and found some evidence to support the theory of MI. The alphas they reported for the various intelligences were high; 0.63 for linguistic intelligence to 0.89 for spatial intelligence. But they also found that the goodness of fit of the model proposed improved if they accounted for a second order general intelligence factor along with Naturalistic, Bodily-kinesthetic, Linguistic, Logical-mathematical, Spatial and Musical intelligences. They concluded that Spectrum activities are neither as separate as proposed by the defenders of the MI theory, nor are they as unitary as explained by those of the g camp.

In an attempt to integrate the MI and Triarchic theories of intelligence, Shearer (2006) found that high innovation college students also scored high on MI scales pertaining to their educational focus and career direction. E.g. Music major who scored high on innovation also excelled in musical intelligence. This shows that some people have a general propensity for creative thinking (in line with Sternberg’s view that creative intelligence manifests across domains), but along with a specific intellectual strength that matches with well-defined careers and educational endeavor (echoing Gardner’s view that intelligence is context specific). Similar results were found for practical intelligence and some of the MI scales. The high Logical-mathematical group was less diverse, but also scoring high on intelligences pertaining to their chosen area of work. Particularly noteworthy was the observation that those scoring high on logical-mathematical intelligence also almost always scored high on intrapersonal intelligence – thus supporting the idea that metacognition is key to academic success.

Hoffman and Frost (2006) linked MI to transformational leadership and found some encouraging results. They used the assessment center methodology to measure social, emotional and cognitive intelligences of leaders and found that cognitive intelligence was significantly related to intellectual stimulation, social intelligence to perceptions of charisma and emotional intelligence was related to individualized consideration. Although the study uses the MI framework proposed by Bass (2001), and not all the hypotheses were completely validated, it is still indicative of an idea worth investigating; that is of the possible links between multiple intelligences and leadership.

In a very interesting case study, Newbold (1999) traces the similarities between the working of the minds of two great contemporaries – Albert Einstein and Pablo Picasso and says that both were gifted with visual-spatial ability. She draws similarities between the thought patterns of Einstein’s quantum physics and Picasso’s cubism – both requiring a clear understanding of parts and their relationship to the whole. Both men were redefining space, time and objects, but in very different ways. She concludes by asking the question that if the childhood backgrounds of the two
had been different, could Picasso have been a scientist or Einstein an artist? The case study is a good example for saying that same intelligence could lead to different outcomes depending on environment. However, the relationship is far from linear if we study the phenomenon across a number of individuals. Additionally, the other factor also highlighted is the co-presence of a different intelligence in each great mind: in Einstein’s case Logical-mathematical and in Picasso’s case probably Bodily-kinesthetic combined with a keen interest in people.

Table 2.3: Summarizing some of the support for MI theory

<table>
<thead>
<tr>
<th>Research focus</th>
<th>What researchers found</th>
</tr>
</thead>
</table>
| **Statistical/ psychometric support for MI theory:** Where tools measuring MI are used, factor analysis supports the existence of multiple intelligences. There is also evidence for criterion-validity of each of the intelligences. Note that the tools used in these studies are self-report questionnaires. Given the non-psychometric origins of MI theory, it is not surprising that statistical evidence is thin. However, evidence from applied projects is strong. | • Shearer (1997) - factor analysis revealed seven subscales with alphas of 0.80 or more; evidence found for concurrent and predictive validity of scales  
• Preito et al (2005) - saturation coefficients for each of the intelligence were between 0.73 for musical intelligence and 0.8 for visual-spatial intelligence  
• Shearer (2006) – relationship between MI scores and educational focus/ career direction; between logical-mathematical intelligence and interpersonal intelligence – perhaps meta-cognition is key to academic success?  
• Harris and Sykes (2010) – correspondence between MI profile and choice of major; the effect of the different intelligences is only emerging as students progress in their education |
| **Applied studies in education:** The purpose behind the educational projects quoted was invariably to improve academic performance or overall development. The MI theory was applied toward that end and the findings indicate that individuals probably do have multiple cognitive gifts as described by MI theory, and an MI based approach in the classroom is facilitative of learning and performance, especially for educationally at-risk groups. | • Campbell (1991) - MI approach in classroom helps students develop increased responsibility, self-direction, independence, reduce discipline problems, improve cooperative learning skills, develop and apply new skills, and improve academic achievement  
• Gardner, Feldman and Krechevsky (1998) - teachers able to identify strength areas for 13 out of 15 students considered at risk for school failure  
• Campbell and Campbell, 1999 - reduced difference in academic achievement between black and white students using MI based instruction  
• Hasan and Maluf (1999) - distinct MI profiles for children; correlations for activities within each intelligence; low correlations found between intelligences  
• Hall Haley (2001) - MI-based instructional strategy had great positive impact on instructors’ as well as students’ motivation to learn  
• Hunter (2001) – got good results using an MI based approach to teach mathematics  
• Ferro (2004) – correspondence between preferred learning activities and MI profile  
• Baum, Viens and Slatin (2005) – Art based MI approach reduced difference in academic performance between at-risk artistic students and not-at-risk artistic students  
• Castejon, Perez and Gilar (2010) – reported high alphas between 0.63 for linguistic intelligence to 0.89 for spatial intelligence. Goodness of fit of the model improved if they accounted for a second order general intelligence factor |
Loori (2005) investigated gender differences in preference for using different intelligences while learning. The study found that males had significantly greater preference for learning involving logical mathematical activities while females significantly preferred learning involving intrapersonal activities. More interesting than the gender differences were the possible reasons discussed for the differences indicating the impact of socio-cultural factors on the intelligences such as parenting practices and sex role socialization. The study therefore suggests that the expression of intelligence is moderated by environmental factors. The evidence supporting MI theory is increasing. Considering that it is only two decades old, the research results are promising. Perhaps due to its conceptual and demographic inclusiveness it has gained widespread popularity in applied projects around the world. However, MI theory has come in for a lot of criticism too mainly because it does not lend itself easily to psychometric evaluation and because it is conceptually too broad. The main objections raised by scholars to MI theory are captured below.

2.3.3. Criticisms of MI theory. The primary criticism leveled against MI theory is that it is not based on psychometric principles, but rather on accumulated anecdotal evidence. In the same vein, not much effort has been made by Gardner and his followers to create comprehensive measures for the various intelligences and validate them against existing established tests measuring similar domains (Towers 1988). Klein (1997) says that there are two contrasting dilemmas to be resolved. If the intelligences are indeed independent, how can we explain their working together? If they are not independent, then are they not just different aspects of g? Even while explaining exceptional performance, each individual chosen to illustrate a domain seems to excel only in a small part of the domain. E.g. Babe Ruth exemplifies according to Gardner, outstanding bodily-kinesthetic intelligence, but only in sport. Similarly, the game of chess requires spatial ability. But Klein says that the best chess players are no more likely than others to do well on spatial tasks and in fact are less likely to work in professions involving spatial problems as compared to professions in the humanities, such as writing. The same argument holds for savants.

A related point is that most of Gardner’s intelligences are content specific, going against Spearman’s concept of the “indifference of the indicator”. That is, the nature of g is such that it will show itself no matter what the content of the test is about – be it verbal, numerical, abstract reasoning or a variety of other items. It is general intelligence and factor analysis over the years seems to have supported it. Thus Gardner’s assertion that g only pertains to school-like tasks is not true (Towers [1988], Visser, Ashton and Vernon [2006]). Moreover, Gardner talks about very specific intelligences which look more like talents or skills and are probably not mental abilities at all. It is unclear, according to Gottfredson (1998) whether Gardner’s intelligences tap motor skills and personality traits or narrow capabilities and achievements rather than mental aptitudes. As Darius (2008) states, it is not that previous generations of researchers ignored the
outstanding abilities of athletes or musicians. But they called these things abilities, or aptitudes rather than intelligence.

Klein (1997) quotes several researchers to describe how the theory of MI has been rejected outright by many on the grounds that it correlates with IQ or g, and therefore the intelligences are nothing but subsets of g. He goes on to say that it does not sufficiently explain overlaps in the intelligences and how they work together. In his words, ‘…if the concept “mammal” is linguistic intelligence, how does naturalist intelligence function without this knowledge?’ Lohman (2001) also shares this view and states that any theory of human abilities that ignores general ability, a central working memory and inductive reasoning is flawed. Klein further states that the theory of MI is prone to two objections which also apply to the concept of g, which are that the cognitive structures are far too broad to apply to specific educational tasks, and that both offer very static interpretations of ability and say nothing about the process of learning. Clifford Morris in his website www.igs.net has summarized and compiled a list of researchers from the 1980s and 1990s who disagree on various counts with Howard Gardner’s work. The list includes names such as Nathan Brody, John Carroll, MW Eyesenck, Arthur Jensen, Perry Klein, Robert Sternberg, and even Howard Gardner himself who in a 1994 paper comments that his own model does not incorporate any underlying executive processes for how the brain works. Effectively, the criticisms leveled at the theory whether on biological, psychological or empirical basis arrive at the same two points described above.

Despite these issues, I have preferred the MI framework for use in this research project for two reasons. Firstly, because it is the only theory of mental ability that includes artistic ability directly within its structure; this point has been discussed earlier in the literature review. Secondly, because it aligns very well with varied perspectives on intelligence including the Indian view of intelligence, which is non-unitary. An exploration of the Indian view of intelligence and the alignment of MI theory follows.

2.4. Applicability of MI theory in non-western, especially Indian context

Having taken a look at the basic propositions of MI theory as well as the debates raging around it, an evaluation of MI theory for the purpose of this study would be incomplete without addressing the issue of its relevance to the Indian context. 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 might be quite different. So when we say the Indian view on intelligence, we could be speaking of any of these perspectives. An overview of the different perspectives is given in Table 2.4.
Table 2.4: Brief description of the Indian views of intelligence

<table>
<thead>
<tr>
<th>Perspectives</th>
<th>Description</th>
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<tbody>
<tr>
<td>1 Sanskrit-Indian view</td>
<td>Intelligence is almost only discussed in the context of knowledge that will enable enlightenment manifest in the word ‘Buddhi’. It includes determination, mental effort, and even feelings and opinions in addition to such processes as knowledge, discrimination and decision making.</td>
</tr>
<tr>
<td>2 Vedic view</td>
<td>Consciousness pervades all animate and inanimate things. Discrimination or intelligence is an additional power that humans have, which is there in order to realize his/her own oneness with the universal consciousness.</td>
</tr>
<tr>
<td>3 Intelligence as delineated by folk-tales</td>
<td>Stories from the Panchatantra, folk tales of Birbal, Tenali Raman or Gopal all speak of the superiority of a practical, creative intelligence rather than facility with words or numbers.</td>
</tr>
<tr>
<td>4 Congruence between traditional and contemporary views</td>
<td>Analysis of Sanskrit suktis, Hindi proverbs and interviews with 1885 men and women across rural and urban India revealed four aspects of intelligence – Cognitive competence, Social competence, Entrepreneurial competence and Emotional competence (Srivastava and Misra, 2007)</td>
</tr>
</tbody>
</table>

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. 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 Buddhi depends 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 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 called 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 will experience peace and happiness.

The Indian view of intelligence can also be explored by examining Indian lore. One story from the Panchatantra (a set of educational fables drawn from the oral traditions in India) describes the lion that sprang to life (retold as The Scholars and the Lion in Govindan 2007). 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 the 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 learned scholars. Another story describes the fish Shatabuddhi and Sahasrabuddhi and their friend the frog Ekabuddhi (recounted as Hundred-wit, Thousand-wit and Single-wit in Ryder 1925). Both the fish were handsome as well as intelligent and knew many tricks to escape any trap. When they heard 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 they 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.
That is not to say that everybody in India looks at intelligence as non-academic or practical. The IQ camp received a substantial boost as India adopted the western system of education during the British rule and also during the brain drain of the eighties and nineties with the focus on competitive examinations such as SAT or GRE. With the growth of psychology as a discipline of study in India, there has also been a lot of research using the western models of IQ. Das and Thapa (2000) discuss many of the prominent studies of this kind and the findings in these are not very different from that of western researchers covered earlier. But the trend of late is once more to enable all round development rather than only academic success and because there are so many views within the Indian view of intelligence, it is necessary to examine whether they can be reconciled into a single model.

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, adaptive, and 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 across 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. It is possible to see that there is also a lot of commonality between MI theory and the Indian view of mental ability. They both see intelligence as varied, as not necessarily related only to school-like tasks, as involving know-how and applied aspects and as not so tightly separated from the non-cognitive aspects of individuals.

However, MI theory is still perceived largely as an American import and I attempt to provide some evidence here to suggest that it need not necessarily be viewed as such. While it is true that it was given concrete shape by Gardner working at Harvard, there has been over the years a lot of interaction between MI theory and cultures across the world. The traditional system of education in Norway, for example, places a lot of emphasis on outdoor education and correspondingly, on the development of the Naturalist intelligence. Given the topography of the country with its wide open spaces and low population, one can see why this is so. Thomas Armstrong (2009) in the book *Multiple Intelligences Around the World* quotes an instance where it is not MI theory which has brought something new to the Norwegian system of education but their practice of outdoor
education which brought something new to MI theory. Most of his observations of the naturalist intelligence at work in schools in the US consisted of occasional garden visits or ecology curriculum or pets in the classroom. But in Norway, he found that elementary school children spend a full day each week in outdoor learning. In one session that he observed, it started raining and instead of packing up and heading indoors as typical American educators would have done the children just put on windbreakers, caps or jackets and continued to work. He also quotes reports from educators that describe how children who often fail in the traditional western classroom setting perform well in the outdoors where they are able to channel their energies into real tasks instead of dealing with theory. He says therefore that this method of encompassing outdoor education is a gift to MI theory and especially to naturalist intelligence rather than the other way around.

In the same book, Jie-Qi Chen describes the integration of MI theory in Chinese educational practices. Chinese people conceptualize intelligence as an attribute of the family, hence MI practices in China involve the whole family. The strengths, interests and skills of the entire family unit are looked at and by looking at the family profiles, educators explore to what extent a child’s particular strengths reflect parental interests and how a home environment may support the education of the child’s intelligences. MI educators emphasize the importance of a child learning the feelings, values, needs and interests of the parents. This is as important as parents knowing more about their child. The better the child understands the parents, the more he or she appreciates their efforts and recognize when their own behavior mirrors or deviates from their parent’s values. Understanding how they are similar or different from their parents contributes to greater self awareness and identity formation.

Similar accounts from all over the world indicate that MI theory today is not something that is built only upon the foundations of American culture. It is changing and growing in different directions. Gardner himself in the book calls MI a meme – a unit of meaning – that has acquired a life of its own, spreading across the globe and getting apprehended and applied in a number of different ways. While the structure and form of MI theory may have originated in America, it resonates very well with, and even draws ideas from many cultures across the world and can surely be harnessed for application in the Indian context as well.

2.5. Summing up

The literature covered in this chapter suggests that there is a major cognitive component to artistic ability. The initial research in the early part of the twentieth century marked several observations of a linkage between artistic ability and intelligence. However, most of the results were correlational and did not explore how this relationship works. Interest in understanding the causal nature of this relationship spawned several experimental projects that explored the impact arts
training would have on other cognitive areas such as mathematical ability, visual-spatial skills or reading ability. While the results of these studies were also promising, the generalizability of these studies was limited. One of the reasons for this conservative viewpoint across studies was that there are possibly many non-cognitive components to art that impact the relationship between arts training and other cognitive abilities. The other prominent explanation was that the definition of mental ability used in most of the early studies was limited to the concept of IQ and did not account for artistic abilities. By applying to Gardner’s (1983) theory of multiple intelligences, both these issues get addressed to some extent. The theory is broad enough that the line between cognitive and non-cognitive gets blurry in the manifestation of any intelligence. Secondly, the structure of the model itself includes artistic thinking since the theory originated in a project advocating the use of arts in education.

MI theory has certainly created a lot of impact in the fields of education, psychology, human development and even psychometrics. There is no doubt that the idea of having several independently functioning intelligences is captivating. Indeed it is not a new one. Thurstone was one of the first to propose it followed by many others. What is called aptitude (e.g. by the Differential Aptitude Test or other General Aptitude Test Batteries) also seems to overlap with the concept of MI. What are new though, are the criteria Gardner uses to determine whether or not a particular intellectual capacity merits inclusion in the list of human intelligences. Experts have criticized these criteria for being subjective, but it is that very feature that allows such a broad conception of intelligence. The appeal of MI theory lies in the fact that it is simple to understand and draws easily from the wisdom of several cultures around the world. Without reducing the importance of empirical data and procedures, MI theory looks beyond to see what positive change can be brought about for the benefit of individuals.

It is important for researchers in this area to now systematically test the theory in different contexts and with diverse populations and amass more empirical data. The concept is less than three decades old whereas the idea of ‘g’ has more than a century of research behind it (and yet it is not decisive or free from controversy). MI being popular with practitioners has had its upside and downside. Because it got such a large following especially in education in the United States it was possible to generate preliminary information about how it works. But there are many instances where implementation has only raised further questions. For example Ferro (2004) in a teacher action research project diligently studied the MI profiles of her students and got feedback from them on how they view teaching methodology. But how practical is it to design a special program for each student? Is it even desirable? As Ferro pointed out, though her students prefer intrapersonal activities, she wishes them to use more interpersonal activities too and encourage them to take risks in using a language rather than just stick to their comfort zone.

There are also times when a particular piece of knowledge simply cannot be approached as effectively through alternate intelligences. E.g. Music can be taught using verbal and logical
methods, the theory, the way tunes are structured etc can be explained and understood using these two intelligences. But if the goal is to develop a musician or even to develop an individual who will appreciate the quality of music, then it is just not enough. At some point music has to be approached through music and through no other medium. Same goes for dance, sport, medicine, law and even management. Any teaching method, therefore, which tries to approach the content of any one intelligence only through the path of some other intelligence, will have limited success; which is what has happened with several practitioners who tried to attune their teaching to the learning styles of the students.

The converse is also true. Gardner says that an intelligence is mostly about “know-how” rather than a “know that”. But he also states that advanced levels of any intelligence also require a fair amount of “know-that” or propositional knowledge around that intelligence. This conversion of “know-how” to “know- that” is probably only possible if there is an interaction between intelligences. For example, while teaching music, the musically gifted student may easily be able to copy the performance of a string of notes, but only when given labels (i.e. use of linguistic intelligence) will the knowledge crystallize and skill/ “know-how” in the musical domain itself improve. The matter only gets more complicated because in most activities of life, several intelligences act together to solve problems or produce certain results. The issue lies in moving from a very broad theory to implementation in extremely micro contexts without strong bridges of research to support the transition. This research aims to contribute a brick or two towards building those bridges to allow easy passage across whether for war or hopefully for peace.