

Beyond *g*: Putting multiple intelligences theory to the test

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Abstract

We investigated Gardner's "Theory of Multiple Intelligences" in a sample of 200 adults. For each of the hypothesized eight "intelligence" domains—Linguistic, Logical/Mathematical, Spatial, Interpersonal, Intrapersonal, Musical, Bodily-Kinesthetic, Naturalistic—we selected two tests based on Gardner's description of its content. Factor analysis revealed a large *g* factor having substantial loadings for tests assessing purely cognitive abilities—Linguistic, Logical/Mathematical, Spatial, Naturalistic, Interpersonal—but lower loadings for tests of other abilities, especially Bodily-Kinesthetic. Within most domains, the two tests showed some (weak) non-*g* associations, thus providing modest support for the coherence of those domains, which resemble the group factors of hierarchical models of intelligence. Results support previous findings that highly diverse tests of purely cognitive abilities share strong loadings on a factor of general intelligence, and that abilities involving sensory, motor, or personality influences are less strongly *g*-loaded.

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1. Introduction

The notion of general intelligence or *g* (e.g., Spearman, 1927) had long been broadly accepted by psychologists when Howard Gardner introduced Multiple Intelligences (MI) theory in his 1983 book, *Frames of Mind*, proposing that there are several independent ability areas. Gardner (1993) described intelligence as a biopsychological potential that could be influenced by experience, culture, and motivational factors. He defined intelligence as the ability to solve problems and to fashion products that are culturally valued. Gardner (1983) initially proposed that there were seven intelligences: Linguistic, Spatial, Logical/Mathematical,

Interpersonal, Intrapersonal, Bodily-Kinesthetic, and Musical. He has more recently added Naturalistic intelligence and has suggested that an Existential intelligence might exist, but that a hypothesized Spiritual intelligence does not (Gardner, 1999).

Gardner (1999) stated that his choice of the word "intelligences" was a deliberate one, noting that if he had written a book referring to "faculties" or "gifts," it is unlikely that his theory would have garnered the attention that it has. Gardner has professed to be quite willing to refer to his eight intelligences as talents or abilities, but only if verbal and quantitative abilities are referred to as talents. Gardner has argued that there is no hierarchy of ability, and that Linguistic and Logical/Mathematical abilities are of no greater real-life importance than any of the other "intelligences".

Gardner (1999) explained that he reviewed hundreds of studies before publishing *Frames of Mind*, and that he

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assessed all candidate intelligences on the basis of eight criteria: the potential of isolation by brain damage; an evolutionary history and evolutionary plausibility; an identifiable core operation or set of operations; susceptibility to encoding in a symbol system; a distinct developmental history; the existence of savants, prodigies, and other exceptional people; support from experimental psychological tasks; and support from psychometric findings. Gardner (1983) admitted that the criteria were somewhat flexible; some intelligences which might have met all criteria, such as face-recognition, were discarded because they were not highly valued within cultures. In addition, Gardner retained candidate intelligences which seemed promising even if they did not meet every criterion.

MI theory was enthusiastically welcomed by many educators and parents (Daz-Lefebvre, 2004; Mettetal, Jordan, & Harper, 1997). Here, Gardner's message that children have unique and diverse abilities meshed well with educators' intuitive sense that children learn in very different ways. Indeed, Gardner's premise seemed far more egalitarian than did notions of *g*. MI theory seemed to say that a child who performed poorly in, say, math and reading had just as great a chance as anyone else at being successful in music, art, physical education, or even geography: everyone could be smart in some way. At a time when standardized testing in US schools had become highly controversial, Gardner (1983, p. 3) claimed that IQ tests had little utility in predicting success beyond school. This claim, however, is clearly contradicted by Gottfredson's (2002) finding that no meta-analysis has reported exceptions to the generality of *g* in predicting job performance, with brighter employees always performing better on average than less intelligent employees.

Although Gardner (1999) has acknowledged the existence of *g*, he has continued to question its explanatory power. In addition, he has maintained that each of his intelligence domains has unique processing resources, and that there are no horizontal capacities, such as memory or creativity, that cut across all hypothesized intelligences. Instead, he views creativity as an operation performed within a domain, rather than as a general, cross-cutting ability. Gardner has suggested that executive functioning likely emerges from Intrapersonal intelligence rather than constituting an intelligence of its own or a horizontal capacity. Gardner (1999, p. 106) stated that he had no objection to others invoking an executive function, but that for the purposes of modeling mental abilities, "it is useful to see whether one can explain human behavior in the absence of such hierarchical considerations, or whether the hierarchy can

emerge naturally, as part of everyday functioning, rather than by invoking a separate executive intelligence".

MI theory proposes that the eight intelligence domains are theoretically independent, but Gardner (1993) has acknowledged that two or more could overlap. He cautioned, however, that correlations among subtests of standardized intelligence tests occur because the tasks all rely on rapid responses to items that are heavily based on logical/mathematical and linguistic abilities. However, Messick (1992) noted that variability in reading ability should not influence intelligence test performance as long as all participants are able to easily understand the task instructions. Gardner has expressed concern about the "verbal lens"—that is, the use of a common verbal format to assess all aspects of intelligence—but Messick claimed that the reasoning component of the Logical/Mathematical domain is a far more ubiquitous element across tests of cognitive ability. Messick noted that the reasoning that a person employs to solve a novel task in an intelligence domain other than Logical/Mathematical appears more similar to a horizontal, cross-cutting ability than to method variance. In a similar vein, Lohman (2001) argued that inductive reasoning, with its component of central working memory, was equivalent to *g*.

The content of Gardner's intelligence domains suggests some similarities to the group factors of hierarchical models of intelligence (e.g., Vernon, 1961), and Carroll (1993) has pointed out that Gardner's intelligences bear a striking similarity to the second-stratum factors of Carroll's hierarchy. For example, Carroll noted that Gardner's Linguistic intelligence corresponded to the factor of crystallized intelligence, Musical intelligence to auditory perception ability, Logical/Mathematical intelligence to fluid intelligence, and Spatial intelligence to visual perception. Interpersonal or social abilities, in Carroll's framework, were represented to some extent in first-stratum factors of knowledge of behavioral content (with separate factors emerging for convergent and divergent tasks assessing those abilities). Carroll stated that only Gardner's Bodily-Kinesthetic and Intrapersonal intelligences appeared to have no counterpart in second-stratum factors. However, psychomotor ability is not typically recognized as an aspect of cognitive ability and, thus, Bodily-Kinesthetic ability would not be represented in hierarchical models. Carroll noted that adequate measures of intrapersonal ability have never been included in factor analytic studies of cognitive structure. Gardner had not introduced his eighth domain, Naturalistic intelligence, at the time of Carroll's writing, but the categorization of objects would seem to be related to logical reasoning.

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