

# Guilford's SI Theory: Decoding the 150 Facets of Human Mind

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According to Guilford's Structure of Intellect (SI) theory, an individual's performance on intelligence tests can be traced back to the underlying mental abilities or factors of intelligence. SI theory comprises up to 150 different intellectual abilities organized along three dimensions--Operations, Content, and Products.

### **Operations dimension**

SI includes six operations or general intellectual processes:

Cognition--The ability to understand, comprehend, discover, and become aware of information.

Memory recording--The ability to encode information.

Memory retention--The ability to recall information.

Divergent production--The ability to generate multiple solutions to a problem; creativity.

Convergent production--The ability to deduce a single solution to a problem; rule-following or problem-solving.

Evaluation--The ability to judge whether or not information is accurate, consistent, or valid.

### **Content dimension**

SI includes five broad areas of information to which the human intellect applies the six operations:

Visual--Information perceived through seeing.

Auditory--Information perceived through hearing.

Kinesthetic--Information perceived through one's own physical actions.

Symbolic--Information perceived as symbols or signs that have no meaning by themselves; e.g., Arabic numerals or the letters of an alphabet.

Semantic - Which is concerned with verbal meaning and ideas.

Behavioral--Information perceived as acts of people.

### **Product dimension**

As the name suggests, this dimension contains results of applying particular operations to specific contents. The SI model includes six products, in increasing complexity:

Units--Single items of knowledge.

Classes--Sets of units sharing common attributes.

Relations--Units linked as opposites or in associations, sequences, or analogies.

Systems--Multiple relations interrelated to comprise structures or networks.

Transformations--Changes, perspectives, conversions, or mutations to knowledge.

Implications--Predictions, inferences, consequences, or anticipations of knowledge.

Therefore, according to Guilford there are  $5 \times 5 \times 6 = 150$  intellectual abilities or factors. Each

ability stands for a particular operation in a particular content area and results in a specific product, such as Comprehension of Figural Units or Evaluation of Semantic Implications.

Guilford's original model was composed of 120 components because he had not separated Figural Content into separate Auditory and Visual contents, nor had he separated Memory into Memory Recording and Memory Retention. When he separated Figural into Auditory and Visual contents, his model increased to  $5 \times 5 \times 6 = 150$  categories. When Guilford separated the Memory functions, his model finally increased to the final 180 factors [Guilford, J.P. (1988). Some changes in the structure of intellect model. *Educational and Psychological Measurement*, 48, 1-4.

### **Criticism**

Guilford's approach is rejected by intelligence researchers who support the existence of a general factor of mental ability. For example, according to Jensen (1998), Guilford's contention that a g-factor was untenable was probably influenced by his observation that a considerable number of cognitive tests of U.S. Air Force personnel did not show correlations that were significantly different from zero. However, Jensen states that according to later reanalyses, this resulted from artifacts such as sampling errors, restriction of range, and measurement errors. With proper corrections for these artifacts, all of the correlations in Guilford's data sets are positive.

Several researchers have criticized the statistical techniques used by Guilford. In one analysis, which used Guilford's own data and factorial procedures, randomly generated factorial theories were found to be as well supported as his own theory.

Guilford's Structure-of-Intellect model of human abilities has few supporters today. Carroll (1993) summarized the view of later researchers:

"Guilford's SOI model must, therefore, be marked down as a somewhat eccentric aberration in the history of intelligence models; that so much attention has been paid to it is disturbing, to the extent that textbooks and other treatments of it have given the impression that the model is valid and widely accepted, when clearly it is not."