

Cattell-Horn-Carroll (CHC) Broad and Narrow Cognitive Ability Definitions

(3rd draft; 3-11-09; Kevin McGrew)

Fluid reasoning (Gf): The use of deliberate and controlled mental operations, often in a flexible manner, to solve novel problems that cannot be performed automatically. Mental operations often include drawing inferences, concept formation, classification, generalization, generating and testing hypothesis, identifying relations, comprehending implications, problem solving, extrapolating, and transforming information. Inductive and deductive reasoning are generally considered the hallmark indicators of *Gf*. *Gf* has been linked to cognitive complexity which is typically defined as the greater use of a wide and diverse array of elementary cognitive processes during performance. Historically is often referred to as fluid intelligence.

General Sequential (deductive) Reasoning (RG): Ability to start with stated assertions (rules, premises, or conditions) and to engage in one or more steps leading to a problem solution. The processes are deductive as evidenced in the ability to reason and draw conclusions from given general conditions or premises to the specific. Often known as hypothetico-deductive reasoning.

Induction (I): Ability to discover the underlying characteristic (e.g., rule, concept, principle, process, trend, class membership) that underlies a specific problem or a set of observations, or to apply a previously learned rule to the problem. Reasoning from specific cases or observations to general rules or broad generalizations. Often requires the ability to combine separate pieces of information in the formation of inferences, rules, hypotheses, or conclusions.

Quantitative Reasoning (RO): Ability to inductively (I) and/or deductively (RG) reason with concepts involving mathematical relations and properties.

Piagetian Reasoning (RP): Ability to demonstrate the acquisition and application (in the form of logical thinking) of cognitive concepts as defined by Piaget's developmental cognitive theory. These concepts include seriation (organizing material into an orderly series that facilitates understanding of relations between events), conservation (awareness that physical quantities do not change in amount when altered in appearance), classification (ability to organize materials that possess similar characteristics into categories), etc.

Speed of Reasoning (RE): Speed or fluency in performing reasoning tasks (e.g., quickness in generating as many possible rules, solutions, etc., to a problem) in a limited time. Also listed under *Gs*.

Comprehension-knowledge (Gc): The knowledge of the culture that is incorporated by individuals vis-a-vis a process of acculturation. *Gc* is typically described as a person's breadth and depth of acquired knowledge of the language, information and concepts of a specific culture, and/or the application of this knowledge. *Gc* is primarily a store of verbal or language-based declarative (knowing *what*) and procedural (knowing *how*) knowledge acquired through the investment of other abilities during formal and informal educational and general life experiences. Historically is often referred to as crystallized intelligence.

Language Development (LD): General development or understanding and application of words, sentences, and paragraphs (not requiring reading) in spoken native language skills to express or communicate a thought or feeling.

Lexical Knowledge (VL): Extent of vocabulary (nouns, verbs, or adjectives) that can be understood in terms of correct word (semantic) meanings. Although evidence indicates that vocabulary knowledge is a separable component from LD, it is often difficult to disentangle these two highly connected and corrected abilities in research studies.

Listening Ability (LS): Ability to listen and understand the meaning of oral communications (spoken words, phrases, sentences, and paragraphs). The ability to receive and understand spoken information.

General (verbal) Information (K0): Range of general stored knowledge (primarily verbal).

Information about Culture (K2): Range of stored general cultural knowledge (e.g., music, art, literature).

Communication Ability (CM): Ability to speak in "real life" situations (e.g., conversation, lecture, group participation) in a manner that transmits ideas, thoughts, or feelings to one or more individuals.

Oral Production and Fluency (OP): More specific or narrow oral communication skills than reflected by CM. Poorly defined by current research.

Grammatical Sensitivity (MY): Knowledge or awareness of the distinctive features and structural principles of a native language that allows for the construction of words (morphology) and sentences (syntax). Not the skill in applying this knowledge.

Foreign Language Proficiency (KL): Similar to Language Development but for a foreign language.

Foreign Language Aptitude (LA): Rate and ease of learning a new language.

General (domain-specific) knowledge (Gkn): The breadth, depth and mastery of a person's acquired knowledge in a specialized (demarcated) subject matter or discipline domains that typically do not represent the general universal experiences of individuals in a culture (*Gc*). *Gkn* reflects deep specialized knowledge domains developed through intensive systematic practice and training (over an extended period of time) and the maintenance of the knowledge base through regular practice and motivated effort (a.k.a., expertise).

Knowledge of English a Second Language (KE): Degree of knowledge of English as a second language.

Knowledge of Signing (KF): Knowledge of finger-spelling and signing (e.g., ASL) used in communication with the deaf or hard of hearing.

Skill in Lip-reading (LP): Competence in ability to understand communication from others by watching the movement of their mouths and expressions (lip reading). Also known as speech reading.

Geography Achievement (A5): Range of geography knowledge (e.g., capitals of countries).

General Science Information (K1): Range of stored scientific knowledge (e.g., biology, physics, engineering, mechanics, electronics).

Mechanical Knowledge (MK): Knowledge about the function, terminology and operation of ordinary tools, machines, and equipment. Since these factors were identified in research prior to the information/technology explosion, it is unknown if this ability generalizes to the use of modern technology (e.g., faxes, computers, internet).

Knowledge of Behavioral Content (BC): Knowledge or sensitivity to nonverbal human communication/interaction systems (beyond understanding sounds and words; e.g., facial expressions and gestures) that communicate feelings, emotions, and intentions, most likely in a culturally patterned style.

Visual processing (Gv): The ability to generate, store, retrieve, and transform visual images and sensations. *Gv* abilities are typically measured by tasks (viz., figural or geometric stimuli) that require the perception and transformation of visual shapes, forms, or images and/or tasks that require maintaining spatial orientation with regard to objects that may change or move through space.

Visualization (Vz): The ability to apprehend a spatial form, object, or scene and match it with another spatial object, form, or scene with the requirement to rotate it (one or more times) in two or three dimensions. Requires the ability to mentally imagine, manipulate or transform objects or visual patterns (without regard to speed of responding) and to "see" (predict) how they would appear under altered conditions (e.g., parts are moved or rearranged). Differs from Spatial Relations (SR) primarily by a de-emphasis on fluency.

Spatial Relations (SR): Ability to rapidly perceive and manipulate (mental rotation, transformations, reflection, etc.) visual patterns or to maintain orientation with respect to objects in space. SR may require the identification of an object when viewed from different angles or positions.

Closure Speed (CS): Ability to quickly identify a familiar meaningful visual object from incomplete (e.g., vague, partially obscured, disconnected) visual stimuli, without knowing in advance what the object is. The target object is assumed to be represented in the person's long-term memory store. The ability to "fill in" unseen or missing parts in a disparate perceptual field and form a single percept.

Flexibility of Closure (CF): Ability to identify a visual figure or pattern embedded in a complex distracting or disguised visual pattern or array, when knowing in advance what the pattern is. Recognition of, yet the ability to ignore, distracting background stimuli is part of the ability.

Visual Memory (MV): Ability to form and store a mental representation or image of a visual shape or configuration (typically during a brief study period), over at least a few seconds, and then recognize or recall it later (during the test phase).

Spatial Scanning (SS): Ability to quickly and accurately survey (visually explore) a wide or complicated spatial field or pattern and identify a particular configuration (path) through the visual field. Usually requires visually following the indicated route or path through the visual field.

Serial Perceptual Integration (PI): Ability to identify (and typically name) a pictorial or visual pattern when parts of the pattern are presented rapidly in serial order (e.g., portions of a line drawing of a dog are passed in sequence through a small "window").

Length Estimation (LE): Ability to accurately estimate or compare visual lengths or distances without the aid of measurement instruments.

Perceptual Illusions (IL): The ability to resist being affected by the illusory perceptual aspects of geometric figures (i.e., not forming a mistaken perception in response to some characteristic of the stimuli). May best be thought of as a person's "response tendency" to resist perceptual illusions.

Perceptual Alternations (PN): Consistency in the rate of alternating between different visual perceptions.

Imagery (IM): Ability to mentally depict (encode) and/or manipulate an object, idea, event or impression (that is not present) in the form of an abstract spatial form. Separate IM level and rate (fluency) factors have been suggested.

Auditory processing (Ga): Abilities that depend on sound as input and on the functioning of our hearing apparatus. A key characteristic is the extent an individual can cognitively control (i.e., handle the competition between signal and noise) the perception of auditory information. The *Ga* domain circumscribes a wide range of abilities involved in the interpretation and organization of sounds, such as discriminating patterns in sounds and musical structure (often under background noise and/or distorting conditions) and the ability to analyze, manipulate, comprehend and synthesize sound elements, groups of sounds, or sound patterns.

Phonetic Coding (PC): Ability to code, process, and be sensitive to nuances in phonemic information (speech sounds) in short-term memory. Includes the ability to identify, isolate, blend, or transform sounds of speech. Frequently referred to as phonological or phonemic awareness.

Speech Sound Discrimination (US): Ability to detect and discriminate differences in phonemes or speech sounds under conditions of little or no distraction or distortion.

Resistance to Auditory Stimulus Distortion (UR): Ability to overcome the effects of distortion or distraction when listening to and understanding speech and language. It is often difficult to separate UR from US in research studies.

Memory for Sound Patterns (UM): Ability to retain (on a short-term basis) auditory events such as tones, tonal patterns, and voices.

General Sound Discrimination (U3): Ability to discriminate tones, tone patterns, or musical materials with regard to their fundamental attributes (i.e., pitch, intensity, duration, and rhythm).

Temporal Tracking (UK): Ability to mentally track auditory temporal (sequential) events so as to be able to count, anticipate or rearrange them (e.g., reorder a set of musical tones). According to Stankov (2000), UK may represent the first recognition of the ability (Stankov & Horn, 1980) that is now interpreted as working memory (MW).

Musical Discrimination and Judgment (U1 U9): Ability to discriminate and judge tonal patterns in music with respect to melodic, harmonic, and expressive aspects (phrasing, tempo, harmonic complexity, intensity variations).

Maintaining and Judging Rhythm (U8): Ability to recognize and maintain a musical beat.

Sound-Intensity/Duration Discrimination (U6): Ability to discriminate sound intensities and to be sensitive to the temporal/rhythmic aspects of tonal patterns.

Sound-Frequency Discrimination (U5): Ability to discriminate frequency attributes (pitch and timbre) of tones.

Hearing and Speech Threshold factors (UA UT UU): Ability to hear pitch and varying sound frequencies.

Absolute Pitch (UP): Ability to perfectly identify the pitch of tones.

Sound Localization (UL): Ability to localize heard sounds in space.

Short-term memory (Gsm): The ability to apprehend and maintain awareness of a limited number of elements of information in the immediate situation (events that occurred in the last minute or so). A limited-capacity system that loses information quickly through the decay of memory traces, unless an individual activates other cognitive resources to maintain the information in immediate awareness.

Memory Span (MS): Ability to attend to, register, and immediately recall (after only one presentation) temporally ordered elements and then reproduce the series of elements in correct order.

Working Memory (MW): Ability to temporarily store and perform a set of cognitive operations on information that requires divided attention and the management of the limited capacity resources of short-term memory. Is largely recognized to be the mind's "scratchpad" and consists of up to four subcomponents. The *phonological or articulatory loop* processes auditory-linguistic information while the *visuo-spatial sketch/scratchpad* is the temporary buffer for visually processed information. The *central executive* mechanism coordinates and manages the activities and processes in working memory. The most recent component added to the model is the *episodic buffer*. Recent research (see McGrew, 2005) suggests that MW is *not* of the same nature as the other 60+ narrow factor-based trait-like individual difference constructs included in this table. MW is a theoretically developed construct (proposed to explain memory findings from experimental research) and not a label for an individual-differences type factor. MW is retained in the current CHC taxonomy table as a reminder of the importance of this construct in understanding new learning and performance of complex cognitive tasks (see McGrew, 2005).

Long-term storage and retrieval (Glr): The ability to store and consolidate new information in long-term memory and later fluently retrieve the stored information (e.g., concepts, ideas, items, names) through association. Memory consolidation and retrieval can be measured in terms of information stored for minutes, hours, weeks, or longer. Some *Glr* narrow abilities have been prominent in creativity research (e.g., production, ideational fluency, or associative fluency).

Associative Memory (MA): Ability to recall one part of a previously learned but unrelated pair of items (that may or may not be meaningfully linked) when the other part is presented (e.g., paired-associative learning).

Meaningful Memory (MM): Ability to note, retain, and recall information (set of items or ideas) where there is a meaningful relation between the bits of information, the information comprises a meaningful story or connected discourse, or the information relates to existing contents of memory.

Free Recall Memory (M6): Ability to recall (without associations) as many unrelated items as possible, in any order, after a large collection of items is presented (each item presented singly). Requires the ability to encode a "superspan collection of material" (Carroll, 1993, p. 277) that cannot be kept active in short-term or working memory.

Ideational Fluency (FI): Ability to rapidly produce a series of ideas, words, or phrases related to a specific condition or object. Quantity, not quality or response originality is emphasized. The ability to think of a large number of different responses when a prescribed task requires the generation of numerous responses. The ability to call up ideas.

Associational Fluency (FA): A highly specific ability to rapidly produce a series of words or phrases associated in meaning (semantically associated; or some other common semantic property) when given a word or concept with a restricted area of meaning. In contrast to Ideational Fluency (FI), quality rather than quantity of production is emphasized.

Expressional Fluency (FE): Ability to rapidly think of and organize words or phrases into meaningful complex ideas under general or more specific cued conditions. Requires the production of connected discourse in contrast to the production of isolated words (e.g., FA FW). Differs from FI in the requirement

to rephrase given ideas rather than generating new ideas. The ability to produce different ways of saying much the same thing.

Naming Facility (NA): Ability to rapidly produce accepted names for concepts or things when presented with the thing itself or a picture of it (or cued in some other appropriate way). The naming responses must be in an individual's long-term memory store (i.e., objects or things to be named have names that are very familiar to the individual). In contemporary reading research this ability is called *rapid automatic naming* (RAN).

Word Fluency (FW): Ability to rapidly produce isolated words that have specific phonemic, structural, or orthographic characteristics (independent of word meanings). Has been mentioned as possibly being related to the "tip-of-the-tongue" phenomenon (e.g., word finding difficulties) (Carroll, 1993). One of the first fluency abilities identified (Eckstrom et al., 1979).

Figural Fluency (FF): Ability to rapidly draw or sketch as many things (or elaborations) as possible when presented with a non-meaningful visual stimulus (e.g., set of unique visual elements). Quantity is emphasized over quality or uniqueness.

Figural Flexibility (FX): Ability to rapidly change set and try-out a variety of approaches to solutions for figural problems that have several stated criteria. Fluency in successfully dealing with figural tasks that require a variety of problem solving approaches.

Sensitivity to Problems (SP): Ability to rapidly think of a number of alternative solutions to practical problems (e.g., what can people do to stay healthy?). More broadly may be considered the "ability to imagine problems associated with function or change of function of objects and to suggest ways to deal with these problems" Royce (1973). Requires the recognition of the existence of a problem.

Originality/Creativity (FO): Ability to rapidly produce unusual, original, clever, divergent, or uncommon responses (expressions, interpretations) to a given topic, situation, or task. The ability to invent unique solutions to problems or to develop innovative methods for situations where a standard operating procedure does not apply. Following a new and unique path to a problem solution. FO differs from FI in that FO focuses on the quality of creative responses while FI focuses on an individual's ability to think of a large number of different responses.

Learning Abilities (L1): General learning ability rate. Poorly defined by existing research.

Processing Speed (Gs): The ability to automatically and fluently perform relatively easy or over-learned elementary cognitive tasks, especially when high mental efficiency (i.e., attention and focused concentration) is required

Perceptual Speed (P): Ability to rapidly and accurately search, compare (for visual similarities or differences) and identify visual elements presented side-by-side or separated in a visual field. Recent research (Ackerman et al., 2002; Ackerman & Cianciolo, 2000; Ackerman & Kanfer, 1993; see McGrew, 2005) suggests P may be an *intermediate* stratum ability (between narrow and broad) defined by four narrow sub-abilities: (1) *Pattern Recognition (Ppr)*—the ability to quickly recognize simple visual patterns; (2) *Scanning (Ps)*—ability to scan, compare, and look up visual stimuli; (3) *Memory (Pm)*—ability to perform visual perceptual speed tasks that place significant demands on immediate short-term memory, and (d) *Complex (Pc)*—ability to perform visual pattern recognition tasks that impose additional cognitive demands such as spatial visualization, estimating and interpolating, and heightened memory span loads.

Rate-of-Test-Taking (R9): Ability to rapidly perform tests which are relatively easy or over-learned (require very simple decisions). This ability is not associated with any particular type of test content or stimuli. May be similar to a higher-order "psychometric time" factor (Roberts & Stankov, 1998; Stankov,

2000). Recent research has suggested that R9 may better be classified as an *intermediate* (between narrow and broad strata) ability that subsumes most all psychometric speeded measures (see McGrew, 2005).

Number Facility (N): Ability to rapidly perform basic arithmetic (i.e., add, subtract, multiply, divide) and accurately manipulate numbers quickly. N does not involve understanding or organizing mathematical problems and is not a major component of mathematical/quantitative reasoning or higher mathematical skills.

Speed of Reasoning (RE): Speed or fluency in performing reasoning tasks (e.g., quickness in generating as many possible rules, solutions, etc., to a problem) in a limited time. Also listed under *Gf*.

Reading Speed (fluency) (RS): Ability to silently read and comprehend connected text (e.g., a series of short sentences; a passage) rapidly and automatically (with little conscious attention to the mechanics of reading). Also listed under *Grw*.

Writing Speed (fluency) (WS): Ability to correctly copy words or sentences repeatedly, or writing words, sentences, or paragraphs, as quickly as possible. Also listed under *Grw* and *Gps*.

Reaction and decision speed (Gt): The ability to make elementary decisions and/or responses (simple reaction time) or one of several elementary decisions and/or responses (complex reaction time) at the onset of simple stimuli. *Gt* is typically measured by chronometric measures of reaction and inspection time.

Simple Reaction Time (R1): Reaction time (in milliseconds) to the onset of a single stimulus (visual or auditory) that is presented at a particular point of time. R1 frequently is divided into the phases of decision time (DT; the time to decide to make a response and the finger leaves a home button) and movement time (MT; the time to move finger from the home button to another button where the response is physically made and recorded).

Choice Reaction Time (R2): Reaction time (in milliseconds) to the onset of one of two or more alternative stimuli, depending on which alternative is signaled. Similar to R1, can be decomposed into DT and MT. A frequently used experimental method for measuring R2 is the Hick paradigm.

Semantic Processing Speed (R4): Reaction time (in milliseconds) when a decision requires some encoding and mental manipulation of the stimulus content.

Mental Comparison Speed (R7): Reaction time (in milliseconds) where stimuli must be compared for a particular characteristic or attribute.

Inspection Time (IT): The ability to quickly (in milliseconds) detect change or discriminate between alternatives in a very briefly displayed stimulus (e.g., two different sized vertical lines joined horizontally across the top).

Psychomotor speed (Gps): The ability to rapidly and fluently perform physical body motor movements (e.g., movement of fingers, hands, legs, etc.) largely independent of cognitive control.

Speed of Limb Movement (R3): The ability to make rapid specific or discrete motor movements of the arms or legs (measured after the movement is initiated). Accuracy is not important.

Writing Speed (fluency) (WS): The ability to copy correctly words or sentences repeatedly, or writing words, sentences, or paragraphs, as quickly as possible. Also listed under *Grw* and *Gps*.

Speed of Articulation (PT): Ability to rapidly perform successive articulations with the speech musculature.

Movement Time (MT): Recent research (see summaries by Deary, 2003; Nettelbeck, 2003; also see McGrew, 2005) suggests MT may be an intermediate stratum ability (between narrow and broad strata) that represents the second phase of reaction time as measured by various elementary cognitive tasks (ECTs). The time taken to physically move a body part (e.g., a finger) to make the required response is movement time (MT). MT may also measure the speed of finger, limb, or multi-limb movements or vocal articulation (diadochokinesis; Greek for "successive movements") (Carroll, 1993; Stankov, 2000) and is also listed under *Gt*.

Quantitative knowledge (Gq): The breadth and depth of a person's acquired store of declarative and procedural quantitative or numerical knowledge. *Gq* is largely acquired through the investment of other abilities primarily during formal educational experiences. *Gq* represents an individual's store of acquired mathematical knowledge, not reasoning with this knowledge. Factor analysis research has been limited in this domain and other *Gq* narrow abilities most likely exist (e.g., dimensions of early number sense or literacy).

Mathematical Knowledge (KM): Range of general knowledge about mathematics. Not the performance of mathematical operations or the solving of math problems.

Mathematical Achievement (A3): Measured (tested) mathematics achievement.

Reading and writing (Grw): The breadth and depth of a person's acquired store of declarative and procedural reading and writing skills and knowledge. *Grw* includes both basic skills (e.g., reading and spelling of single words) and the ability to read and write complex connected discourse (e.g., reading comprehension and the ability to write a story).

Reading Decoding (RD): Ability to recognize and decode words or pseudowords in reading using a number of sub-abilities (e.g., grapheme encoding, perceiving multi-letter units, and phonemic contrasts, etc.)

Reading Comprehension (RC): Ability to attain meaning (comprehend and understand) connected discourse during reading.

Verbal (printed) Language Comprehension (V): General development, or the understanding of words, sentences, and paragraphs in native language, as measured by reading vocabulary and reading comprehension tests. Does not involve writing, listening to, or understanding spoken information.

Cloze Ability (CZ): Ability to read and supply missing words (that have been systematically deleted) from prose passages. Correct answers can only be supplied if the person understands (comprehends) the meaning of the passage.

Spelling Ability (SG): Ability to form words with the correct letters in accepted order (spelling).

Writing Ability (WA): Ability to communicate information and ideas in written form so that others can understand (with clarity of thought, organization, and good sentence structure). Is a broad ability that involves a number of other writing sub-skills (e.g., knowledge of grammar, the meaning of words, and how to organize sentences or paragraphs).

English Usage Knowledge (EU): Knowledge of the "mechanics" (capitalization, punctuation, usage, and spelling) of written and spoken English language discourse.

Reading Speed (fluency) (RS): Ability to silently read and comprehend connected text (e.g., a series of short sentences; a passage) rapidly and automatically (with little conscious attention to the mechanics of reading). Also listed under *Gs*.

Writing Speed (fluency) (WS): Ability to copy words or sentences repeatedly, or writing words, sentences, or paragraphs, as quickly as possible. Also listed under *Gs* and *Gps*.

Psychomotor abilities (Gp): The ability to perform physical body motor movements (e.g., movement of fingers, hands, legs, etc) with precision, coordination, or strength. Movement or motor behaviors are typically the result of mental activity.

Static Strength (P3): The ability to exert muscular force to move (push, lift, pull) a relatively heavy or immobile object.

Multilimb Coordination (P6): The ability to make quick specific or discrete motor movements of the arms or legs (measured after the movement is initiated). Accuracy is not relevant.

Finger Dexterity (P2): The ability to make precisely coordinated movements of the fingers (with or without the manipulation of objects).

Manual Dexterity (P1): Ability to make precisely coordinated movements of a hand, or a hand and the attached arm.

Arm-hand Steadiness (P7): The ability to precisely and skillfully coordinate arm-hand positioning in space.

Control Precision (P8): The ability to exert precise control over muscle movements, typically in response to environmental feedback (e.g., changes in speed or position of object being manipulated).

Aiming (AI): The ability to precisely and fluently execute a sequence of eye-hand coordination movements for positioning purposes.

Gross Body Equilibrium (P4): The ability to maintain the body in an upright position in space or regain balance after balance has been disturbed.

Olfactory abilities (Go): Abilities that depend on sensory receptors of the main olfactory system (nasal chambers). The cognitive and perceptual aspects of this domain have not yet been widely investigated.

Olfactory Memory (OM): Memory for odors (smells).

Olfactory Sensitivity (OS): Sensitivity to different odors (smells).

Tactile abilities (Gh): Abilities involved in the perception and judging of sensations that are received through tactile (touch) sensory receptors. Includes abilities involved in the judgment of thermal stimulation, spatial stimulation, or patterns imposed on the skin. The cognitive and perceptual aspects of this domain have not yet been widely investigated.

Tactile Sensitivity (TS): The ability to detect and make fine discriminations of pressure on the surface of the skin.

Kinesthetic abilities (Gk): Abilities that depend on sensory receptors that detect bodily position, weight, or movement of the muscles, tendons, and joints. Abilities involved in the process of controlling and coordinating body movements, including walking, talking, facial expressions, gestures and posture. The cognitive and perceptual aspects of this domain have not yet been widely investigated.

Kinesthetic Sensitivity (KS): The ability to detect, or be aware, of movements of the body or body parts, including the movement of upper body limbs (arms) and the ability to recognize a path the body previously explored without the aid visual input (blindfolded)

Note. Many of the ability definitions in this table, or portions thereof, were originally published in McGrew (1997), which in turn, were developed from a detailed reading of *Human cognitive abilities: A survey of factor analytic studies*, by J. B. Carroll. 1993, New York: Cambridge University Press, Copyright 1993 by Cambridge University Press. The two-letter narrow (stratum I) ability factor codes (e.g., RG), as well as most of the broad ability factor codes (e.g., Gf) are from Carroll (1993). McGrew's (1997) definitions have been revised and extended here based on a review of a number of additional sources. Primary sources included Carroll (1993), Corsini (1999), Ekstrom et al. (1979), Fleishman & Quaintance (1984), and Sternberg (1994). The broad ability definitions included in this table are from McGrew (2009).