

TEORI TERKINI INTELIGENSI

(THREE STRATUM COGNITIVE
THEORY -TEORI CHC)

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Mari main “lupa-ingat” sejenak...

TULISKAN YANG ANDA INGAT TENTANG :

TEORI INTELIGENSI

dan / atau

NAMA TOKOH INTELIGENSI

(5 MENIT)

Teori inteligensi

Teori Inteligensi

- Frenologi (kepala) → Gall
- Lab Antropmetri → Galton
- G Factor → Spearman
- 2 Factor Theory (g dan s) → Spearman
- Primary Mental Abilities (verbal, word, number, space, memort, perceptual speed, induction → Thurstone
- Structure of Intellect- Operation, Content, Product, 120 mental abilities → Guilford

Cont...

- Theory of Multiple Intelligences → Gardner
- Triarchic Theory of Intelligence → Sternberg
- Cognitive Development → Piaget
- Gf-Gc → Cattel ; Pengembangan Gf-Gc → Cattel-Horn
- Three Stratum Theory → Carroll
- CHC Theory → Cattel-Horn-Carroll

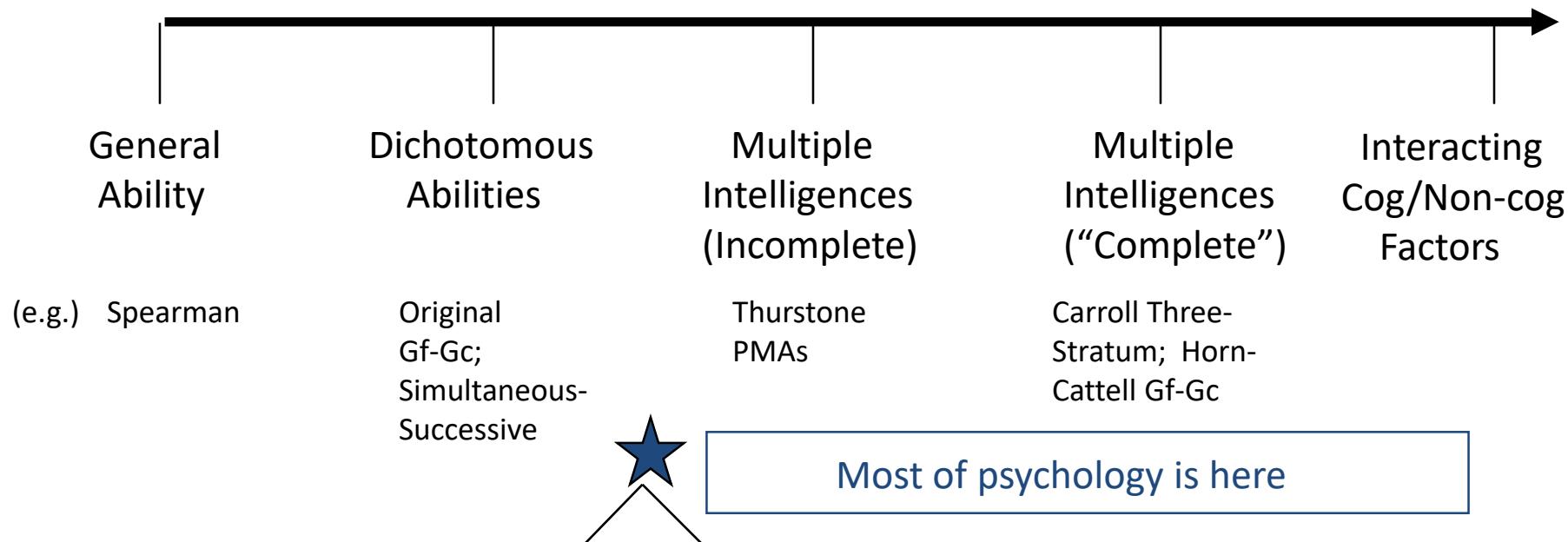
Perkembangan Penyusunan Tes Kecerdasan

- Fase 1 : kecerdasan terdiri atas satu faktor (general) – Stanford Binnet (1916)
- Fase 2 : kecerdasan terdiri atas Verbal-Non verbal – WB, WISC, WAIS, WISC-R (1939)
- Fase 3: kecerdasan terdiri atas beberapa kemampuan – WJ, DAS, WISC-III, WAIS III (1977)
- Fase 4 : kecerdasan terdiri atas kemampuan lengkap – WJ-R (1989)
- Fase 5 : kecerdasan terdiri atas hierarki 3 strata (General abilities, Broad abilities, dan Narrow abilities) – WJ III (2001)

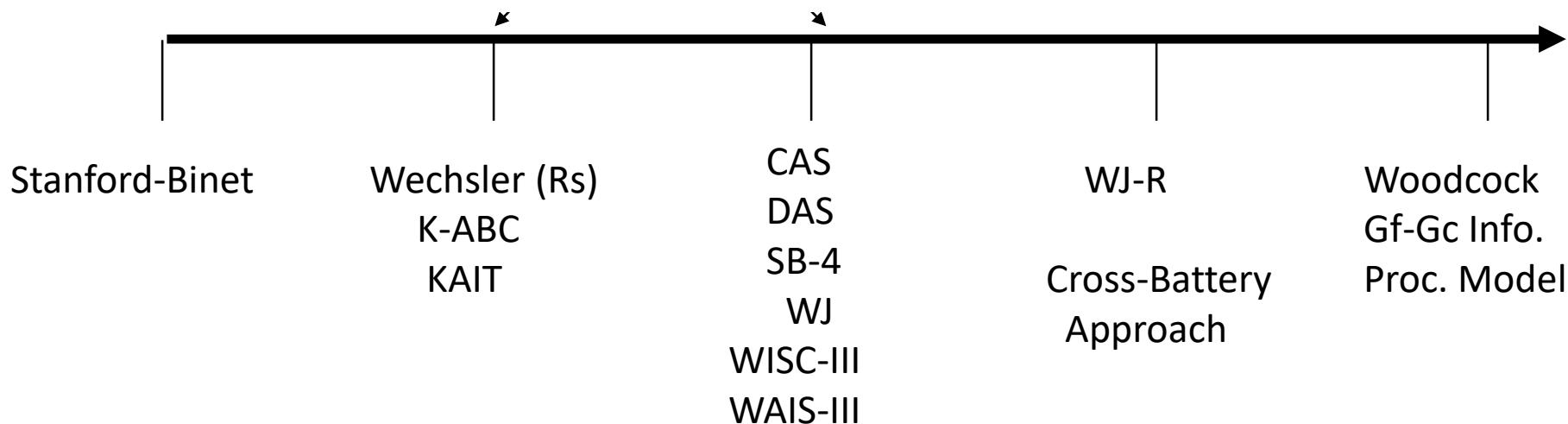
PERKEMBANGAN TES INTELIGENSI

- 1916 → SB I
- 1937 → SB II
- 1949 → WISC
- 1963 → IST
- 1960 → SB III
- 1967 → WPPSI
- 1970 → IST I
- 1974 → WISC-R
- 1977 → WJ
- 1986 → SB IV
- 1989 → WPPSI-R+WJ-R
- 1991 → WISC III
- 2000 → IST II
- 2001 → WJ III
- 2002 → WPPSI III
- 2003 → SB V + WISC IV
- 2004 → IST III
- 2014 → WJ IV + WISC V

CONTINUUM OF PROGRESS IN THEORIES



CONTINUUM OF PROGRESS IN MEASUREMENT



PENGERTIAN INTELIGENSI

TOKOH	DEFINISI
Colvin	Ability to learn orientasi having learned to adjust oneself to the environment
Dearborn	The capacity to learn orientasi profit by experience
Freeman	Sensory capacity, capacity for perceptual recognition, quickness, range orientasi flexibility of association, facility and imagination, span of attention, quickness in response
Haggerty	Sensation, perception, asosiation, memory, imagination, discrimination, judgement and reasoning
Henmon	Capacity for knowledge and the knowledge possessed
Peterson	A biology mechanism by which the effect of a compexcity of stimuli are brought together and given a somewhat unified effect in behavior

TOKOH	DEFINISI
Pintner	The ability of the individual to adapt himself adequately to relatively new situations ini life. It seems to include the capacity for getting along well in all sort of situation
Terman	The capacity to form concepts to related in diverse ways, and to grasp their significance. An individual is intelligent in proportion as he is able to carry on abstract thinking
Thordike	The power of good respons from the point of view of truth orientasi fact
Thursto ne	The capacity to inhibit an instinctive adjustment, the capacity to redefine the inhibit instantive adjustment in light of imaginalli experienced trial and error, and the volitional capacity to realize the modified instinctive adjustment into overt behavior to the advantage of the individual as social animal
Wesch sler	Intellegence is the aggregate orientasi global capacity of individual to act purposefully, to think rationally and to deal effectively with his environment. Intelektual is global because intelektual characterizes the individual's behavior as a whole; intelektual is ananda aggregate because intelektual is composed of elements orientasi abilities which, though not entirely independent, are qualitatively differentiable.

TOKOH	DEFINISI
Binet (1895 / 1975	A scheme of thought : three hierarchical level of intelligence (1. a superordinate factor / general intelligence; 2. 4 lower order elementary cognitive processes; 3. 10 first order intellectual faculties)
Cattel-Horn (1963,1967)	Intelligence is conceptualized in terms of two major interrelated components of intelligence (fluid –Gf- and crystallized intelligence-Gc-)
Carroll (1993)	Hierarchical model of intelligence (Three Stratum- III, II, and I)
Genevan (Furth,1969 in Schonfeld, 1986)	Intelligence is conceptualized in terms of two major interrelated components of intelligence (operative and learning intelligence). Operative intelligence refers to adaptive, increasingly integrated and generalized set of overt and covert action—fluid ability. Learning refers to knowledge that is ‘a function of environmental data’ (crystallized ability)
Reynold & Kamphaus (2003)	Test Intelligence as a ‘comprehensive measures of verbal and nonverbal intelligence and of general intelligence’

TOKOH	DEFINISI
Fagan (2000)	Intelligence as processing and that processing can be measured by performance on certain elementary cognitive task.
Das-Naglieri (1975, 2002, 2009)	PASS model intelligence: four kind of competence (Planning, Attention, Simultaneous and Successive)
Spearman (1904)	Two factor intelligence models (g & s factor)
Guilford (1967)	Three broad intelligence factors (operation, content and product)
Sternberg (1999)	Triarchic theory of human intelligence (analytic intelligence; creative intelligence and practical intelligence)
Gardner (1983)	Multiple intelligence
Cattell-Horn-Carroll	Three stratum structure of human cognitive ability

Teori Terkini Inteligensi ?

CHC Theory

- Merupakan kombinasi riset dari 3 tokoh yaitu : Cattel-Horn-Carrol
- Cattel (1941/1957) –Horn (1965/1968) (gabungan teori Cattel dan Horn); Carroll (1993)
- → Tokoh yang konsisten mengembangkan : **Kevin Mc. Grew**
- Merupakan teori terkini mengenai struktur kognitif manusia yang memiliki dukungan empiris paling kuat
- Mendasarkan analisanya pada ratusan data battery tes

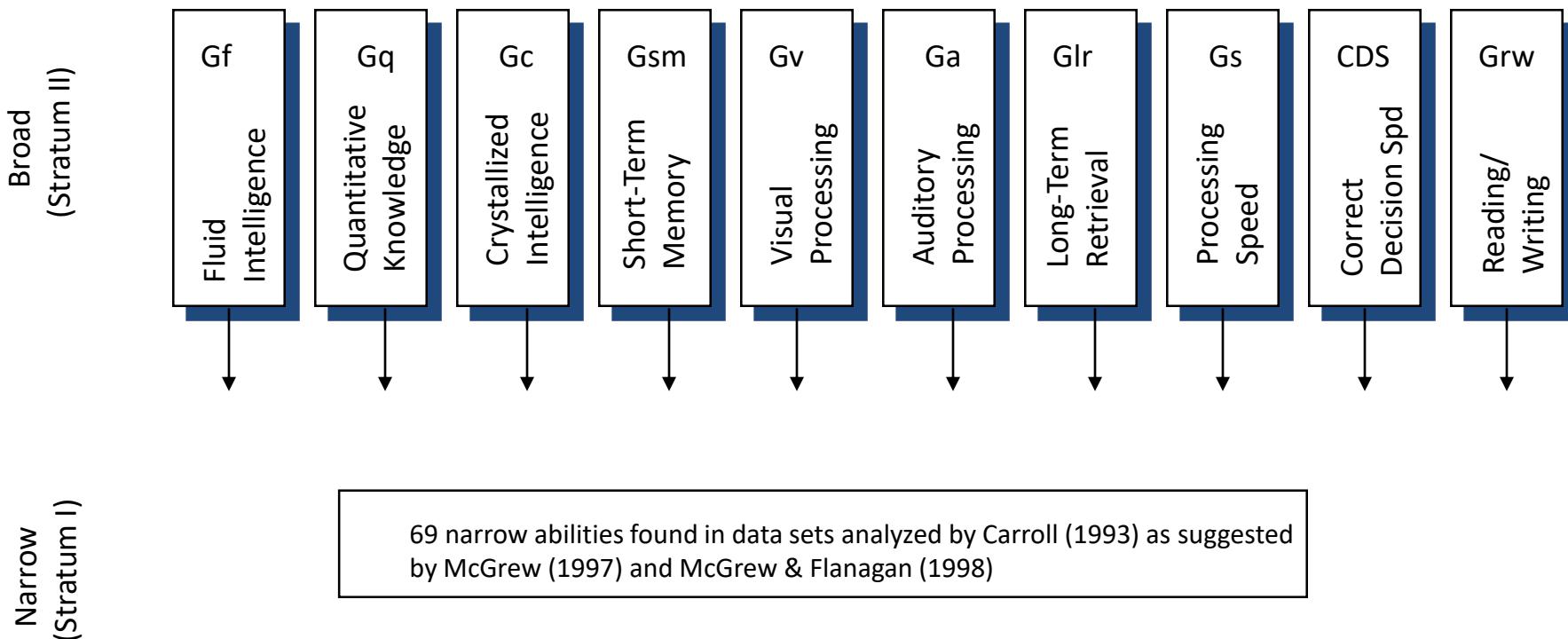
C→ Raymond Bernard Cattell → Fluid Inteligence
-gf dan Crystalized Intelligence -gc (1905-1998)

H→ John K. Horn → Penerus teori R.B Cattel
mengenai gf-gc (1928-2006)

C→ The Three Stratum model of Cognitive
ability (1916-2003)

CHC → Cattel-Horn-Carroll → 16 broad abilities
(three stratum)

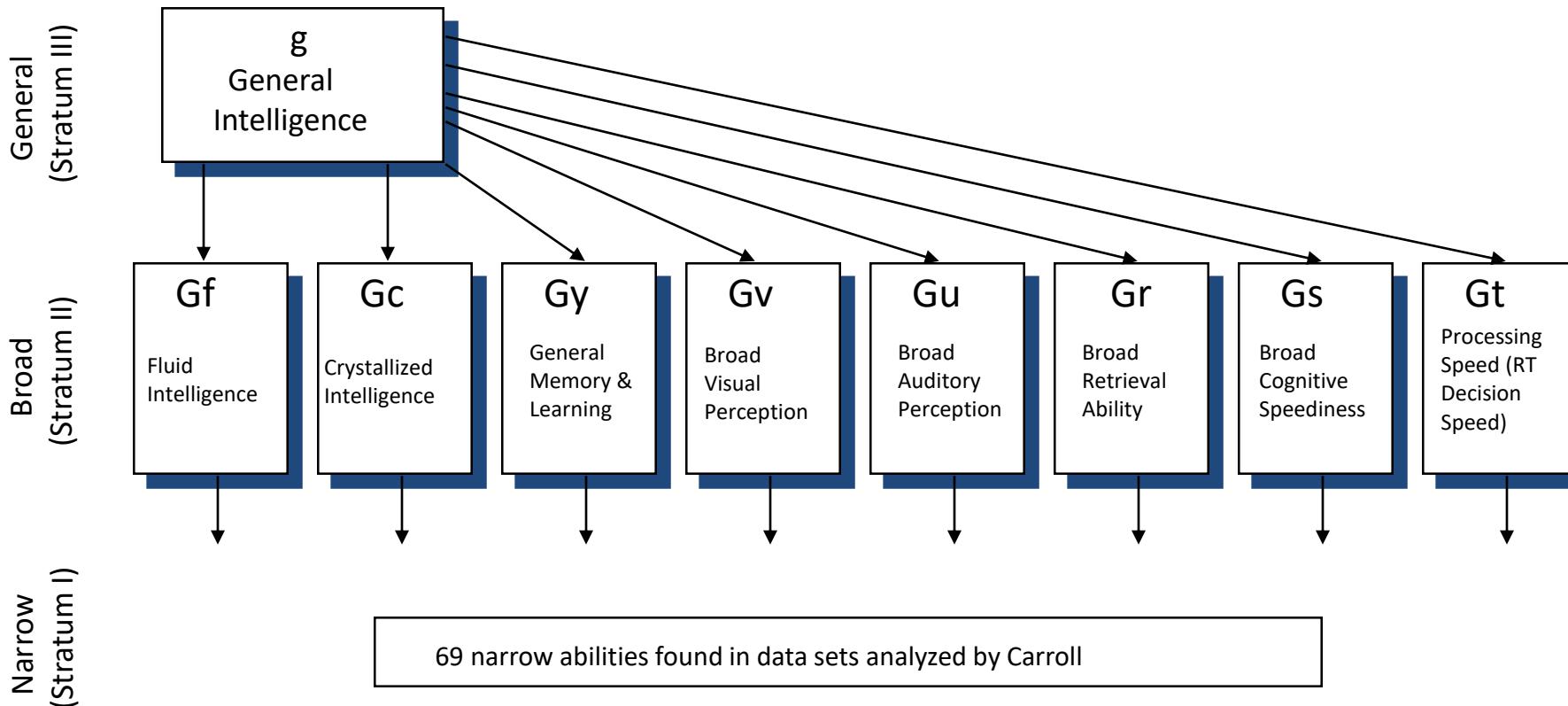
HORN-CATTELL Gf-Gc THEORY



Adapted from K. S. McGrew & D. P. Flanagan (1998). The Intelligence Test Desk Reference (ITDR):

Gf-Gc Cross-Battery Assessment. Boston: Allyn & Bacon.

CARROLL'S (1993) THREE-STRATUM THEORY OF COGNITIVE ABILITIES



Adapted from K. S. McGrew & D. P. Flanagan (1998). The Intelligence Test Desk Reference (ITDR):

Gf-Gc Cross-Battery Assessment. Boston: Allyn & Bacon.

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PEREBEDAAN UTAMA ANTARA MODEL CARROLL DAN HORN-CATTELL

- **Keberadaan g**
 - Carroll terdapat g
 - Horn-Cattell tidak terdapat g
 - **Kemampuan kuantitatif (Quantitative Abilities)**
 - Carroll – didalam Gf
 - Horn-Cattell – terpisah disebut dengan Gq
 - **Reading and Writing Abilities**
 - Carroll – didalam Gc
 - Horn-Cattell - terpisah disebut dengan Grw
- (catatan : Grw merupakan kontribusi Woodcock's /1994)

Terdapat tiga ability adalam teori CHC :

- *General ability (stratum III)*
- *Broad ability (stratum II)*
- *Narrow ability (stratum I)*

Stratum III	Stratum II	Keterangan
Inteligensi umum (g)	Fluid intelligence (penalaran)	3 narrow
	Chrystalized intelligence (pengetahuan)	6 narrow
	Domain-specific knowledge (pengetahuan domain spesific)	8 narrow
	Visual spatial abilities (kemampuan visual-spatial)	11 narrow
	Auditory processing (pengolahan auditory)	7 narrow
	Short Term Working Memory (kemampuan mengingat kembali – jangka pendek)	3 narrow
	Broad retrieval / memory (kemampuan mengingat kembali-jangka panjang)	13 narrow
	Cognitive processing speed (kecepatan pengolahan kognitif)	3 narrow
	Decision speed / reaction time (kecepatan bereaksi atau mengambil keputusan)	5 narrow

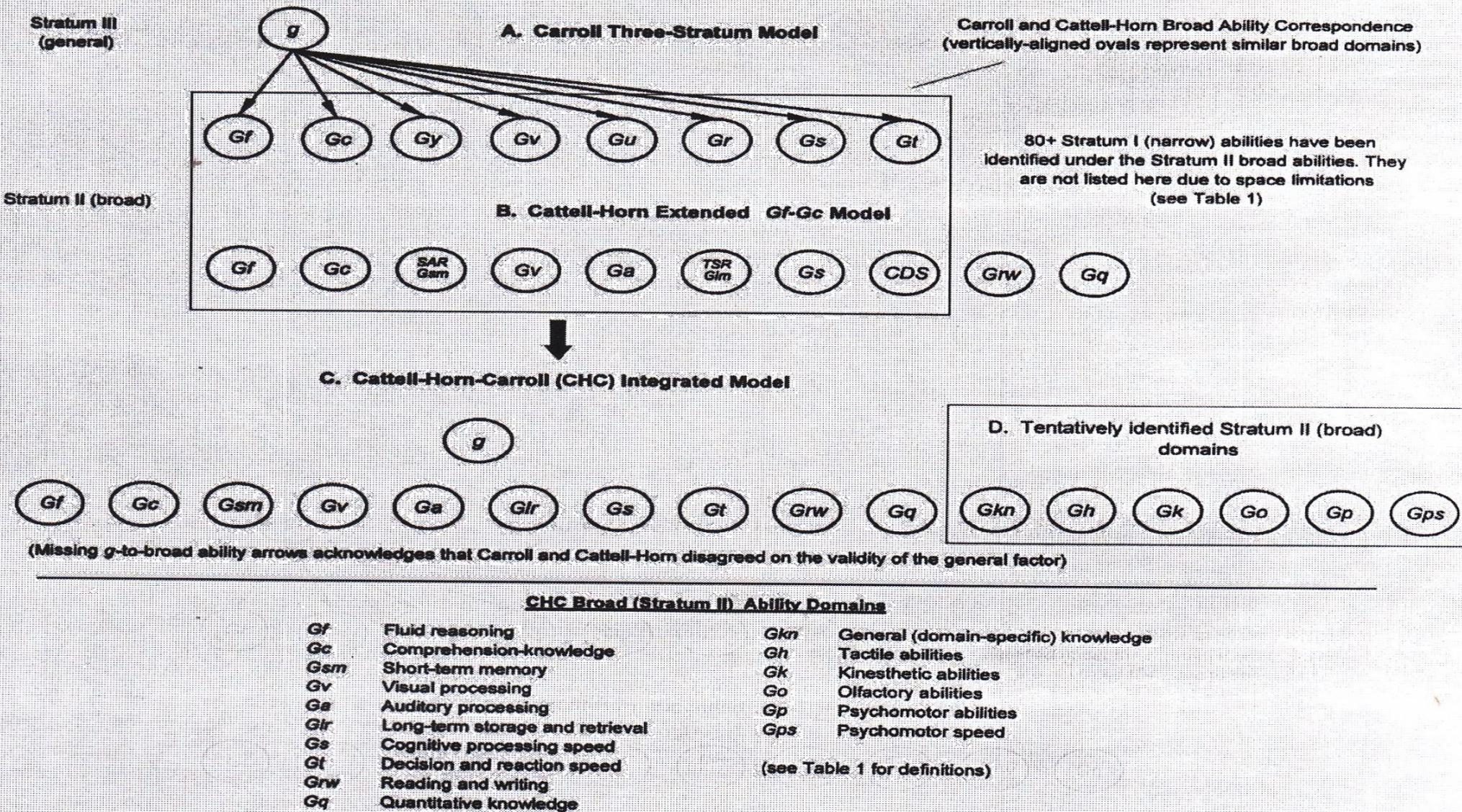


Fig. 1. Schematic representation and comparisons of Carroll's Three-Stratum, Cattell-Horn's Extended Gf-Gc, and the integrated Cattell-Horn-Carroll models of human cognitive abilities.

Ability dalam teori CHC tahun 2012

The Cattell-Horn-Carroll (CHC) Periodic Table of Human Abilities (v2.0)

Gf	I	RG	RQ												
Gwm	WM	MS	AC												
Glr	MA	MM	M6	FI	FA	FE	SP	F0	NA	FW	LA	FF	FX		
Gi	P	N	R9												
Gt	R1	R2	R4	R7	IT										
Gps	R3	PT	MT												
Gc	LD	VL	K0	LS	CM	MY									
Gkn	KL	K1	K2	A5	MK	KF	LP	BC							
Gnw	V	RD	RC	RS	WA	SG	EU	WS							
Gq	KM	A3													
Gv	Vz	SR	MV	CS	SS	CF	IM	PI	LE	IL	PN				
Ga	PC	US	UM	U8	UR	U1 U9	UP	UL							
Gh															
Go	OM														

Gf-Fluid reasoning

- I-Induction
- RG-General sequential reasoning
- RQ-Quantitative reasoning

Gwm-Short-term working memory

- WM-Working memory capacity
- MS-Memory span
- AC-Attentional control

Glr-Long-term storage & retrieval

- MA-Associative memory
- MM-Meaningful memory
- M6-Free recall memory
- FI-Ideational fluency
- FA-Associational fluency
- FE-Expressional fluency
- SP-Sensitivity to problems
- FO-Originality/creativity
- NA-Naming facility
- WF-Word fluency
- LA-Speed of lexical access
- FF-Figural fluency
- FX-Figural Flexibility

Gs-Processing speed

- P-Perceptual speed
- N-Number facility
- R9-Rate-of-test-taking

Gt-Reaction and decision speed

- R1-Simple reaction time
- R2-Choice reaction time
- R4-Semantic processing speed
- R7-Mental comparison speed
- IT-Inspection time

Gps-Psychomotor speed

- R3-Speed of limb movement
- PT-Speed of articulation
- MT-Movement time

Gc-Comprehension-knowledge

- LD-Language development
- VL-Lexical knowledge
- KO-General (verbal) information
- LS-Listening ability
- CM-Communication ability
- MY-Grammatical sensitivity

Gkn-Domain-specific-knowledge

- KL-Foreign lang. proficiency
- K1-Knowledge of signing
- K2-Knowledge of culture
- AS-Geography achievement
- MK-Mechanical knowledge
- KF-Knowledge of signing
- LP-Skill in lip reading
- BC-Knowledge of beh. content

Grw-Reading and writing

- V-Verbal (print) lang. comp.
- RD-Reading decoding
- RC-Reading comprehension
- RS-Reading speed
- WA-Writing ability
- SG-Spelling ability
- EU-English usage
- WS-Writing speed

Gq-Quantitative knowledge

- KM-Mathematical knowledge
- A3-Mathematical achievement

Gv-Visual processing

- Vz-Visualization
- SR-Speeded rotation
- MV-Visual memory
- CS-Closure speed
- SS-Spatial scanning
- CF-Closure flexibility
- IM-Imagery
- PI-Serial perceptual integration
- LE-Length estimation
- IL-Perceptual illusions
- PN-Perceptual alternations

Ga-Auditory Processing

- PC-Phonetic coding
- US-Speech sound disc.
- UM-Mem. for sound patterns
- U8-Maint. & judging rhythm
- UR-Res. to aud. stim. dist.
- U1/U9-Musical dis. & judge.
- UP-Absolute pitch
- UL-Sound localization



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McGrew
03-28-16



Additional resources
available at
www.themindhub.com
(MindHub™)

Gh-Tactile abilities

Go-Olfactory abilities

- OM-Olfactory memory

Gk-Kinesthetic abilities

Gp-Psychomotor abilities

- P1-Manual dexterity
- P2-Finger dexterity
- P3-Static strength
- P4-Gross body equilibrium
- P6-Multilimb coordination
- P7-Arm-hand steadiness
- P8-Control precision
- A1-Aiming

Definitions can be found at:

<http://www.lqs-corner.com/2014/06/the-chc-taxonomy-of-human-cognitive.html>

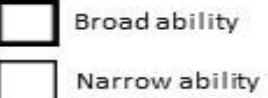
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Ability dalam teori CHC Revisi tahun 2018

<i>Gf</i>	I	RG	RQ	RE	RP	Cattell-Horn-Carroll (CHC) Periodic Table of Human Abilities (v2.5)									
<i>Gwm</i>	Wa	Wv	AC	Wc											
<i>GI</i>	MA	MM	M6		(Technically not a narrow ability)										
<i>Gv</i>	Vz	SR	IM	CF	CS	MV	SS	PI	LE	IL	PN	P*			
	Speech			Nonverbal				Brackets designate content "facets" within a domain							
<i>Ga</i>	PC	US	UR	U8	UM	U1 U9	UP	UL							
<i>Gc</i>	LD*	VL	KO	LS	CM	MY									
<i>Gkn</i>	K1	K2	MK	KL	KF	LP									
<i>Grw</i>	RC	RD	RS	WA	SG	EU	WS								
<i>Gq</i>	KM	A3													
	Ideas				Words				Figures						
<i>Gr</i>	FI	FE	FA	SP	FO	LA*	NA	FW	FF	FX					
	Cognitive				Academic										
<i>Gs</i>	P**	Ps⁺	Pc⁺	N	RS	WS		Gei	Ep	Ek	Em	Eu			
<i>Gt</i>	R1	R2	IT	R4	R7			Go	OM						
<i>Gps</i>	R3	WS	PT	MT				Gk							
<i>Gp</i>	PI	P2	P3	P4	P6	P7	P8	A1		Gh					

Narrow abilities without black outline designate secondary loadings; (e.g., P under *Gs* and *Gv*). Bold font = major ability; regular font = minor ability. If all factor codes within a broad domain are regular font = insufficient data to classify as major or minor. *Italic* factor code font designates “tentative” abilities. * = intermediate stratum abilities



Brackets designate content “facets” within a domain

The stratum III ability (general intelligence or *g*) is omitted for readability purposes and to acknowledge the difference of opinion between Horn (*g* does not exist) and Carroll (*g* exists)



Adapted from Schneider & McGrew (2018)



Additional resources available at www.themindhub.com (MindHub™)

(+ P, PS, Pc within *Gs* likely further differentiated by content facets: reading-writing, figural-visual, auditory, quantitative-numeric, verbal)

(No well supported cognitive *Gk* & *Gh* narrow abilities have been identified)

Gf-Fluid reasoning

- I-Induction
- RG-General sequential reasoning
- RQ-Quantitative reasoning
- RE-Reasoning speed
- RP-Piagetian reasoning

Gwm-Short-term working memory

- Wa-Auditory short-term storage
- Wv-Visual-spatial short-term storage
- AC-Attentional control
- Wc-Working memory capacity

Gl-Learning efficiency

- MA-Associative memory
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- IM-Imagery
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- FI-Ideational fluency
- FE-Expressional fluency
- FA-Associational fluency
- SP-Sensitivity to problems
- FO-Originality/creativity
- LA-Speed of lexical access *
- NA-Naming facility
- FW-Word fluency
- FF-Figural fluency
- FX-Figural flexibility

Definitions can be found at:
<https://tinyurl.com/y8555sjh>

Gs-Processing speed

- P-Perceptual speed *
- Ps-Perceptual speed-search
- Pc-Perceptual speed-compare
- N-Number facility
- RS-Reading speed
- WS-Writing speed

Gt-Reaction and decision speed

- R1-Simple reaction time
- R2-Choice reaction time
- IT-Inspection time
- R4-Semantic processing speed
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- R3-Speed of limb movement
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- PT-Speed of articulation
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- P7-Arm-hand steadiness
- P8-Control precision
- A1-Aiming

Go-Olfactory abilities

- OM-Olfactory memory

Gh-Tactile abilities

- (Currently no well-supported abilities)

Gk-Kinesthetic abilities

- (Currently no well-supported abilities)

Gei-Emotional intelligence

- Ep-Emotion perception
- Ek-Emotion knowledge
- Em-Emotion management
- Eu-Emotion utilization

Narrow abilities with **bold font** = major ability; regular font = minor ability. If all factor codes are regular font under a broad ability = insufficient data to classify as major or minor (Schneider & McGrew, 2018)

Italic narrow factor code font designates "tentative" abilities

* = intermediate stratum abilities

Broadability color codes **

- Blue – Intelligence-as-Process
- Gray – Intelligence-as-Knowledge
- Green – Intelligence-as-Process (speed/fluency)
- Red = other tentatively identified broad abilities

** First three as per Ackerman et al.'s PPIK model of intelligence



Source: Schneider, W. J., & McGrew, K. S. (2018). The Cattell-Horn-Carroll Theory of Cognitive Abilities. In D. P. Flanagan & Erin M. McDonough (Eds.), *Contemporary intellectual assessment: Theories, tests and issues* (4th ed.) New York: Guilford Press.

- Teori CHC memiliki pengaruh yang luas dalam pengukuran inteligensi.
- Beberapa tes yang dikembangkan karena pengaruh teori CHC diantaranya adalah :
 - KABC → KABC-II (2004)
 - WPPSI-R → WPPSI-III (2002)
 - WAIS R → WAIS-III (1997)
 - WJ R → WJ-III (2001)
 - SB IV → SB V (2003), and
 - WISC III → WISC IV (2003)

(McGrew in Flanagan & Harrison, 2005).

TEST	GC	GV	GF	GSM	MA
KABC-II	Expressive Vocabulary Verbal Knowledge Riddles Gestalt Closure	Gestalt Closure Block Counting Rover Triangles	Pattern Reasoning Story Completion Hand Movements	Word Order Number Recall Hand Movements	Atlantis Atlantis-Delayed Rebus Rebus-Delayed
WISC-III	Information Picture Completion Comprehension* Similarities* Vocabulary*	Object Assembly Block Design* Picture Completion	Picture Arrangement Arithmetic	Arithmetic Digit Span*	
WISC-IV	Comprehension* Similarities* Vocabulary*	Block Design*	Matrix Reasoning Picture Concepts	Letter–Number Sequencing Digit Span*	
WJ-III	Verbal Comprehension General Information	Spatial Relations Picture Recognition	Concept Formation Analysis–Synthesis	Numbers Reversed Auditory Working Memory	Visual–Auditory Learning

Alasan teori CHC banyak digunakan sebagai dasar pengembangan tes inteligensi

- Teori inteligensi CHC merupakan teori struktur kecerdasan yang komprehensif, model teori yang dianggap terbaik dalam menggambarkan struktur kognitif manusia karena kuatnya dasar empiris yang digunakan (McGrew, 2005).
- CHC merupakan teori inteligensi terbaru yang paling komprehensif dan disepakati para ahli → Carroll's Three Stratum Theory may be the most accepted model of the structure of human cognitive ability (Kanzler, 1997 dalam Taub, 2002)
- CHC merupakan taksonomi yang menggabungkan berbagai penelitian analisis faktor mengenai inteligensi selama kira-kira lebih dari 50 tahun.
- “The Cattell-Horn-Carroll theory of cognitive abilities is the best validated model of human cognitive abilities” (Ackerman, P.L & Lohman D.F., 2006)

- Teori CHC sudah digunakan secara luas untuk mengklasifikasikan dan mendeskripsikan kemampuan kognitif manusia di berbagai latar belakang budaya
- CHC memiliki implikasi yang paling luas terhadap pengukuran inteligensi (Mc. Graw, 1997, dalam Gregory, 2011).
- Hasil asesmen dari tes kecerdasan yang mendasarkan pada teori CHC mampu menyediakan informasi yang dibutuhkan untuk diagnosis intervensi ABK

References

- Definisi lebih detil mengenai masing-masing ability (baik broad ability maupun narrow ability), dapat di baca di beberapa tulisan Kevin McGrew. Atau dapat diakses di web IAP (Institute for Applied Psychometrics)
- McGrew, K. S. (2005). The Cattell–Horn–Carroll Theory of Cognitive Abilities : Past, Present, and Future. In D. P. Flanagan & P. L. Harrison (Eds.), *Contemporary Intellectual Assessment : Theories, Test, and Issues* (2nd Ed., pp. 136–182). New York: The Guilford Press.
- Flanagan, D. P., & Harrison, P. L. (2005). *Contemporary Intellectual Assessment: Theories, Tests, and Issues* (2nd Ed.). New York: The Guilford Press. <https://doi.org/10.1080/02783190802201986>
- Carroll, J. B. (1993). *Human Cognitive Abilities A Survey of Factor-Analytic Studies*. New York: Cambridge.

Bersama pakar teori CHC (R. Urip Purwono, M.S.,
M.Sc., PhD., psikolog dan Mr. Kevin McGrew)



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