

學習障礙概念的演進與爭議

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1

基本概念

- 學習障礙(learning disabilities, specific learning disabilities)
 - 聽覺理解、口語表達、識字、閱讀理解、書寫、數學運算。
- 閱讀障礙(reading disabilities, specific reading impairment)
 - 識字正確性、識字流暢性、閱讀理解。
- 讀寫障礙(dyslexia)
 - 識字正確性、識字流暢性、寫字的產出。

2

學習障礙定義核心概念的轉變

- 先天性字盲（congenital word blindness）/最小大腦功能損傷（minimal brain dysfunction）
- 差距標準（discrepancy criterion）(1977~)
 - 智力（Aptitudes）與成就（achievement）的差距
- 教學介入反應模式(response to intervention, RTI)(2004~)
- 強項與弱項的模式分析(pattern of strength and weakness, 2006)
- 精神疾病診斷手冊DSM5 (2013~)

3

Samuel Kirk (1962) 提出LD這個名詞者

- A **learning disability** refers to a retardation, disorder, or delayed development in **one or more of the processes of speech, language, reading, writing, arithmetic,** or other school subject resulting from a psychological handicap caused by a possible cerebral dysfunction and/or emotional or behavioral disturbances. It is not the result of mental retardation, sensory deprivation, or cultural and instructional factors (Kirk, 1962, p. 263)
- 提出學障的名詞。
- 說明障礙的內容。
- 提出可能的原因。
- 提出排除的條款。

4

Barbara Bateman(1965)，提出差距標準。

- Children who have learning disorders are those who manifest an **educationally significant discrepancy between their estimated potential and actual level of performance** related to basic disorders in the learning process, which may or may not be accompanied by demonstrable central nervous system dysfunction, and which are not secondary to generalized mental retardation, educational or cultural deprivation, severe emotional disturbance, or sensory loss (Bateman, 1965)
- 提出差距標準：潛力跟成就。
- 排除條款。

Daniel P. Hallahan: LEARNING DISABILITIES: HISTORICAL PERSPECTIVES

5

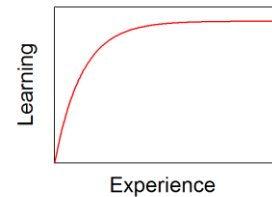
- 1975年，通過Education for All Handicapped Children Act (Public Law 94-142)。
- 確保所有身障兒童都有機會...提供免費的免費公共教育,強調特殊教育及相關服務,以滿足他們個別的需要
- 確保身障兒童及其父母的權利...受到保護
- 協助國家和地方為所有身障兒童提供教育
- 評估和確保對所有身障兒童教育努力的有效性
- 1977年，智力跟成就差距標準的概念在Federal Register提出智力跟成就差距標準（Discrepancy）的運作模式。

6

差距標準（Discrepancy）的計算

- 年齡Age
 - 生理以及表現達到兩個年級的差距。
 - 年齡越小差距要求越低，年齡越大，差距要求越大。
- 標準分數Standardized Score
 - 轉成標準常態分數（Z score），達1.5~2 標準差。
- 迴歸校正Regression correction
 - 兩個變項相關會產生regression toward the mean的議題。高分組容易達成差距，低分組不容易達成差距。
 - 統計方法校正
- 注意：研究上往往用比較寬鬆的標準。智力85（1個SD）以上，成就表現85以下。研究結果是否能能夠類推到現場？

Average is smooth



7

迴歸校正的方式：供參考

Appendix B: Severe Discrepancy Regression Formula

If a school district uses a severe discrepancy model, it must use OSPI's published table to establish a severe discrepancy between intellectual ability and academic achievement ([WAC 392-172A-03065](#); Appendix A). The table was developed on the basis of the regressed standard score discrepancy formula developed in 1983 by the United States Department of Education—Office of Special Education Programs (ED-OSEP) work group. It considers the following variables:

- The reliability coefficient of the intellectual ability test.
- The reliability coefficient of the academic achievement test.
- An appropriate correlation between the intellectual ability and the academic achievement tests.

The regression formula developed by the ED-OSEP is:

$$Z_{yc} = (z_x r_{xy}) \left[\left(1.96 \sqrt{1 - r_{xy}^2} \right) - \left(1.65 \left(\sqrt{1 - r_{xy}^2} \right) \left(\sqrt{1 - \frac{\sqrt{r_{yy} + (r_{xx} r_{xy}^2) - (2r_{xy}^2)}}{1 - r_{xy}^2}} \right) \right) \right]$$

r_{xy} = test to test correlation – IQ to achievement
 r_{yy}, r_{xx} = internal consistency reliabilities

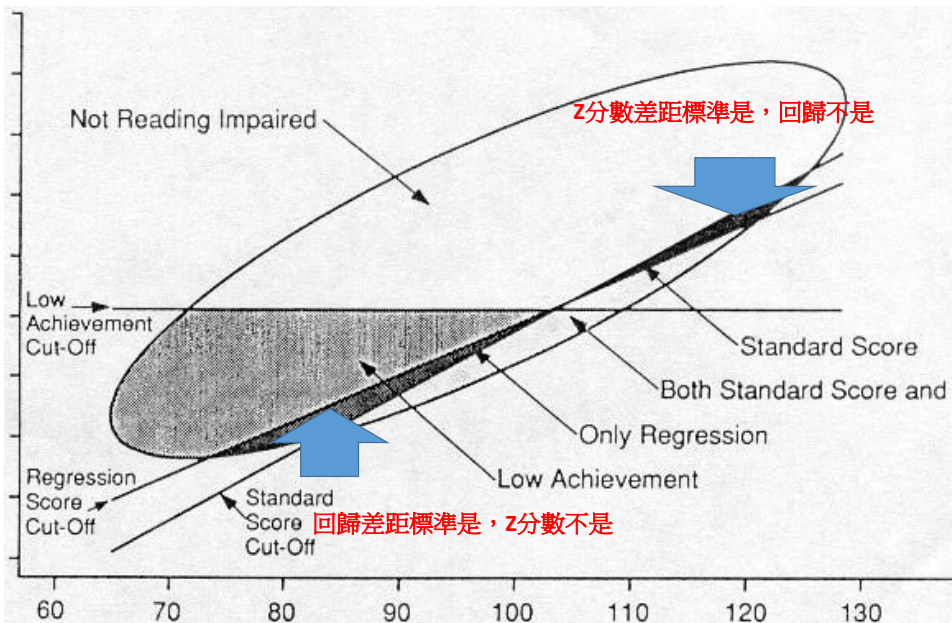
http://www.k12.wa.us/SpecialEd/pubdocs/SLD_Guide.pdf

8

簡單來說，閱讀低成就者分成兩組

- 讀寫障礙(dyslexia)：智力高，閱讀成就低。達到差距標準。
- 弱讀者 (garden-variety poor reader)：智力低，閱讀成就低。沒有達到智力跟成就的差距標準。
- 一個在背後、沒說清楚的假設：智力跟成就間達到高相關。
 - 問題是：真地是如此嗎？一般而言閱讀理解跟智力約為.6X；識字跟智力相關則.2~.4
 - 閱讀理解跟智力？高
 - 識字正確性跟智力？中到低。
 - 識字流暢性跟智力？中到低。

9



- 白話文：以標準分數容易讓智力高者容易達到差距標準，智力低者不容易達到差距標準。

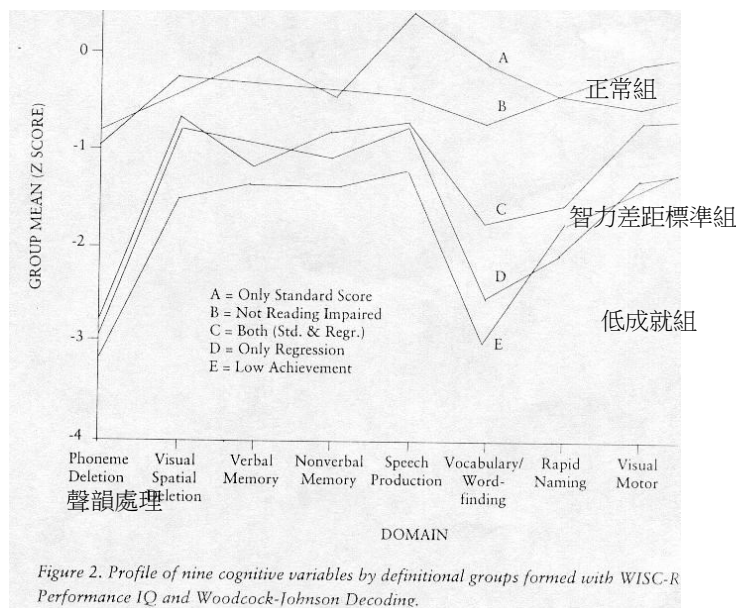
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1988~1994年的研究，對差距標準提出疑義

- 低成就（**low achiever**）分成讀寫障礙（**dyslexia**智力高）以及弱讀者（**garden variety poor reader**智力低）。
- 但，
 - 兩群人的認知剖面圖是一樣的。
 - 兩組人的閱讀發展曲線是一樣的。
 - 智力跟有效的教學介入的反應無關。
- 所以，沒有理由區分。走向，教學介入反應模式**RTI**。

11

請注意他們都是在聲韻處理、字義提取上有問題，而不是在視覺空間處理上有問題



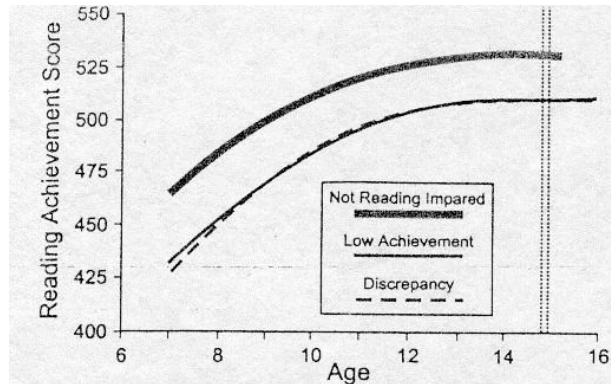


FIGURE 5 Growth curves from Grade 1 to Grade 9 for the reading cluster score of the Woodcock-Johnson for children in discrepant, only-low-achievement, and not-reading-impaired groups. From "Developmental Lag Versus Deficit Models of Reading Disability: A Longitudinal Individual Growth Curves Analysis," by D. J. Francis, S. E. Shaywitz, K. K. Stuebing, B. A. Shaywitz, and J. M. Fletcher, 1996, *Journal of Educational Psychology*, 88, p. 13. Copyright © 1996 by the American Psychological Association. Reprinted with permission.

智力與對教學介入反應無關

Except Child. 2009 October 1; 76(1): 31–51.

IQ Is *Not* Strongly Related to Response to Reading Instruction: A Meta-Analytic Interpretation

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Abstract

A meta-analysis of 22 studies evaluating the relation of different assessments of IQ and intervention response did not support the hypothesis that IQ is an important predictor of response to instruction. We found an R^2 of .03 in models with IQ and the autoregressor as predictors and a unique lower estimated R^2 of .006 and a higher estimated R^2 of .013 in models with IQ, the autoregressor, and

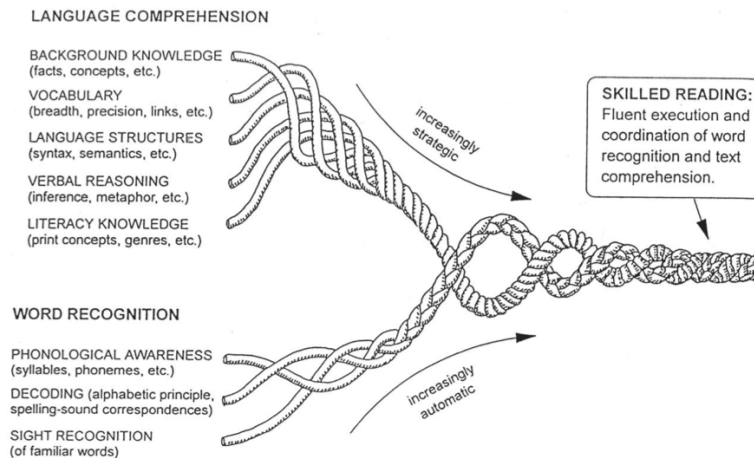
一點點閱讀研究的歷史背景

15

閱讀的簡單觀點

Simple view of reading

閱讀理解 = 字詞辨識 * 聽力理解



16

Specific reading disability (dyslexia): what have we learned in the past four decades?

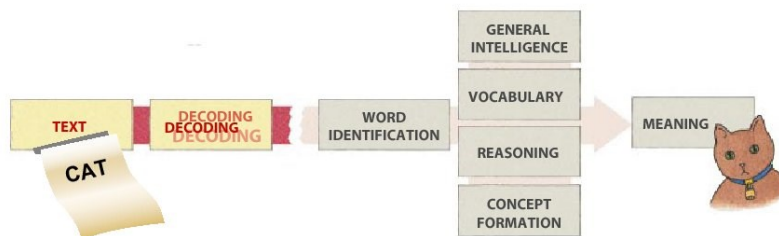
Frank R. Vellutino,¹ Jack M. Fletcher,² Margaret J. Snowling,³
and Donna M. Scanlon¹

¹The University at Albany, USA; ²The University of Texas Health Science Center at Houston, USA;
³The University of York, UK

- However, research in the study of reading disability has made it clear that early reading difficulties in the population of children defined herein, that is, children who might qualify for a diagnosis of dyslexia in accord with the criteria outlined earlier, are manifested primarily in **inadequate facility in printed word identification as well as inadequate facility in related skills such as spelling and phonological (letter-sound) decoding**. Such difficulties may or may not be accompanied by significant deficits in language comprehension, but they are **not necessarily accompanied by such deficits**. Thus, specific reading disability (dyslexia) in otherwise normal children has been and continues to be defined as a basic deficit in learning to decode print

17

閱讀發展與閱讀障礙的 瓶頸假說Bottleneck hypothesis



18

英文裡解碼、字詞辨識的意義。

Decoding, single word reading Word identification in English

- “The identification of printed words has long been treated as a skill that is essential for novice readers, yet it remains important in skilled adult reading as well and is a necessary (but not sufficient) factor for comprehension. By “word identification,” **we mean that the reader can pronounce a word, not whether he or she knows what it means.**” (Preventing Reading Difficulties in Young Children, 1998, p.56)

19

Basic Reading Skill in WIAT III

Academic Skills Profile

Student: _____

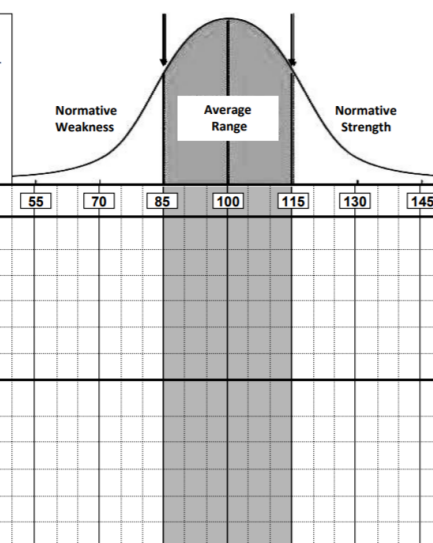
Date: _____

Tests: *Wechsler Individual Achievement
Test (WIAT-3)*

The student's performance on academic achievement tests is compared with national norms for children the same age.

Most children (68 in 100) demonstrate skills within the “Average Range”.

Scores below 85 indicate a possible “Normative Weakness” that may impact school learning.



20

Pseudo-word decoding/word attack

1		
sab		ped
ren		fop
wub		det
tog		lat
zum		vit
bot		bom
cam		gip
mib		nim
yob		bup
kag		hig
Score: ____/20		
Date: _____		

2		
mot		tam
yob		nud
wap		ket
mig		bim
fip		rit
veb		jom
cug		zat
dut		pob
gub		lan
sed		jup
Score: ____/20		
Date: _____		

3		
lam		firm
nop		zug
ret		jad
hob		ven
yun		ped
vot		com
sig		dib
bap		rud
gat		wab
kip		mog
Score: ____/20		
Date: _____		

4		
bub		gam
wim		tud
kig		het
yan		dat
rup		jit
cun		mab
sog		nug
fap		len
vob		pum
mip		zed
Score: ____/20		
Date: _____		

21

國際閱讀障礙學會對閱讀障礙的定義 Definition of developmental dyslexia

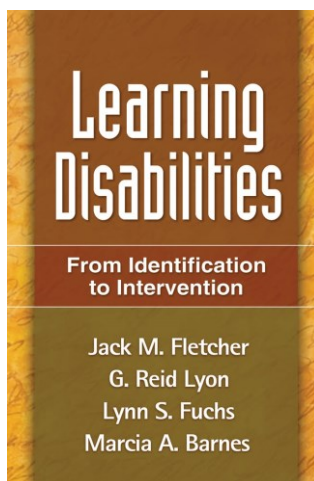
- Dyslexia is one of several distinct learning disabilities. It is specific language-based disorder of constitutional organ **characterized by difficulties in single word decoding**, usually reflecting insufficient **phonological processing abilities**. These difficulties in single word decoding are often unexpected in relation to age or other cognitive abilities; they are not the result of generalized developmental disability or sensory impairment.....Orton dyslexia society(1994), now IDA.
- 注意是在單字詞辨識。
- 聲韻處理困難。
- 有器質性的原因。
- 差標標準。

22

- ”that reading disability is most precisely measured **at the single word level** and causally associated with **phonological deficits**. In contrast to other definitions of dyslexia, this definition does not specify that an **IQ-reading achievement discrepancy** be present and does not exclude any conditions or handicaps where a **specific phonological deficit** could exert a primary causal influence on subsequent reading development. All statements within the definition have an empirical basis and it has been noted that converging data relevant to **genetic and neurobiological factors** are emerging.
- ~ G. Reid Lyon, Ph.D. NICHD

23

但，RD後來加入了specific reading comprehension deficit.



2007/2019

CHAPTER 1	Introduction	1
CHAPTER 2	History of the Field	9
CHAPTER 3	Classification, Definition, and Identification of Learning Disabilities	25
CHAPTER 4	Assessment of Learning Disabilities	64
CHAPTER 5	Reading Disabilities: Word Recognition	85
CHAPTER 6	Reading Disabilities: Fluency	164
CHAPTER 7	Reading Disabilities: Comprehension	184
CHAPTER 8	Mathematics Disabilities	207
CHAPTER 9	Written Expression Disabilities	236

24

Specific reading comprehension deficit

- <https://haskinslabs.org/sites/default/files/files/Reprints/HL1825.pdf>

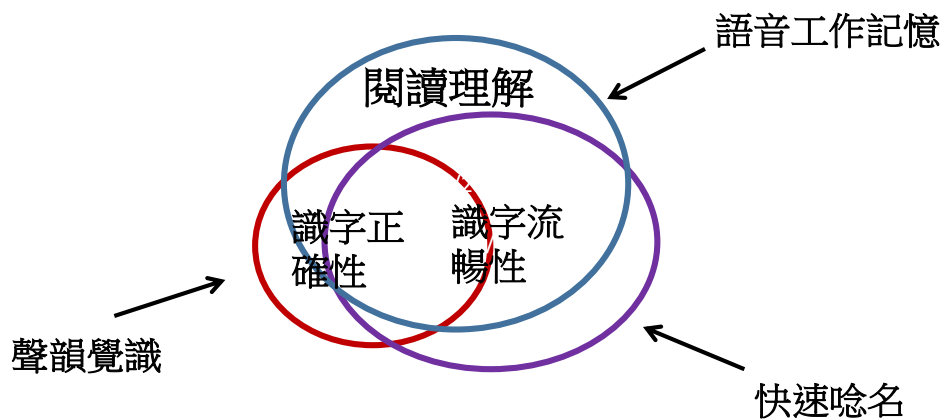
25

閱讀的操作型定義

- 識字正確性（accuracy）：英文裡是sounding out。
- 識字流暢性（fluency）：英文裡是word count per min.
- 閱讀理解（comprehension）

26

為什麼研究不容易重複驗證？



27

轉向RTI的重大原因

- 以智力區分低成者否有意義？
 - 成就測驗與智力高相關？
 - 理解測驗與智力高相關。識字測驗，嗯，相關不是那麼高。
 - 以智力高低區分低成就者沒有意義。
- 基本能力明顯落後，但智力在85以下者。
- 可能因為沒有接受有效教學的介入。
- 等著失敗的議題（wait to fail）
- 測驗的穩定性

28

太晚介入，事倍功半

• Reid Lyon 1997於國會的證詞

• http://www.reidlyon.com/media/lyon_testimonies.pdf

- We have learned that for 90% to 95% of poor readers, prevention and early intervention programs that combine instruction in phoneme awareness, phonics, and reading comprehension strategies provided by well trained teachers can increase reading skills to average reading levels. However, we have also learned that if we delay early intervention until nine-years-of-age, (the time that most children with reading difficulties receive services), approximately 75% of the children will continue to have difficulties learning to read throughout high school. To be clear, while older children and adults can be taught to read, the time and expense of doing so is enormous.

29

Individuals with Disabilities Education Improvement Act of 2004 不主張州政府必須要求差距標準為鑑定，建議改用RTI，或是 另類研究支持的程序。

Additional Procedures for Identifying Children With Specific Learning Disabilities

§300.307 Specific learning disabilities.

(a) **General.** A State must adopt, consistent with §300.309, criteria for determining whether a child has a specific learning disability as defined in §300.8(c)(10). In addition, the criteria adopted by the State--

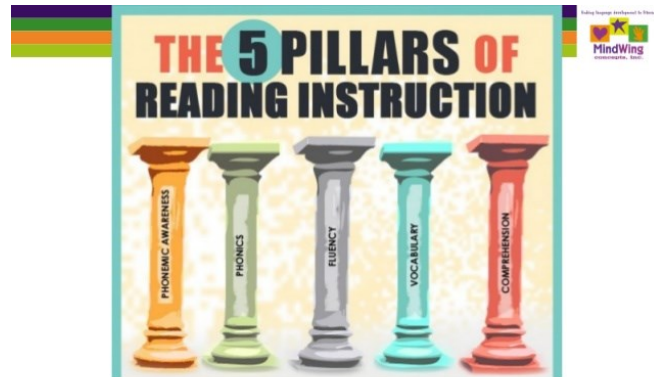
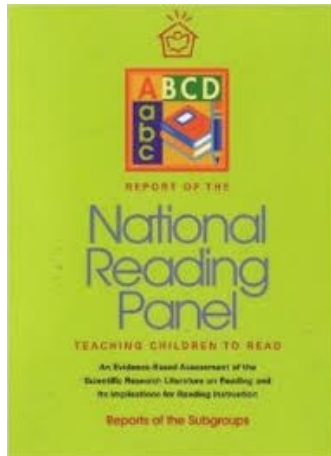
- (1) Must not require the use of a severe discrepancy between intellectual ability and achievement for determining whether a child has a specific learning disability, as defined in §300.8(c)(10);
- (2) Must permit the use of a process based on the child's response to scientific, research-based intervention; and
- (3) May permit the use of other alternative research-based procedures for determining whether a child has a specific learning disability, as defined in §300.8(c)(10).

30

科學、證據為本位的有效的閱讀教學：教學介入反應模式 RTI

Effective instruction in reading

<https://www.nichd.nih.gov/publications/pubs/nrp/Documents/report.pdf>



National Reading Panel Report
National Institute of Child Health and Human Development (2000). Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction. NIH Publication No. 004769 Washington, DC. US Government Printing Office

11 31

教學介入反應模式（response to intervention, RTI, response to instruction, RTI）
第一層以及第二層由原班導師；第三層或是第三層後被研判為特教生。

Academic Systems

Tertiary Interventions Tier 3 or more

- Individual Students
- Assessment-based
- High Intensity
- More frequent monitoring

第二層的介入 (Tier 2)

- 不同學生
- 小團體介入
- 進步監控
- 一點的個別化教學

初級的教学 (Tier 1)

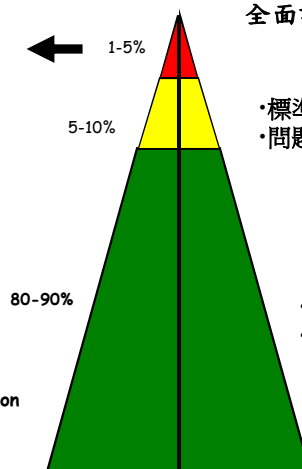
- 所有學生 All students
- 證據為基礎的教學 Evidence-based reading instruction

Behavior Systems

全面評估 Comprehensive Evaluation

- 標準程序 standard protocol
- 問題解決 problem solving

- 普篩的機制 Universal Screening
- 進展監控 progress monitoring



32

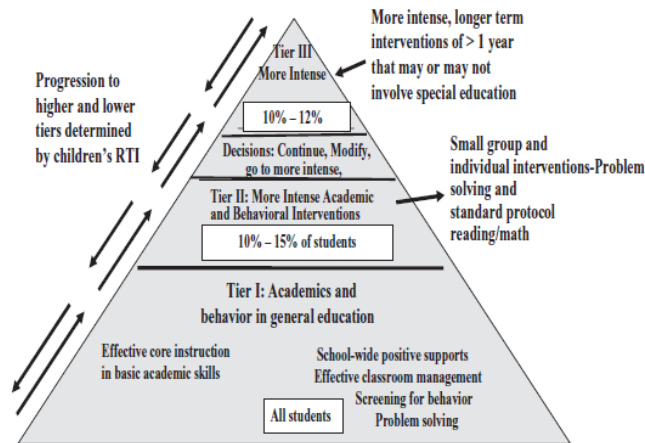


Figure 1. Multitiered system with tiers varying in intervention intensity and measurement precision. MTSS/RTI model with three tiers. MTSS = multitier system of supports; RTI = response to intervention.

33

項目以及標準（Federal Register, 2006）

- § 300.309 Determining the existence of a specific learning disability.
- (a) The group described in § 300.306 may determine that a child has a specific learning disability, as defined in § 300.8(c)(10), if— (1) The child does not achieve adequately for the child's age or to meet State-approved grade-level standards in one or more of the following areas, when provided with learning experiences and instruction appropriate for the child's age or State-approved grade-level standards:
 - (i) Oral expression. (ii) Listening comprehension. (iii) Written expression. (iv) Basic reading skill. (v) Reading fluency skills. (vi) Reading comprehension. (vii) Mathematics calculation. (viii) Mathematics problem solving.
- (2)(i) The child does not make sufficient progress to meet age or State approved grade-level standards in one or more of the areas identified in paragraph (a)(1) of this section when using a process based on the child's response to scientific, research-based intervention; or (ii) The child exhibits a pattern of strengths and weaknesses in performance, achievement, or both, relative to age, State-approved grade level standards, or intellectual development, that is determined by the group to be relevant to the identification of a specific learning disability, using appropriate assessments, consistent with §§ 300.304 and 300.305; and (3) The group determines that its findings under paragraphs (a)(1) and (2)

34

RTI基本概念

- 不管你的智力狀況，提供有效教學後，沒有辦法達到基本能力、年級能力者，都可能視為是特殊教育的服務對象。
- 給每一個學生公平的教育機會。
- 問題：
 - 如何界定有反應？

35

Processing Strengths and Weaknesses

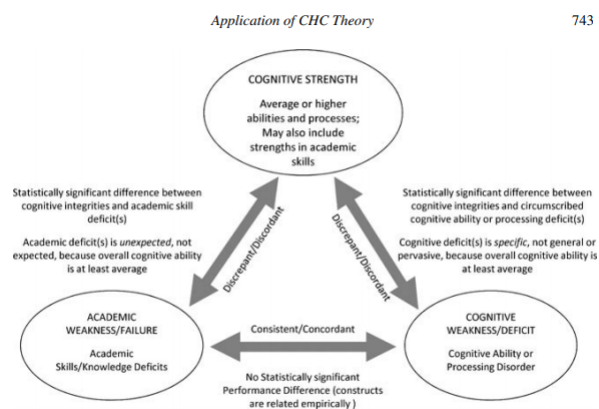
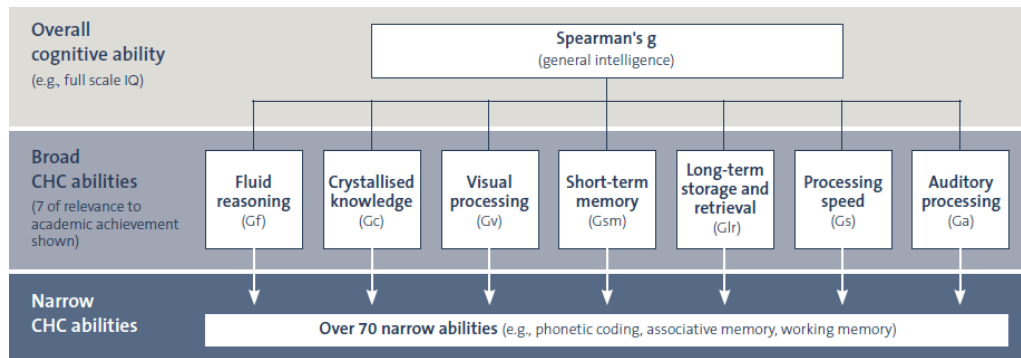


FIGURE 1. Common elements of third-method approaches to SLD identification.

36

PSW的一種模式採用Cattell-Horn-Carroll的架構 各智力可能對應到相關的聽說讀寫算成就



37

教育界實際的運作狀況

Benson, N. F., Maki, K. E., Floyd, R. G., Eckert, T. L., Kranzler, J. H., & Fefer, S. A. (2019). A National Survey of School Psychologists' Practices in Identifying Specific Learning Disabilities, *School Psychology Quarterly* 35(2),

- 差距標準，法規上說明不能要求使用它為鑑定依據，但沒禁止：美國的調查，**67%**的成的州都允許使用差距標準，**37%**的學校心理家使用差距標準。
- RTI，法規上建議使用：雖然對有效教學、教學反應有不同意見，但應該沒有人有異議。只有九個州，單獨使用RTI。**51%**學校心理學家使用。
- PSW(pattern of strength and weakness)，法規上說，另類科學研究支持的方式：**46%**的州都允許使用，**53%**學校心理學家使用，使用PSW的，其中**66.6%**使用Dual Discrepancy/Consistency Model (DD/C)。

38

醫學上的依據DSM-V基本上揚棄差距標準，成就低於生理年紀表現，並足以影響其學業、職能、日常生活功能運作

Specific Learning Disorder

Diagnostic Criteria

- A. Difficulties learning and using academic skills, as indicated by the presence of at least one of the following symptoms that have persisted for at least 6 months, despite the provision of interventions that target those difficulties:
1. Inaccurate or slow and effortful word reading (e.g., reads single words aloud incorrectly or slowly and hesitantly, frequently guesses words, has difficulty sounding out words).
 2. Difficulty understanding the meaning of what is read (e.g., may read text accurately but not understand the sequence, relationships, inferences, or deeper meanings of what is read).
 3. Difficulties with spelling (e.g., may add, omit, or substitute vowels or consonants).
 4. Difficulties with written expression (e.g., makes multiple grammatical or punctuation errors within sentences; employs poor paragraph organization; written expression of ideas lacks clarity).
 5. Difficulties mastering number sense, number facts, or calculation (e.g., has poor understanding of numbers, their magnitude, and relationships; counts on fingers to add single-digit numbers instead of recalling the math fact as peers do; gets lost in the midst of arithmetic computation and may switch procedures).
 6. Difficulties with mathematical reasoning (e.g., has severe difficulty applying mathematical concepts, facts, or procedures to solve quantitative problems).

39

- B. The affected academic skills are substantially and quantifiably below those expected for the individual's chronological age, and cause significant interference with academic or occupational performance, or with activities of daily living, as confirmed by individually administered standardized achievement measures and comprehensive clinical assessment. For individuals age 17 years and older, a documented history of impairing learning difficulties may be substituted for the standardized assessment.
- C. The learning difficulties begin during school-age years but may not become fully manifest until the demands for those affected academic skills exceed the individual's limited capacities (e.g., as in timed tests, reading or writing lengthy complex reports for a tight deadline, excessively heavy academic loads).
- D. The learning difficulties are not better accounted for by intellectual disabilities, uncorrected visual or auditory acuity, other mental or neurological disorders, psychosocial adversity, lack of proficiency in the language of academic instruction, or inadequate educational instruction.

Note: The four diagnostic criteria are to be met based on a clinical synthesis of the individual's history (developmental, medical, family, educational), school reports, and psycho-educational assessment.

Coding note: Specify all academic domains and subskills that are impaired. When more than one domain is impaired, each one should be coded individually according to the following specifiers.

40

315.00 (F81.0) With impairment in reading:

Word reading accuracy
 Reading rate or fluency
 Reading comprehension

Note: *Dyslexia* is an alternative term used to refer to a pattern of learning difficulties characterized by problems with accurate or fluent word recognition, poor decoding, and poor spelling abilities. If dyslexia is used to specify this particular pattern of difficulties, it is important also to specify any additional difficulties that are present, such as difficulties with reading comprehension or math reasoning.

315.2 (F81.81) With impairment in written expression:

Spelling accuracy
 Grammar and punctuation accuracy
 Clarity or organization of written expression

315.1 (F81.2) With impairment in mathematics:

Number sense
 Memorization of arithmetic facts
 Accurate or fluent calculation
 Accurate math reasoning

Note: *Dyscalculia* is an alternative term used to refer to a pattern of difficulties characterized by problems processing numerical information, learning arithmetic facts, and performing accurate or fluent calculations. If dyscalculia is used to specify this particular pattern of mathematic difficulties, it is important also to specify any additional difficulties that are present, such as difficulties with math reasoning or word reasoning accuracy.

41

DSM-V的爭議請見

Comments on Proposed DSM-5 Criteria for Specific Learning Disorder
 from a Legal and Medical/Scientific Perspective

<http://dyslexia.yale.edu/CommentsDSM5ColkerShaywitzSimon.pdf>

- 簡單說明的論點：
 - 基本處理上的問題，不一定是學校成就上的問題。
 - 可能有學障者不是在PR50以下。差距標準還是不能放棄。
 - 不是所有人都是在學校裡。所以可能無教學介入歷史。
 - 應該說明dyslexia的重要性以及清楚的說明。 Specific Learning Disorder 並沒有辦法清楚的說明。

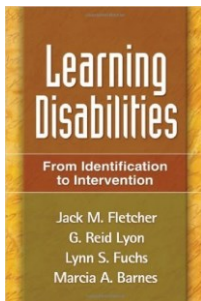
42

一個議題：
亞型 subtype (DSM-V)/
主顯型 presentation (DSM-IV)

- 病源是否不同？
- 類型是否轉換？

43

學障是異質性的群體：亞型/主顯型
改寫自 Fletcher et al. (2007), p. 76。2019新版



學業項目	測量變項	台灣對應測驗概念
Word recognition	word identification, word attack	字詞辨識
Reading fluency	Fluency	流暢性/自動化程度
Reading comprehension	passage comprehension	閱讀理解
Math computations	Calculations	數學計算
Math problem solving	applied problem	數學應用題
Spelling	Spelling	書寫

44

問題？

45