What is Learning?

- Learning is the process of acquiring information.
- What are the cognitive factors that enable students to show what they know and can do?
  - How do they collect, sort, store, and retrieve information?
  - How do they receive, perceive, process, and remember information?
- Other factors?
  - How do they "take in" information?
  - How do they "put out" information?

Cognitive Processing

Input → Process → Output

Attention and Learning

To receive, perceive, process, and remember information, children must:
- selectively attend to certain stimuli while ignoring competing, irrelevant stimuli.
- sustain attentional focus for a prolonged period.
- shift attentional resources from one activity to another.
- respond to more than one task simultaneously – divided attention.

Sensory/Motor and Learning

To respond effectively to the demands of the typical classroom, children must be able to encode information, and show what they know.
- Is the child able to see the information (visual acuity)?
- Is the child able to hear the information (hearing acuity)?
- Is the child able to respond in writing (fine motor skills)?
- Is the child able to respond orally (language production)?
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Visual-Spatial and Learning

Much of what is presented in school has either a visual-spatial or language basis.

- Visual-perceptual skills play a major role in the development of a child’s handwriting skills, and fluency in maths and reading.
  - For example, a student may be able to name individual letters in a word (visual analysis, b-e-d). She may be unable to integrate the letters to say the word (visual synthesis, bed).

Language and Learning

Language is the basis for much of the learning that occurs in schools.

- Children must understand words and sentences to perceive and process information - receptive.
- They must use words to show they can retrieve information from memory - expressive.
- Early development of reading depends critically on the...receptive phonological component of the aural system and the expressive phonological component of the oral system… (Berninger, 2007).

Language and Literacy

Speed of Processing and Learning

Efficient cognitive processing frees-up cognitive resources for more complex or higher-level tasks.

- A weakness in the speed of processing routine information may make the task of comprehending novel and/or non-routine information more time-consuming and difficult.
  - For example, if a child names words effortlessly, s/he can focus cognitive energy on higher-order comprehension; if a child computes fluently, s/he can focus on application.

Working Memory and Learning

Many of the learning activities that children are engaged with in the classroom impose quite considerable burdens on working memory.

- For example, holding in mind information (a sentence to be written down) while doing something that for them is mentally challenging (spelling the individual words in the sentence); or, following lengthy instructions because they forget the instruction before the whole sequence of actions is completed.
- Characteristic of children with many kinds of learning difficulties (language, dyslexia, dyscalculia, ADHD, etc.)

What is a Specific Learning Disorder?

Specific Learning Disorder

- Affects a person’s ability to “receive, store, process, retrieve, or communicate information” (Cortiella & Horowitz, 2014, p.3)
- Brain-based disorder linked to neurological differences in brain structure
- Can manifest in one or more areas of academic achievement
- E.g. SLD can be specific with a student presenting with deficits in reading and writing, but performing at an average or above level in math and oral language.
- Outstanding feature of SLD is that the student’s underachievement is unexpected
- Prevalence estimated to be between 5-15% of students
- Greatly benefit from the use of appropriate adaptations, accommodations, and compensatory strategies

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Historical perspective

Identification of SLD

Lack of clarity regarding definitions and distinctions between learning difficulties and learning disorders.

“Learning Disabilities” “Learning Disorders” “Slow Learners” “Learning Disabled” etc.

Research over past 20 years and changes in State and Federal legislation in other countries (particularly US) helping to produce a clearer understanding of students who fit under the umbrella term “Learning Difficulties”.

Historical perspective

Previous methods of identification and assessment have failed to adequately distinguish between groups.

Advances in cognitive theory and assessment methods assisting with understanding cognitive differences between groups (e.g. SLD vs Slow Learners).

Ability-Achievement Discrepancy (AAD)

Statistical methods to measure size of difference between individual’s cognitive ability and their academic achievement.

Generally = comparison of child’s achievement to their FSIQ using standardised assessment.

Ability-Achievement Discrepancy (AAD)

Issues with this method:

- No specific formulas or numeric values provided by State or Federal legislation to allow for standard measure for discrepancy criteria.
- Potential to under- and over-diagnose due to arbitrary cut offs.
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Ability-Achievement Discrepancy (AAD)

Issues with this method:
- Based on erroneous assumption that FSIQ is...
  - Near-perfect predictor of academic achievement
  - Directly informs individual’s potential
  - Can predict response to intervention.
- Removed from DSM due to overwhelming evidence to show insufficient.

Historical perspective

Previous assessment and identification methods:
Response-To-Intervention (RTI) - ONLY
- SLD = inadequate response to intervention.
- 3 Tiers:
  - Tier 1 = quality instruction & screening
  - Tier 2 = evidence-based intervention (small group) and monitor
  - Tier 3 = individual intervention
    - If the student is still failing to respond at Tier 3, SLD can be diagnosed by default

Response to Intervention (RTI)

Issues with this method:
- Lack of clear definition and criteria for RTI across states and nations resulting in vague, non-specific guidelines which can be interpreted in many ways.
- Traditional psychometric methods are abandoned - no further assessment of cognitive and achievement abilities for students who fail to respond at Tier 3.

Response to Intervention (RTI)

Issues with this method:
- What actually constitutes the “R” in RTI? How is response measured?
- Assumes that if a child isn’t learning through the intervention provided, then the student must be deficient, not the intervention.
- No mathematics behind model

Response to Intervention (RTI)

Issues with this method:
- Fails to distinguish between learning difficulty groups.
- Ignores the notion that children with SLD have average - above average cognitive skills.
315 (F81) Specific Learning Disorder

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.

NB: Requires psychometric evidence from an individually administered, psychometrically sound and culturally appropriate test of academic achievement that is norm-referenced. For the greatest diagnostic certainty, scores on one or more standardised tests or subtests within an academic domain of at least 1.5SD’s below the mean for age, which translates to a Standard Score of 78 or less, which is below the 7th percentile (p.69).

315 (F81) Specific Learning Disorder

C. The learning difficulties begin during **school-age years**...

C. ...are **not better accounted** for by intellectual disabilities, uncorrected visual or auditory acuity, other mental or neurological disorders...etc.

Differential diagnosis (pp.73-74)
- Normal variations in academic attainment
- Intellectual Disability (Intellectual Developmental Disorder)
- Learning Difficulties due to neurological or sensory disorder
- Neurocognitive disorders
- Attention-Deficit/Hyperactivity Disorder (ADHD)
- Psychotic disorders

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 psychoeducational assessment.

Specifiers include with impairment in reading (dyslexia), written expression, and/or mathematics (dyscalculia); as well as severity.

Patterns of Strengths and Weaknesses - A new approach?
What is Patterns of Strengths and Weaknesses (PSW)?

- Developed from the need for a more reliable and valid method for identifying SLD, and distinguishing SLD from others learning difficulties, such as slow learners.
- Methods used within this model are based on 3 common components of SLD:
  - Cognitive and academic weaknesses are empirically related.
  - Generally average or above overall cognitive ability when cognitive weakness has been removed.
  - There is a statistically and clinically meaningful difference between overall cognitive ability and areas of cognitive and academic weakness.

What is PSW?

- Requires the identification of a processing weakness.
  - Differentiates between SLD and underachievement (for other reasons).
  - SLD requires individualised instruction responsive to processing strengths and weaknesses.
  - Important given using RTI only is not sufficient for diagnosing SLD.

PSW Approaches

Read up on these prominent research-based PSW approaches if interested:


PSW Approaches - Commonalities

- Rule out exclusionary factors as part of the definition of a learning disability (i.e. input and output issues).
- Identify a cognitive processing weakness that is related to the achievement weakness.
- Identify one or more areas of strength that are unrelated to the achievement weakness.

Methodological and Statistical Requirements for PSW

- The score comparisons must be significantly different (discrepant) to meet criteria for SLD identification:
  - processing strength vs achievement weakness
  - processing strength vs processing weakness
- Is there a consistency between the achievement weakness and the processing weakness?

Methodological and Statistical Requirements for PSW

- Score comparisons are evaluated using the simple-difference method rather than the predicted-score (regression) method
  - Not an implicit causal relationship, as with AAD
- If comparisons are not statistically significant, the child does not demonstrate a pattern consistent with an SLD
  - However, use clinical judgement and multiple data points!
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Conducting PSW Analysis with WISC-V and WIAT-III:

Step 1
Select the WIAT-III achievement weakness.
  a. Subtest or composite score that corresponds to primary achievement weakness - consider below average scores of less than 85.
  b. Examine subtest variability within a WIAT-III composite score before selecting the composite as the achievement weakness; otherwise use subtests.

Step 2
Select the WISC–V standard score that represents the processing weakness.
  a. Generally associated with the achievement weakness.
  b. Examine subtest variability within the WISC–V standard scores before selecting a processing weakness.
     a. Preferable (not always necessary) to use a different standard score

Step 3
Select the WISC–V standard score that represents the processing strength.
  a. Processing strength not typically related to the achievement weakness.
  b. Examine subtest variability within the WISC–V standard scores before selecting the processing strength (see 2b).
  c. Avoid using WMI, PSI, AWMI as not well accepted as processing strengths.

Step 4
If the child is underachieving in more than one area, the analysis may be conducted once for each area of weakness.

It is important, however, to select the processing strength and weakness carefully each time, according to the achievement weakness selected.
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Comparing the Approaches

**PSW**
- Primary Index scores, some of the Ancillary and Complementary Index scores are used as measures of processing strengths and weaknesses
- Two score comparisons are required to meet criteria
- Statistical evidence of a processing weakness is an essential requirement

**AAD**
- FSIQ is used unless there is some compelling clinical reason to use VCI, VSI, FRI, QRI, NVI, or GAI (e.g., visual, motor or language problems; working memory, or processing speed issues related to some clinical conditions)
- A single comparison is used
- No statistical evidence is required for a processing weakness, though may include supplementary evaluation

US Research
- Data from WISC-IV / WIAT-II linking study.
- Goal to ascertain percentage of children previously classified as having an SLD who would meet the criteria for PSW model.
- Only 63% of 147 children previously identified as having an SLD (using school district criteria) met PSW model criteria.
- Utilising psychometric comparisons only; a slightly smaller number met the criteria of the PSW model than those of the AAD model.

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Important Reminders!

- PSW is intended to help generate hypotheses and not intended for use in isolation.
- Consider all available information, including:
  - developmental, medical, family, social, and academic history;
  - information gained from classroom and test session observations of behavior and motivation;
  - information gained from a RTI approach;
  - other test results including information obtained from teachers, parents, or other family members;
  - any unusual characteristics or disabilities.

Pattern of Strengths and Weaknesses - Case Examples

<table>
<thead>
<tr>
<th>Processing Strength</th>
<th>WISC–V Verbal Comprehension Index</th>
<th>SS = 114</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Discrepant? Yes</td>
<td>B. Discrepant? Yes</td>
<td></td>
</tr>
<tr>
<td>Achievement Weakness</td>
<td>WIAT–III Numerical Operations</td>
<td>SS = 79</td>
</tr>
<tr>
<td>Processing Weakness</td>
<td>WISC–V Working Memory Index</td>
<td>SS = 80</td>
</tr>
</tbody>
</table>

Pattern of Strengths and Weaknesses Analysis

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Relative Strength Score</th>
<th>Relative Weakness Score</th>
<th>Diff.</th>
<th>Critical Value</th>
<th>Sign.</th>
<th>Diff. Y / N</th>
<th>Supports SLD hypothesis?</th>
<th>Yes / No</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Processing Strength / Achievement Weakness</td>
<td>105 (VS)</td>
<td>72 (WR)</td>
<td>33 10.00</td>
<td>Y</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processing Strength / Processing Weakness</td>
<td>105 (VS)</td>
<td>85 (NC)</td>
<td>19 12.00</td>
<td>Y</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The PSW model is intended to help practitioners generate hypotheses regarding clinical diagnoses. This analysis should always be used within a comprehensive evaluation that incorporates multiple sources of information and takes into consideration intervention.
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Pattern of Strengths and Weaknesses Analysis

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Relative Strength Score</th>
<th>Relative Weakness Score</th>
<th>Diff.</th>
<th>Critical Value</th>
<th>Sign. Diff. Y/N</th>
<th>Supports SLD Hypothesis?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Processing Strength / Achievement Weakness</td>
<td>95 (FRI)</td>
<td>85 (MF)</td>
<td>10</td>
<td>11.00</td>
<td>N</td>
<td>No</td>
</tr>
<tr>
<td>B Processing Strength / Processing Weakness</td>
<td>95 (FRI)</td>
<td>85 (PSI)</td>
<td>10</td>
<td>11.00</td>
<td>N</td>
<td>No</td>
</tr>
</tbody>
</table>

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Ability-Achievement Discrepancy Analysis

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths Problem Solving</td>
<td>102</td>
<td>85</td>
<td>17</td>
<td>11.10</td>
<td>Y</td>
<td>&lt;=5%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>102</td>
<td>86</td>
<td>16</td>
<td>9.02</td>
<td>Y</td>
<td>&lt;=5%</td>
</tr>
<tr>
<td>Maths Fluency</td>
<td>102</td>
<td>85</td>
<td>17</td>
<td>10.01</td>
<td>Y</td>
<td>&lt;=5%</td>
</tr>
</tbody>
</table>

A Case Study

Lilly

- 8 years, 2 months
- Grade 3
- Attends mainstream school
- Language: English

Referral: Lilly is experiencing ongoing difficulties with reading despite participating in reading recovery in Grade 1.

WISC V Profile

- WISC–V Visual Spatial Index: SS = 97
  - A. Discrepant? Yes
- WISC–V Processing Speed Index: SS = 80
  - B. Discrepant? No

WIAT-III Profile

- WIAT–III Word Reading: SS = 78
  - Achievement Weakness: WIAT–III Word Reading SS = 78
  - Processing Weakness: WISC–V Processing Speed Index SS = 80

Pattern of Strengths and Weaknesses Model

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Pattern of Strengths and Weaknesses Analysis

<table>
<thead>
<tr>
<th>Computation</th>
<th>Relative Strength Score</th>
<th>Relative Weakness Score</th>
<th>Diff.</th>
<th>Critical Value</th>
<th>Sign. Diff.</th>
<th>Y/N</th>
<th>Supports SLD Hypothesis?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>97 (VSI)</td>
<td>70 (WR)</td>
<td>19</td>
<td>13.00</td>
<td>Y</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>87 (VSI)</td>
<td>80 (PSI)</td>
<td>17</td>
<td>17.00</td>
<td>N</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

The PSW model is intended to help practitioners generate hypotheses regarding clinical diagnoses.

This analysis should always be used within a comprehensive evaluation that incorporates multiple sources of information and takes into consideration intervention.

Summary & Recommendations

Does not meet criteria for a Specific Learning Disorder - not statistically using PSW method nor meeting intervention criteria (reading recovery does not count as evidence-based explicit instruction for reading difficulties).

Given processing speed weakness, we would expect some areas of academics to be impacted. Behaviour assessment also revealed elevated anxiety which may also be impacting on school performance.

- Tutoring - specifically targeting her letter-sound knowledge and reading.
- Implement Individual Learning Plan at school to monitor progress and goals.
- Make reasonable adjustments within the classroom to assist with processing speed weakness (eg. allow more time to complete set work, reduce quantity in favour of quality, limit copying activities).

Pricing

WIAT-III A&NZ Essentials
Q-global Online Scoring and Reporting $3 per report or $45 unlimited license
Q-interactive $355 Annual License plus $1.10 per subtest

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Questions? Comments?

Need Further Support?

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