Supplementary Table 1

*Impaired Level/s of Language and Specific Verbal Working Memory Component/s in Individuals with History and Assessment results Indicative of Dysgraphia* (*n*=26, males=21, females=5): *Handwriting but Not Reading Skills Impaired and Syntax Skills Rarely Impaired*.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Participant Impaired Language Skills Impaired Working Memory Component

1 alphabet 15z -1.45 below average *TSWRF* 83 low average

*DASH Best* 4 below average *D-KEFS Color Word Inhibition* 3 below average

*DASH Fast* 3 below average

2 alphabet 15z -1.97 below average *D-KEFS Color Word Inhibition* 4 below average

*DASH Best* 3 below average

*DASH FAST* 3 below average

*DASH Best* 3 below average *D-KEFS Color Word Inhibition* 7 below average

*DASH FAST* 3 below average

4 alphabet 15z -2.30 below average Note: At assessment was taking medicine for

*WIAT3 Spelling* 88 low average severe ADHD. Only orthographic loop below

average.

5 *DASH Fast* 3 below average

6 alphabet 15z -1.356z below average not administered due to inability to continue

*DASH Best* 4 below average

*DASH Fast* 3 below average

7 alphabet 15z -1.114z low average only orthographic loop impaired

*DASH Best 6* low average

*DASH Fast 4* below average

8 alphabet 15z -0.944z low average only orthographic loop impaired

*DASH Best 5* below average

*DASH Fast 7* low average

9 alphabet 15z -2.14z low average *TSWRF* 87 low average

*DASH Fast 7* low average

10 alphabet 15z –could not write orthographic loop and finger sequencing

any letters—below average (- 1.00z low average) impaired

11 alphabet 15z -2.818z below average only orthographic loop impaired

12 alphabet 15z -2.647z below average only orthographic loop impaired

*DASH Best 7* low average

*DASH Fast 3* below average

13 alphabet 15z -1.11z low average only orthographic loop impaired

*DASH Fast 7* low average

14 alphabet 15z -1.62z below average only orthographic loop impaired

*DASH Fast 7* low average

15 alphabet 15z -2.99z below average *TOSWRF* 82 low average

*DASH Best* 5 below average *D-KEFS Color Word Inhibition*--

*DASH Fast* 3 below average could not do and cried

16 alphabet 15z -2.048z below average *TOSWRF* 87 low average

*DASH Best* 4 below average *CTOPP* 6 low average

*DASH Fast* 3 below average *Wolf & Denckla RAN* 77 below average

*Wolf & Denckla RAS* 89 low average

17 alphabet 15z -2.136z below average *TOSWRF* 84 low average

*DASH Best* 5 below average Comes From -1.407 below average

*DASH Fast* 4 below average *D-KEFS Color Word Inhibition* 6 low average

18 alphabet 15z -1.326z low average Comes From -0.855 low average

*WIAT3* Sentence Combining 82

low average

19 alphabet 15z -1.01 low average *Wolf & Denckla* RAN 88

*DASH Fast* 5 below average

20 alphabet 15z -1.798 below average only orthographic loop impaired

*WIAT3 Spelling* 84 low average

21 alphabet 15z -2.136z below average only orthographic loop impaired

*DASH Best* 6 low average

*DASH Fast* 6 low average

22 *DASH Fast* 4 below average

painful handwriting

23 alphabet 15z -1.966 below average Comes From -0.74z low average

*DASH Best* 4 below average

*DASH Fast* 3 below average

24 alphabet 15z -1.845 below average *TOSWRF* 84 low average

*DASH Best* 6

*DASH Fast* 3

25 alphabet 15z -1.114 low average Comes From -2.666z below average *DASH Fast* 4

26 alphabet 15z -1.796 below average only orthographic loop impaired

*DASH Fast* 5 below average

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Supplementary Table 2

*Impaired Level/s of Language and Specific Verbal Working Memory Component/s in Individuals with History and Assessment Results Indicative of Dyslexia (n= 38, males=26, females=12: Impaired Word-Level Reading and Spelling; Syntax Level Rarely Impaired. See Table Notes* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Participant Impaired Impaired

Language Skills Working Memory Components

1\* *WJ III Word Identification* 79 below *TSWRF* 81

*TOWRE Sight* 81 *Wolf & Denckla RAN* 81

*WJ III Word Attack* 84 alphabet 15 -1.28z

*TOWRE Phonemic* 63 below *D-KEFS Color Word Inhibition* 1 below

*Wolf & Denckla RAS* 84

2\* *WJ III Spell Sounds* 73 below alphabet 15 -1.895z below

*WIAT3 Spelling* 81 Comes From –0.686z

3\* *WJ III Spell Sounds* 84 *TSWRF* 79 below

*WIAT III Spelling* 89 alphabet 15 -1.966 below

*TOWRE Sight* 82

*TOWRE Phonemic* 74 below

4 *WJ III Word Attack* 87 alphabet 15 -1.796 below

*WIAT III Spelling* 77 below *Wolf 7 Denckla RAN* 85

*D-KEFS Color Word Inhibition* 7

*Wolf and Denckla RAS* 82

5\* *WJ III Word Identification* 85 *TSWRF* 88

*TOWRE Sight* 81 *Wolf & Denckla RAN* 77 below

WJ III Word Attack 88 alphabet 15 -1.14z

*TOWRE Phonemic* 78 below *Wolf & Denckla RAS* 86

*WJ III Spell Sounds* 78 below

*WIAT 3 Spelling* 80

6 *WJ III Word Identification* 88 *TSWRF* 82

*TOWRE Sight* 83 *Comes From* -1.674 below

*TOWRE Phonemic* 79 below alphabet 15 -1.796z below

*WJ II Spell Sounds* 76 below *Wolf & Denckla RAS* 88

7\* *TOWRE Phonemic* 86 none

See Table Notes.

8\* *WJ III Word Attack* 89 *Comes From* -4.354z below

*TOWRE Phonemic* 84 alphabet 15 -1.455z

*WIAT III Spelling* 83

9 *WJ III Word Attack* 89 none

*WJ III Spell Sounds* 85

*WIAT III Spelling* 81

10 *TOWRE Phonemic* 77 below *Wolf 7 Denckla RAN* 85

See table notes, *D-KEFS Color Word Inhibition* 6

*Wolf and Dencka RAS* 77 below

11 See table notes. alphabet 15 -2.136z below average

*D-KEFS Color Word Inhibition* 7

12\* *WJ III Word Identification* 83 TOSWRF 71 below

*TOWRE Sight* 84 Comes From -1.10z

*WJ III Word Attack* 87 *Wolf & Denckla RAN* 77 below

*TOWRE Phonemic* 73 below alphabet 15 -1.97z below

*WJ III Spell Sounds* 89 D*-KEFS Color Word Inhibition* 1 below

*WIAT III Spelling* 77 below *Wolf & Denckla RAS* 87

13\* *TOWRE Sight* 84 alphabet 15 -1.284z

*WIAT III Spelling* 80 *Wolf & Denckla RAS* 89

14 *TOWRE Phonemic* 85 alphabet 15 -2.818z

*WJ III Spell Sounds* 88

*WJ III Spelling* 73 below

15\* *TOWRE Sight* 80 *CTOPP Nonword* 7

*TOWRE Phonemic* 83 *Wolf & Denckla RAN* 83

alphabet 15 -1.966z below

*DK-EFS Color Word Inhibition* 7

*Wolf & Denckla RA*S 79 below

16\* WJ III Word Identification 84 *TSWRF* 88

*TOWRE Sight* 88 alphabet 15 -2.968z below

*WJ III Word Attack* 84

*TOWRE Phonemic* 80

*WJ III Spell Sounds* 85

*WIAT III Spelling* 44 below

17\* *TOWRE Sight* 89 *TOSWRF* 76 below

*TOWRE Phonemic* 88 *CTOPP* 7

*WIAT III Spelling* 82 alphabet 15 -1.625z below

18\* *TOWRE Phonemic* 85 alphabet 15 -1.845 be;pw

*TOC Letter Choice* 5 below *D-KEFS Color Word Inhibition* 7

*TOC Sight Spelling* 7 *Wolf & Denckla RAS* 86

19 *WIAT III Spelling* 89 *Wolf & Denckla RAN* 79 below

*TOC Letter Choice* 7 *Wolf & Denckla RAS* 84

*TOC Word Scrambles* 6

*TOC Sight Spelling* 6

*TOWRE Sight* 91 See Notes

*TOWRE Phonemic* 95 See Notes

20 *WJ III Spell Sounds* 85 *TOWSRF* 89

*WIAT 3 Spelling* 78 below *Wolf &Denckla RAN* 77 below

*WJ III Word Attack* 84 *Wolf & Denckla RAS* 85

*TOWRE Phonemic* 71 below

21 *WJ III Spell Sounds* 81 *TSWRF* 83

*WIAT III Spelling* 79 below alphabet 15 -1.702

22\* *WIAT III Spelling* 89 in average range but below

*TOWRE Sight* 96 population mean:

*WJ III Word Attack* 93 *TOSWRF* 93

*TOWRE Phonemic* 95 alphabet 15 -0.606

23\* *WIAT III Spelling* 86 *CTOPP Nonword* 7

*TOWRE Sight* 99 alphabet 15 -1.499 below

*WJ III Word Attack* 97

*TOWRE Phonemic* 97

See Table Notes.

24 *WJ III Spell Sounds* 82 *TOSWRF* 83

*WIAT III Spelling* 81 alphabet 15 -1.4z below

*WJ III Word Identification* 89 *D-KEFS Color Word Inhibition* 4 below

*TOWRE Phonemic* 76 below

25\* *WJ III Spell Sounds* 80 *TSWRF* 88

*WIAT III Spelling* 75 below *CTOPP Nonword* 7

*WJ III Word Identification* 73 below Comes From -.71 below

*TOWRE Sight Word* 88 *D-KEFS Color Word Inhibition* 1 below

*WJ III Word Attack* 82 alphabet 15 not available but in

*TOWRE Phonemic* 79 below low average range on both DASH tasks.

26 *WJ III Spell Sounds* 89 D-KEFS Color Word inhibition 1 below

*TOWSRF* 91 well below oral word reading skills

above the population mean

*WJ III Passage Comprehension* 89 even though all Verbal

Comprehension and Oral Language Skills average or above average

27 *WJ3 Word Attack* 93 alphabet 15 -1.625 below

*TOWRE Phonemic* 92 *D-KEFS Color Word Inhibition* 7

See table notes.

28 *WIAT III Spelling* 81 *TOSWRF* 89

*TOWRE Sight* 83 *Wolf & Denckla RAN* 86

alphabet 15 -2.818 below

29\* *WIAT III Spelling* 77 below *TSWRF* 82

*TOWRE Sight* 89 alphabet 15 -2.647 below

*TOWRE Phonemic* 82 *D-KEFS Color Word Inhibition* 6

30\* *TOWRE Sight* 83 alphabet 15 -1.425 below

*TOWRE Phonemic* 78 below

31 *TOWRE Sight 80* *CTOPP Nonword* 7

*TOWRE Phonemic 83* *Wolf & Denckla RAN* 83

*alphabet 15* -1.966 below

*D-KEFS Color Word Inhibition* 7

*Wolf & Denckla RAS* 79 below

32 See Table Notes *TSWRF* 89

*Color Word Inhibition* 7

33 *WIAT III Spell Sounds* 87 CTOPP Nonword 5 below

*TOWRE Phonemic* 89 *Wolf & Denckla RAN* 80

alphabet 15 -1.154z

34\* *WIAT III Spelling* 84 alphabet 15 -1.183z

*TOWRE Sight* 85

*TOWRE Phonemic* 83

35 See Table Notes. alphabet 15 -1.356z below

36\* *WIAT III Spelling* 82 alphabet 15 -2.14z below

See Table Notes.

37 *WIAT III Spelling* 80 *Wolf & Denckla RAN* 87

*TOWRE Sight* 85 alphabet 15 -1.455z below

*TOWRE Phonemic* 73 below *Wolf & Denckla RAS* 87

38 *WJ III Spell Sounds* 72 below alphabet 15 -1.33z

*TOC Word Choice* 5 below

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**Notes:** All Low Average unless marked Below for Below Average

\*Co-occurring Dysgraphia.

Also note that

**Participant 7** is a twice exceptional student whose verbal comprehension is in the superior range and dictated real word spelling skills fall in the average range but below the population mean; all but one of her word level reading and spelling skills fall at least one standard deviation below her *WISC IV Verbal Comprehension.*

**Participant 10** is very impaired in hallmark word level language impairment and three hallmark working memory impairments even though after years of tutoring only these remain.

**Participant 11** is twice exceptional (superior verbal and nonverbal reasoning); his *TOWRE Phonemic* 98, *TWSRF* 94, *Wolf and Denckla* *RAN* 90 and *RAS* 94, are in the average range but below the population mean and over a standard deviation below his *WISC IV Verbal Comprehension*. Only *D-KEFS Color Word Inhibition* 6 and alphabet 15 -2.136z are low average or below average, respectively.

**Participant 22** and **Participant 23**  have above average Verbal Comprehension and although each has only one spelling measure in low average range, each has three word reading measures in the average range below the population mean and over a standard deviation below measured Verbal Comprehension.

**Participant 26** shows typical word spelling impairment but a different pattern of reading difficulties than typically associated with dyslexia; yet does have persisting silent reading problems.

**Participant 27’s** two oral reading skills that are in the average range but below the population mean are over a standard deviation below the assessed above average Verbal Comprehension.

**Participant 32** is Twice Exceptional with superior verbal comprehension and WIAT II Spelling 97 and WJ III Word Attack 96 in the average range but below the population mean and over a standard deviation lower than Superior Verbal Comprehension.

**Participant 35** is Twice Exceptional (Very Superior Verbal Comprehension) with WJ III Word Identification 97 and Word Attack 99 and TOWRE Phonemic 99 in the average range but below the population mean and over a standard deviation lower than Verbal Comprehension.

**Participant 36**’s oral word reading skills (TOWRE Sight 97 and TOWRE Phonemic 96 ) are in the average range, but below the population mean and over a standard deviation below assessed above average Verbal Comprehension.

Supplementary Table 3

*Impaired Level/s of Language and Specific Verbal Working Memory Component/s in Individuals with History and Assessment Results Indicative of OWL LD (n=13, males=9, females=4): Impaired Syntax Skills with or without Co-Occurring Word-Level or Subword-Level Skills* ***.*** *See Table Notes.*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Participant Impaired Language Skills Impaired Working Memory Component

1a,b  *WJ III Understanding Directions* 88 *CTOPP Nonword* 6 low average

low average range *TSWRF* 88 low average

*CELF IV* *Formulated Sentences* 7 low average *Comes From* -1.01z low average

*WJ III Passage Comprehension* 80 *D-KEFS Color Word Inhibition* 3

low average below average

2a *CELF IV Formulated Sentences* 5 *TSWRF* 6 low average

below average *Comes From* -1.14z low average

*WJ III Passage Comprehension* 60 Alphabet 15z -2.14 below average

below average

3 a,b Below Average: Below Average:

*WJ III Understanding Directions* 68 *CTOPP nonword* 3

*CELF IV Formulated Sentences* 5 *TOSWRF* 77

*WIAT III Sentence Combining* 74 Comes From -3.656z

*WJ III Writing Fluency* 78 Alphabet 15-2.502z

*WJ III Passage Comprehension* 70 *D-KEFS Color Word Inhibition* 1

4 *WJ III Oral Comprehension* 78 below average alphabet 15 -1.45z below average

*CELF IV Formulated Sentences* 1 below average

*WJ III Passage Comprehension* 67 below average

5a,b *WJ III Oral Comprehension* 67 below average Comes From -1.36z below average

*CELF IV Formulated Sentences* 1 below average alphabet 15 -2.307z below average

*WJ III Passage Comprehension* 52 below average *D-KEFS Color Word Inhibition* 5

*WJ III Writing Fluency* 59 below average below average

*Wolf and Denckla* RAS 88

low average

6b *CELF IV Formulated Sentences* 5 low average Comes From -1.88z below average

*WJ3 Writing Fluency* 69 below average *TSWRF* 78 below average

7 a,b *WJ III Oral Comprehension* 85 low average Comes From -1.808z below average

*CELF IV Formulated Sentences* 5 below average *CTOPP Nonword* 5 below average

*WJ III Passage Comprehension* 73 below average *TSWRF* 77 below average

*WJ III Writing Fluency* 80 low average alphabet 15 –0.944 low average

*D-KEFS Color Word Inhibition* 5

8a *WJ III Understanding Directions* 79 below average Comes From -1.489 below average

*WIAT3 Sentence Combining* 83 low average alphabet 15 -2.31z below average

*WJ3 Writing Fluency* 76 below average *Wolf and Denckla RAN* 85 low average

*WJ3 Passage Comprehension* 89 low average *Wolf and Denckla RAS* 83 low average

9b *CELF IV Formulated Sentences* 6 low average Comes From -.84z low average

*WJ III Writing Fluency* 81 low average alphabet 15 -1.45z below average

*WJ III Passage Comprehension* 87 low average

10 *WJ III Understanding Directions* 82 low average Comes From -2.161z below average

*WIAT III Sentence Combining* 83 low average alphabet 15 -1.53z below average

*WJ III Writing Fluency* 84 low average

*WJ III Passage Comprehension* 84 low average

11 *WJ III Oral Comprehension* 78 below average alphabet 15 -1.284z low average

*WJ III Understanding Directions* 89 low average

*CELF IV Formulated Sentences* 5 below average

12a,b  *CELF IV Formulated Sentences* 5 below average Comes From -4.344z below average

*WIAT III Sentence Combining* 69 below average *TSWRF* 68 below average

*WJ III Writing Fluency* 57 below average *CTOPP Nonword* 6 low average

*WJ III Passage Comprehension* 78 below average alphabet 15 -2.477z below average

*Wolf and Denckla RAS* 85 low average

*D-KEFS Color Word Inhibition* 2

Below average See Table Note.

13 *WJ III Understanding Directions* 76 below average Comes From -2.141z below average

*WIAT III Sentence Combining* 77 below average *TSWRF* 83 low average

*WH III Writing Fluency* 64 below average Alphabet 15 -1.625 below average

*WJ III Passage Comprehension* 79 below average

**Notes**. a with co-occurring dysgraphia or b co-occurring dyslexia

Also note that **Participant 12’s** Verbal Comprehension subtest scores spanned low average to below average; Nonverbal comprehension scores spanned low average to average.

Supplementary Table 4

*Level/s of Language and Specific Verbal Working Memory Component/s in Individuals without History or Assessment Results Indicative of SLDs (Control OWLs) (n=11, males=4, females=7)*

Language Skills Working Memory Components

1 all average, above average, or superior all average, above average, or superior

2 range average to superior range average to superior

3 all at or above population mean all at or above population mean

4 most skills fall in average most skills fall in average

or above average range or above average range

5 range average to superior range average to superior

6. span average to superior span average to superior

7 span average to superior span average to superior

8 average or better average or better

9 average to above average average to above average

10 mostly average to above average ranges mostly average to above average ranges

11 all at least in average range only inhibition in low average

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Supplementary Table 5

*Word-Specific Spelling for 4 Diagnostic Groups x 4 Seed Points (corrected for multiple comparisons*).

*Note that counts for connections treat homologous regions on left and right as separate regions.*

**TYPICALLY DEVELOPING READERS AND WRITERS (***n*=9)

**Left Occipital Temporal** Connections to 26 regions: Broca’s area (R BA 44),

Inferior parietal lobule (bilateral PGp), Superior parietal lobule (R 7a, bilateral 7p),

Visual cortex (bilateral V1 BA17, BA 18, V3, V4, V5), Premotor cortex (bilateral BA6),

Left corticospinal tract, Bilateral optic radiation, Cerebellum (bilateral V, VI, vermis VI)

**Left Precuneus** Connections to 24 regions: Broca’s area (L BA 45), Inferior

parietal lobule (bilateral Pga, PGp), Superior parietal lobule (R 5Ci, bilateral 5m, 7a, 7M,

L 7p), Visual cortex (bilateral V1 BA17, V2 BA 18, V5), Callosal body, Bilateral cingulum,

Bilateral OptiC radiation, Cerebellum (R V, L Vl)

**Left Supramarginal** Connections to 46 regions: Anterior intraparietal sulcus (L hIP2),

Broca’s area (bilateral BA44, L BA45), Inferior parietal lobule (bilateral PF and PFM,

L PFcM, PFop, PFt), Primary auditory cortex (R TE1.0 and TE1.1, bilateral TE1.2),

Primary somatosensory cortex (L BA1, BA2, BA3b), Secondary somatosensory

cortex\_parietal operculum (bilateral OP1, OP2, OP4, L OP3), Superior parietal lobule

(bilateral 5m and 7a and L 7p), Visual cortex (bilateral BA 17 and BA 18, R V5),

Premotor cortex (bilateral BA6), Bilateral cingulum, Left corticospinal tract,

Bilateral insula (Id1 and Id2), Cerebellum (bilateral V)

**Left Inferior Frontal** Connections to 10 regions: Broca’s area (bilateral BA44 and

BA 45), Inferior parietal lobule (L Pga), Primary auditory cortex (bilateral TE1.0, R TE1.2)

**CHILDREN/YOUTH WITH DYSGRAPHIA** (*n*=14)

**Left Occipital Temporal** Connections to 42 regions: Amygdala (R superficial group),

Broca’s area (bilateral BA 44, L BA 45), Inferior parietal lobule (R PF, L Pga, bilateral

PGp, 7 p), Primary motor cortex (L BA 4a), Superior parietal (R 5C1, bilateral 5M, 7a, 7M,

7p), Visual cortex (bilateral VA 17 and BA 18, L V3), Premotor cortex (bilateral BA 6),

Callosal body, Bilateral cingulum, Bilateral corticospinal tract, Fornix, Bilateral optic

Radiation, Cerebellum (LV, Bilateral VI, and crus-1, Vermis VI)

**Left Precuneus** Connections to 58 regions: L Anterior intra-parietal sulcus hIP3,

Broca’s area (bilateral BA44, L BA45), L Hippocampus subiculum, Inferior parietal lobule

(LPF and bilateral PFM, Pga, and PGp), Primary motor cortex (LBA4a), Superior parietal

lobule (bilateral 51, 5M, 7a, 7M, and 7p), Visual cortex (bilateral V1 BA 18, V2 BA 18,

and V3, L V3 and V4), Premotor cortex (bilateral BA 6), L Acoustic\_radiation, Callosal

Body, Bilateral cingulum, Bilateral corticospinal tract, Fornix, Bilateral OptiC radiation,

Left superior longitudinal fascicle, Cerebellum (bilateral I-IV, V; Crus\_1, L VI; Vermis VI)

**Left Supramarginal** Connections to 75 regions: Anterior intraparietal sulcus (LhiP1,

hlP2, and hlP3), R amygdala superficial group, Broca’s area (bilateral BA44, L BA45),

Inferior parietal lobule (bilateral PF, PFcM, PFM, PFop, PFt, Pga, PGp), Primary auditory

cortex (bilateral TE1.0 and TE1.2, L TE1.1), Primary motor cortex (bilateral BA4a, L

BA4p), Primary somatosensory cortex (bilateral BA1, BA2, and BA3b, L BA3a),

Secondary somatosensory cortex\_parietal operculum (bilateral OP1, OP2, OP3, OP4),

Superior parietal lobule (bilateral 5Ci, 5M, 7a, 7M, 7p), Visual cortex (bilateral V2 BA 18, V5), Premotor cortex (bilateral BA6), Bilateral acoustic radiation, Callosal body,

Bilateral cingulum, Bilateral corticospinal tract, Fornix, R inferior occipital-frontal fascicle,

Bilateral optic radiation, L superior longitudinal fascicle, R uncinate fascicle, Bilateral

insula (ld1, lg2)

**Left Inferior Frontal**  Connections to 53 regions: Amygdala (R contromedial group

and R superficial group), Broca’s area (bilateral BZ 44, BA 45), Inferior parietal lobule

(bilateral PF, Pga, PGp, R PFcM, LPFM, LPFop), Primary auditory cortex (R TE1.0 and

TE1.1, bilateral TE1.2), Primary somatosensory, cortex (R BA2 and BA3b), Secondary

somatosensory\_parietal operculum (bilateral OP1, OP3, and OP4, R OP2), Superior parietal

lobule (R 7a, bilateral 7M), Visual cortex (L V1 BA17, bilateral V2 BA 18), Premotor

cortex (bilateral BA 6), Bilateral acoustic radiation, Callosal body, Bilateral cingulum,

Bilateral corticospinal tract, Fornix, Bilateral inferior, occipito frontal fascicle, Bilateral

OptiC radiation, Bilateral uncinate fascicle, Insula (L ld1, bilateral lg2)

**CHILDREN/YOUTH WITH DYSLEXIA** (*n*=17)

**Left Occipital Temporal** Connections to 79 regions: Anterior intraparietal sulcus

(bilateral hIP1, hIP3, LHIP2), Amygdala (bilateral superficial group), Broca’s area (bilateral

BA44 and BA45), Hippocampus (bilateral subiculuM), Inferior parietal lobule (bilateral PF,

PFM, PFt, Pga, and PGp, L PFop), Primary auditory cortex (R TE1.0, bilateral TE1.1), Primary motor cortex (bilateral BA4a),Primary somatosensory cortex (L BA1 and BA2, R BA 3b), Secondary somatosensory cortex\_parietal operculum (L OP1 and OP4), Superior parietal lobule (bilateral 5Ci, 51, 5M, 7a, 7M, 7p), Visual cortex (bilateral V1, BA17, V2 BA18, V3,) Premotor cortex (bilateral BA6), Bilateral acoustic radiation, Callosal body,

Bilateral cingulum, Bilateral corticospinal tract, Fornix, Bilateral inferior occipital frontal

Fascicle, Bilateral optic radiation, Bilateral uncinate fascicle, Insula (left Idi, Ig2), and

Cerebellum (L I-IV, Bilateral V, VI, Vermis VI, and Crus\_1\_

**Left Precuneus** Connections to 88 regions: Anterior intraparietal sulcus (bilateral hIP1,

hIP3), Amygdala (R centromedial group, lateral basal group, and superficial group), Broca’s

area (bilateral BA44 and BA 45), Hippocampus (R dentate gyrus), Inferior parietal lobule

(bilateral PF, PFM, PFt, PGp, and R PFcM, L PFop), Primary auditory cortex (bilateral TE1.0 and TE1.1), Primary motor cortex (bilateral BA4a), Primary somatosensory cortex (L BA1 and R BA3b), Secondary somatosensory cortex\_parietal operculum (bilateral OP1 and OP4), Superior parietal lobule (bilateral 5C1, 51, 5M, 7a, 7m, 7p), Visual cortex (bilateral V1 BA17, V2 BA18, V3V, V4, and V5), Premotor cortex (bilateral BA6), Bilateral acoustic

radiation, Callosal body, Bilateral cingulum, Bilateral corticospinal tract, Fornix,

Bilateral inferior occipital frontal fascicle, Mamillary body, Bilateral OptiC radiation,

R uncidate fascicle, Insula (bilateral Id1, Ig2), Cerebellum (bilateral I-IV, V, VI, and Crus I,

Vermis VD)

**Left Supramarginal** Connections to 110 regions: Anterior intraparietal sulcus

(bilateral hIP1, hIP2, and hIP3), Amygdala (bilateral centromedia group, R laterobasal group, R superficial group), Broca’s area (bilateral BA44 and BA45), Hippocampus (L subiculuM), Inferior parietal lobule (bilateral PF, PFcM, PFM, PFop, PFt, Pga, PGp), Primary auditory cortex (bilateral TE1.0, TE1.1, TE1.2), Primary motor cortex (bilateral BA4a, BA4p), Primary somatosensory cortex (bilateral BA1, BA2, BA3a, BA3b), Secondary somatosensory cortex\_parietal operculum (bilateral OP1, OP2, OP3, and OP4), Superior parietal lobule (bilateral 5Ci, 5i, 5M, 7a, 7m, 7PC, 7p), Visual cortex (bilateral V1 BA17, V2 BA18, V3, V4, and V5), Premotor cortex (bilateral BA6), Bilateral acoustic radiation, Callosal body, Bilateral cingulum, Bilateral corticospinal tract, Fornix, Bilateral inferior occipital-frontal-fascicle, Left medial geniculate body, Bilateral optic radiation, Left superior longitudinal fascicle, Bila teral uncinate fascicle, Insula (bilateral Id1 and Ig2, L Ig1), Cerebellum (bilateral V, VI, crus1, and Vermis VI)

**Left Inferior Frontal**  Connections to72 regions: Amygdala (R centromedial group and

superficial group), Broca’s area (bilateral BA 44 and BA45), Inferior parietal lobule

(bilateral PF, PFcM, PFM, Pga, PgB, L PFop, L PFt), Primary auditory cortex (bilateral

TE1.0, TE1.1, TE1.2), Primary motor cortex (L BA4a, R BA4p), Primary somatosensory

cortex (L BA1, bilateral BA 2 and BA 3b), Secondary somatosensory cortex\_parietal

operculum (bilateral OP1, OP2, OP3, OP4),Superior parietal lobe (bilateral 5M, and 7a,

L7p), Visual cortex (bilateral V2 BA 18 and V5), Premotor cortex (bilateral BA6), Bilateral

acoustic radiation, Callosal body, Bilateral cingulum, Bilateral corticospinal tract, Fornix,

Bilateral inferior occipital frontal fascicle, Bilateral optic radiation, Bilateral uncinated

fascicle, Insula (bilateral Id1 and Ig2, L Ig1), and Cerebellum (right V1 and crus I)

**CHILDREN/YOUTH WITH OWL LD** (*n*=5)

**Left Occipital Temporal** Connections to 21 regions: Inferior parietal lobule PGp,

Superior parietal lobule (L5M, bilateral 7a, 7M, 7p), Visual cortex (bilateral BA17, BA 18,

V4, V5), Callosal body, L Cingulum, R corticospinal tract, Bilateral cerebellum VI

**Left Precuneus** Connections to 32 regions: Inferior parietal lobule (L PF, L PFcM,

LPFM, LPga, bilateral PGp), Primary auditory cortex (bilateral TE1.0 TE1.1), Secondary somatosensory cortex (L parietal operculumOP1), Superior parietal lobule (RCi, L51, bilateral 5M, 7a, 7m, 7p), Visual cortex (bilateral V1 BA17, V2 BA 18, V5), Callosal body, Bilateral cingulum, R corticospinal tract, L insula lg2

**Left Supramarginal** Connections to 14 regions: Inferior parietal (L PF, PFcM, PFM,

PFop, PFt, PGp), R primary auditory cortex TE 1.0, L secondary somatosensory cortex

parietal operculum OP1, Superior parietal lobule (L5M, L7M, L7p), Visual cortex (LV1

BA 17, bilateral V2 BA 18)

**Left Inferior Frontal** Connections to 21 regions: Broca’s area (bilateral BA 44,

BA 45), Inferior parietal lobule (L PFcM, R Pga), Primary auditory cortex (R TE1.0, TE1.1,

TE1.2), Secondary somatosensory cortex (bilateral OP1, R OP2, R OP3, bilateral OP4),

Visual cortex (L V2 BA 18), BilateralcinguluM, Bilatera insula lg2