Table 1 | Publications including neuroscientific research on phonological or auditory remediation of dyslexia (or its risk).

Reference	Age of participants (years; mean or range)	Participant *N* (treatment; control)	Impairment or problem	Content of training	Duration of training	Brain research method	Task in testing	Behavioral improvement (pre-test vs. post-test)	Normalization of brain activation
Aylward et al. (2003)	11	10; 11	Dyslexia	Linguistic awareness, alphabetic principle, fluency, reading comprehension	2 weeks (28 h)	fMRI	Phoneme mapping, morpheme mapping	Yes	Yes
Eden et al. (2004)	41–44	19; 19	Dyslexia	Sound awareness, establishment of the rules for letter-sound organization, sensory stimulation, articulatory feedback	8 weeks (112 h)	fMRI	Repeating words, sound deletion	Yes	Yes
Gaab et al. (2007)	10	22; 23	Dyslexia	FastForWord*	8 weeks (about 67 h)	fMRI	Pitch discrimination	Yes	Yes
Hasko et al. (2014)	8	28 (11 improvers, 17 non-improvers); 25	Dyslexia	Phoneme discrimination and orthographic knowledge; phonics training	6 months (30 h)	ERP	Phonological lexical decision	Yes (improvers); no (non-improvers)	Yes (improvers); no (non-improvers)
Heim et al. (2014)	8–11	35 (12 training phonology, 7 training attention; 14 training reading); 10	Dyslexia	Phonological (Würzburger Trainingsprogramm, Kieler Leseaufbau), attentional (CogniPlus, Celeco), reading (Blitzschnelle Worterkennung)	4 weeks (10 h)	fMRI	Reading	Yes	Yes
Jucla et al. (2010)	9–11	24; 10	Dyslexia	Phonological training; visual and orthographic training	2 months (about 16 h)	ERP	Visual lexical decision	Yes (but also in controls)	Mixed (treatment group showed a different pattern than controls)

(Continued)

Table 1 | Continued

Reference	Age of participants (years; mean or range)	Participant *N* (treatment; control)	Impairment or problem	Content of training	Duration of training	Brain research method	Task in testing	Behavioral improvement (pre-test vs. post-test)	Normalization of brain activation
Keller and Just (2009)	8–10	35 treated poor readers; 12 non-treated poor readers; 25 non-treated good readers	Poor reading	Corrective Reading, Wilson Reading, Spell Read Phonological Auditory Training, Failure Free Reading	6 months (100 h)	DTI	–	Yes	Yes
Kujala et al. (2001)	7	24; 24	Dyslexia	Non-linguistic audiovisual matching	7 weeks (about 3 h)	ERP	Passive listening, attention directed elsewhere	Yes	Yes
Lovio et al. (2012)	6–7	10; 10	Difficulties in reading-related skills	GraphoGame: letter–sound correspondences (vs. number-knowledge game for controls)	3 weeks (3 h)	ERP	Passive listening, attention directed elsewhere	Yes	Yes
Meyler et al. (2008)	10	23; 12	Poor reading	Corrective Reading, Wilson Reading, Spell Read Phonological Auditory Training, Failure Free Reading	6 months (100 h)	fMRI	Sentence comprehension	Yes	Yes
Richards et al. (2000)	10–13	8; 7	Dyslexia	Phonological and morphological reading instruction	3 weeks (30 h)	Proton MR spectroscopy	Phonological and lexical access and a non-linguistic tone task	Yes	Yes

(Continued)

Table 1 | Continued

Reference	Age of participants (years; mean or range)	Participant *N* (treatment; control)	Impairment or problem	Content of training	Duration of training	Brain research method	Task in testing	Behavioral improvement (pre-test vs. post-test)	Normalization of brain activation
Richards et al. (2002)	9–12	10; 8	Dyslexia	Phonological vs. morphological reading instruction	3 weeks (30 h)	Proton MR spectroscopy	Phonological and lexical tasks, passive listening	Yes	Yes
Shaywitz et al. (2004)	6–9	37 (experimental intervention); 12 (community intervention); 28 (control)	Reading disability	Phonological intervention: sound–symbol associations, phoneme analysis, timed reading, oral story reading, dictation (vs. community intervention in school)	8 months (50 min/day)	fMRI	Cross-modal letter identification	Yes (experimental group); no (community intervention)	Yes (experimental group); no (community intervention)
Simos et al. (2002)	7–17	8; 8	Dyslexia	Phono-Graphix (phonological processing and decoding), Lindamood Phonemic Sequencing	2 months (80 h)	MSI	Pseudoword rhyme-matching	Yes	Yes
Stevens et al. (2013)	5	8; 6	Risk for reading disability	Early Reading Intervention (phonemic awareness, alphabetic understanding, letter writing, word reading, spelling, sentence reading)	8 weeks (20 h)	ERP	Selective auditory attention	Yes	Yes
Temple et al. (2003)	8–12	20; 12	Dyslexia	FastForWord*	8 weeks (about 47 h)	fMRI	Rhyme letters, match letters, match lines	Yes	Yes

*DTI, diffusion tensor imaging; ERP, event-related potential; fMRI, functional magnetic resonance imaging; MR, magnetic resonance; MSI, magnetic source imaging. *FastForWord includes auditory discrimination, phoneme discrimination, phoneme identification, phonic match, phonic word, understanding instructions, grammatical structures and rules.*

Table 2 | Publications including neuroscientific research on phonological or auditory remediation of specific language impairment (SLI) or language-learning impairment (LLI).

Reference	Age	Participant *N* (treatment; control)	Impairment or problem	Content of training	Duration of training	Brain research method	Task in testing	Behavioral improvement (pre-test vs. post-test)	Normalization of brain activation
Hayes et al. (2003)	8–12	27 treated; 15 non-treated; 7 non-treated controls	Learning problems, auditory perceptual deficit	Earobics: phonological awareness, auditory processing, language processing	8 weeks	ABR, ERP	Passive listening, attention directed elsewhere	Yes	ERP yes; ABR no
Heim et al. (2013)	6–9	21; 12	LLI	FastForWord*	1 month	EEG oscillations	Passive listening and active target detection	Yes	Yes (but not all aspects)
Pihko et al. (2007)	6–7	9 (phonological intervention); 9 (physical exercise)	SLI	Speech and articulation, phoneme discrimination, phonological and linguistic awareness, rapid processing	8 weeks	MEG	Passive listening, attention directed elsewhere	Yes	Yes
Stevens et al. (2008)	6–8	8 treated SLI; 12 treated controls; 13 non-treated controls	SLI	FastForWord*	6 weeks	ERP	Auditory selective attention	Yes	Yes

*ABR, auditory brainstem response; EEG, electroencephalography; ERP, event-related potential; MEG, magnetoencephalography. *FastForWord includes auditory discrimination, phoneme discrimination, phoneme identification, phonic match, phonic word, understanding instructions, grammatical structures and rules.*