Fast ForWord

What claims does the company make / what does the programme target?

Fast ForWord Language and Literacy Series claims to target the development of listening accuracy, phonological awareness and language structures. The Language Series is aimed at primary school-aged children while the Literacy Series is aimed at intermediate to high school-aged children. The website claims that children using either the Language or Literacy Series can expect a reading gain of one to two grade levels, on average, in 8 to 12 weeks. The website also claims that tasks bring about physical changes in the brain that result in "enduring gains".

Specific skills targeted by each of the tasks are described above, but in general focus on language (e.g. listening accuracy, phonological awareness, language structures) and reading-related skills (e.g. letter/word recognition, letter-sound associations, decoding, vocabulary, comprehension) as well as cognitive abilities (e.g. working memory, attention, processing and sequencing).

Evidence for efficacy:

The vast majority of studies investigating the Fast ForWord programme have focused on the **precursor** to Language v2. This is true for studies showing evidence for and against the programme's effectiveness. Consequently, the efficacy of the current redesigned Language Series is yet to be determined. There is also a dearth of studies looking at the Literacy and Reading Series.

Behavioural Studies:

Merzenich et al. (1996); Tallal et al. (1996):

These articles, authored by the founders of the Scientific Learning Corporation and creators of Fast ForWord, describe the results of pilot studies conducted on prototypes of Fast ForWord (FFW) Language exercises. In the first study, seven 5 to 9 year olds with speech language impairment (SLI) underwent FFW Language training and also completed several clinician- administered intervention exercises as well as 1 to 2 hours of homework daily, 5 days/week for
4 weeks. The study found that children showed significant improvement over the 4 week period on the FFW Language exercises. Children also made significant gains on speech discrimination, language processing and grammatical comprehension measures, and improved on the Tallal Repetition test (test of temporal processing ability).

In the second study, 22 children with SLI (also 5 to 9 years) were divided into two groups. Both groups received equivalent language training with a clinician and completed homework daily. One group (Group 1) completed several prototype FFW Language exercises. Group 1 also listened to acoustically modified speech in both their daily clinician-directed intervention sessions and their homework (involved listening to stories). Group 2 was exposed to normal speech and played video games rather than the FFW exercises. The study found that children in Group 1 showed greater improvements on measures of temporal processing, speech discrimination and grammatical comprehension than children in Group 2. Both Studies 1 and 2 also found that improvement on the Tallal Repetition Task was significantly correlated with post training language processing ability.

Limitations: not an independent study as it was conducted by the creators of FFW; we cannot be sure whether the results are specific to the FFW training, the clinician-directed intervention sessions (and homework) or a combination of the two; these studies used prototype versions, results may be different with current FFW Language programme; sample size, particularly for the first study.

Rogowsky, Papamichalis, Villa, Heim, & Tallal (2013):

To our knowledge, this is the only peer-reviewed article that has reviewed the efficacy of both the FFW Literacy and FFW Reading programmes. 25 college students with poor writing skills (some were native English speakers, some spoke English as a second language [ESL]) underwent FFW Literacy and Reading (Levels 3-5) training for approximately 50 mins/day, 4-5 days/week for 11 weeks. Participants completed the Literacy exercises before proceeding to the Reading tasks. 28 students were also selected from the general college population to form a comparison group, but did not undergo FFW training. Reading and writing skills were assessed before and after the training period.

Prior to undergoing the intervention, the training group showed average reading skills though this was significantly below that of the comparison group. Following intervention, the training group made significant gains on reading whereas no change was observed for the comparison group. However subsequent analyses revealed that only the native English speakers significantly improved their reading abilities following training.

The training group, who exhibited below average writing skills pre-training, significantly improved their writing skills following training. This gain meant that the training group's writing scores significantly exceeded that of the comparison group following intervention. Subsequent analyses on the training group revealed that while the ESL students showed lower writing skills that the native English speakers, both subgroups significantly improved on writing following training.

Limitations: there was no no-treatment group with low writing skills; no alternative treatment group; conflict of interest as Paula Tallal, one of the creators of the FFW programme, is a co-author of the study.

Neuroimaging/Neurophysiological Studies:

Temple et al. (2003):

Twenty 8 to 12 year olds with dyslexia underwent training on an earlier version of FFW Language (100 min/day, 5 days/week for average of 27.9 days). Twelve typically developing control children also participated in the study, but did not undergo FFW training. All participants were assessed on measures of reading, language and phonological processing before and after the training period. Participants also completed tasks in the fMRI scanner (specifically a phonological rhyming task with letters and nonphonological matching task with letters – comparison of the two tasks will indicate brain activity during phonological processing).

The study found that children with dyslexia significantly improved on measures of reading (into the normal range), oral language ability and rapid naming (a phonological processing measure) following FFW Language remediation. fMRI results indicated that there were two regions underactive in dyslexics (but active in normal reading children) prior to remediation that were ameliorated following remediation: the left temporo-parietal cortex (this was only partially ameliorated as the region was near but not overlapping the region activated in the typically developing children) and left inferior frontal gyrus. The dyslexic children also showed increases in brain areas following remediation that were not active in normal-reading children, of which the most noteworthy are:

- right inferior, middle and superior frontal gyri; right middle temporal gyrus (authors suggest that this may be compensatory activation, similar to activation that seen in patients suffering from brain injury during recovery of function);
- bilateral cingulate gyrus (this may be due to FFW's concurrent training of attention);
- left hippocampal gyrus (possibly due to FFW's training of working memory).

Authors also note that there was a positive correlation between increases in oral language

ability and activation in the left temporo-parietal cortex. There was also a significant correlation between increased activation in the right inferior frontal gyrus and a measure of phonological processing (Comprehensive Test of Phonological Processing [CTOPP] Blending Words).

Limitations: the study used an earlier version of FFW Language; there was no no-treatment dyslexic control group; no alternative treatment group; several of the FFW creators were co-authors of the article.

Gaab et al., 2007:

22 children with dyslexia underwent training using an earlier version of FFW Language (100 mins/day, 5 days/week for 8 weeks). 22 typically-reading children were also recruited but did not participate in the FFW exercises. All subjects were assessed on language, phonological awareness and reading measures before and after the training period and also completed a rapid auditory processing task while in the fMRI scanner. This fMRI task involved listening to non-linguistic acoustic stimuli with either rapid or slow transitions, which were designed to "mimic the spectro-temporal structure of consonant-vowel-consonant speech syllables".

Prior to remediation, there were significant differences between dyslexic and control children on all measures. Following remediation, while there were significant improvements on almost all behavioural measures for the dyslexic children, children's performance was equivalent to that of the typical readers only for measures of phonological awareness and listening comprehension. fMRI results indicated that while typical readers showed widespread activation to rapid (vs slow) auditory transition, the dyslexic group only showed activation in the left middle temporal gyrus prior to remediation. However, following FFW Language remediation, the dyslexic children showed increased activation in several regions that were part of the network activated in typical readers. These regions included: bilateral insula; left operculum; right inferior frontal sulcus; left superior frontal regions; right precuneus; cingulate gyrus; bilateral thalamic regions; left prefrontal regions.

Limitations: an earlier version of FFW Language was used; there was no no-treatment dyslexic control group; no alternative treatment group; Paula Tallal was one of the co-authors.

Stevens, Fanning, Coch, Sanders, & Neville (2008):

This particular study was interested in looking at whether training with an earlier version of FFW Language influenced mechanisms of selective auditory attention. Twenty 6 to 8 year olds received 6 weeks of FFW Language training (8 with SLI, 12 typically developing). 13 additional typically developing children were recruited but did not receive any training. Participants were assessed on measures of receptive and expressive language before and after the training period. The children also took part in an ERP attention paradigm, and their ERPs for attended and ignored stimuli were compared.

For behavioural measures, both the SLI and typically developing FFW groups showed significant increases in receptive language following training, while there was no change in receptive language measures for the no treatment group. ERP results prior to remediation indicated that both typically developing groups exhibited a larger positive response to attended than unattended stimuli approximately 100-200ms post-stimulus presentation. In contrast, the SLI children showed a similar response to both attended and unattended probes within the same time window. However, following training, results indicated that there was a greater difference in the ERP response for attended and unattended stimuli than at the pre-training assessment for both the SLI and typically developing FFW groups. Additionally, the FFW group combined showed a significantly larger pre to post training change in this effect than the no treatment group. Further analyses revealed that this change was due to signal enhancement, as there was an increase in the neural response for attended stimuli, but no change in the response for unattended stimuli.

Limitations: an earlier version of FFW Language is used; no behavioural measures of attention included; no no-treatment SLI control group; no alternative treatment group; a token economy system was in place to motivate children, even though the FFW programme is designed with motivation measures within the task (e.g. points for correct answers). This would have played a role in maintaining the children's attention and engagement and may have consequently confounded results. It is worth questioning whether the FFW Language programme alone would have produced similar ERP results.

The vast majority of studies investigating the Fast ForWord programme have focused on the precursor to Language v2. This is true for studies showing evidence for and against the programme's effectiveness. Consequently, the efficacy of the current redesigned Language Series is yet to be determined. There is also a dearth of studies looking at the Literacy and Reading Series.

Heim, Keil, Choudhury, Thomas Friedman, & Benasich (2013):

This study investigated the change in early oscillatory responses in the auditory cortex following FFW Language training. 21 primary school children with language-learning impairment (LLI) underwent FFW training for an average of 32 days. Tests on language and reading ability were conducted before and after training, as well as EEG recordings while participants listened to fast-rate tone doublets. 12 typically developing children were also tested, but did not participate in the FFW Language training.

Behaviourally, LLI children showed improvements in measures of language (receptive, expressive and core composite) only following FFW training. Relative to the typically developing children, the LLI group showed reduced amplitude and phase-locking of early (45 –
75 ms) gamma band oscillations in response to the second tone in the doublet prior to remediation. Following training, the amplitude for both the LLI and typically developing groups was equally strong for both tones, though participants still showed attenuated phase-locking. Additionally, receptive language scores were predicted by the phase-lock index (a measure of phase-stability) gains for the second tone, while improvements on receptive language abilities were predicted by phase-lock index gains for the first tone.

The authors suggest that these "gamma band responses" are a potential marker of deficits in rapid auditory processing. However the authors also noted that gamma band responses have been linked to memory and attention. Given that some of the studies above (Stevens et al., 2008; Temple et al., 2003) indicate that FFW Language training improves other cognitive abilities, particularly attention, we cannot be sure that these responses are indicative of rapid auditory processing deficits and not deficits in other core cognitive abilities commonly linked to developmental language impairments.

Limitations: an earlier version of FFW Language was used; sample size; no control group; no alternative treatment group.

Evidence against efficacy:

Studies arguing against the efficacy of the FFW programme generally take on a comparative approach. While most of these studies show that there are benefits to the FFW intervention, these benefits are not greater than that of other intervention programmes with non-modified speech. Thus, the results of these studies suggest that training specifically with acoustically modified speech is not necessary for the remediation of language impairments. The efficacy of the Literacy and Reading Series relative to alternative interventions is yet to be determined.

Behavioural Studies:

Hook, Macaruso, & Jones (2001):

Hook et al. investigated the efficacy of the FFW Language programme on the language and reading abilities of 7 to 12 year olds with reading difficulties, both in the short term (relative to the Orton-Gillingham intervention) and in the long term (relative to a longitudinal control group). Children in the FFW group (*n* = 11) completed 5 of 7 FFW Language exercises (earlier version) for 100 mins overall, 5 days a week for 2 months, while children in the Orton- Gillingham (OG) group (*n* = 9) received a one-to-one intervention method for one hour a day, 5 days a week for 5 months. The longitudinal control (LC) group (*n* = 11) had similar levels of reading difficulties to the FFW group and received "multisensory structured language instruction over a period of 2 academic years". Behavioural measures were collected prior to training for the FFW and OG groups only, post training for all 3 groups and at the end of the first and second academic year for the FFW and LC groups.

Results indicated that while the FFW group did improve on phonemic awareness immediately following training, this improvement was not greater than that of the less intensive OG group. Additionally, the OG group made significant gains on the Word Attack component of the Woodcock Reading Mastery Test – Revised, whereas the FFW group made no gains on reading-related measures. The FFW group did show short-term gains on the speaking and syntax components of spoken language, but as this measure was not assessed in the OG group, it is unknown whether this improvement would have been greater than that of the OG group. Additionally, these improvements were not maintained in the long term. Children in both the FFW and LC groups did not differ significantly on any measure over the course of two years; both groups significantly improved on phonemic awareness and reading measures (these gains were over and above that of age-related improvements).

Limitations: an earlier version of FFW Language was used; participant recruitment differed for the OG and FFW groups. Children in the OG were enrolled in a summer school for children with reading difficulties, whereas the FFW participants were those who responded to flyers advertising the study. While the groups did not significantly differ on IQ, age, phonological awareness and reading abilities, it is possible that the summer school may have provided the OG children with a more structured and well-controlled environment than the FFW group, which may have contributed to the efficacy of the intervention. Although children in the study did have reading difficulties, they had average VIQ and receptive language skills. Results may have been different for children with more extensive language problems.

Pokorni, Worthington, & Jamison (2004):

Sixty 7.5 to 9 year olds with language and reading difficulties were randomly assigned to 1 of 3 intervention programmes: FFW Language, Earobics (Step 2) and LiPS. All participants received three 1 hour interventions daily over the course of a 20 day summer programme and were assessed on phonemic awareness, language and reading abilities before and after the intervention period.

The Earobics and LiPS groups made significant gains from pre-intervention to post-intervention on measures of phonemic awareness only. There were no significant improvements for the FFW group. Comparing interventions, children in the LiPS programme made significantly greater gains on the Blending Phonemes measure of Phonemic Awareness relative to the FFW and Earobics groups.

Limitations: standard protocol was not used for the implementation of FFW Language. The intervention period was shorter, with more intensive daily training. This may have affected children's motivation and progression on the programme, and likely explains why this group did not improve on any of the behavioural measures. An earlier version of FFW Language was used. The

sample was heterogeneous, with highly variable pre-intervention results for language measures.

Gillam et al. (2008):

A randomised controlled trial, where 216 children with language impairments (6 to 9 years old) were randomly assigned to either:

- FFW Language;

- computer-assisted language intervention (CALI): also computer game-based, and targets similar skills as the FFW Language programme but speech stimuli are not acoustically modified;

- individualised language intervention (ILI): based on a social interactionist perspective, where individualised therapy is provided by a speech-language pathologist;

- an academic enrichment (AE) intervention: although these computer games did involve vocabulary, instructions and visual and verbal input, they were focused on maths, social studies and science and thus were not designed to specifically improve language and reading-related skills.

All children received 100 mins of treatment, 5 days/week for 6 weeks, and were tested on a battery of language, literacy and auditory processing measures before remediation and immediately, 3 months and 6 months post-remediation.

Children in all four groups generally made significant gains on language measures and sentence comprehension immediately after the intervention and at the 3 month and 6 month follow ups. FFW, CALI and ILI groups made significantly greater gains than the AE group on the blending words measure of phonological awareness immediately following remediation. There were no significant differences between groups at the 3 month follow up, but both the CALI and FFW children outperformed the ILI and AE groups on blending words at 6 months (suggesting that training games with modified speech are not any more effective than training games with regular speech). Backwards masking was used to test children's temporal processing skills, with results indicating that all 4 groups made equally significant improvements at all post-remediation assessments.

Limitations: the study uses an earlier version of FFW Language

Loeb, Gillam, Hoffman, Brandel, & Marquis (2009):
This study reanalysed the data of a subgroup of participants (n = 103) from the Gillam et al. (2008) study, specifically children who had both specific language impairment and poor reading abilities. This study also just focused on measures of reading and phonemic awareness, and only looked at gains from pre-intervention to immediately post-intervention and from post-intervention to the 6 month follow up.

FFW Language, CALI and ILI groups all made significantly greater gains than the AE group from pre-intervention to immediately post-intervention on the blending sounds measure of phonemic awareness, but these gains did not significantly differ between the three intervention groups. There were no significant long-term gains and no short term or long term reading improvements for any of the intervention groups. These findings also seem to suggest that the acoustically modified speech in the FFW Language programme is not essential for the improvement of phonemic awareness skills.

Limitations: as a subgroup of the original sample was used, the design was quasi-experimental rather than a RCT; an earlier version of FFW Language was used.

What it involves:

Fast ForWord Language and Literacy Series

Created by the Scientific Learning Corporation, Fast ForWord is a computer based series with tasks in a "game" format. The programme slows and amplifies the specific hard-to-process sounds of English language (makes rapid consonant transitions longer and increases the amplitude of some transitions). This acoustically modified speech is used in tasks and adapts from slowed down to naturally fast speech based on linguistic performance (i.e. move towards more rapid and less amplified natural speech following correct responses and vice versa following incorrect responses). Tasks involve the simultaneous development of major cognitive and reading skills and are individually adaptive to keep students continuously challenged, but not too difficult so that they do not lose interest (~80% accuracy). Participants are given instant feedback on performance – correct responses are rewarded with points or auditory- visual animations and incorrect responses are indicated by an auditory cue and presentation of the correct answer.

One theory about the underlying cause of language impairments is the rapid auditory processing deficit hypothesis, which posits that children with developmental language impairments have difficulty processing the "rapid spectro-temporal characteristics of phonemes or sounds" (Gaab, Gabrieli, Deutsch, Tallal, & Temple, 2007; Tallal, 2004). This is said to consequently affect the phonological processing of language (a key skill for reading). The modified speech in the Fast ForWord exercises is designed as such so that it targets this rapid auditory processing deficit while also training other cognitive and reading skills.

Fast ForWord Language Series: Language v2

See: http://indigolearning.co.za/pdfs/support/LanguageV2/Langyage%20V2%20Manual.pdf - for more details.

- *Sky Gym:* participant identifies and remembers the order of a series of frequency-modulated sound sweeps and then indicates the pattern just heard. Targets listening accuracy and auditory sequencing

- *Moon Ranch:* a syllable is repeated (e.g. shu) and then a target syllable (e.g. chu) is presented. Participant has to identify the target syllable when the syllable changes. Targets phonological fluency and memory as well as sustained attention.

- *Robo-Dog:* listens to a target word and selects the picture that represents that word. Targets vocabulary, auditory word recognition, phonological accuracy and phonological fluency.

- *Ele-Bot*: picture that best matches spoken sentences is selected. Targets listening accuracy, English language conventions and vocabulary.*Space Commander*: participant is presented with ros of blocks that vary in colour, shape and is given oral instructions e.g. touch the re square and the blue circle. Targets listening accuracy and the ability to follow directions.

- *Hoop Nut:* participant listens to a target syllable and then identifies the target when it is heard in a sequence of two syllables. Targets phonological accuracy, fluency and memory.

- *Whalien Match:* participant has to identify pairs of matching words or syllables. Participant clicks a whalien character to hear the word/syllable and must rely on memory to find the matching whalien. Targets auditory word recognition, phonological memory, accuracy and fluency.

Fast ForWord Language Series: Language to Reading v2

See: http://mygemm.com/wp-content/uploads/2010/08/LangReadv2Manual.pdf - for more details.

- *Jumper Gym*: participant hears a sequence of sound of sound sweeps, has to remember and identify the sequence heard. Follows on from Sky Gym from Language v2, but more sounds need to be remembered here. Targets sequencing and working memory skills and improves auditory processing.

- *Polar Planet*: participant has to identify a pronounced target word when it is presented in a series of words (each word is presented in simultaneous oral and written form). Targets left to right eye tracking skills, working memory and requires focus/attention.

- *Tomb Trek*: participant has to identify a spoken target word when presented with a sequence of two words (each presented in simultaneous oral and written form). Targets word analysis, decoding, phonological awareness and working memory.

- *Paint Match*: participant has to match all words into pairs using the fewest clicks. Builds on Whalien Match from Language v2. Words are presented in simultaneous oral and written form. Targets working memory, organisation and focus/attention skills.

- *Cosmic Reader*: participant has to listen to a story and answer questions. Also involves following instructions. Targets listening comprehension skills and familiarity with English language conventions.

Fast ForWord Literacy Series: Literacy

See: http://mygemm.com/wp-content/uploads/2010/08/LiteracyManual.pdf - for more details.

- *Galaxy Goal*: participant listens to a series of sounds and clicks a button when the sound changes. Targets phonological fluency and memory as well as sustained attention.

- *Lunar Tunes*: amplifier with speakers is presented, with each speaker playing a syllable/ word. Task is to match all syllables/words into pairs using fewest clicks. Targets auditory word recognition, phonological accuracy, fluency and memory.

- *Space Racer*: participant has to correctly identify a sequence of two sound sweeps. Targets listening accuracy, auditory processing speed and sequencing working memory.

- *Spin Master*: participant has to identify a target syllable when it is presented in a sequence of two syllables. Targets phonological fluency, accuracy and memory.

- *Stellar Stories*: participant has to listen to a story and answer questions. Task also involves following instructions. Targets listening comprehension, ability to follow directions, vocabulary and understanding of English language conventions.

- *Star Pics*: participant has to identify the picture that represents a pronounced target word. Targets vocabulary and auditory word recognition skills as well as phonological accuracy and fluency.

Fast ForWord Literacy Series: Literacy Advanced

See: http://indigolearning.co.za/pdfs/support/LiteracyAdvanced/Literacy%20Advanced%20Manual. pdf - for more details.

- *Sky Rider*: to complete the game in a manner that is as skilful as possible, participant needs to correctly identify sequences of sound sweeps. Targets advanced listening accuracy and auditory sequencing.

- *Laser Match*: monitors in groups of 4, 8 or 18 are displayed, each associated with a word. Participant has to match all words into pairs using the fewest clicks. Targets word analysis and phonological accuracy.

- *Meteor Ball*: participant has to identify a pronounced target word when it is presented in a series of pronounced and written words. Targets word analysis, phonological fluency, sustained attention and visual tracking (strengthens left to right reading behaviour).

- *Lunar Leap*: participant has to identify a spoken target word when it is presented in a sequence of two words (each word is presented in simultaneous spoken and written form). Targets word analysis, phonological accuracy and phonological memory.

- *Galaxy Theatre*: participant has to listen to a story and answer questions. Task also involves following instructions. Targets listening comprehension, ability to follow directions, vocabulary and understanding of English language conventions.

Fast ForWord Reading Series

This Series is generally administered following completion of the Language and Literacy Series. These are also individually adaptive and participants are given instant feedback on their performance.

Note: some of these tasks, particularly those that are part of the more advanced levels of the Series, may be beyond the scope of this audit as it targets more advanced skills and an older age group. We have mentioned them here, just in case they may be of some relevance or interest.

Fast ForWord Reading Series: Reading Readiness

See: https://www.polk-fl.net/staff/teachers/reading/documents/Tools/A- 1%20Resource%20Binder %20-%20FFW%20RDG%20Products/Read_Tchr_Manual/Reading_Prep/RPrep_MNL.pdf - for more details.

- *Inside the Tummy*: participant "feeds" a hungry bear by dragging coloured shapes into the corresponding outlines located inside the bear's tummy. Each time the participant correctly places an object, the bear announces the shape and colour to reinforce knowledge. Targets visual attention and fine motor skills as well as hand- eye coordination

- *Hungry Tummy*: a bear asks for certain objects of various shapes, colours and sizes. Participant must correctly identify the objects and "feed" this to the bear. Targets ability to follow verbal directions, listening comprehension and working memory skills.

- *Packing Pig Goes to Work*: the participant helps Packing Pig work by listening for a spoken target letter and then clicking the matching written letter from a display of several letters. The participant is assisted through the task at first as the target letter flashes, but must then rely on sounds to identify the letters. Targets letter-name association skills, auditory working memory, visual attention and hand-eye coordination.

- *Packing Pig Has Lunch*: participant must match corresponding uppercase and lowercase letters on a grid to clear the grid. Participant can click on the letter to hear the letter's name. Targets letter-name associations for uppercase and lowercase letters, auditory working memory and visual-spatial memory.

- *Coaster*: participant hears a target consonant-vowel syllable and must select the written word containing the target consonant-vowel combination. Targets phonemic awareness and letter-sound association skills as well as an understanding of the alphabetic principle.

- *Houdini*: "Houdini the magic dog" presents four cards and the participant must select the card that presents a different first sound (but also occasionally a different last or middle sound) than the other three cards. The cards display pictures that represent the spoken words in the first stage, the picture and written word in the second stage and only the written word in third stage. Targets phonemic awareness and basic decoding skills.

Fast ForWord Reading Series: Reading Level 1

See: https://www.polk- fl.net/staff/teachers/reading/documents/TeacherHandbook/Product %20Information/FF%20Rea ding%201/ManualReading1.pdf - for more details.

- *Bear Bags*: participant hears a word with a target sound, then sorts "toast" with that word or picture of that word into the appropriate lunch bag (i.e. phoneme-based category). Targets phonemic awareness, understanding of the alphabetical principle and decoding skills. Also includes a speed/fluency round where participant must perform the task within a set time limit.

- *Magic Rabbit*: participant helps the magician change one word into another by choosing the correct letter from a selection of letters to spell the target word. Uses spelling and word-building to "increase sensitivity to letter-sound correspondences".

- *Flying Fish*: a target word is presented by a fishing pelican (oral and written form). Participant must click on fish with the target word from a series of fish with words displayed on them. At first, flying fish words are given in both oral and written form but are then only presented in written form. Targets decoding skills, auditory memory, visual identification of words and visual tracking (strengthen left-to-right reading patterns). Also includes a fluency round.

- *Quail Mail*: mail displayed with a picture or written word (which is also pronounced) must be sorted into the appropriate semantic and linguistic categories. Targets vocabulary and encourages flexibility during reading. Includes a fluency round.

- *Bedtime Beasties*: participants must complete a sentence by selecting the most appropriate picture, word, letter or punctuation mark. Initially, the sentence is also spoken aloud. Targets sentence comprehension and vocabulary skills.

- *Buzz Fly*: text is presented on the screen and also read aloud, with each line of text highlighted as it is being read. Participant must then answer a question about the text (which is also read aloud) by selecting the picture that best answers the question. Targets listening comprehension and working memory.

Fast ForWord Reading Series: Reading Level 2

See: http://mygemm.com/wp-content/uploads/2010/08/Read2Manual.pdf - for more details.

- *Bear Bugs: More Lunch*: similar to *Bear Bags* from Level 1. Also includes a fluency round.

- *Magic Bird*: similar to *Magic Rabbit* from Level 1.

- *Fish Frenzy*: similar to *Flying Fish* from Level 1. Includes a fluency round.

- *Leaping Lizards*: similar to *Bedtime Beasties* from Level 1.

- *Ant Antics*: students select the sentence from a selection of four that best describes a picture. Targets critical reading skills and sentence comprehension.

- *Dog Bone*: similar to *Buzz Fly* from Level 1. Instead of choosing a picture, as in *Buzz Fly*, the participant must select the written response that best answers the question.

Fast ForWord Reading Series: Reading Level 3

See: https://www.polk- fl.net/staff/teachers/reading/documents/TeacherHandbook/Product %20Information/FF%20Rea ding%203/ManualReading3.pdf - for more details.

- *Scrap Cat:* participant must sort target word into appropriate category. Categorisation targets decoding skills, automatic word recognition, semantic understanding, syntax, phonology, morphology and conceptual relationships.

- *Canine Crew:* participant must match pavers with words using the fewest number of clicks. Task may be to match synonyms, antonyms, rhymes or homophones. Targets decoding skills, vocabulary, automatic word recognition, semantic understanding, phonology and conceptual relationships.

- *Chicken Dog:* an incomplete target word is presented in written form, and is then pronounced. Participant must select the correct missing letter(s) to complete the word. Targets spelling, letter-sound correspondences and phonemic awareness.

- *Twisted Pictures:* participant must select the sentence that best describes a picture. Targets sentence comprehension, syntax, working memory, logical reasoning and vocabulary.

- *Book Monkeys:* participant reads a paragraph and is then asked a question relating to the paragraph. The participant must select the most appropriate answer from a selection of written answers. Targets paragraph comprehension, understanding of cause and effect, ability to make inferences, working memory and vocabulary.

- *Hog Hat Zone:* participant must select the most appropriate words to fill in the blanks in a paragraph of text. Targets paragraph comprehension, understanding of pronouns, auxiliary verbs, prefixes, suffixes, word-sentence links and helps build a foundation for vocabulary growth.

Fast ForWord Reading Series: Reading Level 4

See: http://mygemm.com/wp-content/uploads/2010/08/Read4Manual.pdf - for more details.

- *Hoof Beat:* a word or instruction is presented and the participant must select the response that best matches the word/instruction. Targets decoding skills, vocabulary, sentence comprehension, sematic understanding, syntax, phonology, morphology and orthography. Also introduces participant to homophones and homographs.

- *Jitterbug Jukebox:* participant hears a word pronounced and must click the available letters to spell the word out. If an incorrect letter is selected, the trial ends and the correct word is displayed. Targets spelling, letter-sound correspondences, phonological awareness and vocabulary.

- *Stinky Bill's Billboard:* participant must select the word that best completes a sentence. Targets sentence comprehension and decoding. Also reinforces the links between word meanings and sentence structure.

- *Lulu's Laundry Line:* a paragraph is displayed, with missing words and punctuation. For each blank, participant must select the word/punctuation mark from a selection of two or four choices that is most appropriate. Targets the development of capitalisation and punctuation skills, an understanding of the link between words and sentences and an understanding of sentence and paragraph comprehension.

- *Book Monkeys: Book Two:* more advanced version of *Book Monkeys* from Level 3.

- *Goat Quotes:* participant must select a sentence that best paraphrases a headline. Targets (fairly advanced) sentence and paragraph comprehension, working memory,

logical reasoning, decoding, syntax and vocabulary skills.

Fast ForWord Reading Series: Reading Level 5

See: http://mygemm.com/wp-content/uploads/2010/08/Read5Manual.pdf - for more details.

- *Wood Words:* participant must sort a target word (written or pronounced) into the appropriate phoneme or spelling-based categories. Targets spelling accuracy and fluency, decoding and phonemic analysis. Includes a fluency round.

- *Gator Jam:* participant has to complete an analogy by identifying the missing word(s). Participant must then read a completed analogy and sort it into the type of analogical relationship it demonstrates. Targets vocabulary skills, critical thinking and abstract reasoning.

- *Toad Loader:* participant must select the appropriate word or phrase to construct a sentence that best describes a picture. Targets accuracy and fluency in recognising and constructing sentences.

- *Lana's Lane:* participant reads a passage of text, which is followed by comprehension questions that involve either graphically or textually organising information from the passage using a range of different comprehension strategies. Strategies for graphically organising information included building a diagram and filling in a graphic organiser. Strategies for textually organising information include choosing or building a summary. Targets reading comprehension and the development of comprehension strategies.

- *Quack Splash:* this is quite an advanced task. Participant must select the correct text to complete a paragraph. Participants must then correctly order sentences to build paragraphs. Next, participants must correctly order paragraphs to build pages of a chapter. Finally, participants must answer comprehension questions about the chapter. Targets the construction and organisation of fiction and nonfiction passages, and the understanding and use of figurative language.

Prescribed protocols for all Fast ForWord Series: three days a week for 30 or 50 mins; five days a week for 30, 40, 50 or 90 mins.

Price:

According to the *What Works Clearinghouse* website (http://ies.ed.gov/ncee/wwc/reports/ adolescent_literacy/fastfw/info.asp), a single license for the Fast ForWord Language Series is US $900, with discounts available for multiple licenses. For the Fast ForWord Reading Series, single licenses cost US$500, with no quantity discount.

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Website / for more information see:

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http://www.scilearn.com/products/fast-forward/language - series

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