Arrowsmith PROGRAM
Strengthening Learning Capacities

Exercise Benefits in Academics

READING

Exercise	Benefits
Word & Tracing	Reading speed Eye tracking for smooth reading; not skipping words, endings of words, lines in text; not losing place in reading
Narrow Visual Span	Reading Speed; less fatigue and jerky reading
Symbol Recognition	Sight word recognition; visual memory of words
Broca's	Sound-symbol correspondence; sounding out words using phonics; smoother reading; better pronunciation
Lexical	Remembering words; vocabulary building
Phrases	Remembering information that was read and talked about in the reading
L Think	Getting the main point of what was read; thinking about the information and drawing conclusions; prioritizing information as to importance; interpretation of text is appropriate; thematic analysis
Clocks	Understanding what was read; comprehension; making connections between ideas in reading
Predicative	Comprehension

SPELLING

Exercise	Benefit
Word & Tracing	Muscle memory for writing words
Broca's	Memory of sound-symbol correspondence for phonetic spelling
Symbol Rec	Visual memory of words
Auditory Speech Discrimination	Hear words correctly to learn their spelling
Phrases	Memory for spelling rules

WRITING

Exercise	Benefits
Word & Tracing	Automatic flow of ideas into writing; more content gets written; smoother mechanical operations in writing; copying text more accurately and with greater speed; able to complete tests and assignments in less time; handwriting becomes more legible; uniform formation of letters and text; less jerky hand motions in writing
Kinesthetic Perception	Appropriate pressure; less deviation from the line
Primary Motor	Control of the writing instrument
Phrases	More retained knowledge to write about; memory for thoughts that are being written

L Think	Generating arguments in writing; relevant information is tied to thesis or main idea; less ambiguity in writing; less rambling, more to the point
Clocks	Formulation of logical arguments; proper use of grammar
Predicative	Elaboration in sentences; proper use of grammar and placement of words in sequential order; good turn of phrase

MATHEMATICS

Exercise	**Benefits**
Word & Tracing	Eye tracking for computations on paper; neat and legible work; less careless errors in written computation
Phrases	Remembering rules
Symbol Rec	Visual memory for formulas
Q Sense	Can perform math calculations in head; quantification; sense of number; can learn and retain math facts
Clocks	Understanding concepts and applying logical reasoning to math problems; understanding the "why" in math; sees relationships in concepts; processing information
L Think	Able to determine what is relevant information in a math word problem necessary to solve the problem; able to generalize formulae appropriately to solve problems
Predicative	Remembering order of operations, sense of procedure and steps in a math procedure which allows for the retention of it
Spatial	Geometry - Ability to construct geometric figures

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EXERCISE OUTCOMES

DYSFUNCTION	EXERCISE	OUTCOME
Motor Symbol Sequencing	**Tracing and Word**	**Writing** becomes automatic. A person can think and write at the same time; they do not have to concentrate so hard on writing that they forget what they were thinking about. Written assignments and tests can be completed in the allotted time. Handwriting is no longer messy and irregular. Handwriting becomes more automatic and often preferable to printing. There is more flow of thought to paper in the writing process with more content ending up on paper. Copying material from one location to another (i.e., from the blackboard or a text into a notebook) is faster and more accurate. **Reading** - Words are no longer misread due to poor eye tracking. Reading speed improves. **Spelling** - The person can spell the same word properly and consistently on the same page. This is improved muscle memory for writing words in the correct symbol sequence. **Speech** - The person no longer rambles and can get to the point. Speech is more concise. They no longer leave out chunks of information which are necessary for the listener to understand what the person is talking about. **Mathematics** - Improved accuracy in mathematical computations. The person no longer makes written or eye tracking errors. **Science -** Less careless errors in scientific formulas.
Symbol Relations	**Clocks**	**Time** - The student can learn how to read an analog clock. **Math/Science** - The person understands math concepts or scientific formulas. The person understands the meaning or "why" of the procedures. **Comprehension** - The person understands cause and effect relationships or the reasons why events happen. The person sits in on a seminar and is able to comment on the points being made because he fully grasps the meaning at that moment and can participate in discussion. **Reading Comprehension** - The person no longer has to read material over and over again to understand what is being said. **Socially** - There is often less personality rigidity or stubbornness because the person is able to consider several alternatives logically at the same time in order to plan and make decisions. The individual is better able to understand and communicate his own thoughts and feelings to others. **Vocabulary** - Understanding the deeper level of meaning of words. **Writing/Speech** - Conceptual versus narrative.
Memory for Information or Instructions	**Phrases**	**Memory** - Instructions no longer have to be repeated several times. The person is better able to remember what he or she has to do and can follow through with assignments. **School** - The student will remember what the teacher asked them to do for homework. People with this problem tend to compensate by taking notes in order to help them remember information or by developing rigid habits without which their lives fall apart. They no longer need to rely on these compensations but can remember the auditory information/instructions.

		Studying - Remembering information for an exam becomes easier and sticks through the exam, a student does not forget it gradually throughout the study time. **Vocabulary** - Remembering definitions of words. **Reading Comprehension** - Remembering all of the information read leads to better comprehension. **Writing/Speech** - Remembering thoughts intended to impart in speech or written work. **Spelling/Math/Science** - Remembering rules.
Predicative Speech	**Predicative**	**Memory** - In any learning situation the person is able to actively recode information through internal speech in order to retain the information solidly in memory. In other words, the person is able to recapitulate or 'put things in his own words'. **Speech/Writing** - The person can elaborate in both speech and in written expression. The person has a sense of the appropriateness of where words go positionally in a sentence. Increased fluency in sentence expression. **Math/Science** - Procedures in mathematics and science can be learned without a breakdown of the steps of the procedure. **Socially** - The person has the ability to say things to himself inside his head to control his behavior. He can go through a process of active internal rehearsal of what he should do in various situations. The person is capable of thinking out the possible consequences of an action beforehand. **Reading Comprehension** - The person has the ability to understand sentences through the meaning conveyed by the positioning of the words in the sentence. **Vocabulary** - The person has the ability to learn vocabulary through context - by understanding the meaning of sentences.
Broca's	**Broca's**	**Reading** - It is easier to learn and enlist phonics skills in the reading process. **Speech** - The person is able to think and talk at the same time. The person is less likely to lose his train of thought. This results in a gain in confidence in speaking to others in new situations. The individual no longer mispronounces words. Strengthening this area improves the ability to learn the spoken aspect of a foreign language. **Spelling** - The person is able to spell with sound symbol correspondence. **Vocabulary** - New words can be learned through improved ability to read. Improved word retrieval aids vocabulary building. The person's oral vocabulary improves because he can now pronounce words that he previously recognized the meaning of in silent reading.
Auditory Speech Discrimination	**Auditory Speech Discrimination/ ASD**	**Hearing** - The person no longer mishears words in a conversation, discussion, lecture, TV program or series of instructions and therefore has correct interpretation of the information he hears. **Listening** - While taking notes the person no longer mishears words and writes down the wrong words. A person has less trouble understanding someone who speaks with an accent. **Spelling/Speech** - Words are spoken and spelled correctly due to an improved ability to hear them correctly.

Symbolic Thinking	**L Think or Main Idea**	**Planning & Organizing** - The student can develop strategies for studying. The person can work out an active plan to organize himself. **Setting Goals** - The person can make long term goals and plans for himself and follow through on these. A person is generally more trustworthy because they are stable in long range planning. **Thinking** - There is a stronger process of active probing or searching for an answer, active mental initiative in problem solving. The person can generalize learned information appropriately to similar situations. The person sees the differences between situations and responds appropriately to each situation. The person is able to self-correct mistakes. A person thinks through a situation and is less impulsive. The person now considers all the existing elements in a situation before acting and therefore behavior is appropriate to the specific situation; he does look before he leaps. **Focused** - The person is better able to keep his attention focused on a language related task to completion. Student can see the main point or overall idea of a symbolic activity (e.g., a discussion, a story, a movie, and a math question) and does not get sidetracked by irrelevant details. **Vocabulary** - The person will learn new words as a result of increased attention and drive for information. **Reading Comprehension** - The person has the ability to see the main point of written material. **Writing/Speech** - More focused writing and speech with an increased ability to stay with the main point without getting sidetracked by irrelevancies. **Math/Science** - The ability to organize all cognitive areas to problems solve.
Symbol Recognition	**Symbol Rec**	**Visual Memory** - This is the capacity to recognize and remember a word or symbol visually that has been seen before. **Reading** - Reading is no longer a slow process. The person's word recognition level improves (i.e., words he can see and say immediately). Reading speed is faster because the person no longer has to rely on sounding out words, but can recognize the words from visual memory. **Spelling** - The person is better able to edit their work and recognize spelling errors. **Vocabulary** - The person can learn vocabulary words as a result of an improved reading ability. **Math/Science** - The person can visually memorize symbol patterns in mathematics or in chemistry.
Lexical Memory	**Lexical**	**Memory** - A person can remember four unrelated words in a series. The person can follow oral information. **Vocabulary** - Auditory acquisition of new words is improved. The person can use paired associative learning (for example: a road is a street; a dog is an animal). **Reading** - Improved ability to match printed words with the sounds of those words.
Kinesthetic Perception	**Right Kinesthetic** **Left Kinesthetic**	**Agility** - There is less awkwardness of body movement with decreased clumsiness. The person is less likely to cut himself with a knife or hurt himself when using tools.

		Writing - Writing on the line with less pressure exerted on the pen.
Kinesthetic Speech	**Kin Speech**	**Speech** - Clearer speech; less likely to get tongue-tied. Clear articulation of words.
Artifactual Thinking	**R Think or Picture Thinking**	**Socially** - The person can interpret non-verbal information such as facial expressions and body language and as a result he can change his behavior according to the signals people are sending him. Also the person acts appropriately in social situations because he perceives the significance of the non-verbal information. The person can interpret subtle cues to stop talking excessively about a topic. The person is less impulsive. **Focused** - The person can develop plans and long term strategies to deal with situations. **Emotions** - The person can register and interpret his own emotions. The person can register others' emotions to be able to empathize and sympathize with them.
Narrow Visual Span	**Narrow Visual Span**	**Reading** - The person can now see whole words in a single visual fixation. Reading is less fatiguing and less jerky. Reading speed increases. Navigating in the dark is less problematic.
Object Recognition	**Object Rec**	**Visual Memory** - The person recognizes items more readily when shopping and when looking for things as they can remember the picture of the object. The person can remember visual cues such as landmarks to help in the process of remembering the location of places. **Socially** - The person can recognize and remember faces and will not miss details in facial expressions both of which cause social and interpersonal problems.
Spatial Reasoning	**Spatial**	**Mapping** - The person can visualize a pathway of movements inside his head; he can work out a map inside his head of how to get from one place to another. When map reading the person no longer has to rotate the map to orient towards the direction he is going. The person has a map of how space works inside his head. In driving a car the person has less trouble planning his moves ahead of time. Games such as checkers or chess become more enjoyable since the person can imagine several moves ahead in their head. Performance in sports activities requiring a spatial plan of movement improve. There is ability to imagine different ways to arrange furniture in a room. **Workplace & Home life** - The person's workspace tends to be less messy and more organized. The person does not have to leave things in piles within line of sight but can organize things spatially and remember where they are filed/stored. The person no longer forgets spatially where he has left objects. Things do not get lost as often. **Math/Science** - There is less difficulty in constructing geometric figures and molecules.
Mechanical Reasoning	**Mechanical**	The person has less difficulty in imagining how machines operate and can effectively handle and use tools. The person can build/construct objects/machines. **Science** - Improved ability to understand physics.

Abstract Reasoning	**Abstract**	The person is able to carry out in proper sequence a series of steps in a task such as in computer programming, using tools, in cooking or in sewing. **Science** - Procedures in science can be learned without a breakdown of the steps of a physical procedure.
Primary Motor	**Primary Motor - Left or Right**	**Body** - Improved speed, strength and control of muscle movements on one side of body or the other. There is less awkwardness in the body. **Writing -** Improved control of the writing instrument.
Quantification Sense	**Q Sense**	**Math** - The person can calculate change, estimate time, number, learn math facts and perform mental calculations in their head. The person is able to make progress in mathematics and no longer resorts to counting on their fingers when solving math questions. Factoring, at a high school level, is no longer confounding. The person has a sense of the magnitude of number which is important for time scheduling, budgeting and time signature in music.