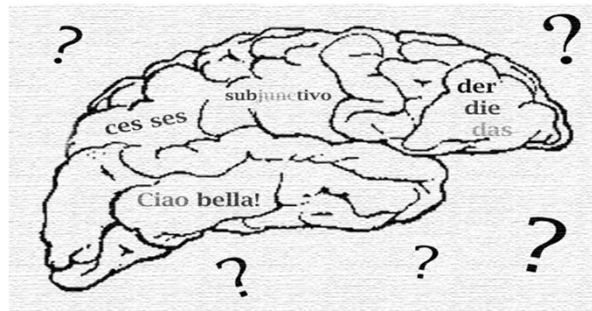


## Translating Brain Research into Language & Literacy Instruction for English Learners



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SGIS March 2015

### Test Your *Language* Brain! (p. 1)

1. *If a child does not learn a language before the 'critical window' closes, she will never become fluent.*
2. *The brain learns language by 'memorizing' correct forms; otherwise, mistakes will always be made by L2 speakers and writers.*
3. *The more different the two languages are (i.e. L1 & L2), the more difficult it is for the brain to process both.*

Test Your *Language Brain!* (p. 2)

4. *Students learn a language better when the instructional format – such as visual or auditory – matches their learning style.*
5. *Students who excel at languages have bigger brains than those who do not.*
6. *Females are better at languages than males due to the radical differences in their brains.*

Test Your *Language Brain!* (p. 2)

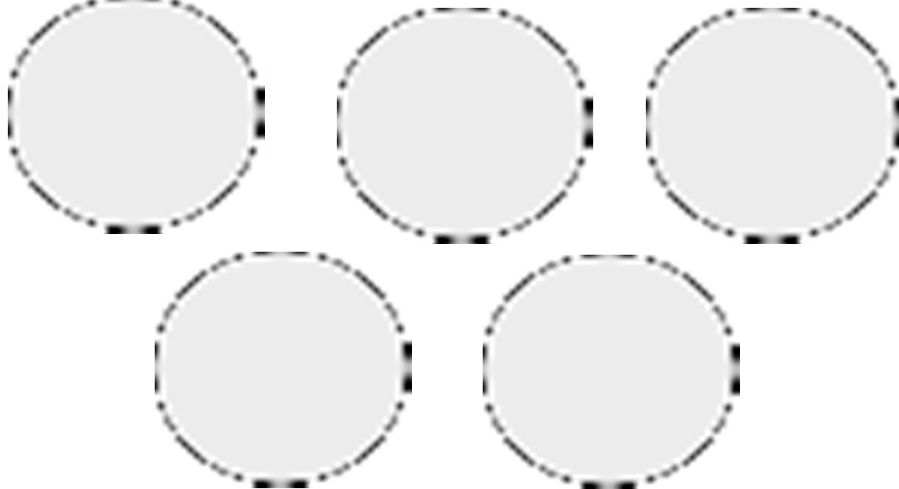
7. *Only 10% of the brain is used for language learning which explains why English learners should not study a third language at the same time.*
8. *A specific section of the brain is exclusively responsible for second language acquisition, and it is located in the left hemisphere.*
9. *The sleeping brain can acquire language from audio tapes.*

## Test Your *Language* Brain! (p. 2)

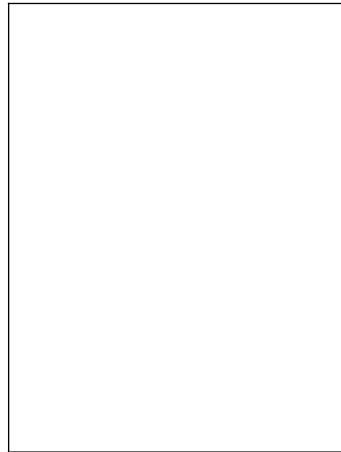
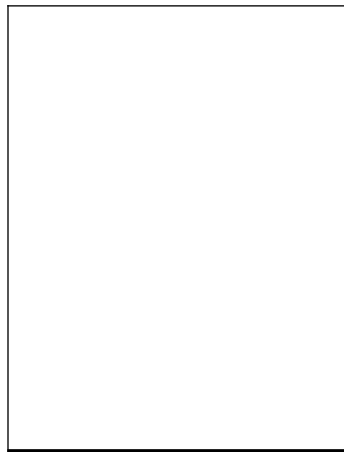
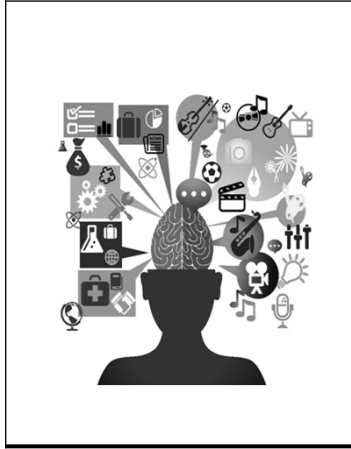
10. *The cause of fossilization is due to a lack of connections between neurons – called synapses – in some language learners' brains.*

## Brain Principles *Sort* + (pp. 6-12)

Vocabulary



*The brain is a highly, effective  
air traffic control system ... (p. 4)*



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## RESEARCH-BASED BRAIN PRINCIPLES FOR EFFECTIVE LANGUAGE INSTRUCTION

**PRINCIPLE #1:** *The brain is social and learns better in concert with others. To optimize learning in a language classroom, teachers can design **verbally-interactive** learning experiences using structured talk through pair or small-group collaborative strategies.*

**PRINCIPLE #2:** *The language learner consolidates and internalizes information by **actively processing** it. Information is connected to prior learning. The stage is set before a unit of study is begun by the teacher preparing the students to attach new information to prior knowledge so the new information has something to latch onto. Such building background learning experiences should appeal to all the different ways brains process information.*

**PRINCIPLE #3:** *For early language learners, '**initial**' reading requires the cooperation of three neural systems working together to decode sound-to-symbol relationships particular to the language (i.e. auditory processing system of the left hemisphere, visual processing system, & the executive system). Alphabetic languages involve visual processing (left hemisphere) while logographic languages such as Chinese also use a portion of the right hemisphere identified with processing graphical representations.*

**PRINCIPLE #4:** *Learning involves both focused attention and peripherals which include charts, graphic organizers, illustrations, set designs, and/ or art. Effective language and literacy instruction utilizes **student-created materials and products** to create rich, stimulating environments.*

**PRINCIPLE #5:** *Second language instruction leverages learners' native language; that is, teachers - regardless of whether they speak the languages - use students' **native languages as entry points or to provide 'comprehensible input'** when and where needed. Similarly, human competence is defined by the values of the culture to which people belong; language classrooms should therefore avoid representation of any socially constructed biases about the prestige of some languages over others.*

## RESEARCH-BASED BRAIN PRINCIPLES FOR EFFECTIVE LANGUAGE INSTRUCTION

**PRINCIPLE #6:** *Brain-based language learning has hatched a new discipline, now entitled by some as **educational neuroscience**, **educational neuroscience**, or by others as **mind, brain, and education science** (Souza, 2011). Whatever the name, it is a comprehensive approach to instruction using current research from neuroscience; it emphasizes how the brain learns language naturally and is based on what we currently know about the structure and function of the brain - including the bilingual or multilingual brain - at varying developmental stages. The goal is to generate a biologically-driven framework for creating effective language and literacy instruction.*

**PRINCIPLE #7:** *Up until now, the most often used metaphor to refer to the brain has been a computer (or some other type of machine). However, the human brain isn't hardware or software, it's 'wetware.' The brain as an unbelievably **intricate network of ecosystems** is much closer to the truth than that of a complex machine. What is needed is pedagogical discourse that better implements this conception of **neurodiversity** - one which provides a sense of hope, that all brains - regardless of how they think, speak, read, or write - will be recognized for their language and literacy potential, and accorded the same rights and privileges as any other brains. The instructional implications for this neurodiversity is **differentiation**.*

**PRINCIPLE #8:** *Second language acquisition and bilingualism are **multi-dimensional and complex phenomena**, consisting of interdisciplinary fields of study (e.g. psycholinguistics, sociolinguistics, neurolinguistics) and competing hypotheses and theories (e.g. limited capacity, dual language system vs. unitary language system hypothesis, etc). Much research remains to be done to design an explanatory framework which reconciles opposing theories as well as account for linguistic and learning phenomena not wholly understood.*

**PRINCIPLE #9:** *Acquiring a new language later in life requires the learner to listen carefully to the **prosody** of the language; that is, its rhythm, cadence, accent patterns, and pitch. After listening, the speaker needs to speak it so that the speech apparatus can practice the prosody of the target language (but not with 'mim-mem' choral repetition exercises!). Keep in mind that the goal of oral language usage is to be understood (and not perfect accuracy at the early stages of language acquisition).*

## RESEARCH-BASED BRAIN PRINCIPLES FOR EFFECTIVE LANGUAGE INSTRUCTION

**PRINCIPLE #10:** *Language learning is enhanced by challenge and inhibited by threat; in other words, the brain learns when optimally challenged but 'down shifts' under perceived threat. Teachers should make sure that materials and tasks are challenging but that the climate for learning is supportive and marked by mutual respect and acceptance. Effective instructional methods to support this notion include: (1) **cooperative learning** where learners are engaged in a great deal of interaction jointly solving problems and determining meaning, (2) **chunking** which is a learning strategy enabling learners to remember more content more successfully through categorizing and sorting information into chunks rather than trying to memorize many discrete pieces of information, and (3) '**dentrite food**' which is a nickname for a learning experience in which students summarize and record new information in their own words (i.e. this phrase refers to the fact that new learning, when physically established in the brain, is accompanied by the growth of more connections between nerve cells, called dendrites).*

**PRINCIPLE #11:** *Brain research confirms that people are meaning makers: the search for meaning cannot be stopped, only channeled and focused. Additionally, the brain needs and automatically registers the familiar while simultaneously searching for and responding to novel stimuli. The brain is both artist and scientist as it attempts to discern and understand patterns as they occur and gives expression to unique and creative patterns of its own. When learning a language, the brain resists having meaningless patterns imposed on it; that is, isolated and discrete pieces of information unrelated to what makes sense. Teachers need to plan and create natural language learning environments to immerse students in language learning. **Orchestrated immersion** approaches provide meaningful activities and materials and utilizes collaborative learning methodology (frequently!) in flexible and fluid grouping structures (e.g. students grouped with native, near-native, or more-proficient speakers).*

**PRINCIPLE #12:** *Effective language learning experiences allow students to reflect on what and how they learned so they can begin to take charge of their language and literacy development (i.e. **meta-linguistic awareness and meta-cognitive strategies**).*



## RESEARCH-BASED BRAIN PRINCIPLES FOR EFFECTIVE LANGUAGE INSTRUCTION

**PRINCIPLE #13:** *Language learners spend a lot of time with rote memorization but then are not always able to transfer into usage what they have memorized. Vocabulary and skills that carry meaning is processed differently in the brain, almost automatically and therefore requiring less memorization. Second language classroom activities that are meaningful create an ideal learning opportunity for second language students to do more in a shorter time, with less effort. For example, an effective learning experience might be to have students act out scenes from their readings (or demonstrate a science experiment or a dialogue between historical figures).*

**PRINCIPLE #14:** *Students need multiple opportunities in the language/ literacy classroom to turn **declarative knowledge into procedural knowledge** (i.e. automatic usage) vocabulary which they will need in order to achieve bilingual proficiency and/ or to perform tasks expected of proficient second language speakers (e.g. describe, explain, retell, etc.). Additionally, second language learners need exposure and multiple practice opportunities with using 'shades-of-meaning' vocabulary, idiomatic or multiple-meaning terms, and 'text-specific' discourse connectors.*

**PRINCIPLE #15:** *Effective **vocabulary instruction** incorporates different teaching strategies based on appropriate stages of process (i.e. exposure/ practice/ mastery vs. mastery/ mastery/ mastery) using elaborative rehearsal rather than rote rehearsal methods (i.e. making meaning vs. taking meaning). An overemphasis on memorization leaves learners' brains impoverished and does not facilitate transfer into usage.*

**PRINCIPLE #16:** *Reading and writing are connected though not all 'good' second language readers make 'good' second language writers. Becoming a writer requires abundant amounts of '**elaborative rehearsal**' opportunities which challenge students to clarify, organize, and express themselves. Some examples include: process writing, writer's workshop, collaborative writing, and writing models and/ or frames. Teachers must be masterful and intentional about the use of 'scaffolds' to enable students to take risks and write beyond their current capacities.*

## RESEARCH-BASED BRAIN PRINCIPLES FOR EFFECTIVE LANGUAGE INSTRUCTION

**PRINCIPLE #17:** *For older language learners, **reading** in a second language is somewhat easier when second language learners already know how to read in their first languages since **transfer** between the two languages has been shown to occur.*

**PRINCIPLE #18:** *Different languages and cultures are outward signs of **diversity** but true human uniqueness lies within each individual. Every student is unique because every brain processes information differently. Although each person has the same set of systems, each one integrates these systems differently. As second language educators, we need to be open to many interpretations and **different ways** of viewing information. The least effective language and literacy instruction relies in learners using "the same material to show their understandings in the same way at the same time alone." Conversely, effective language and literacy instruction provides for "different products, processes, and student groupings" not as events but as a way of classroom life. It is simply teaching mindfully to support the success of each human brain entrusted to our care.*

**PRINCIPLE #19:** *Teaching strategies for **reading comprehension** in the context of the text students are about to read and having students talk and write about what they are reading are effective language and literacy instructional approaches.*

**PRINCIPLE #20:** *Teachers carefully choose materials that are appropriate, and all classroom libraries contain **content-appropriate materials** for readers.*

**PRINCIPLE #21:** *Human brains exist along **continuums of competence**. Rather than regard learners as 'unable' to acquire language proficiency or literacy, it is more appropriate to speak of spectrums or continuums of competence. We are all somewhere along continuums related to language usage and learning, and thus always progressing. Brain research indicates that the '**timeliness and type**' of feedback is critical as an intervening variable in language acquirers' movement along these continuums.*

## RESEARCH-BASED BRAIN PRINCIPLES FOR EFFECTIVE LANGUAGE INSTRUCTION

**PRINCIPLE #22:** *Teachers provide students with opportunities for **synthesis and creativity** as they become autonomous readers, apply rigor in their learning, and do more self-monitoring.*

**PRINCIPLE #23:** *A '**fixed language acquisition or literacy mindset**' starts from the premise that some students will learn and others will not, due to genetic or home variables. This mindset often results in practices such as low expectations, 'ability grouping,' 'dummied down' materials and tasks, and accelerated or remedial programs. On the other hand, a '**growth language acquisition or literacy mindset**' begins with the premise that all students will progress and that the teacher's role is to join with the students in doing whatever it takes to make it happen.*

**PRINCIPLE #24:** *Writing and thinking are strongly linked, and some research has shown that **rhetorical writing styles** are culturally and/ or linguistically determined. Just as students learn to write in native languages through multiple experiences, so too do second language learners. Mentor texts, explicit mini-lessons, and 'anchor style charts' are examples of brain-compatible language and literacy strategies.*

**PRINCIPLE #25:** *One of the key tenets of brain-based education is that **attention follows emotion**, and both **music and art often tap into the emotional areas** and thus are natural conduits for remembering and connecting information. Music can lower stress and boost learning when used three different ways: (1) as a carrier - using melody or beat to encode content; (2) as arousal - to calm down or energize; and (3) as a primer - to prepare specific pathways for learning content) impacts the immune system, and is an energy source for the brain. Art also provides many learners with avenues of expression and emotional connection and release. Indeed, due to the diverse power and inherent potential of music and art to create deep emotional connections and aid in memory retrieval, some educators think the arts should be named as the fourth R.*

## RESEARCH-BASED BRAIN PRINCIPLES FOR EFFECTIVE LANGUAGE INSTRUCTION

**PRINCIPLE #26:** *In addition to style, writers must develop **text-specific language skills and structures** (i.e. grammar). In other words, writing 'genres' each have specific characteristics that make them different from other genres, and students need frequent exposure and interaction with these in order to become proficient writers. Teachers explicitly teach the skills and structures of text types through mentor texts and mini-lessons and then provide writers with the time and supports they need to practice and move to higher levels of 'structural' competencies. (NOTE: teaching grammatical rules and having students fill out worksheets is not writing).*

**PRINCIPLE #27:** *There are tools, resources and strategies for altering the learning environment so that it meshes with the needs of '**neurodiverse**' learning brains. When teachers create positive '**niche construction learning sites**' (i.e. classrooms in which round pegs do not have to try and fit into square holes), then neurodiverse brains develop a more complex network of neuronal connections in the brain. This more complex brain, in turn, has an easier time adapting to the needs of the surrounding environment.*

**PRINCIPLE #28:** *The brain is changing in response to the transformations brought about by the **high-tech information age** in which we live. If we want brain-compatible classrooms, we need to know how technology affects our brains. Becoming a part of this transformation is something we must do because we are dealing with 'native speakers of digital equipment and communication systems.' Besides, the more we challenge our own brains by learning new things, the better off our brains will be!*

**PRINCIPLE #29:** *Effective language and literacy instruction is designed with attention to "**progressions**" as students' skills, competencies, and proficiencies grow. Teachers explicitly plan students' progressions, design instructional supports, and provide immediate feedback (i.e. pastoral coaching vs. punitive evaluation). Additionally, teachers collect evidence and adjust instruction accordingly.*

## RESEARCH-BASED BRAIN PRINCIPLES FOR EFFECTIVE LANGUAGE INSTRUCTION

**PRINCIPLE #30:** *Effective instruction offers opportunities for students to engage in extended oral and written discourse using rich tasks, requiring higher-order application and meaning negotiation. Teachers are highly skilled and intentional about the use of rigorous tasks which do not diminish students' capacities and which, in fact, require them to 'struggle productively.' There is no one method, strategy, or approach to language teaching that can encompass all learners and the variations of the human brain. Teachers who select from a broad repertoire of techniques and strategies are more successful in engaging their learners.*