A SEMIOTIC PERSPECTIVE ON THE POSITIVE TRANSFER OF L1 STRUCTURE IN SECOND LANGUAGE INSTRUCTION

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Abstract

Until recently, the field of second language pedagogy has focused disproportionately on the impact of negative transfer in language learning. This, in part, has led to methodologies that attempt to limit students' use of their first language (L1), positioning many to feel ineffective and unsatisfied by their learning experience. Currently, language educators are re-examining positive transfer. It is suggested that the benefits of positive transfer were not emphasized to some degree because the term "language interference" is misleading. This has over-simplified a complicated process that when considered from a semiotic perspective with reference to language acquisition, embodied cognition, neurolinguistic and applied linguistic theories could be better understood as a symptom of "equivocal signs". Language interference is also redefined as a symptom of 'semiotic confusion', which is a specific state of disorientation caused by a misinterpretation of signs. A hypothetical model of two competing states of consciousness that correspond with synthetic and analytic brain functioning and aspects of Peircian semiotics provides insights as to the importance of activating their students' internal and external semiotic cultural consciousness. The thesis concludes with a brief analysis of language learning approaches that utilize colour to help students transfer their L1 knowledge from their first language into the second language (L2) in a manner that should limit some of the effects of 'semiotic confusion'.

Dedication

This thesis is dedicated to my grandmother; Marjory Gilbert, for her generosity and love of culture; my parents, Ian and Nancy Caunce, for their ongoing support; Dr. William Acton, for his inspiration; and in living memory of my grandfather, Jack Gilbert. As well as my dear cousin, Ryan Miglierina, who said if one could not go through something then one had to find a means to go over it, essentially a bypass.

Acknowledgments

It is with an immense depth of gratitude that I would like to acknowledge all of my advisors, students and colleagues, who helped to make the dream of completing this thesis a reality. I owe much of my current fascination with semiotics to my undergraduate degree in Fine Arts, and in particular the brilliant art historian, and Professor Leslie Dawn and my cultural anthropology professor Andrea Cullar. Jamin Pelkey, since then, has helped me refine my knowledge and has guided my thinking with his expertise in Peircian semiotics, linguistics and embodied cognition to an extent that my interest in semiotics has developed into a lifelong passion. His knowledge and contemporary perspective has been invaluable right from the beginning of this research.

Piers Messum and Roslyn Young provided an extraordinarily detailed review of the original thesis, which has ultimately resulted in a far stronger paper, one that I hope grounds the complicated theory of semiotics within the language classroom and the process of learning in general. Without their detailed knowledge of Gattegno's Silent Way methodology, it would have been difficult to clarify the link between semiotics and language learning. William Acton's previous experience of Lamb's networks and Gattegno's Silent Way Methodology was also instrumental in making this connection apparent and relevant to a professional audience. William Acton's forty years of experience in the field of second language teaching, and keen interest in each of the subject areas discussed in this thesis have been most instructive and inspiring. I feel tremendously privileged to have had all of these professors' input, particularly my thesis advisor, William Acton, who has always been accommodating and supportive during the thesis process. Michael Walrod must also be thanked for his lively conversations and research on the nature of the cognitive grid, which were instrumental in shaping the initial argument of the thesis. I would

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Chapter 1: Introduction

In a manner of speaking, the disciplines of linguistics and second language learning have been greatly influenced by the linguist, Ferdinand de Saussure, who became so concerned with the presumed structure and pieces of language, such as its grammar and forms, that he perhaps unintentionally drew a circle around language (Agar 2002). Within linguistics, this hypothetical circle thus situated the internal forms and frames of language that Saussure referred to as *Langue* within the circle. Every other aspect of language, such as the use of those frames by actual speakers for communication known as *Parole* (Saussure 2000), was kept outside the circle. Saussure's work also led to a potential solution to this problem through the study of linguistic signs (*semiology)* but due to the dyadic nature of his conception of the sign, it focused on form rather than function. While Saussure noted the importance of the collective for determining what forms were to be used and in what circumstance, he was less concerned with the functional purposes for using signs. In this way, language was considered to be a secondary modeling system composed of non-verbal and verbal sign systems.

Given the place of Saussure in linguistics, the effect that original divide may have caused between form and function is perhaps still apparent as the generative and functional strains present in modern linguistics. Functional theories are more concerned with how actual speakers use language to communicate, whereas generative theories tend to be more interested in the mechanisms, rules, forms and constraints that make it possible for language to be used as a tool for communication. Consequently, this difference in perspectives has provided insights into the notion of an inner-self based function of the bodymind which is inexpressible through language and a social-self (developed through the use of forms) that is maintained and communicated through one's membership in a collective sociolinguistic system. It seems the organization of the

aspects of language into one or the other of these categories has been to avoid making language learning and description too confusing, but as a result, language studies may not reflect the language used by real speakers.[1]

The relevance of semiotics for applied linguistics and language teaching may not be immediately apparent until one considers the phenomenon of transfer. In language teaching, transfer refers to the process whereby elements of language A, a first language, may affect the same forms in language B, a second or other language, when trying to learn language B. While this has been referred to as language interference, this definition fails to address why there is interference. Yet, when language interference is viewed from a semiotic perspective, the cause of it may become evident. However, Saussurian semiology that goes no further than the signified is not going to provide the necessary bridging material to move from one level of a sign to another. One difficulty with semiology is that although it acknowledges that there is a relationship between the sign and signifier, it does not explain how one form of sign becomes another type through the transfer of the role of the sign to another.

In contrast, the semiotic work of Charles Sanders Peirce, who developed his conception of the sign as a triad, does just this. By situating his triadic sign consisting of a representamen (sign), an object and an interpretant (determined by the sign/representamen in relation to the object) within the states of Firstness (signs relating to vague qualities), Secondness (signs relating to facts) and Thirdness (signs relating to laws), Peirce's work explains how the relationships between signs are never static and in fact, constantly evolve. This is because signs rely on habit forming experience. The implication is that meaning can be generated through sign

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[1] The inclusion of forms within the circle and the usage of those forms situated outside it might also resemble a broader historical division between the body and the mind. When Chomsky (2006) proposes that the mind contains predetermined forms he is following this Cartesian dualist notion. In section 2.2 an alternative theory

relations as a form of transfer from one type of sign to another. However, one may want to consider that transfer is not a simple process because as Peirce argues the type of signs and route by which they connect varies considerably.

One of Peirce's many types of signs is called a rhematic indexical sinsign. This sign is formed from the combination of a rheme, a sign of possibility; a sinsign, which is a sign that relates to an actual event or something that exists; an icon, a sign that is related to an object because of some similar quality; and an index, a sign that shows the influence of the object it is related to (Tejera 1995, 137). This rhematic indexical sinsign points to the presence of another sign, the one that motivated it. Peirce's example of this is an unplanned scream (Peirce 1903, CP 2.256). Such a cry is a rhematic indexical sinsign because it is a sign of raw experience generated as a reaction to some other sign.[2] Iconic sinsigns "… requires that the sign occupy (minimally) a spatiotemporal position similar to that of its object and that it is through this property that the sign can indicate its object" (Lee 1997, 123). A cry of surprise identifies its producer by its tone and theme. In this way it becomes both an index and an icon. The cry functions as an index of the person who cried out because he/she caused the sound to occur and it functions as an icon because the sound quality of that unique voice serves to identify the individual (Lee 1997, 124).

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[2] In LeDoux's (1996) book "The Emotional Brain," he describes many of his studies with split brain patients. In one such study with a patient referred to as PS he found that when the left brain had to make a judgment about the level of goodness of each word that was only shown to the right hemisphere, the man's judgments matched those to be expected. His left hemisphere allowed him to class the word "devil" as bad without any conscious knowledge that his right hemisphere had been shown the word "devil". LeDoux implies the importance of this may be that the right hemisphere can respond emotionally to signs and transfer that response to the left hemisphere even without the aid of the corpus callosum (LeDoux 1996, 14-15). He considers emotions as particular functions of the brain controlled by neural systems that coordinate interactions with the environment to ensure the mammals survival (LeDoux 1996, 12, 125).

Peirce gave a cry of surprise as one possible example yet, arguably, signs of surprise are not limited to screams, but likely include other automatic bodily responses.[3] Rhematic indexical sinsigns could hypothetically be conscious or unconscious expressions of one's emotional state. Rhematic indexical sinsigns become particularly relevant to the task of learning when one considers the relationship between surprise and confusion. The presence of such emotional signs seems to demonstrate that a person has become confused because an expectation has not been met.[4] The individual is then uncertain as to the status of a known sign because of the influence of an unknown sign. By default, there will be an element of surprise in confusion because of the conflict between the expected and the unexpected sign. In response to a mismatch of expectations, multiple signs may come to mind in an effort to find an equivalent or relevant sign in order to gain some understanding of the new one. This processing of signs is to ensure one may attain an accurate perception of one's environment and circumstances. When an expectation is not met, perhaps momentarily contradictory signs are present: one, the previous expectation, and the other, the new situation. An individual will need to choose between these, often using other signs to guide them. For example, if a man is eating his lunch before work, believing it is 1 PM and his boss calls to tell him that he is late as it is 2 PM, he may immediately check his watch in response to the call, which is the unknown and unexpected sign. This is because the man's expectation was that he had an hour before work left. If he checks his watch and then sees

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[3] The full list of what these could be is beyond the scope of this current work. At the present time it is only necessary to understand that a number of physiological reactions could be considered rhematic indexical sinsigns in respect of its definition.

[4] While surprise can incorporate a broader range of phenomena than confusion, as confusion is the focus of this thesis, the use of rhematic indexical sinsigns is only for the purpose of explaining how the presence of a known sign in tandem with an unknown sign can result in semiotic confusion. Surprise can be viewed as an integral part of confusion because it involves an unexpected sign occurring where a known sign was supposed to have occurred. In contrast, confusion is not necessarily a part of surprise as surprise is a complicated emotional reaction that as LeDoux (1996) would argue, has been motivated by automatic mechanisms in the body that have evolved to ensure the survival of the species.

it is 2pm, this will reinforce the strength of the call (unknown sign). However, if the watch says it is 1pm this may motivate a sense of confusion resulting in any manner of emotional reactions from anger to panic. It should be noted though, as everyone's level of tolerance for ambiguity is different, the strength of the rhematic indexical sinsign displayed will likely vary markedly across cultures and between individuals.[5]

Generally, it seems that when the meaning of a new sign is incomplete, some form of rhematic indexical sinsign may be generated and this emotional response to the lack of equivalence between signs may trigger a type of temporary disorientation whereupon a person's perception of their environment may be impaired.[6] This is referred to as 'semiotic confusion' in this paper. This confusion is largely unconscious, but students can become conscious of it if they can be made aware of sign systems and how they can be utilized to transfer meaning. When Peirce's rhematic indexical sinsign and its relationship to confusion is viewed within the confines of the process of transfer, it appears that language interference between an L1 and an L2 could be caused by a mismatch of signs, thus language interference may only be a symptom of this broader phenomenon of semiotic confusion. Semiotic confusion may occur when a person is unsure which sign is right or true depending on the circumstances.

In this thesis, it is proposed that the underlying motivation of L1 transfer can fruitfully be conceptualized as 'semiotic confusion'. This concept could be somewhat analogous to the semiotic mediation referred to by Anton and DiCamilla (1998) cited in Cook (2001). Based on

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[5] It is likely that age is also a contributing factor in regards to the strength of rhematic indexical sinsigns because each hemisphere undergoes certain growth spurts which can affect a person's emotional states. For example, pre-linguistic children might express themselves through their volume or body movement, whereas adults could use their words in combination with their facial expressions to indicate what they wanted to express. This topic will be explored further in sections 3.1 and 3.2 when the PSCC is considered.

[6] While Davis (1994) gives a detailed explanation of how Dyslexics can experience disorientation, he also notes that almost everyone experiences altered perceptions due to disorientation at some point in their lives. This suggests that anyone could have the potential to experience semiotic confusion.

Vygotskian research Anton and DiCamilla suggest that the tendency for students to use their L1 in group work is valuable because the ". . . L1 is used as a powerful tool of semiotic mediation between learners. . . and within individuals" (Anton and DiCamilla 1998 cited in Cook 2001, 408). That position implies that the L1 contains signs that should enable the creation of meaning and language acquisition in the L2. When no equivalent L1 sign can be found to match an L2 sign this can cause a form of disorientation where the individual feels confused.[7] As this confusion is between signs, it is semiotic in nature. Thus, the self-created term 'semiotic confusion' is appropriate.

Semiotic confusion (SC) results from the fundamental need to create meaning through the L1 and L2 by incorporating L1 resources.[8] The abbreviated term SC refers to all manner of confusion that can be generated by the self when there is a mismatch between signs. In this sense, semiotic refers to sign systems, whereas signs may include anything that can be experienced through the senses. Thus, semiotic confusion involves sign systems that have at least some unequivocal signs. This means that SC can occur not only between L1 and L2 but also within sub-networks of signs within the L1.[9] For example, one may be looking for a street based

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[7] Davis' description of average to extreme cases of disorientation in both dyslexic and non-dyslexic individuals has a key role in describing the phenomenon of semiotic confusion and is discussed briefly in Section 2.6. Davis' orientation training, which is designed to limit disorientations, focuses on the importance of perception for an individual's orientation (Davis 1994, 131-132). His analogy of the "mind's eye" seems to support embodied cognition.

[8] The phenomenon of cognitive dissonance proposed by the social psychologist Leon Festinger in 1957 is similar to the concept of semiotic confusion because it refers to the tendency of human beings to experience an uncomfortable feeling if there is a disharmony between their beliefs and actions (Festinger 1957). According to Festinger when faced with such dissonance a person is expected to either change their beliefs, their actions or their perception of the relationship between their beliefs and actions in order to achieve harmony. For more information about Festinger and Carlsmith's landmark study read "Cognitive Consequences of Forced Compliance" *(Festinger and Carlsmith 1959).*

[9] When a scent sign such as the scent of bitterness from an orange conflicts with the healthy looking orange seen on the counter this too is an example of semiotic confusion because two different sensory systems of signs are involved. The appearance of the orange signifies a tasty ripe orange, but the bitter smell conflicts with this, so what the orange may now signify is unclear.

on its number, but the street may only have a name. Thus through the process of looking for the number of the street one will experience a conflict between L1 signs. The map with the number of the street, and perhaps numbers on the surrounding houses and streets, will indicate what should be the correct street but the presence of a name is in conflict with the expected number and may cause anxiety.

In order to represent the underlying elements involved in the phenomenon of semiotic confusion, a construct model that is related to the notion of semiotic consciousness is described here briefly. Deely states that "'Semiotic consciousness' is nothing more nor less than the explicit awareness of the role of the sign as that role is played in a given respect" (Deely 1990, 107). In this thesis the self–created terms *personal semiotic cultural consciousness* (PSCC) and *semiotic cultural consciousness* (SCC) are used to not only imply that an individual has some sense of the role a sign can have but to situate this knowledge within the internal environment of the self as the full actualization of embodied meaning and the external environment of the social world.

The PSCC is perhaps similar to Uexküll's concept of *umwelt* in that it connects bodymind systems through sensory and motor codes as established through an organism's experiences with its environment; however, Uexküll's concept extends to all manner of life, whereas the PSCC/SCC is restricted to human beings. The degree of complexity of an organism's *umwelt* will vary depending on the needs of the species. Uexküll categorized types of *umwelt* based on the species functional cycles; the combination of sensory and motor processes that help to create an organism's *umwelt*. Based on this sensory-motor code, Uexküll determined whether species had a vegetative (non-temporal soley iconic *umwelten*), animal (spatial and non-temporal exclusively iconic and indexical *umwelten*) or cultural (simultaneously spatial and temporal

iconic-indexical-symbolic *umwelten*). A vegetative *umwelt* allows the organism to recognize when it is missing a cell or some quality in the cell. Actions that can result from vegetative relations are searching, selecting, swarming and spreading among others (Cobley 2010, 52). Animal *umwelten* involves the associating of objects with actions in memory and the creation of relations between new objects. This then allows for the connections between objects, angles and distances, allowing mental maps of terrain to be created, orienting animal species in space (Cobley 2010, 53). As alluded to earlier in this paragraph, cultural *umwelten* involves the combination of spatial and temporal relations such as those experienced by human beings. The creation of human languages is a quintessential example of how these temporal relations become represented by syntactic signs such as markings on verbs for present and past.

In consideration of Uexküll's work, semioticians such as Sebeok (1999) and Deely (2001) divide *umwelt*s into three different systems based on the complexity of language possible in each one. A first order system consists of the signs that are necessary for survival. Perhaps this would be roughly equivalent to a vegetative *umwelten*, whereas a secondary system is more complicated, geared towards communication. A third order modeling system is achieved when an awareness of one's *umwelt* allows one to actively combine the former modeling systems to create a sense of reality. An awareness of one's *umwelt* "life world" as an objective world composed of objects and relations is also referred to as *Lebenswelt* (Kull 2010, 53). This involves the recognition of signs as representing relations between objects that are separate from the objects that evoke them.

Umwelt is a broader term than the PSCC because it represents the life world of any species; whereas the PSCC, in similar fashion to the term *Lebenswelt*, only represents the modeling systems of human beings. If one is to accept the three divisions within *Lebenswelt* then

it is fair to say that the PSCC would be considered as a first modeling system and that the SCC would be a secondary modeling system, as it would rely heavily on verbal and textualized signs. The SCC's aforementioned proposed association with left hemispheric functioning supports this. However, the PSCC does not stop developing and so it is never wholly fixed and constantly utilizes the signs of the first and second modeling systems, therefore being itself both a first and third order modeling system. Thus the concept of third order modeling is quite similar to the PSCC because it consists of the combination of a first order modeling system, which is one that life forms possess in some form, with a secondary modeling system, which is believed to consist mainly of verbal signs and speech, such as is found in language and text.

In contradistinction to *Lebenswelt*, the PSCC could be associated with right hemispheric functioning, whereas the term *Lebenswelt* remains connected to human awareness rather than aligned with particular mental functioning. In this way the PSCC is distinct and lacks the grand generality of *Lebenswelt*. In general, Uexküll seems to categorize *umwelt*s as species specific constructs with less focus on the *umwelt*s of individuals. He implies individuals will vary within the confines of their *umwelten* (Deely 2001, 162; Kull 2010, 44-45). The PSCC/SCC focuses on the individual and his/her perspective of his/her social group's worldview.

It seems that the PSCC also reflects Peirce's states of Firstness, Secondness and Thirdness because the PSCC overlaps a first order modeling system, the one created during early-life, with an SCC, secondary modeling system of verbal texts and language. The layering of the two modeling systems seems to create a synthesized third order system that unites the first and second and subsequently balances their functioning through a greater awareness of each. For example, a third order modeling system would allow individuals to move from a verbal sign (the word "rose") in their SCC, to a memory of the action associated with it in their PSCC. The

sensation of touching a rose's petals as a child could be utilized as a means of teaching someone else what a rose was; in other words, to create an awareness of the meaning of the term "rose". While the act of teaching may seem to be more strongly associated with the SCC because of its communicative function, it is also a part of the PSCC as teaching is a responsibility and duty of the teacher and is therefore personal as well as public. A third order system cannot be achieved without an awareness of the other two systems as an *umwelt*.

The PSCC/SCC model that is proposed in this thesis also represents something of a synthesis of Peirce's states of Firstness, Secondness and Thirdness; Piaget's stages of child development, Gattegno's conception of the soma and learning, Chevalier and Lamb's perspectives on neural semiotic networks and Chomsky's notion that there is an innate capacity for human language that is generated from their common biological endowment that is referred to as universal grammar. The model attempts to synthesize these and other relevant theories from language acquisition, neurolinguistics and applied linguistics in order to demonstrate how language interference can be conceptualized as a symptom of an initial mismatch of signs. The model further contextualizes semiotic confusion within states of consciousness that correspond to synthetic and analytic brain functions.[10] These are referred to as Left (L) and Right (R) modes. The thesis includes some brief semiotic analyses of language learning approaches that utilize colour to help students transfer their L1 grammar or phonological knowledge into the L2. It is hoped that this research will provide more insights into the importance of engaging learners' personal semiotic and semiotic cultural consciousnesses in promoting such positive L1 and L2 transfer. Semiotics may offer a perspective on transfer that reveals the need for a semiotic bridge between established sign networks and unknown signs.

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[10] Going forwards, I will be using left and right hemispheric functions as a means of a conceptual short hand which is consistent with Danesi (2003).

Lamb's (1999) work on semiotic networks seems to support the idea of a semiotic bridge. He proposes that there may be several perceptual pathways that allow for the integration of sensory input within language. He intimates that a person's linguistic system is a relational network, which is composed of nodes and their interconnections within the brain. He asserts that as there are multiple sense modalities such as sight, smell, touch and taste that form networks, there could be numerous connective lines at different categorical levels that aid the process of transfer by allowing the conceptual system to integrate perceptual systems with language through sensory input (Lamb 1999). Any number of these pathways could be activated to stimulate a node to move downward to production or upward to recognition. Lamb (1999) and Chevalier (2002a; 2002b) imply that the information that signs represent, like neurotransmitters, travel along pre-formed connection lines in a network of signs. Without sign relations organized into networks perhaps it would be difficult to make sense of one's perceptions.

If a sign remains alienated from relevant mental networks it may be more difficult to retain it. For example, many learners find it challenging to pronounce English sounds that are not in their language sound system. When there is no known sign to introduce a new one, instructors might attempt to find an alternative established sensory network to create a connection between the new L2 sign and the L1 sensory sign. Two learning approaches that appear to be utilizing such semiotics-inspired strategies currently are Acton's Haptic-integrated Clinical Pronunciation (Acton 2012) and Messum and Young's PronSci (Messum and Young 2012b).[11] Acton intimates that he uses haptic anchoring for the purpose of having his students connect new signs through established kinesthetic networks. Likewise, Messum and Young's PronSci Approach, which is

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[11] In section 4 these two approaches as well as Gattegno's Silent Way and the Montessori approach are considered from a semiotic perspective and related to embodied cognition.

largely based on the work of Gattegno, is designed to connect new pronunciation sounds with the sensations of the articulators used to make those sounds.

Perhaps the presence of semiotic confusion is most prevalent when it occurs between an L1 and an L2. The following example should elucidate the phenomenon of semiotic confusion within the context of using an L1 to understand an L2. When individuals are faced with an L2 concept that they do not understand or a symbol they do not recognize, they may attempt to consider whether they have anything like it in their L1 in order to help them interpret it. In a situation where one needs to navigate through a foreign airport, communicating L1 words in an L2 structure may result in receiving correct directions from a native L2 speaker. However, when blank stares are returned instead of directions, one may use images or gestures to communicate one's need. Hand signals to indicate the gate number may be recognized at this point and one may then be successful in finding the gate. Potentially relying on numerical data that was first learned in the L1 can act as a bridge between the L1 and the L2, if the gate numbers are represented in dots as well as the symbols of the foreign language.

In another example, it is a common practice to indicate essential service areas with a symbol of a silhouetted woman in a dress to designate the ladies' washroom. The effectiveness of such symbols suggests that people are able to use stylized images as bridges between the L1 meaning and the L2 symbol. If one were to imagine this individual had no L1 understanding of such images, he or she would be forced to use a system of trial and error in the same manner a child would. Depending on the culture, a mistake between a ladies' and a men's washroom could have unpleasant to severe consequences. The point of the bathroom example is not to suggest that these symbols are universal, but to hint that human beings have a capacity through their common biology to establish a symbolic code to refer to phenomena.

Once one code has been learned, the process of learning a second code will be impacted in some aspect (Hammerly 1982). Hammerly (1982) argues that the process of first language acquisition is fundamentally different from learning a second because the latter involves the learning of a new code. Hammerly argues that:

> The study of the native language calls for the expansion and creative use of a known code; the study of mathematics involves learning a new code via a non-conflicting known code; it is only in second language study that a new code must be learned despite the conflicting demands of a known code. As a consequence of this difference, second language teaching and testing procedures are unique. Secondly, this is the only field of study for which adequate professional preparation means . . . taking several courses in each of a considerable number of disciplines outside education…. (Hammerly 1982, 19)

Hammerly's argument suggests that Second Language teaching does not always produce positive results because of the phenomenon of *language transfer*: the idea that when learning a language, elements of a first language can have a negative or positive consequence for the learning of a second. Second Language pedagogy has been influenced by the concept of transfer. Avoidance of negative transfer has been central to methodologies, such as Audiolingualism, that tried to limit students' use of their first language (L1), whereas an interest in positive transfer is evident in mentalist models such as Selinker's interlanguage perspective (Selinker 1972). Currently, language educators such as Cook (2005), Collins (2001), Butzkamm (2003) and Deller and Rinvolucri (2002) among others are re-examining positive transfer. Gass and Selinker (2008) assert that over the years the term "transfer" has been reinterpreted as composed of two processes: negative and positive transfer. They further assert that this tendency to use the terms positive and negative transfer is theoretically untenable and that negative and positive transfer must be seen as products rather than separate processes. The implication is that the term "negative transfer" tends to emphasize the errors in student output (Gass and Selinker 2008; Odlin 1989; Wang 2007; Arranz 2005). This tends to ignore the process, focusing only on the

product, making it difficult to assist students in gaining an awareness of their transfer process. Student awareness is a pivotal factor in learning (Gattegno 1987; Young and Messum 2011).

Gattegno had a unique perspective on the importance of awareness in education and assumed that the ability to be aware of the human skill to have an awareness of the self and others came from the skill to distance oneself while still being present and aware of one's own body. He stated that:

> Awareness of awareness can be illustrated by the example of awareness of ways of knowing used by each of us every day with greater or lesser penetration. Exercises of awareness of the perceiving self while perceiving can well represent the most universal exercise to acquaint everybody with awareness as such. Because we focus while we look and see, we know at once and immediately that the self is present that the will is present, that we are mobilized in our sight, that we receive impacts and process them, make sense of them by integrating to ourselves what we receive and to it what we already had. (Gattegno 1987, 55-56)

It has also been argued persuasively that disallowing the use of a student's L1 has the potential to lead to identity denial and a lack of satisfaction with their learning experience (Belz 2003). From a different perspective, Gattegno contends that in developing his Silent Way approach, which selectively utilizes the target language, he found that students were highly motivated to participate and experienced a sense of freedom, in part decreasing the need to produce language until they desired to. His approach took the same grapheme and sound correspondences that are used in English teaching, but in one innovation, he colour-coded the grapheme to symbolize the sound it represented to help students read the pronunciation of words by aiding their' recognition of graphemes and the retention of sounds via colour. Gattegno's claim was that this allowed students to give more attention to what the colour of the grapheme designated as the sound rather than the grapheme itself to assist students with pronunciation and spelling. Potentially the use of a relational network of the colour, sound articulator position and

grapheme made it easier for Gattegno's students to retain information as they transferred from one sign mode to another.[12]

The apparent success of Gattegno's approach suggests previous understandings of transfer may have been missing some vital element. In his work this may have been a colour-based pathway. From a semiotic perspective, Gattegno's colour schema essentially appears to have acted as a semiotic bridge that enabled children to learn more quickly because they did not appear to have become as confused when faced with a grapheme that could signify more than one sound.

As a symbol system has already been established in the L1, the learning of L2 forms may require the connection to L1 meanings at some point. From this semiotic perspective, Cook's view that L1 sign usage is rudimentary for effective L2 learning (Cook 2001) becomes apparent. It is argued that mediating the impact of semiotic confusion could be a key to enabling more effective L1 transfer use in teaching. Since L1 transfer can occur between different types of signs, the use of colour and articulatory awareness in Gattegno's (1987) work, haptic anchoring and colour in Acton's (2012) and articulatory awareness in Messum and Young's (2012a; 2012b) approaches, can be seen to function as a semiotic bridge between L1 and L2 through their connection to the L1's perceptual sign networks.

The literature review in Chapter 2 is divided into six sub-sections that present research and frameworks from various theories such as: semiotics, language interference, learning disability theory, and colour in learning that have contributed to the formation of the semiotic confusion model. The potential implications of these theories in relation to language teaching are

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[12] Leach describes a mode as a type of channel made of one sensory pathway such as a visual mode, tactile, kinesthetic, auditory etc…. A sign mode then connects the information taken in by sense with the sense itself. Peirce's distinctions were far more complicated than this but the term "sign mode" is being used in an effort to make connections between learning approaches and semiotic theory apparent (Leach 1986).

discussed in order to explain how semiotic confusion can affect learners and how it may be avoided. Semiotic confusion is defined in Chapter 3. In Chapter 4, this construct is then applied to four language-teaching approaches in order to analyze them. The Colour-form approach, which has been evolving through this work, is presented in Chapter 5. Conclusions and caveats are presented in Chapter 6.

Chapter 2: Literature Review

Language learning is one of the most amazing achievements of human beings. Countless researchers have contemplated how it is that an infant who can barely babble and receives imperfect language gains a basic intuitive sense of their language's grammar within a few years. Although second language learning researchers have posited several hypotheses to account for this, such as the critical period hypothesis[13] (Brown 1994, 52), neurocognitive linguistics is one theory within applied linguistics to consider the impact of brain functioning on learning (Lamb 1999). Unlike traditional linguistics that analyzed language into units, neurocognitive linguists consider the mental mechanisms that make it possible for language to be created (Lamb 1999).

Neurocognitive evidence from split-brain studies has recorded that children use both hemispheres of their brains to make discoveries about language (Lenneberg 1967). The right side of the brain is primarily responsible for analyzing the complex milieu of referential and imagined images that come into the visual cortex, while the left side of the brain is mostly responsible for categorizing them (Sperry 1973; Lenneberg 1967) and gradually creating a useful framework by which to learn languages (Brown 1994, 109; Edwards 1989).[14] "… Split-brain experiments

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[13] The critical period hypothesis suggests that after the age of puberty language learners rarely gain a native-like accent when learning to speak a second language (Brown 1994, 53).

[14] Neurology has been influencing education for decades and not just in linguistics and language learning. In the silent language of art, Betty Edwards devised a drawing system to help her students produce more life-like images based on the research of Sperry (1968;1973), Levy (1969) and many other neurologists' work. Edwards (1989) devised a strategy to bypass the critical and impatient left hemispheric (LH) functions (what she termed L-

established, in a phrase, that the two hemispheres complement each other in normal cognitive processes. The main L-Mode and R-Mode functions they established are well-known today" (Danesi 2003, 35). Danesi intimates that Second Language Acquisition (SLA) methodologies can be placed on a continuum based on the degree to which they utilize L-mode processes or R-mode processes with an extreme R-mode endpoint on one side and a similar endpoint for the L-mode. In regards to this, he says that:

> The midpoint of this continuum is, in effect, the "breakpoint" at which an SLT [Second Language Teaching] practice takes on more and more of the modal characteristics of that half of the continuum as it approaches an endpoint. Thus, for instance, the Grammar-Translation Method, in its extreme form, would be located at the L-Mode endpoint; Silent Way teaching, on the other hand, would be placed at the R-Mode endpoint; communicative approaches that integrate formal skills into their instructional plan would be located near the breakpoint but slightly to its right; and so on. (Danesi 2003, 49-50)

The significant difference between first language learning and second language learning is that, arguably, during the process of early first language learning, before the age of two, the process of lateralization has not caused key language functions to have been specialized to the left hemisphere (Brown 1994). It is likely that this is the reason why children with damaged left hemispheres can often relearn their first language through their right hemisphere (Brown 2000, 54; Edwards 1989). In fact, as early as 1994, Chiron *et al.* argued that, ". . . the right hemisphere develops its functions earlier than the left" (Chiron *et al.* 1997, 1057). Their studies showed that there was a greater flow of blood through the right hemisphere than the left, resulting in showing

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mode) while drawing. This allowed for the smooth shift into their creative and patient right hemispheric (RH) functions (what she termed R-mode). In conceptualizing the R-mode, Edwards, based on this neurological research, described the RH as mostly spatial, holistic, nonverbal and intuitive. During R-mode activities a person will have little awareness of the passage of time, sounds are not made into meaningful words, thinking is in pictures and one feels alert and focused yet relaxed. In contrast, the LH was considered logical, critical, punctual and impatient and was inclined to aid in the production of symbols rather than what a person actually sees before them. Since Edwards used these terms other authors have generalized them to refer to only the set of characteristics that each hemisphere possess as is consistent with neurological research. L-mode and R-mode have become a convenient short hand for describing the general functionality of the brain and how that may impact learning. They are hereafter used in this paper with that purpose in mind.

a "right hemispheric predominance" (Chiron *et al.* 1997, 1057). Although there is continuing

debate as to the impact of lateralization, neural plasticity is greater during early childhood

(Damasio 2010; Edwards 1989, 59). In part because of this, it is argued that there is a greater

level of awareness of the subconscious cultural symbol systems in the first language (L1) than in

the second (L2). When activated at a conscious level, these linguistic systems may allow students

to view language as part of a broader system, one of signs. For the purposes of this thesis, the

initial state of these sign systems is referred to as sign slots. This is something of an extension or

an abstraction from Chomsky's Universal Grammar (UG) theory where he implies that there are

certain universal slots for grammar. To accept the notion of UG would suggest that the brain in

some sense has an internal capacity for language, due to human beings' biological endowment,

to generate signs out of experience. Sign slots represent the broad semantic categories that can be

generated out of experiences, which may be present in Chomsky's UG.[15] In essence, if one

concedes the general validity of Chomsky's notion of UG, then perhaps programs could be

designed to better utilize the embodied features of human neurophysiology such as the

somatosensory system in order to promote the positive transfer of information from an L1 to an

L2.

    The Colour-form methodology that is based on the PSCC/SCC[16] learning model is featured

in Chapter 5. It is just one of the many potential ways that semiotic confusion, a type of

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[15] Sign slots could be considered somewhat similar to Wierzbicka's semantic primes. She hypothesizes that semantic primes are universal meanings that occur cross-culturally, suggesting that human cultures though distinct in many ways also have marked similarities. For more information on Wierzbicka's theory please refer to her 1996 book: *Semantics: Primes and universals*. Oxford: Oxford University Press. Another excellent read is "Semantic Primes and Linguistic Typology." In *Meaning and Universal Grammar – Theory and Empirical Findings*, Vol. II, edited by Cliff Goddard and Anna Wierzbicka, Amsterdam: John Benjamins. 257-300.

[16] PSCC is an abbreviation for *personal* semiotic cultural consciousness. This is a self-created term that refers to the notion that individuals develop a personal understanding of themselves and the world based on the experiences they have within and outside their body. This is used to refer to signs that one comes into contact with, whether directly or indirectly, before the sign level of schema creation and object recognition is reached within the

disorientation, can be bypassed or moderated in learning. The PSCC and SCC are vital

components of a learning model that may provide a unique perspective on the cultural and

neurological forces that allow for the recognition, interpretation, creation and re-interpretation of

language signs.[17] These model components are defined and explored in Chapter 4. The learning

model is based on the combination of various theories such as language interference, universal

grammar and neurocognitive studies. However, the overarching theory behind the model is

semiotics, the study of signs. While we have not been able to determine exactly how the mind

processes and stores information, semiotics does give one a useful meta-linguistic framework for

doing so. In order to understand the potential value of a semiotics-inspired model for second

language learning, we must begin with the study of signs, semiotics.

Chapter 2: Semiotics Defined

Semiotics can be loosely viewed as a theoretical framework that can be applied to any

phenomenon in order to understand its forms in relation to other signs. However, semiotics is not

merely a heuristic as Peirce refers to semiotics as the necessary laws of thought (Peirce 1896, CP

1.444). The origin of the word semiotic is the Greek term *semiotikos*, which means an interpreter

of signs (Cobley and Jansz 1999, 4). This term implies that there is a relationship between a

phenomenon, the background habits of the interpreter who is thinking about it and the resulting

interpretation of that phenomenon. Despite differing perspectives within the semiotic canon,

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PSCC/SCC construct model. In contrast SCC is the abbreviation for semiotic *cultural* consciousness. In like fashion to Eco's Cognitive Types model, which is introduced on page 34, this is the idea that people have an understanding of how the particular cultural group of which they are members, view the group and its position in the world through the experiences it has with reference to itself and its members. The SCC refers to signs that one is exposed to in the sign level of schema creation and object recognition.

[17] The term "language signs" is used and not the term "linguistic signs" to make it clear that language signs are being referred to as anything that can exist and be referred to using language, including people and solid objects. In contrast, linguistic signs imply in Saussure's words "sound-images" (Saussure 2000, 24); that is, only the symbols that are used to express what is referred to.

these three components define the basic elements of the theory and their presence is expected in any semiotic inspired investigation of texts.

Arguably, the most important term to emerge from semiotics is the term *sign*. Peirce explains that:

> A sign, or representamen, is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the interpretant of the first sign. The sign stands for something, its object. It stands for that object, not in all respects, but in reference to a sort of idea…. (Peirce 1897, CP 2.228)

Peirce refers to this idea as a ground, which suggests it is perhaps the main or conventional meaning that is associated with the sign. A sign in its broadest sense then seems to stand for some phenomenon that can be used to indicate something through its relationship to other phenomena (Peirce 1897, CP 2.228). This is a central idea in semiotics. Sub-fields of semiotics consider signs within their relation to each other within a sign system (Cobley and Jansz 1999). In this manner, signs are not isolated from the collective mind of the people because they reside within conventional sign networks. Thus signs combine and interact with each other to impact human thinking and language within systems.

The linguist Ferdinand de Saussure and the American philosopher Charles Sanders Peirce are credited with the formulation of semiotics even though they did not refer to their work as semiotics per se, which was the original term for the analysis of signs that was re-used later in order to cover all sub-fields and labels referring to the discipline of the study of signs (Cobley 2010; Cobley and Jansz 1999 13; Deely 1990, 1-2). It is claimed that Peirce is the father of American semiotics ("semiotic") and Saussure, the father of European semiotics ("semiology") (Cobley and Jansz 1999 13, 18). Peirce proposed the term 'Semiotic' for his work based on his conception of how signs are thought, whereas Saussure used the term 'semiology' as his

investigation of the sign focused on linguistic thought (Deely 1990, 7). When contemplating the term semiology, the logic of signs, it is important to note that Saussure thought of his semiology as forming part of a social and general psychology because of the lack of autonomy he found in semiology (Thibault 1997, 3, 21).

The notion that signs relate to one another through their status as an index, icon, analogy or habit in vast associative webs of signification was first proposed by Peirce. This is referred to as *unlimited semiosis* (Cobley and Jansz 1999, 26). Peirce's collection of semiotic thought has inspired the idea that the world is entirely composed of signs, as anything one experiences in life is transformed via receptors in the brain (Lamb 1999) and made meaningful through the process of signification (Deely 1990). Consequently, there is still some lack of consensus as to what constitutes a sign and how a sign is formed. Deely suggests that semiosis, which can be roughly equated with signification, the act of constructing relations, is a process of sign interaction as mediated through socio-cultural frameworks (Deely 1990, 23). In this way, a sign can be created from sensory experience because there will be a relation between a sign, an object and the sensory mode that makes it perceivable. That means that anything that is seen, felt, touched, tasted, heard or smelled is eligible to become a sign when it is received and used in the experiential landscape of a person. Deely explains that:

> … a sign is a representative, but not every representative is a sign. Things can represent themselves within experience. To the extent that they do so, they are objects and nothing more, even though in their becoming objects signs and semiosis are already invisibly at work. To be a sign, it is necessary to represent something other than the self. Being a sign is a form of bondage to another, to the signified, the object that the sign is not but that the sign nevertheless stands for and represents. (Deely 1990, 35)

Deely's explanation above can also serve to introduce Saussure's dyadic conceptualization of the sign, as it demonstrates that a sign can only represent an object and never be an actual object, but only the mental image of it. The notion of the dyadic sign is a

defining contribution of Saussure to European semiotics. Figure 1 below illustrates his

conception of the sign.[18]
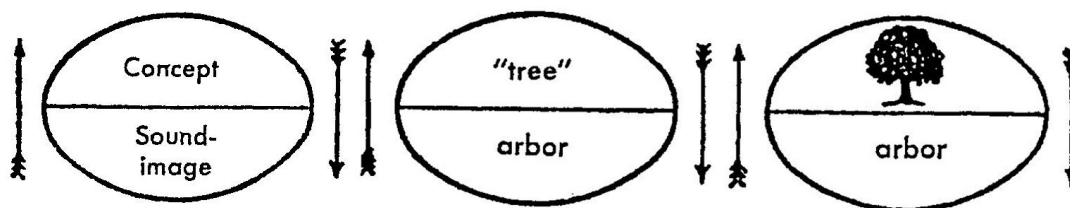
Figure 1. Saussure, Ferdinand de. 2000. "The Nature of the Linguistic Sign." Translated by L. Matejka and I. R. Titunik. In *The Routledge Language and Cultural Theory Reader*, edited by Lucy Burke, Tony Crowley, and Alan Girvin, 21-32. London and New York: Routledge Taylor & Francis Group. (Original work published 1916 161-174): 26.

Saussure proposed that the linguistic sign was composed of two parts: a sign and a

relational unit that exists between the signifier (the material aspect of the sign) and the signified

(a mental concept) (Cobley and Jansz 1999, 10-11). In semiology, a sign begins with an

"acoustical impression" (Saussure 2000, 21). This impression is a psychological unit that

connects a concept and a sound image. This conglomerate unit is both a sign and the

psychological imprint of a physical sound. It functions as the "instrument of thought" (Saussure

2000, 22). It seems that for Saussure, thought involves a physiological process whereby the brain

transmits sensory information and translates this into a sound image.

Saussure asserted that language was not just a nomenclature as a language is not simply a

set of arbitrary names relegated to pre-existing concepts (Thibault 1997, 23). Names instead refer

to the arbitrary relationship between the signifier and signified. These relationships are

considered arbitrary based on their distinctiveness in each language and their assumed lack of

motivation. It is clear that Saussure assumed that the relationship between the sign and signifier

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[18] Please note that although the diagrams above are originally from Saussure's *A General Course in Linguistics*, they were combined from two different diagrams in *The Routledge Language and Cultural Theory Reader* and juxtaposed in order for the reader to follow the logical connections from mental concept to the word "tree" and then to the image.

must be arbitrary because every language has a different set of signifieds. Saussure implied that if a unit of language was expressed differently, it would still be the same fundamental sign so long as it was still distinguishable from other signs currently in use by the collective speech community (Thibault 1997, 21, 127). In this way, he contends that the overarching relationship between a signifier and a signified contains no natural meaning despite the strength of the association of the word to its meaning (Thibault 1997, 22).

Saussure's assertion that languages are built on arbitrary connections suggests that there is no natural human language, as it is entirely composed of layers of arbitrary connections that are only validated and given meaning through a continual use of them via the collective mind of a population. Saussure's work implies then, that as the collective mind of a people changes, their language can also reflect these changes. That change is not brought about by one person, but must be used collectively.

Within Saussure's vision of semiology, he reveals two oppositional processes regarding language. Saussure suggests the signifier is fixed in terms of the linguistic community that uses it and neither individual nor the collective could will it to be different because it is bound to the language (Saussure 2000, 28). He calls this phenomenon the "immutability" of language (Saussure 2000, 30). Relating to this immutability, he says that as language is such a complex system, daily users of it are unaware of its mechanisms and do not perceive the logic that governs its forms. He further suggests that even specialists have difficulty explaining the linguistic devices that reveal the underlying logic of language. He contrasts immutability with its antithesis, "mutability," which is the rapid change of linguistic signs through a shift in the relationship between the signifier and the signified due to its arbitrary nature (Saussure 2000, 30). As language is rooted in no natural law, it is uncontrollable when used by a collective.

Saussure acknowledges that these positional forces operate to ensure language evolves (Saussure 2000, 31).

These positional forces suggest that one must differentiate between relational units and their physical representations. By this, Saussure means that the linguistic unit is a form rather than a substance; a distinction he refers to as *Langue* and *Parole* (Thibault 1997, 22). *Langue* is essentially language as a system of forms, whereas *Parole* is the actual speech made possible through the system of language operating within a collective (Thibault 1997, 20, 22). *Parole* then is realized when a person selects elements from the linguistic system and gives them a physical representation. Saussure seems to suggest that linguists will be more productive if they isolate their study of languages to *Langue* (Thibault 1997, 22).

Saussure defines speech as *Parole* (Saussure 2000, 23). As an individual conforms to the language laws of the collective to express their own thoughts through speech, they create *Parole.* When combined with other signs from either *Parole* or public sources, the sign can gain relationships with the other signs close to it, as in a paragraph. In some cases, signs may even be interchangeable depending on the context of their use. Some signs can also be signifiers, and a sign is not only a signified but a representation of the relationship between signified and signifier (Noble, Biddle, and Tempero 2006). Thus a written or visual text may embed various signs that serve a unified function within the sign system. Saussure believed if he could understand the linguistic sign, he would be able to interpret all semiological systems (Rauch 1980, 2). He predicted the study of semiology would be considered a part of general psychology and would be used to study the active use of glotto-centric linguistic signs in contemporary life (Barthes 1968, 22-23).

Within Saussure's conceptualization of *Langue*, an ordered collection of signs such as a sentence is called a *syntagm* (Cobley and Jansz 1999, 16). He proposed this term to show how elements of a phrase have a relationship to each element contained within it (Cobley and Jansz 1999, 16-17). He recognized that as each language had a different way of ordering elements, the language "storehouse" (Saussure 2000, 23) of possible options available must be socially derived through a collective mediation of signs (Saussure 2000, 22). This system of signs is essentially what is assimilated by the collective in an effort to communicate not merely through speech, as this is only part of language (Saussure 2000, 22), but through written symbols and overarching linguistic conventions (Cobley and Jansz 1999, 14-15).[19]

Saussure seems to suggest then that people can recognize a sign only in its relation to other signs within a collective (Cobley and Jansz 1999, 14). The collective is able to use signs within a signifying system to refer to mental concepts that they wish to communicate. What helps to define the sign is its position in the system and its relation to other signs (Barthes 1994, 203; Cobley and Jansz 1999, 20). Languages do not have the exact same set of signifiers and signifieds.

Though Peirce's work developed around the same time as Saussure's semiological work, there is no evidence in the literature that they ever influenced each other and instead remarkably seem to have developed similar ideas contemporaneously (Deely 1990, 114; Chandler 2007, 29). One of the quintessential differences between Saussure and Peirce's work is that Peirce contrived a three-part relation for the sign, not a dyad like Saussure. This triadic model consisted of a

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[19] Saussure implies that languages must be studied synchronically as systems that are complete in so much as they fulfill the communicative needs of the collective body that use them. What he seems to mean is that at any point in a language's history the underlying system that is used to generate it is complete (Culler 1986, 35). This shared language is viewed as self-contained even though it is perpetually changing with time, warranting diachronic analysis as new words are added to the lexicon that it is generated from (Saussure 2000, 22). Thus, it is the embodiment of Saussure's *Langue* (Culler 1977).

representamen, which is the form that the sign takes (Cobley and Jansz 1999, 21); the *interpretant,* which is essentially individuals' experience of the relationship between sign and object as mediated through collateral experience; and the *referent*, the written symbols, oral sound, visual text, image, gesture or movement that relates to something outside of itself. The representamen is usually considered the material aspect of Peirce's model, but Peirce does not attest this (Chandler 2007). It seems Peirce's interpretant necessarily represents the habitual use of signs because the very fact that there is a relation between an interpretant and an object suggests that a convention had to exist for people to recognize the connection was a relationship. If it can be perceived as a relationship this implies, if not a conventional system, then at least the formation of habit. One point that cannot be emphasized enough is that Peirce views his three components of the sign as perpetually in relation with each other because possibility, through its relation with an object, becomes habit and habit ultimately relates to convention and laws. As Peirce says, "A man may become aware of any habit, and may describe to himself the general way in which it will act. For every habit has, or is, a general law, (Peirce 1902, CP 2.148).

According to Peirce (1895, CP 2.302) people only think in signs. A sign is manifested through different forms, one moment a word or sound, the next an image, scent or flavor. For example, the presence of the word "rabbit" may cause the image of a rabbit or the sound of it to come to the person's mind in an infinite spectrum of possibilities, forming a chain of signs. Signs become the medium and vehicle for all thought when people give meaning to phenomena through signification (Chandler 2007). Perhaps what Chandler is referring to here is that people experience meaning through the process of signification.

In Peirce's model all signs are interpreted through the observation of objects, whether actual or imaginary (Ransdell 1980, 161). Each object in a given sequence is a sign and an

interpretant for the following sign. These parts are considered as part of a larger object, similar to the way in which an animated movie is made up of hundreds of cells each predetermining the layout of the other, in some way, to form a united motion picture. Signs can differ from each other in terms of the form they take; the painting of an apple is remarkably different from a photograph or an actual apple, but they can still represent each other. This fact led Peirce to distinguish between sign types and the states that motivated them (Ransdell 1980, 138).

Peirce's writings suggest that the order of signs are not fixed in terms of their referential order, but are contained within a cycle of relations. Perhaps an example of cutting carrots will make this clear. Sign A (a chopping knife) is connected with sign B (the carrot) and sign C (the sensation of pushing down) relates to both A and B likewise D (the scent of freshly cut carrots) relates to all of these (the physical sensation of chopping). When a person attends to A and this focuses the person's thought back on sign C (the sensation of pushing down on the knife), a memory can be triggered creating sign E (cutting one's finger while cutting carrots as a child) producing sign F (an emotional response of anxiety). A whole other host of sign cycles could then occur through the sign 'childhood' or could build on the existing sign cycle perhaps creating sign G (the children's song "Three Blind Mice"). In other words, sign A (a knife) that originally referred to sign C (the physical sensation of cutting) could also refer to F (an emotional response of anxiety). Thus while the elements exist in a cycle, the order in which they refer to each other does not remain static. The point here is that a person may be vaguely aware of many layers of subconscious signs simultaneously and that any sequence of these may bring to mind other signs. For example, a person may hear the dull sound of the refrigerator fan behind them; feel the sensation of their elbows resting on the counter and the cool temperature of the knife's handle, among many possibilities.

Peirce's vision of "Firstness," "Secondness" and "Thirdness" form a multifaceted continuum based on his mathematical demonstration. Pierce reasons any triad must break into three parts, any dyad into two parts and a monad into one because "…no element can have a higher valency than three" (Peirce 1905, CP 1.292). A monad would contain Firstness, but a dyad would constitute Secondness and a triad would possess Thirdness. In this way, there will always be an element of Firstness in Secondness and an element of Secondness in Thirdness (Peirce 1905, CP 1.297-1.298). Though this is seemingly simple, it is pivotal for an understanding of Peirce's perception of the sign and how it functions within signifying systems. Firstness is linked to origin for it refers to the moment before the becoming of some phenomenon. Thirdness is the mediation that modifies the First and Secondness. Within Secondness, the origin aspect of Firstness functions as a quality. Secondness holds the notion of relations with objects; for example, an object A might be shinier than object B. In Thirdness, mediation is held to be a characteristic of the sign (Peirce 1902 CP, 2.92). A sign can typically be anything related to its object in respect to a quality. This relation will produce an interpretant. The diagram below which is taken from Peirce's collected works could serve to illustrate these concepts.
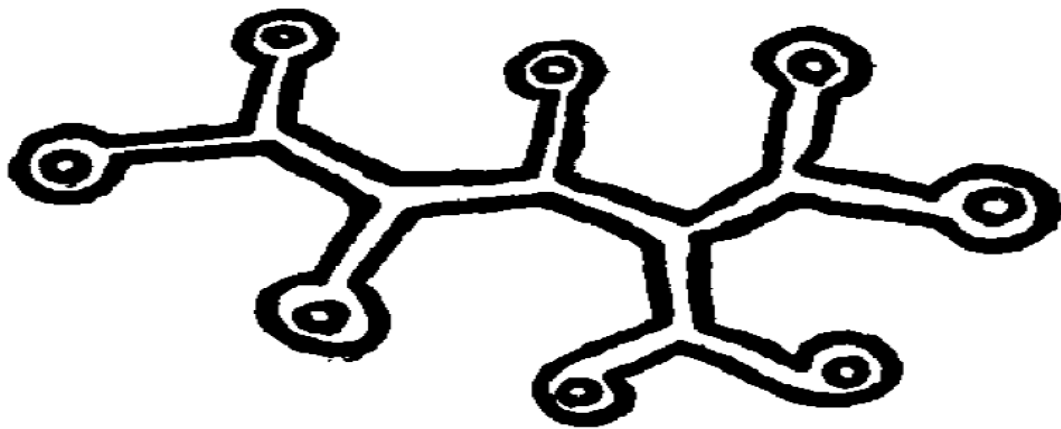
Figure 2. Peirce, Charles S. 1994. *The Collected Papers of Charles Sanders Peirce*, edited by Charles Hartshorne, Paul Weiss, and Arthur W. Burks, 8 vols. 1866-1913[1931-1958]. Cambridge, MA: Harvard University Press. 1885: 1.371.

In reference to this image, Peirce says, ". . . no combination of roads without forks can have more than two termini; but any number of termini can be connected by roads which nowhere have a knot of more than three ways" (Peirce 1885, CP 1.371). When considering this quote, it seems like he is referring to his states of Firstness, Secondness and Thirdness. In the "self-returning roads" that he depicts, arguably, the nothingness that exists before the roads can represent Peirce's Firstness. Following this, the two paths created by the fork can represent the state of Secondness and of the connection of the object to its null set state, whereas the actual divisions into paths that branch out from that point represent the state of Thirdness.

Firstness seems to imply a feeling or sense that has no recognizable component, a form of non-binary immediate consciousness, and would refer to only a moment before the becoming of some phenomenon and not even itself (Peirce 1902, CP 2.85). Though Peirce does not explain it like this, one might consider a state of Firstness as an embryonic period where the self has only a vague awareness of its existence, which is subconscious. The self cannot consciously recognize anything yet still experiences a flow of energy. Firstness is used to describe events that just happen as a kind of background existing within the ephemeral world of thought beyond active human experience.

Secondness is seen as the object that bears a connection to its origin. In this way, Firstness compels it to exist. Peirce gives an example of the terms "husband and wife" in order to explain the state of Secondness in which he suggests the words "husband" and "wife" can be seen as separate entities, but cannot exist without the other, thus they have a mutually exclusive relationship with each other (Peirce 1902, CP 2.84). If there is no wife, then the man cannot call himself a husband because there is no one to have a relationship with him. Another example of

this would be an infant in a pregnant mother. The mother does not exist without the baby and the baby is in a state of becoming so the baby is in a state of Firstness and the mother is in a state of Secondness. In a sense, the infant necessitates the existence of the mother.

The sentence "he threw a stone and it hit her," is also an example of Secondness because two simultaneous actions are taking place but the reader has no evidence that there is a relation between them. However, if the sentence were to be changed to say, "he threw a stone at her" this would imply intention and mediation and Peirce would now consider it as embodying a state of Thirdness (Peirce 1902, CP 2.86).

Peirce contextualizes his Firstness, Secondness and Thirdness within three categories of logic: "obsistant logic", which refers to relationships between elements; critical logic, which is the tendency for symbols and signs to possess some quality; and transitional logic, which is concerned with methodology (Peirce 1902, CP 2.93). Because of this overlap of signs, signs that are involved in Firstness may become the initiating sign in either Secondness or Thirdness. As Peirce states:

> In consequence of every sign determining an Interpretant, which is itself a sign, we have sign overlying sign. The consequence of this, in its turn, is that a sign may, in its immediate exterior, be of one of the three classes, but may at once determine a sign of another class.
> Symbols, and in some sort other Signs, are either *Terms, Propositions*, or *Arguments*. A *Term* is a sign which leaves its Object, and *a fortiori* its Interpretant, to be what it may. A Proposition is a sign, which distinctly indicates the Object, which it denotes, called its Subject, but leaves its Interpretant to be what it may. An Argument is a sign, which distinctly represents the Interpretant, called its Conclusion, which it is intended to determine. That which remains of a Proposition after removal of its Subject is a Term (a rhema) called its Predicate. That which remains of an Argument when its Conclusion is removed is a Proposition called its Premiss, or (since it is ordinarily copulative) more usually its Premisses. . . . (Peirce 1902, CP 2.94-95)

As signs of one class can be the representamen, object or interpretant, for another, each state has the potential to contain a sign associated with another state. Perhaps it would be useful to

consider each of the three parts of the sign as having a progression from something that more closely resembles its state environment to gradually representing more complicated relationships that involve signs from other states. This would mean that there should be a representamen for the state of Firstness, Secondness and Thirdness. There would also need to be an Object and Interpretant for each of the three states. In fact, this seems to be what Peirce is proposing in his table of the states. Peirce's table illustrates how Firstness can contain a sign that is associated with Firstness called a qualisign, which represents a quality such as a colour, yet it can also have a sinsign, which is a sign of Secondness. Thus, a qualisign is in a state of Firstness of Firstness, whereas a sinsign is in a state of a Firstness of Secondness. In this manner, an iconic sign such as a photograph, which relates to an object by merit of its resemblance, is one of Secondness yet also Firstness through the qualisigns that the photograph may have. Likewise, a symbol, which is a sign of Secondness, can also be contained in Thirdness through its relation to a conventional law. To summarize, icons, indexes and symbols are associated with the object and are modes of Secondness. Icons gain meaning from their resemblance to the object, whereas symbols involve future-oriented habits based on previous experiences with iconic and indexical relations.

Peirce said that signification is a process, as symbols are not static icons but ever changing. Semiosis involved three elements: *dynamical interaction*, meaning the physical or psychological action of a sign; the *interpretant,* referring to the sign; and the *significate outcome,* which exists explicitly in the sign (Deely 1990). Semiosis involves these elements because each of the signs is associated with certain actions and these actions take place within the different levels. Peirce is able to link language, man, signs and thought together and, through his investigation, identified 66 types of signs (Misak 2004, 362). Later by devising a complicated

web of sign relations he identifies over 50,000 variations of signs (Misak 2004). However, he only explains ten of these signs in detail (Misak 2004, 247).

Peirce made distinctions between the types of signs that operate within each state. Firstness imbues the *qualisign*, *sinsign* and *legisign* sign types (Cobley and Jansz 1999). The *qualisign* is made up of qualities such as the colour blue. The *sinsign* refers to a real object existing in space. The *legisign* is a sign based on a law and the classifying function of it (Sebeok 1999, 124). Each of these functions as a representamen: *qualisign* in Firstness, *sinsign* in Secondness and *legisign* in Thirdness (Cobley and Jansz 1999, 31). One reason Peirce sought to discover the embedded states of Firstness, Secondness and Thirdness in multiple modalities may have been to explain the process of *unlimited semiosis.* This means that the states allow one to conceive of how a sign of a certain type can be interconnected with another. Inspiration for this example came from Cobley and Jansz (1999, 25-29).

Peirce's Secondness of Firstness focuses on the nature of the relationship between the object and the representamen. Thus, although Secondness involves an *indexical sign*, *icon* and *symbol,* an icon functions as the relationship between the representamen and the object in Firstness, the index is the relationship between the object and the representamen in Secondness and a Symbol is the relationship between the object and represeantamen in Thirdness. For Peirce, an index is one possible event of a sign. Not all signs are indexes, but all indexes are signs (Silverman 1998).[20] As the index is a sign of Secondness it cannot be a sign of Firstness; however, it can combine with a sign in Secondness or Thirdness. For instance in Chapter 1, one can recall its role in the rhematic indexical sinsign.

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[20] Heidegger (cited in Silverman 1998, 49) critiques semiotics for this ambiguity. He is preoccupied with the notion of essence and is frustrated with semiotics' refusal to clearly define its essence.

In the realm of Thirdness, Peirce identifies three other types of signs. Namely, these are the previously mentioned *rheme*, where the sign is depicted for the interpretant as an option; a *dicent*, where the sign is depicted for the interpretant as a factual statement; and an *argument*, where the sign is demonstrated for the interpretant as a rational (Cobley and Jansz 1999, 34-35). Each of these signs functions as an interpretant. The rhematic interpretant is a mode of Firstness. The dicent interpretant is a mode of Secondness and an argument interpretant is a mode in Thirdness (Cobley and Jansz 1999, 31, 34-35). As discussed above, Peirce used the term *ad infinitum*, which means unlimited semiosis to describe the combination of signs within a contextual framework where each referred to another sign in the cycle (Cobley and Jansz 1999, 25).

Peirce says, "Nothing is a sign unless it is interpreted as a sign" (Peirce 1902 CP, 2.308). A sign then can represent an object as long as it is referable. To be phenomenal, the referent must be describable. Thus, Peirce's Secondness is demonstrated because if a sign can be related to some object, there must be some kind of pre-existing relationship based on habitual usage between the elements of a sign for it to be interpreted as a sign (Ransdell 1980, 154, 177). For example, when looking at a picture of a castle, a child might imagine what it would be like to live there, thus moving from the initial object, to the mental image, to the word sign "castle" which triggered several other signs created in the mind. This supports Peirce's Thirdness phenomena, where the sign representamen and object form a relationship that, while simultaneously being conditioned by an interpretant, results in an interpretant (Wells 1980). This cycle continues as more signs are observed or imagined by the child demonstrating Peirce's *ad infinitum* (unlimited semiosis) (Cobley and Jansz 1999, 25).

Peirce and Saussure's followers have in some cases extended the founders' underlying assumptions to explore the implications of the theory. Following Peirce's original intentions, today's semioticians use semiotics as a theoretical framework that can be applied to any discipline. Since semiotics' beginnings as a vital part of linguistics through Saussure, it has been expanded through further research to apply to several areas of study such as zoology, *(zoosemiotics)* and botany (*phytosemiosis)* among many others (Deely 1990, 29-30). Given these diverse fields of study and the flexible nature of semiotics, it is not surprising Eco says that "Semiotics is concerned with everything that can be taken as a sign. A sign is everything which can be taken as significantly substituting for something else. This something else does not necessarily have to exist or to actually be somewhere at the moment in which a sign stands in for it" (Eco 1976, 7).

Eco re-considers Peirce's conception of the sign with reference to Kant's schema theory (Eco 1997, 65). He argues that Peirce was likely influenced by Kant's notions of perceptual and experiential judgments and re-conceptualizes the schema as a three dimensional model in the mind. This design would contain information gained from sensory input (Eco 1997, 121). Eco emphasizes the connection between the task of recognition and this model. The model of a subject could possess any number of features providing they were all consistent with the parameters that were created in order to confirm or disconfirm the subject's identity. While cognitive theorists would be content to call this a prototype, because a three dimensional model becomes assigned to it and it is then used to judge any other object, Eco feels this response is too simplistic.

Eco's model has a number of significant divisions. These are Cognitive Types (CT), Nuclear Content (NC), and Molar Content (MC). If cognitive theorists were correct than his CT

would be reduced to a simple rule (Eco 1997, 130-132). As cognitive types are created through collective knowledge and usage of signs one can recognize a subject without having to name it or be aware of its name. For example, people can recognize that roller blades function in a similar way to roller skates. The passage of a new term into a generic term comes from the social need to be able to separate it from its current situation. The term roller blade did not become part of one's common vocabulary until marketers wanted to emphasize its differences from roller skates in order to sell it to people as something unique and different. He suggests that experience confirms everyone shares the same CT. The expansibility of the form a CT takes in the mind is left understandably vague. He implies that the collective opinion of what the subject encapsulates and means is the NC. Eco asserts that this is distinct from meaning because one associates meaning with mental experience. He takes meaning as synonymous with content in the Hjelmslevian tradition (Eco 1997, 137-138). A diagram of Eco's CT/NC model is provided below.

MC_1 MC_2

CT/NC
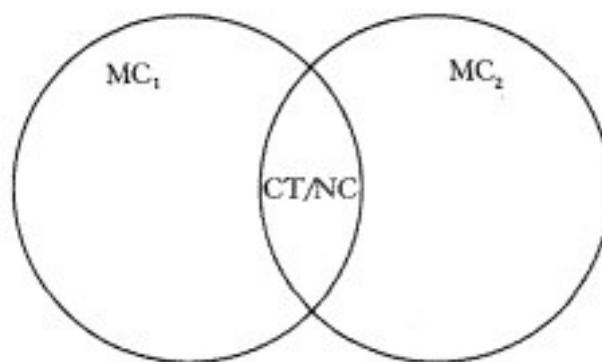
Figure 3.3

Figure 3. Eco, Umberto. 1997. *Kant and the Platypus: Essays on Language and Cognition*. United States: Harcourt Brace. 1997: 177.

The NC also supplies the criteria to identify the referent that leads to the CT (Eco 1997, 139). He asserts that identification is not to be confused with recognition because recognition

implies that any cognitive processing of a previously experienced phenomenon relies on that perceptual experience, whereas identification implies we have not actually had experience with it (Eco 1997, 139). Thus, one can be given instructions in order to identify a referent and must wholly rely on this because the individual has had no experience of it. By this, he contends that the NC leads one to the creation of a "tentative" CT.

He argues that the CT supplies instructions for identifying the referent. However, when referring to some phenomena, it is considered a form of performance. His foundation for this argument is that a word for a thing is also a referent in and of itself, but referring to the referent requires an act of referring. He also considers the labeling patterns of pre-categorical phenomena saying that there are semiosis primitives that are sensed by human cultures before labeling has occurred. Animality, life and rationality are considered pre-categorical to Eco.

As an artist and semiotician, Roland Barthes was intrigued by Saussure's signifying dyad and by semiology in general. He believed that he could use it to unpack culturally accepted myths of everyday reality (Cobley and Jansz 1999, 43). Barthes wrote a short series of articles titled "a mythology a month" in the French magazine, *Les Lettres Nouvelles,* decoding the seemingly simplistic signs of everyday life revealing their complexity and hidden naturalisms (Cobley and Jansz 1999, 43).

While Barthes was heavily influenced by Saussure, he recognized some of the inadequacies of Saussure's original model (Barthes 1968, 25). He notes that Saussure had perceived that semiology would form part of a general study of linguistics, but Barthes implies that no signification process can exist outside of language because a real object in space must always have some referent acting as a duplicate of its meaning. He says all manner of objects only assume a place in the system through this duplication in what he calls a second-order

language (Barthes 1968, 11). Therefore, he asserts that semiology is a part of linguistics as opposed to linguistics being a part of semiology (Barthes 1968, 9-10). Thus, Barthes' exploration of the sign considers the sign with reference to how it functions in a linguistic system. Even when Barthes was decoding images, underlyingly he still has a linguistic viewpoint and when he refers to signs, it is within a linguistic context.

Barthes was fascinated with the idea that language was not referential but conceptual, as Saussure implied. Language then was not simply the medium in which reality was represented, but rather that, which allows reality to be constructed. It is this very function of the sign dyad, which allows Barthes to modify Saussure's model, and apply it to images and objects as well as words. He reveals how objects relate to signification not only as signs, but also through their layering (Barthes 1994).

For Barthes, the signifier was a level of expression and a signified was a level of content. Barthes suggests that the world has an abundance of signs because signification is the mode of thought rather than fact as held by the objectivists and positivists (Barthes 1994, 159). However, signs have varying degrees of complexity (Barthes 1994, 158). Barthes chooses to focus on the difference between signs (Barthes 1994, 159). Through this, he hypothesizes that signs can have secondary levels of signification called 'connoted meaning' (Barthes 1994, 159). He notes that the phonic and graphic substance of words has a denoted meaning that is very different from its connoted meaning, although each of these are obtained through the interpretation of the signifieds. The second level of interpretation (connotation) always refers to both messages. Here the first message has become a simplified signifier of the second message because the first message is already contained in the second (Barthes 1994, 175).

Barthes asserts there is no object that escapes meaning through some manner of naming, for even if it attests to have no meaning, this signifies it as "nothing" (Barthes 1994, 182,188). He viewed this naming system as a type of contract between individuals and the collective. People had to follow the rules or they would not be permitted to function within the system. In this way, he felt language was also an institution and it is this idea that leads him into thinking about the myths of everyday objects because of the various institutions they represent; not the least of these language itself (Barthes 1968 14, 166). Like Saussure, he viewed *Parole* as an individual's speech act complete only in a speech community and forming one-half of a continuous dialectic with *Langue* (Barthes 1968 27, 169).

Barthes says that a sign must be repeated in order for it to exist, for without recognition it cannot become a sign (Barthes 1985, 237). Semiosis is constantly being established and laid open for interpretation and critique (Silverman 1998).[21] Here visual texts are read in reference to the person's own cultural semiotic understanding as embodied in their "gaze" (Barthes 1985, 238), a discursive conversation occurring between the art object and the reading viewer. While at first art appears to have no code, the code must be present, for anything that can be depicted must exist first in the realm of language (Barthes 1985, 228). He suggests that when words become illustrated, the image encodes the history of those words into the very fibers of the canvas (Barthes 1985, 228-229).

The sign of the word attempts to impose itself on the signifier (the painting) and force it to signify what the word connotes (Barthes 1985, 171-174). While the word sign seems to have tamed the signifier in a realistic painting, this is not so present in an abstract art piece where

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[21] Technically, what Silverman refers to as semiosis is Conceptual Linguistic Semiosis, However, it seems that, given the main direction of the thesis to suggest a semiotics-inspired learning program that attempts to capitalize on the effects of positive transfer through the bringing about of student awareness of the similarities and differences between an L1 and L2 via colour, the basis in Conceptual Linguistic Semiosis is implicit.

tension between the word sign and signifier (abstract image) are apparent on a subconscious level. Arguably, this tension holds the viewer's gaze and allows them to have an aesthetic experience. In order to do this, Barthes implies, the modern artist must attempt to strip the signified (Barthes 1985, 233). The act of signifying implies that there is something that functions as a sign, which can be understood, because there is also a sign system present to regulate the use of such information based on convention (Barthes 1994, 180-181).

The challenge of interpretation was how to dissect the art image as text yet not tamper with its aesthetic beauty. Through the substitution of words through synonyms the writer is able to substitute one signifier for another of the same meaning but this frequently will create a connotation (Barthes 1994, 84). Barthes implies that art objects, be they musical scores or theatrical performances or paintings, only gain meaning when integrated in the material life (how a material is utilized) of its users (Barthes 1985). The implication of Barthes' work is that signs will gain meaning based on the cultural context they are used in. A sign's environment will affect how sign users interpret the meaning that is presented through the sign.

In a like fashion to Barthes, Halliday contends that there is a semiotic code in language, but he also contends that language is a "product" of a "social process" (Halliday 1978, 1). Halliday says that "… the semantic system, which is the meaning potential embodied in language, is itself the realization of a higher-level semiotic which we may define as a behavioral system or more generally as a social semiotic" (Halliday 1978, 39). This social process occurs within a semiotic framework composed of tenor, register and mode. Tenor refers to the role relationships of the participants; the mode is the function the language has in the action (Halliday 1978, 110). "A register is a set of meanings that is appropriate to a particular function of language, together with the words and structures which express these meanings" (Halliday 1978,

195). In this way, a person's reality becomes continually informed by their semantic system because it has been used to encode reality. The development of language in a semiotic framework is the creation of "meaning potential" (Halliday 1978, 1).

Halliday views language as a "shared meaning potential," and a text, in light of this, is the actualized potential for meaning. Thus, the semantic system is a network of meaning potential. While Halliday agrees with Saussure that there is an arbitrary connection between content and expression, he argues that the connection between semantics and grammar cannot be arbitrary because grammar represents roles or functions of which language is but one realization of a social semiotic (Halliday 1978, 55). Halliday asserts that in its basic nature, a text is essentially a sociological event: "… a semiotic encounter through which the meanings that constitute the social system are exchanged" (Halliday 1978, 139). Halliday says "… it is only through the encoding of semiotic interaction as text that the ideational and interpersonal components of meaning can become operational in an environment" (Halliday 1978, 145). Semantic trends of the environment are the register. The combination of the field, which refers to what is happening, the tenor, which represents the social "… status and roll relationships" and purpose for speaking and mode which is essentially the genre, determine the register (Halliday 1978, 62). He contends that there is no strict boundary between vocabulary and grammar. The relationship varies across cultures. He uses the example of colour to demonstrate this (Halliday 1978, 197, 198). The human eye has the potential ability to view the whole spectrum, but this does not mean each language will have a word for each of the visible colours. This helps set the standard for what users pay attention to as they converse (Halliday 1978, 198). As a discourse has a generic structure, and lexicogrammatical systems take from all components to form a text,

a text may contain a variety of meanings which all conform to fit the structure (Halliday 1978, 188).

Halliday views language as just one of the semiotic systems that produce culture. Language is used to express social processes and metaphors, allowing people to use language to act and to reflect on their thoughts. He says that language as a system is divided into three levels: semantics, phonology and lexicogrammar. Meaning is expressed through a variety of modes, and language is only one of these (Halliday 1978, 189). Variation is built into the language. Language represents reality referentially and metaphorically. Context creates needs for certain language, and certain language allows for the development of content. Halliday realizes that language as knowledge is connected to other broad fields of information: language as knowledge, language as art, language as behavior.

Halliday says language is the medium through which a human being becomes a personality in consequence of his membership of society and his occupancy of social roles (Halliday 1978, 15). He asserts that even an infant has a linguistic system in as far as he/she can use vocal sounds for a consistent reason (Halliday 1978, 19). In other words there is a relationship between infants' content and expression (Halliday 1978, 30). Halliday argues that initial utterances gradually result in instrumental, regulatory, personal, heuristic, imaginative and informative language functions (Halliday 1978, 19-20). Halliday believes that these are the six basic functions that result from utterances (Halliday 1978, 19-20; Halliday 1975, 19).

He contends that infants internalize the fact that language gives them the potential for these functions. Language becomes a means of learning, and children learn how to use it to encode their daily experiences (Halliday 1978, 21). He states that at 18 months of age, infants subconsciously encode utterances as either mathetic or pragmatic, and at 21 months, most

utterances are classed as one or the other. At 24 months, "every utterance" an infant hears "is both ideational and interpersonal" (Halliday 1978, 72).

Halliday says that "… language is first used to identify the self, in contradistinction to the environment; it is then used to explore the environment" (Halliday 1978, 55). He contends that language has to interpret the various phenomena that one encounters in the external world outside the self as well as the internal processes occurring in one's consciousness, thus a linguistic system must have a certain number of categories and processes to make it manageable. Halliday's model is triadic, composed of ideational, textual and interpersonal parts. He states that the child's system is two dimensional with content and expression, whereas an adult system includes grammar as a third dimension in order to separate various language functions (Halliday 1978, 56) to make it more clear which function is being utilized.[22] In the adult system the speaker/hearer looks to the social system in order to decode a text. It seems that the tenor creates the mood which makes up part of the interpersonal part and the textual aspect (Halliday 1978).

When children become aware of their own semiotic, there can be a conflict with the semiotic of their ideas and those of the dominant culture. As linguistic codes have different statuses, the knowledge of one code may be viewed as a deficit in comparison to another and this has no relation to the actual language structure or vocabulary (Halliday 1978, 103). It is a social disadvantage (Halliday 1978, 104). Halliday implies that a child's ability to develop his/her meaning potential is not an innate property of the child or any indication of his/her intelligence, "… it is merely the result of a mismatch between his own symbolic orders of meaning and those

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[22] Halliday's (1978) argument that grammar is not a part of children's semiotic system could support the idea that children begin thinking in signs that are more likely to be present in R-mode thinking such as qualisigns, sinsigns and icons before being able to process arbitrarily related symbols such as letters. Children may be exposed to such signs through viewing images, manipulating objects and expressing their feelings.

of outside influences such as school" (Halliday 1978, 26). He feels this mismatch results from different social patterns (Halliday 1978, 26).

Halliday contends that, because of external influences on the internal symbolic system of people, the act of creating meaning is limited to the way people are allowed to interact in the social structure (Halliday 1978, 66). There is a sense then, that the linguistic system is "value charged" (Halliday 1978, 66). He suggests that if a person's speech or their semantic habits are imbedded in one's consciousness, criticisms of pronunciation have less to do with forms and more to do with the value placed on linguistic tendencies. A person's language can be viewed as somehow aesthetically or pragmatically sub-standard based on the specifications of their language, thus language can function as symbols and represent indices of social structure (Halliday 1978). Children learn then that there is a natural dialectic relationship between language and the social system (Halliday 1978). Through the union of internal and external influences children create meaning based on a certain set of social functions, gradually developing the ability to use combinations of these as they present advantages for their developing minds.

Halliday views social contexts as semiotic structures. These, he asserts, are three dimensional, composed of the role relationships involved, the ongoing social activity and the symbolic of rhetorical channel. He formalizes these into tenor, field and mode (Halliday 1978, 110). In this way, Halliday says that one's culture is transferred to one by making the semiotic principles of one's culture accessible. The code comes pre-defined thus language is the main medium through which culture is transmitted (Halliday 1978, 106).

Codes are "above the linguistic system" as "they are a type 'of social semiotic' meaning" as generated by the social system (Halliday 1978, 111). These codes are manifested in language through social actions. Thus they control the patterns of register underlying culture.

> Hence the codes transmit, or control the transmission of, the underlying patterns of a culture or subculture, acting through the socializing agencies of family, peer group and school. As a child comes to attend to and interpret meanings, in the context of situation and in the context of culture, at the same time he takes over the code. The culture is transmitted to him with the code acting as a filter, defining and making accessible the semiotic principles of his own subculture, so that as he learns the culture he also learns the grid or sub-cultural angle on the social system. (Halliday 1978, 111)

Barthes' impression of *Langue* as a language made of societal conventions based on values and devoid of speech sounds very similar to Halliday's. Barthes did not consider this an act, but a social reality made of rules that individuals could not penetrate unless willing to conform to the rules of the collective in order to communicate within the confines of the system. Of central importance to this system was the act of classification (Barthes 1994, 47). This included the naming of phenomena into rules, materials, styles, genres and parts (Barthes 1994, 47). He adds that the signified has two coordinates. The first is the symbolic coordinate, whereby each object has some metaphorical basis, and the second, a classification coordinate, whereby objects are given a name within a particular field that associates them into a category (Barthes 1994, 183-184). While these categories are by no means universal, it is likely that there is some "reservoir" of a "finite" set of "symbolic objects" (Barthes 1994, 185).

From the arguments in this section, some conclusions can be drawn before moving to section 2.2. The Saussurian sign does not seem to go beyond the confines of language, whereas Peirce's sign, due to its triadic representation, necessarily interacts with wider semiotic sub-systems through his states of Firstness, Secondness and Thirdness. Although Barthes seems to extend Saussure's semiology by noting that a sign's context can influence the meaning it conveys, his focus still seems to be linguistic because he is decoding the written and visual texts

of items from popular culture such as advertisements. In other words, he is treating a sign whether it is on a canvas or a billboard as something that can be read and interpreted based on the broader linguistic context that it occupies within society. Halliday then takes cultural context even further, trying to determine how social context aids in language learning. He discovers that children actively create meanings from the sign relations they recognize through the performance of functions within the confines of their social environment. In order to understand how learning became dependant on the use of internal and external signs as a mode of human functioning, it can be useful to consider how the use of signs evolved.

2.1 The Evolution and Development of Signs

Deacon asserts that human beings are the only mammalian species to possess the rare ability to use "symbolic reference" (Deacon 1997 22, 41). This associative power separates human beings from chimpanzees that can be trained to use tools and make certain routine associations between images on computer screens. During such computer-based tests, human beings are able to randomly choose from a variety of images and combine them in any manner. However, while chimpanzees can be trained to remember a certain combination of images, when given the opportunity to combine any set of pictures together, they are unable to choose freely without duplicating the original learned sequence.

According to Deacon the ability to "communicate" symbolically came from years of evolution where symbolic reference became a kind of organizing strategy in which to catalogue and classify referents (Deacon 1997, 22, 100). At some point in humankind's evolution it became advantageous to communicate through symbols instead of non-symbolic grunts. As early hominid cultures diversified, the need to communicate more complicated messages, such as

teaching skills to offspring, became necessary. [23]He hypothesizes that as symbolic reasoning became more and more useful, it actually helped form the brain by gradually developing more specialized brain sectors for language and communication. Deacon attempts to make the distinctions between ape and human vocal apparatuses clear, using the diagram in Figure 4.
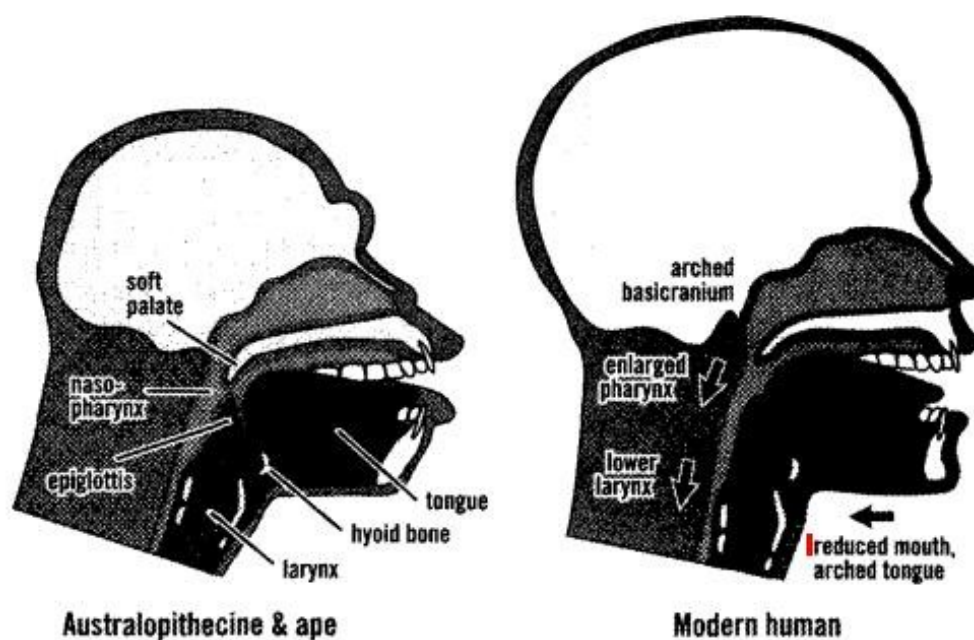
Figure 4. Deacon, Terrence. 1997. *The Symbolic Species: The Co-evolution of Language and the Brain.* New York and London: W. W. Norton & Company Ltd. 1997: 356.

Deacon says there are concrete and abstract concepts represented in the brain, but these are culturally recognized and constructed as people create hierarchies of indexical interpretations through their daily experiences. He states "… it is not the thing that is ultimately brought into reference, nor even the common images that are elicited, that determines the difference in the ways that words and odors can derive their reference; it is rather how these responses are

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[23] These developments came into effect in part due to the need for a more stable society where men hunted and returned to the camp with meat in order to ensure pregnant mothers could be guaranteed there would be enough meat for them to sustain their offspring who would be raised to support the group (Deacon 1997).

produced" (Deacon 1997, 64). Human beings are able to interpret signs in different ways and organize them into hierarchies of associative relationships.

People have to be able to create indexical associations between words and objects in order to achieve symbolic reference, but they must go beyond them in order to achieve a functioning symbolic reference. He hypothesizes that as there are words that can transfer to a word that rhymes with it, stimulus features and semantic features reveal how the brain can house both symbolic and non-symbolic connections under the same classification. This is because symbols do not only relate to objects in the world, but to each other, thus hinting at the system that lies behind them. He implies that the blueprint for this system pre-exists in order to give a symbol its referential power. This is the basis of non-symbolic referential processes where indexical relationships exist in a hierarchy that in turn dictates the symbol's relationship to other symbols and continues to influence the evolving symbolic reference system (Deacon 1997, 71, 72, 98).

Deacon further argues that symbolic reference is complicated because the signs' linkage has nothing to do with their proximity to each other but represents the function of the relationship that the symbol has to other ones. For example, words that have similar functions do not occur together. Once formed, previous sign relations allow one to anticipate future correlations. Thus, people learn to connect symbols to corresponding objects, which provides guidance to understanding the relationship represented by the association.

Piaget became interested in testing children to determine how they learned to associate objects with symbols. He also wanted to understand the effect that established sign relations would have on future ones as the child's synthetic and logical thinking skills developed. Piaget's research has provided numerous contributions to child psychology (Vygotsky 1962). In his book,

The Grasp of Consciousness, he summarizes children's intellectual development by tracking how conscious they are of their actions while they perform certain tasks. He summarizes these findings based on operational levels of skill and cognition. How conscious children are of the effects of their actions is determined by their level of cognitive growth. His work shows that this correlates with children's ages. Knowing this helps him to establish his sensorimotor, preoperational, concrete operational and formal operational stages of conscious development based on children's ages. Although his followers such as Case, Pascual-Leone and others have since modified precisely when these stages occur, the essential idea that children go through certain developmental stages as they grow from infancy remains intact (Santrock *et al*. 2004). Piaget's theories are discussed here only to establish a plausible timeframe for the activation of the sign slots and networks that is compatible with Peirce's states of Firstness, Secondness and Thirdness. This synthesis, in the form of a construct model, is referred to in Appendix C.

Piaget's work suggests that the child's mind has two mental modes of thinking. One is concerned with all his/her immediate wants. This is the plane of subjectivity. It contains egocentric thought. He says this functions as a sub-conscious thought where causal relations are represented by images not words and, as such, is "incommunicable" (Piaget 1966, 63).[24] The second sphere consists of the upper plane. This is called the plane of objectivity and it houses socialized thought (Claparede 1966, 14). It is built up by the social environment and gradually shapes the child's speech and logic and vise versa. This socialized thought constitutes the child's reality outside her/himself. The socialized plane of the brain then is viewed as ". . . enabled through the bond established by language between thoughts and words to make an increasing use

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[24] This incommunicable state seems to resemble Peirce's state of Firstness: images are fluid, continually taken in by the sensorimotor system in the brain. Piaget's socialized thought is more like Peirce's state of Secondness because this brings the child's situational environment into a relation with the self.

of concepts; whereas autism, just because it remains individual, is still tied to imagery, to organic activity, and even to organic movements" (Piaget 1966, 64).

Piaget argues that egocentric reasoning is more intuitive, "syncratic" rather than deductive, while "abstract collaboration" does not seem to appear until age seven. Piaget argues that egocentric thought is different from socialized thought in that it is non-discursive, intuitive without deduction, whether the thoughts are expressed verbally or not, and uses schemas. He conglomerates the three aspects of egocentric thought into the phenomenon of syncretism of thought (Piaget 1966, 140). Until a child is seven or eight years of age, egocentric thought will dominate, and the child's need for syncretism will be evident. After the age of seven to eight years, egocentric thought is still present, but only in abstract verbal modes of thought. The result of this is that children may not reveal any syncretism in their thoughts motivated by what they observe whether these include language or not, but it becomes apparent in their thoughts that do not involve immediate observations. This type of syncretism is called *verbal syncretism* and only appears after age seven to eight (Piaget 1966, 141). He says that children think in terms of general schemas and that these schemas "supplant" the ability to perceive detail (Piaget 1966, 144). From this, Piaget suggests that language must develop from the whole to the part and from a syncretism of thought to more analytic thought (Piaget 1966, 146).

Piaget intimates that egocentric and socialized forms of thinking are active during certain operational stages in the child's life (Piaget 1966). Egocentric thought dominates during the sensorimotor stage from birth to two years of age. The preoperational stage occurs from age two to age seven and is characterized by the increased use of socialized thought, while still within an egocentric framework. The period of age eight to eleven is characterized by more socialized thought and less egocentric thought, whereas the formal operational stage is dominated by

socialized thought (Santrock *et al*. 2004). He feels there is little social life for children younger

than seven due to the dominance of their egocentric thought (Piaget 1966, 61). He found that

during the ages of five to seven and a half, children speak to themselves even when in a group of

children because children do not pay attention to the hearer as their speech is for their own

benefit only (Piaget 1966, 32). Piaget called this a collective monologue (Piaget 1966, 33). This

form of self-communication still occurs between the ages of six and seven (Piaget 1966, 37).

Children have great difficulty understanding another person's point of view because their

thought is egocentric. He suggests that children can still understand each other only that their

comprehension may not be along verbal lines depending on which stage they are in (Piaget 1966,

62).

Piaget lists several examples where children justify the feature of an item by the presence

of other features as integral and un-removable from the whole. One such example was a five year

old trying to justify that the moon does not fall down because it is high up and the sun is not

there. This answer demonstrates that the child always perceives the moon's features together as a

unified whole (Piaget 1966, 147). When he tested children's understanding of proverbs, he found

that they were able to sense that the story had some symbolic meaning. During his observations,

he was able to deduce that unknown words in the text were formed from the same schema of the

phrase, and then any details to be discovered after these were interpreted within the framework

of general schemas (Piaget 1966, 162). All children of the same age groups answered the

questions in the same manner. There was continuity between the children's answers. Piaget

states that ". . . the ego-centric mentality, occupies, as will be shown later on, a position half-

way between autistic and logical thought" (Piaget 1966, 170). He demonstrates this by noting

that when children draw, it is not as they see things, but as they interpret their world based on the aforementioned general schemas (Piaget 1966, 189).

Piaget wanted to test to what degree the child attributed the item's reactions to his action or to the causal relationship between objects (Piaget 1976, 238). These studies ranged in their complexity from describing the act of crawling on the ground and reproducing the crawling motions taken with a toy model, to more complicated acts such as estimating in which direction a tethered ball would travel after being released from a specified location. The accumulative results of all of these tests showed that children of a particular age group tend to have the same level of awareness of the causality of their actions and the actions of objects. While the infant is in this sensorimotor stage, which occurs from birth to about two years, the infant is focused on his own understanding and can only use trial and error procedures to lead him/her to a correct understanding (Piaget 1976).[25] He argues that the act of becoming conscious of an action associates a concept with an action (Piaget 1976, 332). For example, if a goal is assigned to a particular object such as throw the ball at a right angle, Piaget suggests that when learners are aware of the result of their actions these are recognizable while still generalizable, allowing the schema to become a concept (Piaget 1976, 336). Thus, the implication of this is that learner's awareness of the ball moving from their throw allows for the development of cause and effect relations.

Piaget argues that an infant of a few months old first discovers "causal connections" only through his own actions (Piaget 1976, vi). Later he/she gains the ability to perceive these in terms of how objects can act on other objects, for example, a ball bouncing off a toy. This is

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[25] Piaget's account of the infant's trial and error procedures in order to learn would likely support the theory of embodied cognition because the implication is that the infant only gains an understanding of himself by continually exploring his environment through his/her body. The repeated movements would also strengthen pathways between receptors in the body and the corresponding connections in the brain in the bodymind.

called the "representation level" (Piaget 1976, vi). Piaget concluded that "the mechanism of cognisance appears in all these aspects as a process of conceptualization—reconstructing, then going beyond, on the semiotic and representational planes what was acquired on that of the action schemes" (Piaget 1976, 342).

Piaget suggests that "pre-causality" results from confusion between the physical/intellectual world, known as the world of ethical or logical necessity, and the world of mechanical necessity (Piaget 1966, 188, 194). This is because children understand an object by its name. In this respect, the name is bound to the thing (Piaget 1966, 199). The assumptions of children reveal confusion between ". . . the real order of things, just as pre-causality confuses logical implication and causal explanation" (Piaget 1966, 215). When children ask what an object is, they mean they want to know the name of the object. When they receive this name, it functions as a symbol, a definition, and an explanation of the object itself. From his research with children, Piaget was able to deduce that the mind has two main categories of thought: an explicatory function and an "implicatory function," that exist simultaneously in the process of thinking. The "explicatory function" refers to when the mind turns outwards, whereas the "implicatory function" operates at a moment when one's mind turns inwards (Piaget 1966, 236).

Vygotsky contends that Piaget "revolutionized" the study of child language and thought, allowing for many positive developments (Vygotsky 1962, 9). He summarizes Piaget's argument as the view that egocentric thought associated with the earliest form of thought lies in the middle of autistic thought and socialized thought. Vygotsky critiques Piaget's work saying that Piaget has ignored the phenomenon of inner speech, but if he were to connect these to Piaget's egocentric and socialized thought, he would have to consider that a child's inner speech development occurs before their socialized speech. However, Vygotsky's research suggests this

is contrary to his findings (Vygotsky 1962, 19). His perspective is that both communicative and egocentric language have distinct social functions. Egocentric speech is produced when a child transfers social behaviour into inner-functions. He hypothesizes that socialized behaviour comes before inner speech thus he believes that an individual is shaped from the social to the individual (Vygotsky 1962, 20). He asserts this because the very fact that children can learn concepts suggests that there must be a pre-existing system in which to designate them as such.

Vygotsky hypothesizes that there is a link between the overt and inner-speech of children. In the child, this intermediary stage occurs when a child starts using grammatical forms and structures before they know what they mean (Vygotsky 1962, 46). Being able to say words does not guarantee a child understands them. For example, a child can speak with correct grammar long before he or she knows the causal relations between the words he/she speaks (Vygotsky 1962, 46). For example, a child can use words like "because" and "if" before he/she understands temporal, conditional, or causal relations. Words and syntax are mastered in speech before thought (Vygotsky 1962, 46). He suggests one can consider speech and thought as divergent lines. Where they intersect verbal thought involves speech (Vygotsky 1962, 5, 49).

Vygotsky argues that during the child's first months of life, sound formations such as babbling have definite social functions (Vygotsky 1962, 42). He envisions the mind as overlapping spheres where thought and speech come together to form verbal thought. From such evidence, Vygtosky implies thought and speech develop from different types of thought. He contends that a child will understand the external structure of word-object before the inner symbolic structure (Vygotsky 1962, 50). This means that if children are given guidance by a more informed learner, the introductory learning will help them learn the concept and convert it into their inner speech. Careful guidance from adults and older children can help prepare

children for concept formation. Thus, Vygotsky stipulates that learners have a zone of proximal development, which allows them to learn concepts that would normally be too difficult for them to grasp, providing they are given help in the form of social instruction from elders such as teachers, older family members, etc. Vygotsky says,

> All the higher psychic functions are mediated processes, and signs are the basic means used to master and direct them. The mediating sign is incorporated in their structure as an indispensible, indeed the central, part of the total process. In concept formation, that sign is the word, which at first plays the role of means informing a concept and later becomes its symbol. (Vygotsky 1962, 56)

The ability to control one's mental actions by using words and other signs is central to concept formation. In general, this skill develops in adolescence and progresses through adulthood (Vygotsky 1962, 59). Vygotsky argues that concept formation can be divided into three stages. The first stage involves the creation of syncretic heaps of objects. The children in his study guessed what the meanings of the words were in order to place the words into piles. In the second stage, the pile is organized based on the children's original self-created criteria, based on their current perceptual needs. During the second phase, individual objects become bound to each other. When children enter this stage they will no longer confuse their perceptions of connections and the conventional ties that exist between objects. Vygotsky referred to this as a complex. A complex contains concrete connections that are based on factual evidence rather than logical and abstract conceptions (Vygotsky 1962, 61).

Narziss Ach (cited in Vygotsky 1962) argued that concept formation is a creative purposive process, whereby a concept is formed through searching for a solution to a problem (Vygotsky 1962, 54). Thus for a concept to form at all, a problem has to occur that needs the concept to be learned in order to solve the problem. Ach's study showed that children under twelve years of age might understand there is a problem but take a different mental route in

determining how to solve it (Vygotsky 1962, 55). Children, under the age of seven, form complexes to establish relationships between objects, experiences and words. To attain this complex thinking, one must learn how to abstract elements away from the experience they were connected to. The process of abstraction continues while children gradually put objects in groups based on greater similarity of features (Vygotsky 1962, 76).

The bonds forming the basis of complexes are based on experiences, thus there may be no unity between the objects in the complex. Vygotsky mentions a few types of complexes, such as the associative type, whereby an object is given a name and the name is used to mediate which objects will be selected based on their degree of similarity to the collective by merit of its features (Vygotsky 1962, 62). All objects in the group will then take on this name in the same way that people have family names. A common feature is not necessary to require the family name because even the degree of spatial closeness may motivate the child's decision to include the object in the family group of objects (Vygotsky 1962, 62). Children may also group objects based on their level of contrast to the nuclear object (Vygotsky 1962, 63). The nuclear object has no special significance once the objects are selected for the group because there is no hierarchy in the group. As each part is equal at this point, it has become a chain complex and no longer an associative complex (Vygotsky 1962, 64).

The last type of complex is called the "pseudo-concept," as it is still a complex, although it seems like a concept (Vygotsky 1962, 66). Complexes are connected to word meanings that already exist in adult language. In Vygotsky's last experiment, a word was written on the block that had a contrary meaning to test what children would do to classify it. In this situation, the children have conflicting information because they have classed the object based on their own criteria but now the word gives them a contrary meaning. Subjects that followed what the

classificatory word said restarted their sorting, but other subjects, after finding out they were incorrect, kept objects together based on the colour or shape of the block under the category name. Other children removed the one block containing the contradiction, but kept the rest in the pile under their original label (Vygotsky 1962, 67). From his experiments, he contended both adults and children have a sense of what words mean, but the child uses different mental processes to reach that conclusion (Vygotsky 1962, 68). In terms of labels, Vygotsky says that the transfer of names to objects is carried out through concrete similarities such as through its image or function. Various associations will influence transfer, but the longer the time passes before the transfer occurs the more difficult it will be to locate the source of the original connection (Vygotsky 1962, 74).

When a child is able to abstract features or qualities of objects away from the complex and re-analyze them as a synthesis of which complex thinking is a necessary part, then this synthesis becomes the main instrument of thought (Vygotsky 1962, 79-80). For adolescents to be able to take that and apply it to concrete situations, which are unlike their original experience that helped them to form the complex, an abstraction of what they have learned must occur (Vygotsky 1962, 80). Vygotsky says that research shows that adolescent concept formation involves the use of words to focus a category, which will lead to the abstraction of qualities and the synthesis of these qualities until they can be "symbolized" with a sign (Vygotsky 1962, 81).

Vygotsky criticizes Piaget for his failure to connect the socialized thinking that begins to develop in children to their inner-developmental processes because he feels that the inner egocentric thought of the child is assimilated by the socializing thought they receive from their external environments (Vygotsky 1962, 85). Vygotsky says that Piaget's research would suggest that during a child's development these two types of thought would be in conflict, each

compromising its use until adult language subsumes it (Vygotsky 1962, 87-88). Vygotsky

contends that egocentric language does not just fade away as this does not take into account the

integrative process of concept formation (Vygotsky 1962, 135).

In contrast to Vygotsky, Lamb (1999) is interested in what happens to concepts once they

have been formed and need to be related to established concepts within the brain. He argues that

a person's linguistic system consists of relational networks, which are composed of nodes and

their interconnections within the brain. Figure 5 is one of his diagrams that illustrate this.

COMPONENTS OF RELATIONAL NETWORKS

Internal structures of nodes of compact relational notation
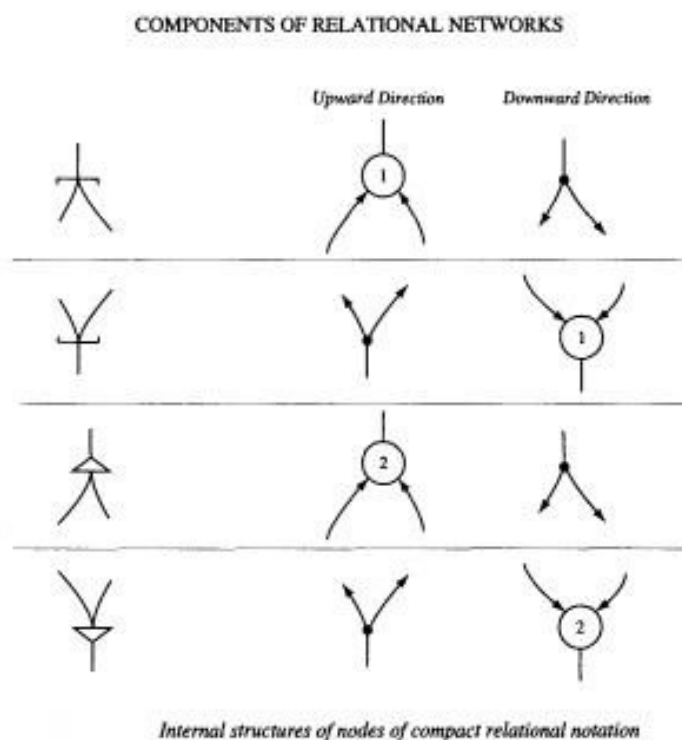
Figure 5. Lamb, Sydney M. 1999. *Pathways of the Brain: The Neurocognitive Basis of Language.*
Amsterdam & Philadelphia: John Benjamins. 1999: 79.

He asserts that multiple sense modalities, such as sight, smell, touch and taste, form

networks. He contends each of these seem to connect to higher levels within its sense network

until the newly activated nodes reach a level where they interact with the other senses (Lamb

1999, 124). For instance, one's perception of a bird song could also be connected to its image or

the sensation of touching its feathers. The combinations of these networks create the concept of bird. In other words, in a similar manner to semiotics, Lamb (1999) believes that the brain processes brain signals as signs. These signs are represented by a label, which is connected to a network. He intimates these signs and symbols can form part of the structure of a system and be the sign itself (Lamb 1999, 112). This system allows people to view words and sentences metaphorically as linguistic objects (Lamb 1999, 112, 118). Evidently, text has a form on paper that one can perceive.

Lamb (1999) uses the term 'concepts' to refer to a group of connections that reside in a network. The label for the network is a lexeme, such as the word 'bird,' which is used to represent the category of bird. Lamb's work suggests that the lexeme level of categorization is at the same level of the conceptual fields at the tops of the sense networks, thus the conceptual system integrates perceptual systems with language.

Halliday, cited in Lamb (1999), contends with Lakoff (1987), Dooley and Levinson (2000) that child language evolves as a two part system whereby meaning is linked to sounds and gestures at first, but gradually evolves and shifts to take meaning from words first and secondly to apply them to expressions (Lamb 1999, 34). The cognitive mechanism that functions to allow for the creation of concepts through the activation and deactivation of nodes has two different responsibilities: production and comprehension. To stimulate production, both perception and recognition are required. He postulates that there is likely considerable redundancy of high frequency phonological forms and commonly used words in the production and reception systems, while low frequency forms may only be represented in the recognition system. As low frequency items have to travel from the lower levels of the recognition system to the production

system, it takes longer to produce low frequency forms (Lamb 1999). He illustrates this by drawing out networks and describing each of the types of junctions that are possible.

The recognition and production functions of the cognitive mechanism must be considered in the process of learning (Lamb 1999). Children learn to recognize sounds before they can produce them (Lamb 1999, 131). The area of the brain responsible for sending messages to the organs involved in speech is activated through its recognition of signs. This tendency is demonstrated when people can understand more vocabulary than they can produce because articulatory production is in effect maintained by auditory perception. When one is listening to speech, the nerves in the auditory receptors send messages to the brain to the conceptual and motor areas of the brain. Thus, new words are learned at the recognition level first, before they move downwards to production. Reception not only occurs before production but it also influences that production, such as when a person monitors their own speech as they say it (Lamb 1999, 131).

Lamb gives an example of a concept network at work in a child's mind after limited exposure to a shirt. He says that even this small network is made of 10,000 nodes because the concept is formed through the joining of many sub-networks. There is a visual sub-network that contains the object's viewable features (Lamb 1999) and there are also the somatosensory connections through sight and touch of a shirt (Lamb 1999). All of these sub-networks come under the lexical category of 'shirt,' which in turn represents the concept of shirt. A child learning language must learn to connect this vast system of sub-networks to the category and word 'shirt,' which she/he has heard previously in order to communicate effectively. Thus, a

connection between the phonological form and the mental label of 'shirt' is able to form out of

necessity. [26] Lamb says that categories:

> . . . will be defined for each child according to that child's semiological system, according to that child's knowledge (already present) of what eating is, as it exists at the time of learning of the word eat. Later, as the child learns more, it may change its understanding of the categories. (Lamb 1999, 268)

> Children will know that humans share qualities such as the ability to eat and that something needs to perform the action. Gradually they will become aware that most often the first participant in the utterance performs the action. (Lamb 1999, 269-270)

Lamb implies that the elements of a system that allow for the development of networks is

pre-determined by biology. He proposes that children are born with a universal set of pre-

connections. Thus, the human brain may already have thousands of connections to other

networks simply waiting to be activated with the appropriate stimuli (Lamb 1999, 190).[27]

According to Lamb, these connection lines do not become activated through a logical point A to

point B manner, because the activations are constantly moving, strengthening one pathway, and

weakening another as the nodes move from the "semological" level to the "lexemic nection"

level of activation (Lamb 1999, 125). How strong the activation of a connection becomes is

dependent on the connection itself and the amount of activity it receives (Lamb 1999, 178).

Lamb suggests that human beings are "model builders" (Lamb 1999, 103). Each person

has a personal information system that is embedded in a world that one uses to navigate his/her

environment. This world encapsulates all that is within and outside the body. Lamb criticizes the

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[26] Lamb hypothesizes that children only process the content words in the sentence because they do not yet have the cognitive ability to process the grammar. In his example, he says that participants and verbs are grouped together as a unit because words such as "eat" cannot be separated from the action (Lamb 1999, 268).

[27] Lamb's (1999) idea that despite the proposed pre-programmed nature of the brain activation of such networks requires the appropriate stimuli such as muscular action seem to support the notion of embodied cognition. Here he suggests that there is evidence that shows merely having networks is not enough. Mental networks need stimulus to be activated and they need more activity to sustain those networks.

idea that there are three worlds: the real world, the mental system that reflects it, and the projected world. He believes the projected world is always super-imposed on the real one. He also feels one's mental system is not a world in and of itself because it is merely an internal representation of the actual world, in essence the creator of the projected world (Lamb 1999).

The internal world receives direct experience of the real world as experienced through the senses and perceptual systems (Gattegno 1973; Lamb 1999). This includes linguistic information (Lamb 1999, 105). Because the cognitive mechanism has worked so hard to render itself invisible, it is not surprising that people can have difficulty distinguishing between the projected world and the actual world. Model building is a lifelong process. The cognitive mechanism works so well that people equate what it is able to do with what it actually does to produce products.

People are limited in their perceptions of the world (Lamb 1999, 105) because they can never grasp what is truly real and must be content with approximations of it (Lamb 1999, 106). Lamb's response, according to his network model, is that the process of putting information in memory is a matter of strengthening connections within the network. The activation, reactivation and deactivation of nodes allow memory to work as directly as it seems to (Lamb 1999).

Lamb implies that the connection of forms to the actual world they represent is not as direct as it seems because there are several levels of "activations" that occur between the lexico-grammatical level and the world. He proposes that there is an "inner semantics" and an "outer semantics" level in the "sememic system" (Lamb 1999, 145). The inner involves the lexis but the outer includes its interactions with the outside world (Lamb 1999, 146). For instance, as a person's concept of a bird expands to include a bird song, auditory connections are established.

Lamb attests that lower level nodes, which represent perceivable characteristics, allow for one's conscious experience of the world, whereas high-level nodes internalize that perception, slotting it into categories. Lower level nodes allow the spread of information from one sub-system to other ones (Lamb 1999, 152). Lamb asserts that there is sufficient research in neurophysiology to postulate that for children, language development is mostly a bottom up process (Lamb 1999, 162). For example, in the fetus the neurons of its cerebral cortices have very little myelination on their axons. When there is myelination, this enhances the abilities of the neurons to activate the primary cortical layers gradually spreading to the secondary layers (Lamb 1999, 162-163).

Lamb is, of course, not the only theorist to consider the brain's relationship to signs in the mind. Chevalier endeavours to determine how the brain and language intersect using neuropsychology, semiotics and philosophy (Chevalier 2002a, 3). He attempts to answer whether signs could relate to each other in a similar way to how neurons function (Chevalier 2002a, 91). Communication between neurons involve "…a special type of branched cell that binds together and supports the nervous tissue of the central nervous system" (Chevalier 2002a, 6). He metaphorically links this net of neural activity, to the process of signification (Chevalier 2002a, 9). In this manner, Chevalier does not quite equate the process of signification with "nervous sign activity" in the brain, but rather says the ways by which signs connect will likely resemble neural processes (Chevalier 2002a, 91). In his vision, the physical mental fibers that neurons pass through become the foundation of the webbing to allow for the transference of signs from one strand to another. Davis (1994) also uses a similar analogy of a net to describe the relationship of neurons to synapses. As it serves to clarify Chevalier, it is included below:

> Picture the brain as a large fishing net. There are vertical cords and horizontal cords, and every place the cords cross there is a knot. In this model, the cords would be

neurons and the knots would be synapses. By tracing along the cords, you can move from any knot to any other knot in the net. So theoretically, every synapse of the brain is connected to every other synapse. (Davis 1994, 46)

As a perceptual stimulus comes into the net, the first knot is stimulated. From there the signal is processed by sending other stimuli along other cords to other knots, and so on, until the original stimulus has reached all the knots it must reach. There are an untold number of different paths this stimulus could follow, but once a particular path is used, it becomes stronger. The stronger it is, the more it is used. Also, there are certain paths that never get stimulated, so they remain weak and unused. (Davis 1994, 47)

Chevalier calls this phenomenon "semiotic weaving." He intimates that neurons can only be discussed in reference to things that are bound to affect brain and sign activity.

Chevalier contends that brain functions can be *syncretic* or *diacritic* in nature (Chevalier 2002a, 81-82). As some tasks are more syncretically oriented, whereas others require more diacritic processing, the lateralization of the brain reflects this. The middle of a neuron is composed of a soma cell body, which is covered by a protective membrane. Outside the membrane, the intra and extracellular ions mix with negatively charged ions. As these neurons move around they travel through single-ion channels signaling back and forth between neurons (Chevalier 2002a, 86). He argues that the brain functions through both *diacritic* and *syncretic* processing. He concludes that more research is needed to confirm whether sign processes are synonymous with neurons' sign activity but adds signs likely resemble neural communications (Chevalier 2002a, 92) because sign actions are made by the brain. He says that when words only denote and do not connote meaning, such words may represent nerve cells without connections to other types of cells (Chevalier 2002a, 100).

Sign neurons exist within broader networks that group similarities and differences (Chevalier 2002a, 100) through their negative and positive charges. Signs, through their pre-existing interconnections, become associated with other signs. In light of this, Chevalier states "… the sign process is a nervous brain and body activity involving massive quantities of

electrical and chemical events" (Chevalier 2002a, 138). Thus, nervous signs that both act and react to other nervous signs produce a form of neural conversation. He suggests that a sign is the go-between that links an object to a subject's concept (Chevalier 2002a, 143). Sign processes have the ability to make an infinite amount of connections (Chevalier 2002a, 143). He argues that cells organize themselves into groups based on actions and the situational context of other cells that are around them. This is precisely how words interact with other words and utterances link to body signs, etc. (Chevalier 2002a, 143-144). In this way, signs are similar to sensory transducers that change energy into different forms (Chevalier 2002a, 144).

Chevalier states that, sometimes, neural conversations trigger the web. He calls this a reticle, which means to activate synapses, allowing the brain to be aware of depolarizations as they occur. However, many of the "communications" between neurons do not trigger an awareness of them because during a neural process, there can be both attentive and inattentive synaptic intersections. He compares the nervous system with sign networking, finding that there are striking parallels between somatic, autonomic, hypolarized and polarized functions of the neuron and semiosis. He implies that they process information in the same manner. Chevalier further argues that semiosis produces "somatic sign communications" (Chevalier 2002b, 58).[28]

He contends that, just as in the brain, people are not aware of every interaction between signs because many of these neural conversations only support the thinking process, preparing it to accept incoming signs. He also suggests that there are inhibitive devices that do not allow for certain connections to form between nervous signs. These involve "hypolarized" interspaces;

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[28] Gattegno (1973) refers to a person's soma as their "bag," intimating that individuals in the womb possess the genetic material in which to create the proteins that allow for the growth of the entire body. Chevalier's use of the term here when viewed in the broader scope of his argument suggests that the process of semiosis is not only the mode of thought as Peirce intimated, but it is entirely integrated through one's biological systems. This supports the embodied cognition theory.

sign pathways that cause tension because the pathways have not made appropriate connections (Chevalier 2002b, 58-59).

The potential of the sign to be activated and used is referred to as its sign potential. He says it is fruitless to try to place this in any distinct area of the brain because "synaptic events" are read through the combination of many functions and levels of semiotic activity (Chevalier 2002b, 167). As changes in the brain's voltage travelling past the membrane allows ions to pass through channels creating a path for one neuron to signal to another, Chevalier views this as semiotic nervous activity (Chevalier 2002a, 87).

Chevalier discusses the different functions of cerebral hemispheres, suggesting that it is better to consider them as having different cognitive styles rather than entirely separate hemispheres. He reviews the research generated from split-brain studies to contend that the right hemisphere (RH) tends to be primed for interpreting information in nonverbal, holistic, spatial and emotive ways. The connection between right and left is so integrative that it is difficult to divide their functioning entirely in practice. For example, he claims that even in a drawing task, which has traditionally been considered a right brain dominated technique (Edwards 1989), the task also needs to utilize the left hemisphere to consider details (Chevalier 2002a, 29). Synthesis occurs because of the interaction of these different hemispheres.

Gattegno's approach to concept formation is different from Piaget, Vygotsky and Lamb's in some respects. His opinion is that the soma is conscious of itself in as much as it can sense energy move through itself. Infants do this so that they can know their own energy in order to maximize their potential (Gattegno 1973, vii-viii). Thus, consciousness was already forming in utero and possibly at the point where a single cell started to divide and designate particular tasks for each cell. Consciousness then did not start in the brain, but began in the egg that the brain

would ultimately grow out of (Gattegno 1973, 13-14). He implies the soma is aware that it is constructing itself with a full chemical knowledge of how that is to be done (Gattegno 1973, 15). He intimates that when the mother's raw elements of blood and the chemicals it carries have been "objectified" into tissues, the soma can then repeat this process with every other element in the body, and thus tissue can be developed into all aspects of the body that the soma needs (Gattegno 1973, 15-16).

After each necessary item is made for the body, the conscious energy of the self can provide it an additional amount of energy to allow it to sustain itself, and then move from there to focus on the objectification of something else until it needs to utilize that area (Gattegno 1973, 16). He says that the internal world of the soma receives direct experience of the real world as interpreted through the senses, but only in relation to itself. His research implies that conscious knowledge also creates a residual mental image of all of its parts from the way they feel in the soma (Gattegno 1973, 19). In this manner every person is a self-motivated learning system that is continually shaped by experience through a conscious awareness of itself (Gattegno 1973, viii).[29] It can be inferred from Gattegno's research that consciousness is formed through layers of residual sense-images and is therefore initially pre-linguistic. It is not established within a collective through Saussure's *Langue* or through Barthe's connotative conventions. Consciousness in this sense is created out of the embodiment of meaning in the self. As Peirce's description of Firstness implies, the somatic state is one that is ever present in more complicated

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[29] Gattegno says, "Another non-verbal awareness permitted to each not-yet-born baby is the formation of the so-called body-image. Under this name, for a long time, has been understood the image each of us has of every part of his soma, the intimate knowledge of his limbs, say, which remains in the mind even after an amputation" (Gattegno 1973, 19). "Dysfunctions call for the intervention of consciousness and the knowledgeable self that has learned what its soma is all about knows what to do to put things back into balance (Gattegno 1973, 20)".

relationships because, regardless of the actions human beings engage in, the self is always present.

One's somatic state could involve Qualisigns, Iconic Sinsigns and Rhematic Indexical Sinsigns especially. Given the manner and speed by which infants develop their awareness of these signs through experience with various objects most especially their own bodies, it seems that human beings' universal capacity for language involves the creation and recognition of relationships between signs long before speech develops. At this point it seems they take in information that then comes to occupy their sign slots.

Saussure and Lacan might argue that these relationships are already present because the child has been born into a pre-existing linguistic system (Cobley and Jansz 1999) until the infant becomes aware of the conventional uses of objects. Before this recognition, in a sense they create relationships between objects through means of their experience because they know of no other interpretation. Lacan, a follower of Saussure, explained this in an algorithm S/s. The large "S" represents the world of signification and culture, whereas the little "s" represents the human subject that enters into the realm of signification (Cobley and Jansz 1999). Perhaps the little "s" can be associated with the self and the large "S" with social. Lacan cited in Cobley and Jansz (1999) argues that the two realms never meet yet there are key signifiers that lock in some manner of meaning for participants who use the sign. The implication of this is that the sign may appear to have inherent meaning even though it does not. This suggests during a child's pre-linguistic stage, they are engaged in the creation of rudimentary relationships somewhat within, but also external to the confines of *Langue*. Lacan's use of an internal world of the self and an external social world becomes valuable for the discussion of the PSCC/SCC construct model to be defined in Chapter 3, Section 2.

2.2 A Semiotic Interpretation of Key Sign Systems: Language and Culture

Arguably there are many sub-systems of signs within larger sign systems. If we consider the work of Gattegno (1973) in regards to the evolving soma, there is the potential to view the human body as one immense sign-creating machine with various faculties. For example, the pulmonary system is designed to respond to certain signs; the sign of the unaerated blood signifies to the heart that it needs to react by aerating it. Because of how neurons interact in the brain and allow information to travel from one to another, every body part, through its neurological connection to the brain, has the capacity to function as a sign and an interpretant of other signs. Given that the body is organized into a vast sign network, it should not be surprising that people can perceive the external world as an immense and intricate tapestry of signs.

Language and culture are perhaps the most intricate sign systems there are. Each is complex, being composed of multiple and often overlapping sub-systems because signs have relationships with each other. Since the introduction of semiotics, researchers and philosophers alike have sought to characterize the types of sub-systems that allow for the use of language and culture. Language and culture are such immensely complicated systems that they have led to centuries of research and contemplation. As they are constantly evolving, there is no way to describe them comprehensively; therefore, one must be satisfied with exploring certain areas of language in a sufficient amount of detail for the time available. With this in mind, the rest of this section will highlight some significant sub-systems in language and culture, beginning with a fundamental one called categorization.

Categorization, the labeling of a certain phenomenological slot, is practiced by all human societies in one form or another (Lakoff 1987). Human beings have a basic need to classify and categorize phenomena they perceive in their physical and mental environments in order to

survive and be successful through organizing their life. Lakoff implies human societies use categories to group information for easy retrieval and understanding. People create categories in order to link concepts and objects that have certain properties or qualities in common (Lakoff 1987, 5).

Wittgenstein, cited in Lakoff (1987), asserts that categories can have extendible boundaries in that they can be extended to include additional objects or be limited to include less, but this is an active choice by the user and not a natural flexibility of the category (Lakoff 1987, 16). Wittgenstein suggests that categories are based on items that have family resemblances (Lakoff 1987, 16). In other words, items can belong to a family if they have some feature in common, but each member does not need to have the same property in common. For instance, Sibling A and Sibling B may have one quality that is the same, but Sibling D and Sibling A have a different commonality (Lakoff 1987, 16). Thus, categories are made to be flexible. Historical semanticists and lexicographers have considered such relationships.

Lakoff's (1987) proposal is distinct from the classic view, which holds that categories are created based on the properties of the items within the categories. For example, in the classic sense, marbles, billiard balls, pachinko balls and peppermints may all occupy a single category because of the properties of hardness and roundness that each possesses. Lakoff argues that this classical view came from objectivism and has been central to western culture for so many decades that people seldom question its logic. He implies that the only logic to come from this socially imposed and self-internalized system is that symbols are given meaning through their relation to actual objects in space (Lakoff 1987, 7).

Lakoff (1987) argues that categorization involves not only the embodiment of knowledge from a people group's daily experiences, but also imagination, perception, motor activity and

culture. Categorizing can happen consciously or subconsciously as people use a combination of the above to organize their understanding of the environment. There can be good and poor examples of categories since many abstract concepts do not share properties, but will be related in specific ways through the relationships that they have, such as through, analogy or metaphor in sentences (Lakoff 1987, 7).

In order for language to serve its communicative purpose, speakers must have an understanding of categories. They need to have some sense that an utterance refers to some other elements other than simply sounds. Thus, language is made possible through categorization and it becomes such a natural process that one is scarcely aware of it (Lakoff 1987). A toddler's broad groups of objects are initially organized under one word. The term "dada," for example, may be a child's first word, but it can represent many different objects in the child's environment, not just their own father (Gattegno 1972, 10).

As this mental organizing process develops so early, the practice of categorizing becomes so natural for people that they tend to believe that the world is actually composed of natural kinds and that one's mental categories describe things, as they are (Lakoff 1987, 6). People have countless categories to represent abstract ideas such as emotions and relationships. Lakoff also argues the process of categorization is so fundamental to human beings that to alter one's perception of what constitutes a category is to change one's understanding of the world. This means that one's understanding of knowledge, meaning, grammar, truth, and rationality may change based on their category construction processes (Lakoff 1987).

Brown (1965, cited in Lakoff 1987) states that basic level categories develop before taxonomic categories. Basic-level categorization involves experiential aspects of human psychology, gestalt perception, motor activities, social function, memory and mental imagery

(Lakoff 1987, 37). Therefore, basic level interactions connect to cognitive structures and knowledge about the actual world. A basic level category is a level where shape is used to determine membership into the category. In a basic level category, the role of perception is to perceive shape and to produce a single mental image in order to promote immediate identification through symbol recognition and fast recall. The level of subject is the level learned most quickly, as it is also the first category level to be named and understood by children across languages (Brown 1965).

Basic-level categories govern how a person organizes most of the knowledge he/she gains. This means that basic level categories involve perception, function and communication to help organize information in specific ways (Lakoff 1987, 47). Function is connected to the general motor skills that are needed to do the action associated with the category. Communication functions to promote ease of use and sharing through its contextually neutral words. Qualities and characteristics of all the words are usually accompanied with the words at this level. These are usually divided into parts and wholes (Lakoff 1987, 47).

As mentioned in Chapter 1, Uexküll categorized types of *umwelt* into different levels based on an organism's sensory-motor code in relation to its environment. The vegetative *umwelt* included organisms that could perform simple actions such as searching, selecting, swarming, and spreading among others (Cobley 2010, 52). Animal *umwelten* involves the associating of objects with actions in memory and creation of relationships between new objects. This then allows for the connections between objects, angles, and distance allowing mental maps of terrain to be created, orienting animal species in space (Cobley 2010, 53). The last type is referred to as *lebenswelt* and this category is strictly used in reference to human beings. This involves the recognition that signs represent relations as separate from the objects that evoke them. Thus,

lebenswelt involves the ability to perceive one's *umwelt* as an "objective world." According to Deely (1982), Uexküll intimated that given the unique forms of organisms, the manner by which they interpret signs would be dependent on their sensory systems (Deely 1982, 99).

Leach implies that sensory information can be converted into sign "modes" (Leach 1986, 11). [30] This makes it possible to move smoothly from a written text into speech and from listening to music to singing or visualizing the song being played. He implies that this means all sensory data must be coded in the same manner. This seems to support Peirce's notion of unlimited semiosis where one sign of the triadic relation functions as a representamen for another. Leach proposes to modify Saussure's original term of sound image to sense-image (Leach 1986, 18). Likely this would extend Saussure's semiology to more of a semiosis where the emphasis is on the process of forming signs rather than linguistic analysis. Leach endeavors to explain the connection between these sense-images, objects and events in real life. Signs occur within events that flow from culture, thus signs are inextricably linked to each other through that event. Without its relationship to other signs a sign cannot convey information. He asserts that outside of this, context signs must have come from the same contextual set if they are to have meaning (Leach 1986, 13). This is because "human communication is achieved by means of expressive actions which operate as signals, signs and symbols" (Leach 1986, 9).

Although, like Leach, Chomsky is interested in human communication, he is less interested in analyzing what it is and how it is achieved through signs than discovering what the mental mechanism is that allows it to take place. To account for the fact that children learn how to communicate in relatively similar ways despite being exposed to imperfect linguistic forms,

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[30] Leach uses the term "modes" to refer to the means or pathway that the sign information uses to travel. For example, he says "The basic argument is that the messages which we receive in different modes (through our various senses of touch, sight, hearing, smell, taste etc.) are readily transformed into other modes" (Leach 1986, 11).

Chomsky argues that human beings are genetically endowed with a universal grammar

(Chomsky 2006, viii). The language faculty believed to house this UG is part of the brain. Thus,

UG is a study "… of the nature of human intellectual capacities" (Chomsky 2006, 24). He speaks

of the means of generating grammar from a singular UG source through deep and surface

structures (Chomsky 2006, 24). The surface structure will be the same as the actual language

used; however, the deep structure will consist of the abstract structures that influence which

surface structures appear. This UG would serve to explain why the rules in each language

operate to produce certain sentences while disallowing others. He considers UG as "… a system

of conditions on grammars" (Chomsky 2006, 55). This determines how they are to be interpreted

and distinguishes between deep and surface structures that limit what manner of transformations

can take place in order to fulfill the UG constraints (Chomsky 2006, 62). Chomsky seeks to

know what the first mental structure is that can be attributed to the mind that allows it to

construct a generative grammar from sensory data (Chomsky 2006, 69). Anttila (2003) seems to

suggest that it is an individual's ability to use analogy to create relations between signs. He says

that "… the faculty to analogize is innate …" (Anttila 2003, 428) and argues that "Language

structure and language use are also predominantly analogical, and this is why analogy is a central

component of UG" (Anttila 2003, 439). For without this ability it is uncertain how human beings

could generate a language grammar. Analogy through its function to utilize certain qualisigns of

objects is arguably semiotic in nature.[31] Analogy allows one to find a commonality between

seemingly dissimilar signs that at first appear completely different such as those between distinct

semiotic sub-systems such as an L1 and an L2. Perhaps Chomsky would not object to Anttila's

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[31] Anttila (2003) also discusses gestalts, relating them to UG and suggesting that they are structures of empty slots awaiting components. In section 3.2 and 3.4 the notion of an empty slot is viewed through a semiotic perspective and takes on a role within the embodiment of meaning, as a sign slot.

argument in part because he intimated that UG may simply interact with other mental faculties to create this grammar. This could mean there may not be a distinction between linguistic properties and "common sense understanding," because UG is not a system that can generate an infinite amount of sentences with their semantic properties (Chomsky 2006, 42).[32] If this was the case, Chomsky says that:

> … grammar is not a structure of higher-order concepts and principles constructed from simpler elements by "abstraction" or "generalization" or "induction." Rather, it is a rich structure of predetermined form, compatible with triggering experience and more highly valued, by a measure that is itself part of UG, than other cognitive structures meeting the dual conditions of compatibility with the structural principles of UG and with relevant experience. (Chomsky 1977, 43)

In the above quote from Chomsky, his mention of predetermined form leading to structural principles through experience seems to imply that at some level, he recognizes that if UG's structures are truly predetermined then they need individuals to engage in certain experiences to gain the compatibility conditions necessary to use language. In other words, there must be some stimulus that unlocks these structures, making them accessible to users. His conception of the language acquisition device as a switch box where the language of an individual is determined by the input that goes into the box also implies this. Perhaps at some level, cross culturally, infants receive the same general input. With reference to semiotic theory this input could be called somatosensory signs. Once infants reach the stage where they specialize on a language in their environment, one could hypothesize that constraints develop which inform the switches as to what structures are appropriate for the language based on the input that is received.

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[32] Chomsky considers Saussure's impression of *Langue* and *Parole*, noting that Saussure restricted *Langue* to linguistic units, whereas *Parole* meant the active and creative process of sentence formation. Chomsky hypothesizes that the phonetic form of a sentence is derived from the surface structure. He says that "Deep structure provides the grammatical relations of prediction, modification and so on, that enter into the determination of meaning" (Chomsky 2006, 97). In addition, it appears that matters of focus and presupposition, topic and comment, the scope of logical elements and pronominal reference are determined, in part at least by surface structure (Chomsky 2006, 97). Language users thereby need both linguistic competence and the skills in order to perform them with extralinguistic competence.

Considering the amount of conflicting input that may be present in the infant's environment, the fact that cross-culturally children develop their linguistic competence suggests not only that Chomsky's UG theory is at the very least partially correct, but also that there is some mental function that allows an infant to concentrate on one set of sounds rather than others. One might wonder how that distinction is made without the use of analogy: the process of making connections between dissimilar entities.

Anttila argues that analogy is "… the warp and woof of cognition" (Anttila 2003, 425). This suggests that when one considers the task of language specialization in infants, babies may be associating their L1 somatosensory signs with the L1 sounds they hear rather than with other languages perceived in the environment. Anttila's suggestion that analogy has a central role in UG seems highly plausible in light of this. Anttila's argument suggests that analogy's status as an innate capacity of human cognition grounds it in UG. His work demonstrates that other paralinguistic devices, such as metaphor, may also be present in a universal grammar. Considering once again Saussure's dyadic conceptualization of the sign and Agar's circle from Chapter 1, it seems apparent why such aspects of language have been kept out of linguistic enquiry. However, a theory that has grown in popularity over the last decade in light of neurological studies and Lakoff and Johnson's (1980) pivotal work on metaphor is motivating some to reconsider whether the circle was ever necessary. This is the theory of embodied cognition and it rejects the Cartesian dualism that has dominated many disciplines within Western culture.

The central idea of embodied cognition is that aspects of the body, and not merely the brain, have an important role in cognitive processing. Lakoff and Johnson's (1980) work could support this because they argue that metaphorical concepts are based in one's

physical orientation in space. They present many examples where orientational and ontological metaphors, that once established, have been extended to other concepts to describe one's human experience (Lakoff and Johnson 1980, 14, 26). So widely used are such metaphors in one's daily life that their metaphorical basis is not considered. Like Anttila's analogy, metaphor has been regarded as outside Saussure's permissible circle. Orientational and ontological metaphors are based on relationships that go beyond form and instead correspond with how individuals experience the world through their physical bodies. They stress that metaphor is not simply in language but in one's thoughts and actions as well (Lakoff and Johnson 1980, 6). Their assertion that "A metaphor can serve as a vehicle for understanding a concept only by virtue of its experiential basis" (Lakoff and Johnson 1980, 18), implies that the development of concepts is only possible through the extension of orientational metaphors gained through one's body's interactions in space. By this account, learning and communication become extensions of these "experiential gestalts" (Lakoff and Johnson 1980, 81). Thus, concepts are understood in relation to other concepts (Lakoff and Johnson 1980, 56) and the function of metaphor is to aid individuals' understanding of one kind of experience with another. Such capacity to understand is "… rooted in the structures of our biological embodiment but are lived and experienced within a domain of consensual action and cultural history" (Varela, Thompson and Rosch 1991 149).

Within the theory of Embodied cognition, there are three main strains: "body as constraint," "body as distributer" and "body as regulator" (Wilson and Foglia, 2011). Body as constraint refers to the tendency of an agent's body functions to limit the nature and "…content of the representations processed by…" (Wilson and Foglia, 2011) his/her

cognitive system. For example, a human cannot experience flight as a bird because a human has no wings. Body as distributer implies that a body will spread its representational load over the whole "bodymind" including neural and non-neural structures. Thus, people can have a physiological response to an image based on their perception of it. An example of this could be young children crying in response to a frightening image. Body as distributer is similar to body as regulator whereby cognitive activity is monitored by body functions. This would show that cognition and action are well integrated (Wilson and Foglia, 2011, http://plato.stanford.edu/entries/embodied-cognition/). Embodiment theorists have reinterpreted the works of nativists and cognitive theorists while conducting their own research to determine that, in part, perception and motor processing are related and assist in cognitive functioning.

Upon reflection on the connection between perception and motor processing and Peirce's semiotics, it seems if Peirce is correct, then signs are involved in cognitive processes and as signs are created out of one's perception of signs' relationships to other signs, the process of sign creation, semiosis, likely has a role in embodied cognition. Leach seems to support this argument when he suggests that signs can develop from different sensory modes. The fact that visual consciousness in part relies on how individuals move their eyes, head and body in order to "bring something into visual consciousness" also implies that semiosis is a part of embodied cognition (Madary and Spicer 2010, cited in Wilson and Foglia 2011). Likewise, the discovery of mirror neurons and how individuals watching other people doing a task will experience the same neural activity in their sensory areas as if they were doing the task themselves seems to suggest that somatosensory signs

are created through embodied cognition. Embodiment theorists attest that this may be evidence that perceptual and sensory motor systems contribute to cognitive processing.

An infant's learning process as described by Gattegno (1973) seems intrinsically semiotic. If one applies Peirce's triadic model of the sign to the event of an infant learning through the manipulation of objects, an infant is only able to gain some sense of the objects through qualisigns such as colours, texture and weight. This learning is made possible through the use of his tongue and fingers as extensions of his bodymind. Gradually the memory of these experiences may allow the infant to realize certain qualisigns are connected to the objects he manipulates with his body. This realization would constitute a state of Secondness. All of a sudden, the infant's beloved toy has qualities that as Piaget's moon example implies, the boy knows in its totality though he is as yet unable to abstract these qualities away from the object. At this stage, he does not separate the parts away from the whole. Until he can recognize this, he will not have attained a state of Thirdness, where he becomes aware that objects including his own body can function as symbols. Peirce's account of how signs are formed through relationships between the representamen, object and sign seems consistent with Piaget's developmental stages as well as the embodiment thesis.

In a somewhat similar vein as Leach, Gardner is also interested in mental experience and how that can be aided through sensory modes. However, Gardner extends the ideas of sensory modes, looking at how sensory input leads to the development of specific intelligences. By intelligence Gardner means "… the ability to solve problems, or to create products, that are valued within one or more cultural settings" (Gardner 1985, x). The implication of this work is that human beings gain intelligences through sensory experiences. Pathways can be strengthened

through repeated use of the sensory apparatus used to develop a particular intelligence. For example, if one's visual intelligence is weak then one can engage in activities that involve using the eyes in specific ways in order to strengthen that intelligence. Gardner says that typically the intelligences are intertwined so it can be difficult to tease them apart, though as he defines each of these, he notes that people will have some blend of intelligences. Gardner wanted to follow Piaget's idea that assessing students' correct answers was not as important as understanding how and why the students thought in a particular way (Gardner 1985, 18). Gardner questioned the validity and efficacy of "traditional IQ tests" because he felt that they did not give sufficient focus to each of the intelligences (Gardner 1985, ix) and criticizes Piaget for not including other skills such as artistic ability among others in his research on scientific thought.[33] Gardner proposes to take the methods and schemas developed by Piaget and apply them to a broader range of symbol systems that include each of the senses. He considers the whole notion of intellect as more complicated because it is influenced by both genetic and cultural factors (Gardner 1985, 35). It is best then to think that there are a variety of intelligences that act as sets of knowledge that are organized in the brain (Gardner 1985, 69).

In a distinct but similar manner to Gardner, Stokoe becomes interested in the genetic and cultural factors that influence the creation and use of language. His argument that sign language likely evolved before spoken language may reveal that culture and language are more directly connected than once thought. He wanted people to conceive of sign language as a full language in its own right. He said that "the idea that language does not exist without speech persists, and yet the nature of signs and their importance to all life forms shows the universality of semiosis-

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[33] Other scientists have found Piaget's stages were not entirely accurate as the tasks that the children performed in his studies were not considered real world tasks. However, as previously mentioned, his stages of child development are only being used in this thesis to provide a general context for the development of a personal semiotic cultural consciousness with reference to Peirce's triadic conception of the sign.

something gets interpreted by some creature or person as a sign meaning something else"
(Stokoe 2001, 74). Semiosis is possible through the presence of a collective that creates the sign
through their acknowledgement of the thing that is being referred to as a sign.

Stokoe (2001) reasons that humans' need to hunt in packs while strategizing, as well as
the need to teach skills to offspring would have necessitated the use of visual signs. Those who
argued that a language must have speech stipulated that gestures would not be able to make all
the necessary contrasts in language. He refutes this by stating that the human torso can make as
many movements as the vocal apparatus can, if not more, and the human eye can detect all of
these distinctions. He further contends that as public speakers often use gestures to support their
meaning, only visible signs would have direct links to what they represented. In contrast to
written or spoken language, Stokoe argues that visible movements can represent actions or
persons directly through their natural resemblance to the event as it took place and therefore
visible actions are signs (Stokoe 2001, 11). He provides the example of a person pointing in the
direction someone just walked in. The image of the act of the person pointing now refers to the
person who is absent. Thus, the visible action of him pointing functions as a sign to refer to the
absent person.

Stokoe says that human beings use movements in the same way other animals do. Vocal
sounds and gestural signs are elements of primate behavior, however due to greater manual
dexterity; human beings could make their movements represent beings and actions more
accurately (Stokoe 2001, 137). These could be fine tuned later to shows subtle distinctions
between subjects and actions. The diagram of the signer below in Figure 6 illustrates this.
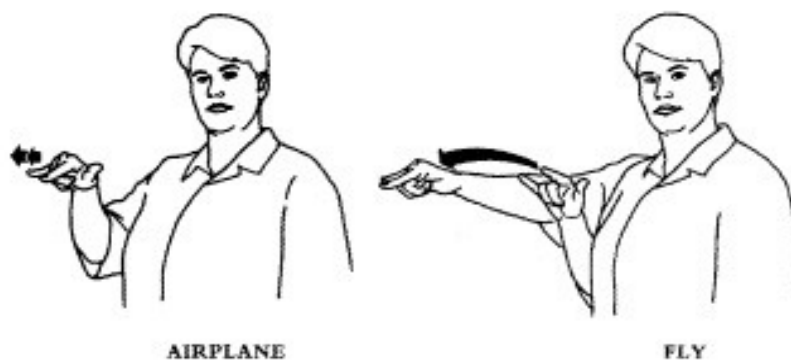
FIGURE 1. *An example of a noun/verb pair differentiated by movement.*

Figure 6. Stokoe, William. 2001. *Language in Hand: Why Sign Came Before Speech*. Washington, DC. United States: Gallaudet University Press. 2001:13.

Early human beings who realized their movements could represent relationships between things instead of just things would have used this to their advantage. Human beings could point to their subject of interest. For example, motioning with a finger as someone left could represent both the action and the subject moving in the direction he/she went (Stokoe 2001, xiii). The hand and its movement would represent a whole mental conception (Stokoe 2001, 112).

Using the hand to point to items to refer to them would have been the first step towards the development of a sign language. He also intimates that arm movements could re-make the features of many types of activity. He contends that visible movement was essential for making the first connection between sign and movement (Stokoe 2001, 21). Early hominids would have used a simplistic syntax; however, this kind of usage would have served to create more connections in the brain gradually giving them a greater capacity for expression, allowing individuals to pass on what they had learned to their offspring, creating a more sustainable culture (Stokoe 2001, 121). He predicts this would also have increased the capacity of the brain to sense information from the hand.

Early gestural languages would have developed increasingly more complicated visible representations such as movements that had adverbial and adjectival functions. These could have been added through the accompaniment of facial expressions or posturing. As society became more complex, busy hands would have lead to verbal communication as a surrogate for hand motions (Stokoe 2001, 116). Once gestural language was established, oral representations could have been made to match these signs (Stokoe 2001, 103). Thus early hominids would have had two sign modes for the same set of signs. Changes to the bones, skull and neck, as the need to walk bipedal increased, would have allowed for the larynx to become lower, thus lengthening the vocal apparatus, creating a double resonance-chamber making speech, not merely sounds, possible. From that point, it would have been a natural progression to the discovery that when only sound could be used to convey meaning because hands were busy doing something else, gesture may have become decreasingly necessary.

When considering the origin of language Stokoe argues that the visual system would have been a more complex and "neurologically richer" system then the auditory system (Stokoe 2001, 20). He asserts that the senses of seeing and hearing do not have the same level of strength. In the visual system there are strong connections between the eyes and the brain, whereas there are far fewer connective lines joining the auditory center of the brain to the ear. Also, the task of waiting for each sound to hit the ear and then be processed by the auditory system would have been cumbersome in comparison to gestural communication. He asserts that words and sentences would have come simultaneously as part of a single gesture that resembled the original action. Later, some early hominids were able to recognize that the sentence contained a noun-like element and an action and the sentence was interpreted as one sign. In reference to this, the coordination of eye and hand would have been essential for everyday life. Once established,

younger generations would have been born into a linguistic environment that would support the continued growth and development of their gesturing and speech capabilities. This implies that there would be a pre-existing culture and a collective that actively created and maintained it.

Like Stokoe, Agar is also interested in culture, but he takes a broader perspective, focusing not on one specific area like sign language as Stokoe does, but trying to summarize the key issues that bind language to culture. Agar emphasizes that, in contrast to the traditional view, culture is not something that people possess, but something they are exposed to as they experience life. It occurs with them and through them. Agar says that "Culture is an awareness, a consciousness, one that reveals the hidden self and opens paths to other ways of being" (Agar 2002, 20). It "… starts when you realize that you've got a problem with language, and the problem has to do with who you are" (Agar 2002, 20). "Culture happens in language, but the consciousness it inspires goes well beyond it" (Agar 2002, 20-21). Essentially Agar refers to the conscious knowledge of the language and its usage in context as a "languaculture" (Agar 2002, 71). This is because "Culture is in language, and language is loaded with culture" (Agar 2002, 28).

Agar seeks to remove language from the circle that has inadvertently been drawn around it by such structural linguists as Saussure. This circle objectified language, making it easier to conceive of language as a set of forms such as grammar and the dictionary that could be studied diachronically and avoid sociolinguistic considerations. However, Saussure almost simultaneously insisted that languages are not fixed and therefore must be studied synchronically. In other words, language had to be studied beyond the circle as well as within it. Agar considers grammar and the dictionary components of the circle, whereas he refers to the schematic material that exists outside the circle as frames. These "frames contain default values"

(Agar 2002, 134) that motivate cultural expectations and influence behavior though they are not static. Agar states that "Culture happens when one realizes that something "natural" is actually just a frame, that the way one always assumed things were isn't always the case" (Agar 2002, 162).

While Agar concedes language is not a system of frames, it can be useful to think of areas of difference between cultures, what he refers to as "rich points," as the gradual collection of information in order to build frames. These frames help one navigate through problems with language as it refers to culture. However, given that many frames are unconscious, they can also lead to problems, especially when one is suddenly faced with the situation where one's frames turn out to be wrong and individuals are forced into an awareness of them. By questioning these frames, it brings to light the possibility that the frame one has may only be one of many possible frames. This can lead to an awareness of one's own "languaculture" which is essentially how individual's languages operate beyond the circle and within it (Agar 2002, 205). Agar says learning a "languaculture from the inside" or the outside "are the same thing," though when "learning from the inside" differences are more subtle because the inner circle maintains the guise of sameness" (Agar 2002, 205).

Agar argues that while syntactic considerations of language are important and indeed languages are still classed as similar or not based on their grammar and words, these should not comprise the entirety of language study nor should they outweigh the cultural context that surrounds the circle. He also implies that semiotics is the key Saussure provided for connecting the inner circle of grammar and words to the outer circle of experience and usage. If one wants to communicate effectively it is vital that one learn

these frames (Agar 2002, 47). As a teacher, becoming aware of one's own languaculture will help one understand the ideological nature of one's own frames. This awareness can aid in the presentation of a second language as just another semiotic sub-system that is made up of frames and the sharing of languacultures to discover "rich points" and extract frames. As frames connect the inner circle and the outer circle, the sharing and discovery of frames can lead to broader discussion of culture because frames have connections to institutions and values (Agar 2002, 218). This exchange and transfer of knowledge can help students to become more aware of the similarities and differences between their L1 and L2.

2.3 A Semiotic Perspective on Positive Transfer

Simply put, according to Gass and Selinker (2008), the classification of transfer is that aspects of language A (L1) may affect the same forms in language B (L2) when trying to learn language B (L2). Structures that are the same may aid the learner, resulting in a positive product. Aspects that are distinct may or may not make it difficult for learners to understand the new form being presented. In terms of a semiotic perspective this means that where signs have a high degree of similarity, positive transfer should be easier to attain, whereas dissimilar signs may result in an incomplete or weak transfer of an L2 sign to an L1 sign. Supporters of the contrastive analysis hypothesis came to view L1 as interference to the learning of the L2 and the methodology developed at that time limited the learner's use of their L1 (Bou Franch 1998). Gass and Selinker contend that learners have a tendency to transfer the meanings, forms and the order of their L1 to their L2 in situations where they are producing L1 or receiving L1 input (Gass and Selinker 2008).

Early studies of transfer were based on the behaviorist model, whereas a more cognitive

approach to transfer is common at present (Gass and Selinker 2008, 90). Although transfer was

first associated with behaviorist habit formation, this could not account for L1 influence and

learner strategies such as avoidance (Bou Franch 1998). The 1960s and 70s witnessed a number

of learning movements such as The Silent Way (Gattegno 1972)[34], the Berlitz Method, that was

developed in 1978 (Brown 1994)[35], the communicative language teaching method (CLT)[36]

(Brown 1994, 244; Harmer 2004, 84)[37], the audio-lingual method (ALM), that was based on

behaviourist principles (Harmer 2004, 79).[38] Suggestopedia created by Lozanov in 1979 (Brown

1994, 97) and the Total Physical Response (TPR) method created by James Asher in 1977

(Brown 1994, 98). The lack of L1 use in each of these methods suggests that they may have had

concerns about using L1 in the classroom. As these approaches are not known for their use of the

L1, this could suggest that perhaps practitioners attributed L1 use with learner errors due to the

potential negative transfer of the grammatical, phonological and morphological patterns of their

students' first language.

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[34] The Silent Way used colour coded charts called Fidels and Cuisenaire rods of various lengths and colours to prime students on how to create specific situations students could learn from (Gattegno 1972).

[35] The Berlitz method was developed in 1978 by Charles Berlitz from the Direct Method and only uses the target language to teach, mimicking an emersion setting (Brown 1994, 44).

[36] In the CLT model students develop various competences as they use language for communicative purposes and pick up grammar intuitively like native speakers would (Harmer 2004, 85).

[37] The ALM moved beyond the Direct Method to include recorded dialogs and role-plays that included communicative drills as well as grammar learning (Brown 1994, 70-71; Harmer 2004, 79).

[38] Suggestopedia even transformed the learning environment to be one of relaxing music and images where students sat on comfortable chairs and did yoga in order to evoke the sense of ease and simplicity that Western culture associates with childhood (Harmer 2004, 89). This was meant to simulate the first learning environment in order to allow the student to learn the second language as they did their first (Brown 1994, 97).

A few methods such as Krashen's Natural approach suggested that second language learning should reflect the learning process of the first. As a nativist, Krashen says that despite the differences between languages, first language learners tend to go through remarkably similar stages of language development (Krashen 1987, 15). He called this "language acquisition" (Krashen 1987, 10). This was meant to maximize the student's ability to learn the second language by limiting interference from the L1. He intimated that there could be benefits as well as serious consequences if students used syntactic rules from their L1 to communicate in their L2 (Krashen 1987, 27). In contrast, Kellerman (1979) attempted to put transfer in the cognitive domain by suggesting that a learner's perceived distance could influence their learning. He said that learners actively use their perception of the L2 in comparison to the L1 to make decisions about what is similar and different between the two languages and its degree of transferability (Gass and Selinker 2008, 146).

Odlin (2005) pushes transfer further into the cognitive domain, investigating the transfer of concepts from the L1 to L2. He says, "Speech communities vary in how they code the affective meanings that permeate languages, and the linguistic differences can induce conceptual as well as meaning transfer" (Odlin 2005, 15). He intimates that even if meaning transfer occurs, conceptual transfer may not because it is merely a subset of meaning transfer (Odlin 2005, 6). For example, he would consider that temporal meanings such as space, time and effect might not be conceptually transferable elements (Odlin 2005, 10). He refers to the work of Stutterheim on conceptual transfer, noting that the examples presented in her work imply that the structure of one's language may shape the way one conceptualizes reality (Stutterheim cited in Odlin 2005, 13). For instance, she discovered that English speakers tend to use a path to finish their sentences, whereas German speakers use a concrete location for an endpoint. Thus, German

speakers are apt to describe things more holistically than English speakers who phrase things more analytically (Stutterheim cited in Odlin 2005, 14-15).

There is also evidence that suggests advanced learners are more likely to use an L2 processing strategy than new learners (Gass and Selinker 2008, 151). Singleton (cited in Gass and Selinker 2008) concluded that the L1 and L2 are likely stored in separate locations with a communicative channel between them (Gass and Selinker 2008, 462). Gass and Selinker contend that negative transfer and positive transfers are not two separate processes, but these are in fact merely products of the process of transfer (Gass and Selinker 2008, 90). They state that learners will bring previously learned skills and apply them to a new situation such as a transfer from tennis to playing racket ball (Gass and Selinker 2008, 93). They note that there are two types of language errors: *interlingual* which involves the L1 and *intralingual* which involves the L2 (Gass and Selinker 2008, 103).

Kellerman suggests that if languages appear too similar this may seem unbelievable to the learners (Kellerman and Smith 1986). However, Gass and Selinker argue that learners must be able to recognize some similarities between their L1 and the L2 before they will concede that their L1 may assist them in learning the L2. Also learners may be influenced by how they view content. For example, if an aspect of language is viewed as language-neutral that would imply the content is common across languages, at least in the L1 and L2. These might include certain grammatical structures and writing conventions among other rules (Gass and Selinker 2008, 147). How they perceive the distance between their language and another is the learner's psychology (Gass and Selinker 2008, 148-149). Kellerman (1979) found that the concept of "coreness" which related to forms' frequency of usage, their degree of abstractness and how

literal the forms were, strongly influenced how quickly L2 users were able to learn the L2 (Gass and Selinker 2008,149).

Gass and Selinker suggest that such items would be likely to occur across languages, whereas the non-core meanings would likely be language specific items (Gass and Selinker 2008, 149). Their hypothesis is consistent with such linguistic theories as optimality theory which holds that non-default language features will likely be associated with only a few languages and will be marked because of it, whereas there will be default features that are shared by many languages (Hale and Reiss 2000, 159-160). Gass and Selinker (2008) state that, "… we can predict where transfer will and will not occur" (Gass and Selinker 2008, 149). The implication of this is that the greatest likelihood of transfer is in core elements regardless of the perceived distance.

In reference to first language acquisition, Gass and Selinker examine the impact UG theory has had on SLA (Gass and Selinker 2008, 159). They seem to propose that UG principles make up a part of one's mental representation of language allowing for the connection of sound to meaning. They describe UG as a set of principles that show there is a need for a certain language form within human languages and there are parameters that designate how much a particular language needs a form (Gass and Selinker 2008, 161). These universals are believed to be caused by properties of the brain that are present in the human mind regardless of the language spoken (Gass and Selinker 2008, 160). Each language puts a different level of importance on each of the various forms.[39]

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[39] Optimality theorists accept Chomsky's notion of a universal grammar. However, they argue that the variations between languages may be accounted for by the different ranking of universal constraints (McCarthy 2002; McCarthy 2008, 15-16).

Lado (cited in Gass and Selinker 2008) insisted that teachers should do a contrastive analysis of the mother tongue and the language the student wanted to learn, to determine the similarities and differences between them (Selinker and Gass 2008, 89). However, there have also been researchers who suggest that the L1 has little influence on L2 learning, such as Dulay, Burt and Krashen's Creative Construction Hypothesis theory, which investigates how human beings are able to learn a first language if exposed to language input (Dulay, Burt and Krashen 1982, 8). They argue that this is mostly unconscious learning because people acquire languages without an awareness of what all the forms are called. They refer to the linguistic rules for the forms' positioning as constraints. It would not be unreasonable to suggest these constraints as expressed in optimality theory, when ranked, account for the similitude and variation found in the world's languages (Kager 2004, xi).

In a second language learning situation, when children are given language input they will not have access to UG principles because the only language universals they have are created via their L1. These second language learners may subconsciously use their L1 to access UG by using their ability to solve problems to extract overarching tendencies of language. For example, students learn a second language keeping certain basic rules in mind, such as the understanding that speakers must be able to use language to create an infinite amount of sentences through a finite means, and that a language will have rules for what forms can be combined (Selinker and Gass 2008, 165). People have some sense that there is a difference between lexical and functional categories. Lexical contains content words such as nouns and verbs, whereas functional categories are made of functional elements that allow for the connection of the actor to its action.

Gass and Selinker say it's important to determine whether a class of words is connected with lexical properties (Gass and Selinker 2008, 166). As UG is an abstract concept, it is difficult to determine to what extent learners have access to UG (Gass and Selinker 2008, 170). If language users had full access to UG, they predict that learners should be able to reset the parameters to match the forms appearing in the L2 (Gass and Selinker 2008, 170). The implication of their proposal is that an awareness of UG principles could aid in teaching a second language and as UG is not visible, it cannot be proven entirely wrong (Gass and Selinker 2008, 174). References to UG are speculative and rely on "arguments of learnability" (Gass and Selinker 2008, 177). In this manner, an understanding of how students learn a certain form has to consider differences between the L1 and L2 as well as universal tendencies (Gass and Selinker 2008, 179). Learners will try to maintain their L1 syllable structure even when there are sounds in the L2 that are not present in their L1(Gass and Selinker 2008, 180). This L2 syllable structure is affected by L1 structure but also influenced by UG tendencies (Gass and Selinker 2008, 182). They imply that discrepancies between the results are due to the use of distinct analytic frameworks (Gass and Selinker 2008, 131).

A collection of the various UG parameters would give one an impression of the types of languages there can be. From Greenberg's landmark study on language's universal tendencies on word order, one can notice that languages that have certain features are likely to have certain companion features. For example, in languages that have prepositions as opposed to post-positions, the genitive is likely to follow the main noun. However, in languages with post-positions the genitive will come before the noun (Gass and Selinker 2008, 191). There is some evidence that lexical errors will cause more disruption for the learners than incorrect grammatical structure; however, they conclude that difficulties in producing sentences may make

it difficult to use words correctly (Gass and Selinker 2008, 450-469). They state a combination of considerations that affect language transfer: perceived distance between L1 and L2, learner's knowledge of their mother tongue and a learners'-psycho-typology (Gass and Selinker 2008, 150).

While Gass and Selinker's book focuses on adult second language learning, they refer to children's first and second language acquisition where appropriate (Gass and Selinker 2008, xv). As SLA has been influenced by child language studies, these studies are often referred to. In some studies, children are found to use L1 structure when presented with a complicated L2 structure (Gass and Selinker 2008, 124). This possibility seems reasonable given the tendency of human beings to use previously learned signs to learn an unknown sign. Studies of L1 and L2 language acquisition research were, in part, behind the development of the concept of interlanguage. An *interlanguage* is composed of a combination of L1 structures with L2 forms. Interlanguage theory utilizes a few principles; the learner's language is flexible, thus it develops as the learner's knowledge and usage of forms grow. Interlanguage is a transient representation of the learner's language and it is systematic in that it uses predictable formulas (Bou Franch 1998).

Ellis' (1982) work explores the concept and origin of interlanguage. He attempts to conflate second language learning with first language learning in order to problematize interlanguage. He investigates research regarding L1 and L2 acquisition in order to determine if interlanguage is both a learning and an acquisition process. When Ellis studied his two year old daughter's utterances, he found that she used language in terms of its somatosensory motor meanings. This included semantic roles such as *agent/actor* and *undergoer* which are readily available regardless of which language individuals speak. He also noted that she made no

attempt to express tense, mood or aspect in her utterances. Ellis suggests that the former might be universal elements of grammar, whereas the latter will need to be acquired linguistically (Ellis 1992, 82, 214).

Ellis implies that both L1 and L2 learners use "semantic" language. This is language that describes their immediate experiences. Thus, it seems that one's interlanguage is unconsciously based on previous experience. L1 and L2 learners code their experience into expressible language such as "me cookie eat." As evident from the example above, even the word order may not impede the meaning until undergoers are involved. As languages involve some form of action, the implication is that some kind of actor must be present to perform the action and therefore L1 and L2 learners can communicate a wide variety of expressions without having to utilize grammar. When the actor is obvious to the speaker then sometimes learners omit the actor entirely. One of Ellis' examples was when his daughter said, "daddy down," which indicated she wanted to be put down (Ellis 1982, 213).

Ellis concurs that semantic simplification is the learner's primary strategy for processing L1 and L2 data. However, the L2 learner uses this strategy in tandem with his/her awareness of word order and looks for "modality elements" that will help communicate how he /she feels (Ellis 1982, 16). He says that both L1 and L2 users learn language for social purposes. The implication is that as the more complicated expressions arise, the learner will need to gain a knowledge of language structures. Ellis states that as a learner begins to process language "… it is syntactic only in the sense that the learner operates word order rules borrowed from his L1 in order to sequence the symbolic function he elects to encode" (Ellis 1982, 219). His evidence for this is that both baby language and teacher talk have a reduced length of utterance, few function words and the use of feedback questions (Ellis 1982, 209). Past studies regarding L2 learning

and interlanguage have focused on the use of grammatical functors and syntax rather than the semantic ordering of utterances. He urges that semantic simplification should be considered an important developmental strategy, but this simplified action seems to be limited to events occurring in the here and now. Establishing an event in time and space tends to require formulas. The desire to communicate when an event is finished rather than occurring drives the need for such formulas (Ellis 1982, 217).

2.4 A Semiotic Orientation in Language Teaching

Doughty (cited in Halliday) says that:

> "… language is both a product of, and the means by which we have access to, the systems of meaning relationship that constitute culture, the specifically human environment." That the child makes a language system for himself out of his cumulative experience of the "specifically human environment" to which he has access is a fact that no one working in education can now afford to ignore or evade. (Doughty cited in Halliday 1975, v)

> Recent research suggests that students who have difficulty learning a second language have weaknesses in their oral native language. Thus affecting their performance within an English language environment, these weaknesses affect the comprehension of phonetics, syntax, and semantics. Dyslexic and other learning-disabled students may be affected by the same weaknesses. If a child cannot decode letters, they will inevitably have difficulty reading, whether they are learning disabled, learning English as a second language, or in early grade school and presently learning reading skills. (Nosal 2012)

As noted by Marcel Danesi, while several authors have written about the overlap between education and semiotics, few volumes have been published on whether a semiotic perspective on education is relevant to second language teaching (Danesi 2000, vi). His investigation includes a view of Piaget's work on child development. He intimates that as infants grow, they rely on more semiotic behaviors and finer motor skills to explore objects and try out new sounds. Thus children gradually become more reliant on the system of signs they have been predisposed to create based on their cultural environment (Danesi 2000, 15). If children begin to construct their symbolic system from objects and events that become linked to words in their mother-tongue(s),

then it stands to reason that some kind of transfer process needs to occur for the child to recognize the same sign in an L2. For this reason, a semiotic perspective on second language teaching may provide some valuable insights.

According to Goodman (cited in Chomsky 2006), the reason why the problem of language learning is different from that of first-language learning is that "once one language is available, it can be used for giving explanations and instructions" (Chomsky 2006, 72). He then goes on to argue that "… acquisition of an initial language is acquisition of a secondary symbolic system" (Chomsky 2006, 72) and is quite on a par with normal second-language acquisition. The "primary symbolic systems" to which he refers are "pre-linguistic symbolic systems in which gestures, sensory and perceptual occurrences of all sorts function as signs" (Goodman cited in Chomsky 2006, 72).

At around one year of age, children begin using words such as "mama" and "dada." This occurs after they have made a progression of babbling to mono-syllabic abbreviations from their sound inventory. While it is tempting to consider these indications as signs, they can connote a whole phrase in reference to a milieu of different sign types such as images, stories, or a mental diagram, not just a symbol. Then this holophrastic stage of one word utterances becomes a condensed phrase more reminiscent of an adult's grammatical structure, but only containing the basic elements which operate around grammatical pivots (Braine 1971) such as "me want cookie." Vygotsky noted that human beings remember through the assistance of signs (Vygotsky 1978) and Danesi calls a person's ability to use a variety of sign devices, such as music and pictures, as their "semiotic competence" (Danesi 2000, 15).

Danesi uses the terms of L- and R-mode that were first used by Edwards to refer to left and right brain functioning, illustrated in **Figure 7**.

A Comparison of Left-Mode and Right-Mode Characteristics

L - MODE

R - MODE

Verbal: Using words to name, describe, define.

Analytic: Figuring things out step-by-step and part-by-part.

Symbolic: Using a symbol to *stand for* something. For example, the drawn form 👁 stands for *eye*, the sign + stands for the process of addition.

Abstract: Taking out a small bit of information and using it to represent the whole thing.

Temporal: Keeping track of time, sequencing one thing after another: Doing first things first, second things second, etc.

Rational: Drawing conclusions based on *reason* and *facts*.

Digital: Using numbers as in counting.

Logical: Drawing conclusions based on logic: one thing following another in logical order — for example, a mathematical theorem or a well-stated argument.

Linear: Thinking in terms of linked ideas, one thought directly following another, often leading to a convergent conclusion.

Nonverbal: Awareness of things, but minimal connection with words.

Synthetic: Putting things together to form wholes.

Concrete: Relating to things as they are, at the present moment.

Analogic: Seeing likenesses between things; understanding metaphoric relationships.

Nontemporal: Without a sense of time.

Nonrational: Not requiring a basis of reason or facts; willingness to suspend judgment.

Spatial: Seeing where things are in relation to other things, and how parts go together to form a whole.

Intuitive: Making leaps of insight, often based on incomplete patterns, hunches, feelings, or visual images.

Holistic: Seeing whole things all at once; perceiving the overall patterns and structures, often leading to divergent conclusions.

Figure 7. Edwards, Betty.1989. *Drawing on the Right Side of the Brain: A Course in Enhancing Creativity and Artistic Confidence*. Los Angeles: Tarcher St. Martin's Press. 19879: 38.[40]

Danesi makes a distinction between acquisition and learning in a similar manner to Krashen (1987) where he contends that a second language is learned, rather than acquired, as a first language is. Danesi conceptualizes acquisition as a function of the R-mode, inadvertently linking it to a learner's mother-tongue (Danesi 2003, 17, 42), whereas the L-mode is associated with the left brain functioning and by default with learning. He suggests this while acknowledging that different language tasks can activate several areas of the brain. When presented with some unfamiliar information, the R-mode is needed to experience a sufficient amount of freedom for the mind to be prepared for learning the new information.

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[40] Edwards' table in Figure 7 provides a convenient visual for distinguishing between the characteristics of the left and right hemispheres. Her simple design of the "L" and the "R" makes the differences between the modes apparent.

Danesi intimates that neurological research can help teachers make informed decisions about classroom conditions and expectations, particularly research that concerns how to utilize the strengths of each hemisphere (Danesi 2003, 37).[41] There is some evidence that if R-mode techniques are used to introduce a new lesson, Danesi argues it will cause an association between memory and the new information. Classroom activities then can be organized into a series of three stages: an R-mode stage, where information is introduced in a manner that utilizes more synthetic functioning such as discussion and creating diagrams; to an L-mode stage, where learning is reinforced through a more analytic means such as analysis; and an intermodal stage, where a synthesis is achieved through the discoveries made in the L and R-mode stages (Danesi 2003, 51). When considering this once again within a semiotic framework, one might suggest that, given the evidence from Sperry (1973) and Lenneberg (1967), the two hemispheres of the brain have evolved to process certain types of signs more efficiently than the other. If this is the case then it seems the use of signs, such as qualisigns, sinsigns, icons and indexes, would be engaging during an R-mode stage of a task. As mentioned in chapter 1, pre-linguistic life can include qualisigns; therefore the use of colour in particular may be effective during R-mode stages.

2.5 Colour in Learning: A Potential Bypass

The nature of colour is arguably semiotic in the way that it connects hue with object in the perceptual apparatus. Colour seems to function to join disparate sensory experiences into unified actualizations of self. Conway *et al.* (2010) contend that "Color has become a premier model system for understanding how information is processed by neural circuits and for investigating the relationships among genes, neural circuits, and perception" (Conway *et al.* 2010, 14955).

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[41] Asher cited in Danesi attests that the brain will house and analyze linguistic information autonomically when introduced through an R-mode first (Danesi 2003, 40).

Assuming this is correct, an investigation into the visual system and an understanding of how the mechanisms operate to allow for perception is essential because it will mediate and impact the sensory experiences human beings are able to have. Furthermore, "…color has immediate perceptual and cognitive significance in human experience" (Varela, Thompson and Rosch 1991, 157).[42] Varela, Thomspson and Rosch (1991) argue that individuals' experience of colour is shaped by the structure of colour, its role as a perceivable attribute of objects and as an "experiential category" (Varela, Thompson and Rosch 1991, 157). With their work in mind, a discussion of colour would not be complete without a brief description of its properties, how it is produced and how it is perceived.

Libby defines what colour is and reviews Munsell's (1905) system of colour relations in light of this. He considers Munsell's system of colour notation as necessary to gain an understanding of colour relationships. However, he recognizes that due to the flexible nature of colour, it cannot be perfect. Libby implies that colour is complex because it originates as electromagnetic energy and then goes through a process of change. This energy travels through waves to the inner eye where it is transformed into electrochemical energy. Later it is changed into encoded impulses through the optic nerve and then is finally processed by the visual centers in the brain to be recognized as colour (Libby 1974, 25).

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[42] Although the current discussion is about colour the following quote from Varela, Thompson and Rosch in regards to the category of form seems to suggest that colour is merely one component of the perceptual apparatus and is therefore influenced by other senses.

> This category refers to the body and the physical environment. It does so, however, strictly in terms of the senses—the six sense organs and the corresponding objects of those organs. They are the eye and visible objects, the ear and sounds, the nose and smells, the tongue and tastes, the body and touchables, and the mind and thoughts. The sense organs do not refer to the gross external organ but to the actual physical mechanism of perception. (Varela, Thompson and Rosch 1991, 64)

The argument that not only colour but any somatosensory sign could potentially serve as a semiotic bridge between an L1 and an L2 is highlighted in the analysis of language learning approaches presented in Chapter 4.

Munsell wanted to create a notation form for colour that functioned in the same manner as notes did for music. However, Libby says this is unattainable because there is no static relationship between a surface and its colours. Colours of objects are perpetually changing based on the reflective surface of the object and the colours of the surfaces around it. All objects deflect, divide and absorb the light that touches them (Libby 1974, 25). Perceiving colour then involves both external and internal processes. Varela, Thompson and Rosch (1991) seem to imply this when they say "We have seen that colors are not "out there" independent of our perceptual and cognitive capacities. We have also seen that colors are not "in here" independent of our surrounding biological and cultural world" (Varela, Thompson and Rosch 1991, 172).

Walsh (1999) argues that the colours people perceive are not merely the wavelengths reflected from the surface being looked at, but of the surrounding surfaces as well. In essence, this supports Libby's critique of Munsell's colour system. Walsh says that the body's visual system can respond to changes in "incident illumination" giving a relative perception of light, but not actual proportions of reflected light (Walsh 1999, 13594). He refers to this tendency as colour-constancy.

Zeki et al. cited in Walsh (1999) conducted a study of a patient with severe atrophy of the occipital parietal cortex to determine whether the patient, who was virtually blind, could see colours (Walsh 1999, 13594). He found that the man reported seeing different colours than subjects without that condition. He saw the colours as its wavelength dictated irrespective of any surface illuminants, whereas those without his condition saw colour as the surrounding objects influenced it.

The results of Zeki's study support Varela, Thomson and Rosch's assertion that colors are not contained in the "pregiven world" but in the perception of the world only made possible

through the connections between colour, shape and other qualities processed through the sensory motor system (Varela, Thompson and Rosch 1991, 164). Varela *et al*. refers to this combining as "structural coupling" (Varela, Thompson and Rosch 1991, 164). The implication of this is that perception is yet another aspect of individuals' embodied experience. In further support of this interpretation he states that:

> The visual system is never simply presented with pregiven objects. On the contrary, the determination of what and where an object is, as well as its surface boundaries, texture, and relative orientation (and hence the overall context of color as a perceived attribute), is a complex process that the visual system must continually achieve …. Indeed, color vision is actually involved in the cooperative processes by which the visual scene comes to be segmented into a collection of surfaces. In the words of P. Gouras and E. Zrenner, "It is impossible to separate the object sensed from its color because it is the color contrast itself that forms the object."29 Thus colors and surfaces go together: both depend on our embodied perceptual capacities. (Varela, Thompson and Rosch 1991, 167)

According to Munsell (1905) cited in Libby (1974), colours have three attributes: chroma, the amount of strength of a colour; value, the degree of light in the colour; and hue, the specific wavelength that makes a colour unique from others (Libby 1974, 12, 18, 19, 20). The light sensors in the human eye, called rods and cones, are sensitive to wavelengths of light. It is assumed that these sensors transfer colour messages to the optic nerve, which is then interpreted by the brain as colour.

In the back center of the retinal area of the eye, the rods and cones are very sensitive to yellow, whereas rods and cones at the outer edges of the retinal area are more sensitive to the degree of lightness or darkness. When stimulated, these sensors allow a person to see white, and when there is no stimulus, they see black (Libby 1974, 74). The Young-Helmholtz theory of colour vision (cited in Seidelinger 1947) proposed that the eye is able to perceive colours through a red, green and blue set of sensors where upon each set is designated to pick up the

lightwaves of a different colour either blue, red or green depending on which set they belong to (Seidelinger 1947, 24).

Zeki *et al*. refers to the parts of the visual cortex and discusses how wavelengths relay information between them. An area of the visual system, composed of portions of the posterior fusiform gyrus, was found to influence colour constancy without relation to memory, learning or judgement and it is instrumental in the act of connecting colour to form (Walsh 1999).

It is believed that when a dominant colour wavelength is present in the field of vision for an extended period, such as one to two minutes, the sensors designed to receive that wavelength become too tired to send the wavelength message to the occipital lobe. At this time, if the eye is exposed to a neutral ground such as a white piece of paper, other receptors send the message and the eyes perceive an "afterimage" of the dominant colour (Wilkins 2003, 36). This is why when one sees a pink light after a camera flash, the pink image will then turn green.

Every hue has its own "afterimage" and these tend to complement each other. For example, green has an afterimage of magenta (Wilkins 2003, 25). When two colours are present, their afterimages will overlap, blending with the other. If complimentary colours are used in an image, the degree of influence and visual interest between the colours is heightened. The colour mixing that occurs when complementary colours are adjacent to each other is called "simultaneous contrast" (Sidelinger 1947, 28). This effect is most powerful with primary hues and decreases with additional light and dark values (Sidelinger 1947, 28). In reference to afterimages, the new colour is based on the average of the chromas and values in reference to the original hues. This mixing occurs via the eye physiologically and is relayed to the occipital lobe and back to the brain and it is perceived as an "afterimage" (Sidelinger 1947, 28).

Although Libby acknowledges that it may never be proven, he predicts that one of the reasons for the human eye to attend to warm colours first is because sources of heat would have been extremely important for early human beings. Likewise, such colours as red and yellow would have been found not only in the sun, but also in animals they killed. Thus, warm colours could have become associated with living beings, different from the cool green of the ground and trees. Despite current cultural differences, if one were to trace the origins of man back to his beginning, perhaps one would find that warm colours were extremely important to pay attention to. Gengenfurtner *et al*. (1998) postulate that colour vision evolved into two separate systems: "… a primordial (yellow-blue opponent) subsystem and a phylogeneticlly more recent, second (red-green opponent) subsystem" (Gengenfurtner *et al*. 1998, 1041). The first sub-system compares short (S) wave cones with long (L) wave cones and middle (M) wave cones. They predict that this function served to allow for the division of the colour spectrum into cool (S wave), warm (L wave) and neutral colours (M wave) as this would help in the classification of objects (Gengenfurtner *et al*. 1998, 1041).

In contrast, the second visual sub-system compares the L and M cones (the red-green opponent). In both sub-systems however, wavelengths divide into cool and warm colours.[43] Mollon (1991) suggests that this division would have made it easier for early man to find fruit

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[43] Gegenfurtner *et al*. (1998) presented subjects with 48 images of randomly chosen natural scenes from a data base of 96 images. These included such elements as green fields with flowers, rocks, trees and even a few man-made objects. Half of the images were black and white and half were in colour. These images were presented to participants 50-100-msec within an interval of 7seconds in between each image. After this, a second set of images with the same 48 images and 48 new images were reordered and presented. Participants were asked to identify the original 48 images from the new ones at their own pace. The evidence from their tests showed that both colour deficient observers and those with normal colour vision were able to remember 5-10% more of the colour images than the black and white images. Gegenfurtner *et al*. thus concluded that there was little difference between those with normal vision and those with deficiencies. However, the authors concluded that an image of a scene is different than being in a tropical forest foraging for food or knowing when to ascertain when to cross the road in the urban jungle. For present, they suggest that their results show that the visual system's ability to discern forms from the primordial visual subsystem of yellow –blue is sufficient to recognize landscapes. They also suggest that as a person with normal colour vision can perceive more details than those that are colour deficient, un-visually impaired people would likely gain advantage in certain contexts (Gegenfurtner *et al*.1998).

among an African tropical rainforest. "Because all objects in the visible external world possess attributes of colour, colour difference is always an available means of classification. But, an indefinitely large variety of things will fall into any one colour class, so the social metaphors of colour are always potentially polysemic" (Leach 1986, 59).

Berlin and Kay's (1969) study of colour terms has also generated some evidence that could support Mollon and Libby's hypothesis. The (1969) work of Berlin and Kay argued that the evolution of basic colour term systems has developed independent of language. In their research they discovered that languages tend to gain colour terms in a predictable order. Cultures separate the spectrum into warm and cool colours that will be represented by the terms for white and black. Berlin and Kay (1969) called a language with two colour terms a "stage II" system. Warm colours tend to be divided up first before cool colours. For example, according to Berlin and Kay it is more likely for a language to have colour terms for red and yellow than green and blue. Typically, after a basic colour term has been established for a colour category, it is rarely removed from the language (Kay *et al*. 2009, 8).

Since reviewing and re-testing some of Kay and Berlin's work, Kay *et al*. find that Stage II systems develop into either a type III system comprising of green and blue, or a type III system that includes black, green/blue[44]. Stage III systems could develop into Stage IV systems that include green and blue or stage IV systems that contain black and blue. The general idea is that the spectrum is partitioned into two categories, warm and cool colours. This is followed by additional partitioning of the categories, dividing them in half each time. Thus, they claim that there are five evolutionary trajectories of basic colour term systems.

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[44] Where green and blue are represented with a slash between them this signifies that they do not have separate terms in the language. The / is used to represent a conglomerate term whenever it is used with any colours throughout this section.

Kay and McDaniel (1978) have come up with a seven stage system and replaced Kay and Berlin's model of eleven universal colour categories with three distinct types of colour categories: primaries, composites and derived categories (Kay and McDaniel 1978; Kay *et al*. 2009; Regier, Kay and Cook 2005). Primaries are roughly equivalent to focal categories, whereas composites are fuzzy categories that are made from the combination of primaries. In contrast, derived categories are made from the mixture of these combined primaries (Kay *et al*. 2009, 4). World Color Study has also found that Kay and Berlin were correct in their conclusion that colour adjacency is predictable based on its position in the colour spectrum. For example, focal colours have dominant wavelengths. Warm colours have more dominant wavelengths than cool colours (Kay *et al*. 2009, 6). From this, they were able to determine rules for composite categories. When a blend of primaries occurs, which they call "fuzzy unions," a chain that does not cross the delinquent line forms (Kay *et al*. 2009, 6).

The Kay and McDaniel model assumes that every language will begin as a Stage 1-"fully partitioned" system and will divide into certain groups of colours as it develops (Kay *et al*. 2009, 38). They hypothesize that as the yellow and green belong to distinct composites at Stage 1, yellow and green should not become associated, and yet there are languages that do this (Kay *et al*. 2009, 38). However, in a Stage III system where black, white and red have established terms but yellow, green and blue do not, it could divide into two ways. It could divide the yellow from the green/blue or the blue from the yellow/green. Cree was the only language in the data set to demonstrate the yellow/green composite pattern (Kay *et al*. 2009, 38).

Ultimately, Kay *et al*. view the yellow/green/blue situation as temporary before it divides into the expected yellow/green/blue. It is rare for languages to parse the spectrum into yellow/green and blue. They predict that in such rare cases, the cause of this parsing will be

either a natural extension of black, white, and red colour terms to composites, the existence of a special term that means yellow/green/blue or not black/white/red, or well defined terms for yellow/green/blue or green/blue. In general, there is a fair bit of variability of these terms between the language's speakers as derived categories may occur before all the expected composite categories do (Kay *et al*. 2009, 39).

They remove Stage IV and V from their stages and restrict their research to "basic stages" (Kay *et al*. 2009). They conclude that there are five basic stages moving from two to six term systems, as it was more accurate to classify languages in between two types rather than assigning them to one (Kay *et al*. 2009, 8). Presumably, this allows them to have one system that accounted for some of the data that did not fit the original studies, such as why a culture could have brown, a derived category, instead of purple which was only a composite of red and blue.

Individual's internal representation of colour seems to influence how colour term systems evolve in languages (Kay *et al*. 2009, 32). Each partition is believed to add one colour term until each of the six primaries has its own basic colour term. A Stage I system dictates that either white/red/yellow will have separate terms or black, green/blue will have separate terms (Kay *et al*. 2009, 33). If the division is between white/red/yellow it will result in a stage II system. When portioned again, black will be extracted from green/blue as white is already separate. This will result in a stage III system (Kay *et al*. 2009, 33).

A Stage III system will have terms for black, white, red/yellow and green/blue. Red/yellow are typically the next two colours to be distinguished with separate terms creating one more term, resulting in a Stage V system that has separate terms for black, white, red, and yellow, but green and blue are still connected. The next colour to be divided up is green/blue, resulting in another separate colour and a Stage IV system. There is variation within Stage II and

III because in the transition between Stage II to Stage III red and yellow may be divided instead of dividing black from the single green/blue term (Kay *et al*. 2009, 34). Similarly, a Stage III system becoming a Stage V system can group black with blue or separate black from both green and blue (Kay *et al*. 2009, 34).

In a survey conducted by Kay *et al*., 110 languages were assessed for colour systems. The survey showed that 92% of languages are consistent with the partitioning, but 10% order red over black and white at some point in their development (Kay *et al*. 2009, 35).One such language is Yeli Dnye which has basic colour terms for black, white and red and another red term that describes the red of kula shells. However, Kay *et al*. assert that this still meets the criteria for "basicness" and therefore does not contradict the principles based on Levinson's (2000) work (Kay *et al*. 2009, 35). This is because the black, white and red extended, but instead there was separate "phrasal expressions" for the colours of green, yellow and blue thus Yeli Dnye is not a stage II partitioning language (Kay *et al*. 2009, 37). If a language has not gone beyond distinguishing the colours of red, black, and white with terms, they expect to see that the colour terms for black, white, and red are used consistently with language speakers. There would also be a significant amount of variation in the descriptions used to describe other areas of the spectrum and they would not have simple terms (Kay *et al*. 2009, 37).

With the potential to confuse one colour with another because of the tendency of the eye to perceive afterimages, and for cultures to code them differently, one might think the use of colour in learning would cause more problems than it solves. However, evidence from Wilkins (2003) suggests that this may not be the case. Wilkins proposes that the use of coloured overlays can help prevent visual stress, allowing people to increase their reading speed significantly. Wilkins has done studies that suggest people can have difficulty reading due to print size, clarity

of print, spacing, brightness of paper and glare from surrounding light sources. He argues that the text in children's books is not optimal as it is sometimes too small with not enough white space in between words (Wilkins 2003).

Poorly printed texts can lead to symptoms of "visual stress," even leading to headaches (Wilkins 2003, 20). He describes this as a type of distortion experienced when reading. He says that any one of these criteria can cause the image of the text to become distorted. These distortions may manifest as the words looking fuzzy, jumping words, letters moving, letter reversals and even whole pages turning into bright white blurs. Frequently these distortions lead to headaches, stomach aches and other forms of physical stress (Wilkins 2003, 85, 20). The application of coloured overlays on top of a text may prevent these distortions from occurring (Wilkins 2003, 15). In clinical trials he found that even students who had no prior learning challenge found their visibility of text improved and they were able to score higher on tests then when they did not use the overlays.

Through several trials he has been able to determine that the use of coloured overlays are far more effective for helping children read than clear ones and grey ones. While other colours can help a student read, the best results tend to come when the child selects which colour overlay works best for him/her by trying each one in turn and choosing one (Wilkins 2003, 47). Seventy-eight children reported 2.8 symptoms of visual distortion and chose to use a colored overlay. Eleven other children did not choose an overlay because they only mentioned 1.0 symptom. "Of children who showed an increase in reading rate of more than 30% or more, 83% reported four or more symptoms on the group test. Conversely, 63% of those who reported less than four symptoms showed an increase in reading rate of less than 30%" (Wilkins 2003, 49).

Grounds and Wilkins cited in Wilkins (2003, 50) arranged three different groups of children: those diagnosed dyslexic, non-learning disabled students of the same age, and a group deemed intellectually impaired and the same age The results of the study showed that there did not seem to be a significant difference as to who could benefit from overlays. In light of this, he concludes that approximately "… 5% of a school population reads considerably faster with the use of an overlay…." and an additional 20% of the school populous had some benefits (Wilkins 2003, 55). For additional information regarding the details of this study please see Wilkins (2003). The children that benefit from overlays may already be "good readers" but more frequently overlays help those who have difficulty reading (Wilkins 2003, 118). He states that "the proportion of individuals with dyslexia who benefit is not significantly greater than the proportion of non-dyslexic individuals who benefit" (Wilkins 2003, 109).

Wilkins is not the first person to believe that colour may assist in the process of reading and learning. Montessori and Gattegno's methodologies both utilized colour. Perhaps it can be assumed that the tendencies of colour to grab people's attention, evoke emotional responses and stimulate the senses through its connection with memory are just some of the reasons why these educators made it an important part of their approaches. Montessori suggested that when children could experience colour through their senses, such as by seeing it and touching it, they would achieve what she called "colour memory" (Montessori 1965, 86). This meant that through prior interaction with coloured materials, the child would be able to call back the colour image that had been created through that interaction even when the object was no longer present (Montessori 1965, 86). Leach suggests, "It is possible that early childhood experiences may 'imprint' particular emotional attitudes towards particular colours" (Leach 1986, 57).

Gattegno's (1962) *Words in Color* approach used colour effectively to help students associate sounds with colour in order to learn how to read and, perhaps, to prevent the flow of students' thoughts from being disturbed by the contrary relationship of vowel combinations with their corresponding grapheme. Gattegno says that colour can help to teach reading and writing, explaining that:

> If we use colors to write each sign, we can at first refer to the sign by its color instead of giving its sound or name. That will reduce our interference with the learning process. In addition to this, we can make use of color in a systematic way to bring out the similarities and differences in sounds that we want the learner to perceive. (Gattegno 1962, 8)

Gattegno says ". . . it seems that colors add an extra dimension to the sign and strikingly help most learners to distinguish between similar shapes" (Gattegno 1962, 28).[45]

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[45] In *Words in Color: Background and Principles*, Gattegno devotes several pages to the explanation of his use of colour and alludes to the benefits colour can have in aiding language learners. It seems years later when he writes the Silent Way, the same principles are used, but he no longer needs to justify his use of colour as explicitly because he has already done so in the previous book. While the relationship between the two books may not be apparent because the former was used to teach English speaking children reading skills and the later was designed for teaching English as a second language, Gattegno includes a section of how his methodology has been successful with "foreign" languages (Gattegno 1962, 21-24). The following quotes from *Words in Colour: Background and Principles* seems to confirm that Gattegno used colour for essentially the same reasons in his work regardless of the language being learned.

"As a result of our work in a number of languages, we have evolved a number of learning principles that may be valid for all languages" (Gattegno 1962, 25). "The most distinctive characteristic of our approach is not so much the use of color to make a language quasi-phonetic, but in the fact that this method uses the dynamic properties of the mind" (Gattegno 1962, 10). In section 4.1, evidence from Montessori also implies that colour can be used to stimulate these dynamic mental properties.

> Since there is no logical reason why one should write from left to right in some languages, from right to left in others, and from top to bottom in still others, we must expect that the new apprentice will want some time to decide on that, and some pupils show us that they do need some time for this decision. Similarly, since there is no logical reason for any sign corresponding to a given sound, we must pay special attention to the way in which we introduce signs and their corresponding sounds. The English alphabet is patently the wrong way to introduce them. Based on the work we have done to date, it seems that colors add an extra dimension to the sign and strikingly help most learners to distinguish between similar shapes. (Gattegno 1962, 28)

> The successful transfer of the ideas that worked in one phonetic language to other phonetic languages enabled us to arrive at a tentative conclusion: the principles underlying the learning of reading and writing were largely independent of the structures concerned, i.e., the shape of the signs and the sounds of these particular languages. Naturally, each language to which we applied our method had its own problems and required adaptation of the principles which resulted in apparently different treatments for the first three phonetic (or quasiphonetic) languages… (Gattegno 1962, 67)

Gattegno states that colour can be used effectively for helping students who are learning how to read and write language (Gattegno 1963). He intimates that if educators use colors to write each sign, they can refer to the sign initially by its color rather than giving its name or sound (Gattegno 1962, 8). By coding such sounds as [ʌ] in the word "up" and [ʌ] in the word "from" with the same colour he bypasses the non-phonetic nature of English spelling, making it easier for children to read and spell in English. Gattegno uses colours in order to help students instantly recognize how a word needs to be pronounced so that they can read confidently. "The learning principle involved in the use of color is to contrast or show similarities between the signs of spoken American English by using sharply contrasting or very similar colors; the choice of colors is obviously to a great extent arbitrary" (Gattegno 1962, 31). He suggests that using colour assists in the learner's ability to build mental structures for letters, words and phrases in their mind.

Shams and Seitz (2008) attest that studies of perceptual learning have been more interested in the effects of single sensory modality, but their research suggests that people experience the world through a constant integration of multisensory information. They argue that visual and auditory information are inextricably linked during the performance of many tasks such as bird watching, driving a car, etc. They hypothesize that these experiences have caused the brain to be most efficient in multisensory environments. Therefore, they feel that "… multisensory training protocols greater resemble natural learning conditions and would ultimately be more beneficial than single modality ones" (Shams and Seitz 2008, 1, 5).

Shams and Seitz (2008) attest that traditionally researchers and critics of multisensory learning argue that using more than one sense while learning can be confusing. When students engage in an activity that involves primarily one sense, such as answering the question of what a cat looks like, knowing the sound of the cat may only interfere with the learning of the image of the cat. These researchers imply that the sound of the cat should be absent while learning its image. Shams and Seitz contend that their research suggests this is not the case. They state that "multisensory interactions are ubiquitous in the nervous system and occur at early stages of perceptual processing" (Shams and Seitz 2008, 1).

Within the brain itself, Shams and Seitz found that there are many brain areas and pathways for the interaction of multisensory input. These areas extend from the brain stem to early sensory cortical areas. This has led them to believe that learning during early development can involve multisensory processes at any time. Researchers have noted that during early development, a change in the effectiveness of one sense can directly influence other senses, demonstrating there is a high degree of neural plasticity. Shams and Seitz also hypothesize that congruent stimulus, the relationship between stimuli that matches the individual's previous experience in nature, will really respond to multisensory learning protocols.

Shams and Seitz claim that the main difference between uni-sensory and multisensory training protocols occurs during the encoding process because a wide set of processing structures becomes active during multisensory learning. Thus, there are multiple possibilities in regards to which structures will change during the learning process (Shams and Seitz 2008, 4). Lehman and Murray cited in Shams and Seitz found that when they presented an image with its correct sound, observers were able to recognise the image again, and had a better chance at success than those who only saw it. In addition, when an incorrect sound was paired with the image, the image did

not facilitate the memory of the object. They conclude that multisensory interactions with stimuli allow it to be encoded into multisensory representations and because of this, when presented with the same stimuli again later, will stimulate a larger network of brain areas than after uni-sensory encoding.

Educators such as Slingerland and Montessori and psychologists have known about the benefits of multisensory learning for decades (Shams and Seitz 2008, 5). Beyond its benefits to individuals, the use of multisensory learning allows a class of students an opportunity to learn through their own preferred style as well as strengthening their other intelligences. Shams and Seitz attest that "Related research indicates that multimodal processing reduces cognitive load because information from different modalities can be more easily chunked into short-term memory and used to build long-term representations" (Shams and Seitz 2008, 5).

2.6 Dyslexia: Orienting the Self: Disorientation and Dissonance

Traditionally, the classification of mentally disabled was bestowed upon a person based on the result of an intelligence test (Westling and Fox 1995, 4). The American Association on Mental Retardation (AAMR) adapted this, ensuring those suspected of having a disability were evaluated based on the evidence from multiple areas (Westling and Fox 1995, 4). The focus of this scrutiny is to find the means for people to function tolerably well in society. Their strengths and weaknesses are identified and supports put in place in order to assist individuals to be able to do what they would need to (Westling and Fox 1995, 4). Individuals who scored between 20 to 25 and 35 to 40 were classed as severely mentally disabled on "traditional intelligence tests" (Westling and Fox 1995, 4). As such, this class of individuals were seen as having few academic skills. Individuals who received lower scores than this were viewed as profoundly disabled. There is a great deal of variability in this category, but many are capable of participating in daily

activities (Westling and Fox 1995, 4). In the current AAMR classification system, these labels are no longer used and a multidimensional approach is utilized instead (Westling and Fox 1995, 4). This is meant to generate an accurate profile of the person's adaptive skills, as well as their internal influences, such as emotional and physical health considerations, and external considerations, such as their environment (Westling and Fox 1995, 4).

One well known learning disability is dyslexia. This term is used to describe people who have difficulties with reading due to irregular mental processing, although it can occur with many other areas of difficulty such as dyscalculia (difficulty in math), dysgraphia (difficulty with writing/spelling), etc. Since the discovery of learning disabilities and the classification of individuals as learning disabled based on intelligence tests, the theories of researchers such as Orton, Gillingham and Slingerland have been used to develop programs to help dyslexics learn.

Orton, a neuropsychologist, used multisensory techniques as far back as the 1920s to treat patients with language-related difficulties (Nosal 2012). He believed that using kinesthetic and tactile movements could help students with their visual and auditory understanding of letters and specifically prevent learners from reversing the letters. Orton encouraged Gillingham to take his research and theories and apply it to her work with alphabets (Nosal 2012). She developed techniques for teaching phonemes, morphemes and spelling rules. This became known as the Orton-Gillingham or Multisensory approach.

In the Multisensory approach, students connect what they hear with the letter by writing it out on a large piece of paper. Students run their finger over the letter multiple times while repeating its sound. The approach utilizes sight words, tracing and phonics (Nosal 2012). Orton-Gillingham Multisensory Learning has been in operation since the 1920s and the classroom adaption of that, The Slingerland Method, has helped decades of students learn to read, write,

spell and do mathematical equations (Nosal 1012). The Slingerland Method is based on the premise that the more mental pathways that can be activated during the learning process, the greater the retention of that material there will be.

While the hypotheses of Davis (1994) are unique and researchers and practitioners may question whether his results are scientifically verifiable, as Davis is a severe dyslexic himself, he has a strong voice in the dyslexic community. His explanation of what causes dyslexic symptoms has been influential because it has made tremendous sense to dyslexics across the globe. There are licensed professionals for the Davis' Dyslexia Correction program in many countries such as America, Austria, Germany and Greece, just to name a few. In fact, the programs are available in over 45 nations and in 30 languages (Davis 1994).

The thousands of dyslexics that have been helped through Davis' program attest to its remarkable effectiveness (Davis 1994). For example, L. Smith, a Davis facilitator from Rocky Point Academy in Calgary, noted that students made an improvement in four full grade levels in their reading and one third of the group showed an improvement of at least three grade levels by the end of the five-day program. Smith's results also confirmed that children, teenagers and adults were able to improve their skills, proving that the Davis program is effective for multiple ages. On average, adult participants improved their skills by six grade levels after the five day sessions (Marshall, Smith and Borger-Smith 2009). The image in Figure 8 below is from the book *The Gift of Dyslexia* that was written by Davis in 1994.[46] It shows a typical example of how fast students can improve their writing after receiving the Davis training.

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[46] Please note that this book was written to be read easily by Dyslexics. It features large print with minimal punctuation marks. At times colloquial language has been used and images are used throughout the book.

Figure 8. Davis, Ronald D.1994. *The Gift of Dyslexia: Why Some of the Smartest People Can't Read and How They Can Learn.* Ability Workshop Press. 1994: 49.

A central concept of Davis' theory is the phenomenon of disorientation. He says:

> Disorientation is a common occurrence. With very few exceptions, it happens to everyone at times. Disorientation is the natural function of a normal brain. It occurs when we are overwhelmed by stimuli or thought. It also occurs when the brain receives conflicting information from the different senses and attempts to correlate the information. (Davis 1994, 15)

> During a disorientation, your brain sees things moving when you really aren't, or your body feels as if you are moving when you really aren't. Your sense of time can slow down or speed up. Your brain alters your actual perceptions, and you experience the altered perceptions as reality. (Davis 1994, 17)

While disorientation is a normal occurrence, Davis asserts that dyslexics unknowingly cause disorientations to happen as a means of perceiving objects multi-dimensionally. In this way, "…they are able to experience multiple views of the world" (Davis 1994, 18). "They can perceive things from more than one perspective and gain more information from these perceptions than other people" (Davis 1994, 18).

Davis has created his program based on certain assumptions about the dyslexic mind and how it operates using his own experience and perceptions as a means to understand others. He realizes that it may be a long time before science can provide the evidence to support his hypothesis. However, the success rate of his program and its longevity of several decades suggests he may have discovered certain truths about the dyslexic mind. He contends that the source of dyslexics' difficulties, and their often profound ingenuity and creativity, is the same and comes from the dyslexic's ability to think in three dimensional pictures rather than words or two-dimensional images (McConvile 1998). This may not cause difficulty for words that dyslexics can generate a picture for, but for functional words such as the word "the" which has no immediate meaningful image, it can cause problems (McConvile 1998).

Davis contends dyslexics can become confused when they initially encounter such abstract words as "the" because they are unaware that their mind will unconsciously view that word from every possible perspective resulting in the page suddenly appearing blank or letters moving (McConvile 1998). Letters may move, the word may shift or the page may appear blank several times during the reading of a passage. If this happens frequently during the task, then the movement or blanks can trigger a special type of confusion he calls "disorientation" where a person no longer perceives what they see and only what their mind perceives is there (Davis 1994, 17). It does not take much imagination to determine from this that if dyslexics think in three-dimensional images, then when they encounter a functional word like "the" they will see nothing. As such words are common, after coming to the end of a sentence or paragraph, dyslexics may not understand what they have read.

Davis implies that when dyslexics become confused they will apply different strategies to deal with their confusion, perhaps the most common of these being concentration, an intense

stare into the page in an effort to make those printed letters produce an image (Davis 1994). In Davis' program students are instructed to form letters out of clay thereby making them three-dimensional and "picturable"[47] so that they do not cause these blanks. After punctuation signs have been introduced, students set out to replicate this process for all of the two hundred and seventeen "trigger words" that he assists the learner to identify (McConvile 1998). Students also create a clay model of the image they want to associate with the word (McConvile 1998).

Davis attests that "the primary thought process" of a dyslexic is a non-verbal three-dimensional picture thinking mode which occurs at thirty-two pictures per second. "In a second, a verbal thinker could have between two and five thoughts (individual words conceptualized) while a picture thinker would have thirty-two (individual pictures conceptualized)" (Davis 1994, 98). This results in anywhere from 6 to 10 times more thoughts per second (Davis 1994, 98). Thus, picture thinking in general is believed to be 400 to 2,000 times faster than verbal thinking (Davis 1994, 98). It is believed that visual and auditory information is retained in a sensory register for only 3 to 5 seconds (Swanson and Cooney 1991, 107). Thus, in dyslexic students the thoughts could speed by so fast, many of the thoughts would be too fast for the individual be consciously aware of them.

Davis' approach emphasizes the importance of awareness in the orientation training phase of his program. Orientation involves a combination of mental picturing and visualization techniques where students are helped to create devices in their mind such as an image for their mind's eye. Davis says that "The mind's eye does have a location. In fact, it has a multitude of possible locations. It is wherever its owner intends it, wishes it, or perceives it to be. If this

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[47] Please note that "picturable" is not Davis' term, but one of my own that is used to describe a sign that one is able to make a mental image for. The word cat for example is picturable.

sounds like a supernatural or metaphysical concept, please remember that dyslexics are able to

experience their mental images as actual perceptions" (Davis 1994, 129).

Without an awareness of where their mind's eye is, dyslexic students cannot orient

themselves. Davis stresses that the mind's eye is a location inside the students themselves.

Figuratively speaking, this might function as an internal window that they look out from. In

order to re-orient their mind's eye they need to understand that:

> When dyslexic people look at an alphabet letter and disorient, within a split second they see dozens of different views-from the top, the sides, and the back of the letter. In other words, the mind's eye is mentally circling around the letter as though it were an object in three-dimensional space. (Davis 1994, 129)

> Whenever disorientation occurs, all the senses (except the sense of taste) are altered. The brain no longer sees what the eyes are seeing, but an altered perception of the images. The brain no longer hears what the ears are hearing, but an altered perception of the sounds. And so on through the rest of the perceptions, including the senses of touch, balance, motion and time. (Davis 1994, 17)

Davis is aware that this analysis will sound somewhat akin to the quantum physics

concept that an object is affected by one's perception of it, and he is not entirely sure whether the

dyslexic mind is simply creating these multiple views. He cannot prevent the theory from

seeming somewhat surreal. For the present, all he can assert is that he knows that somehow this

mental movement disorientation process takes place in the dyslexic mind, as he is a severe

dyslexic (Davis 1994, 129).

Davis is not the only researcher to have realized that a conflict between relations during

cognition can result in a state of disorientation. Festinger uses the term "dissonance" instead of

disorientation in his cognitive dissonance theory. However despite the distinct terms, the

principles underlying both Davis' and Festinger's theories are quite similar due to the manner in

which they involve conflict and attempt to resolve it by sustaining a consistent orientation.

Festinger describes dissonance as "nonfitting relations among cognitions" (Festinger 1957, 3).

According to him the theory of Cognitive Dissonance stems from the idea that ". . . the individual strives toward consistency within himself" (Festinger 1957, 1). This can be likened to the idea of the individual's orientation point as described in Davis' theory. Festinger later uses the term consonance to refer to this consistency, making its oppositional relation to dissonance more apparent. He states that although there are of course exceptions generally, a person's beliefs and attitudes tend to be internally consistent and where there are inconsistencies these are usually obvious (Festinger 1957, 1). In Davis's work he is able to recognize these inconsistencies tracking their source to a disconnection between letters on a page and the mental image resolving them by giving the necessary visual information to achieve, as Festinger would say, consonance.

In a like manner to Davis, the work of Festinger seeks to account for dissonance in the hopes that he may discover a formulaic means of limiting the "psychological discomfort" that results from it. Festinger contends that, "The existence of dissonance, being psychologically uncomfortable, will motivate the person to try to reduce the dissonance and achieve consonance" (Festinger 1957, 3). Davis would say that dyslexics will employ concentration in order to do this. Festinger further argues that individuals will likely avoid situations and information that could intensify the degree of dissonance they experience. Davis notes this possibility as well. In their own ways both Festinger and Davis suggest that when new information is presented to someone this may cause temporary dissonance with previously learned knowledge (Festinger 1957; Davis 1994). It should be noted, however, Davis implies for dyslexic individuals this is most likely to happen with text and would not likely occur with visual media, whereas Festinger makes no such distinction.

Festinger also implies that in situations where individuals cannot control environmental variables during an event dissonance may result (Festinger 1957, 4). As both Davis and Festinger

intimate the level of tolerance for dissonance will understandably vary between individuals (Festinger 1957, 4). Although Festinger does not specifically mention that a person can become overwhelmed by this discomfort, as Davis seems to suggest, Festinger does imply through his use of Adams (1954) work that the dissonance can build up. Ultimately a build up will result in a release of tension whether that is smooth or abrupt (Festinger 1957, 33). Thereby the degree of dissonance experienced will depend on the value given to elements which exist in opposition to the element being considered (Festinger 1957, 17). The level of dissonance increases as the degree of importance of the elements increases. Davis would likely agree with Festinger in this regard, knowing that some dyslexics avoid certain subjects to prevent feelings of disorientation while others struggle to find bridges and alternative routes to learning such as utilizing analogies and pictures. Festinger concurs that the expectation would be that when faced with dissonance individuals would look for information ". . . that would produce new cognition consonant with existing cognitions and the avoidance of information that would add to the dissonance" (Festinger 1957, 144).

He further suggests that when a person experiences a sense of dissonance the person may become defensive ". . . to protect himself from the new information" (Festinger 1957, 149). Language teachers have certainly noted how their students can become agitated when they do not comprehend a new concept because of some previous conception. A defensive strategy could result in a misperception or avoidance of the information (Festinger 1957, 150). Student work that reveals holes in their grammatical knowledge, demonstrates this tendency. In other words individuals may simply forget information that causes dissonance. As previously mentioned Gass and Selinker (2008) have certainly noticed this in their research. In particular if the individual's experience is not prolonged and no reminders are provided through their daily life, the

information will likely be disregarded (Festinger 1957, 156).[48] Festinger says that "The total

dissonance introduced into a person's cognition by the knowledge that someone holds a contrary

opinion will, of course, depend upon how many existing cognitions are consonant with the

cognitive elements corresponding to the operation in question" (Festinger 1957, 178). Speaking

of Cognitive elements, it is time to consider the brain and its significant role in the process of

learning.

Chapter 3: Semiotic Confusion: A Synthetic Construct Model

Regardless of the topic, neurological research will ultimately become useful for

explaining certain events or behaviors in any number of fields of study. This is why neurological

research is applied to a large assortment of fields such as psychology, marketing, linguistics and

especially education. Indeed the scientific journal, *Cerebrum*, says there is even an emerging

field of study called "neuroeducation" (Hardiman and Denckla 2010, 4). Current research

focuses on the "Neuro-plasticity" of the brain that accounts for human beings' extraordinary

ability to adapt to new situations and environments (Hardiman and Denckla 2010). LeDoux says

that as the basic framework of the brain is the same for all individuals, the unique soma that is

created is a result of how synapses form into neural systems (LeDoux 2002, 36, 65). It is evident

from this work that, assuming he is correct, the brain both constructs the self and the brain is

influenced by the self as it evolves (LeDoux 2002). [49]

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[48] Although the work of Festinger is from a number of decades ago, today's teachers are still faced with such challenges and regardless of how old a theory may be when considered in the light of current practices and research it cannot help but to produce a post modern perspective because those that utilize it are products of their current culture. In chapter 4, two current methodologies, Pronunciation Science (Messum and Young 2012) and AHIEP (Acton 2012) attempt to address the tendency of students to forget what they have learned.

[49] LeDoux's use of the term self here arguably can be thought of as the soma. The implication of this is that he recognizes that the body influences the brain after the neural systems have worked to create it, thus at some level he recognizes the underlying principle of embodied cognition; the body has an important role in cognition.

3.1 The Brain and Neural Networks

LeDoux (2002) explores the biological mechanisms in the brain that ultimately allow for the creation of the self. The information that people become consciously aware of gradually forms the explicit aspects of the self. He says that the implicit and explicit aspects of self are in a constant state of change because one's genes can be affected by one's external environment. To appreciate these insights fully, it is necessary to consider what the brain is composed of and how it creates. The brain is categorized into ever-smaller areas such as the fore/mid and hind brain and these contain neurons and glia cells that help the neurons to function optimally (Danesi 2003). The broader structures of the cerebellum, cerebrum and brain stem make up the nervous system.[50] The brain is encased in three protective membranes. Together these seem to isolate the brain from damage and to increase the efficacy of neural circuits (LeDoux 2002).

According to LeDoux (2002) and Gattegno (1973), the creation of the self initially begins in utero as an embryonic form. While they have somewhat different views as to the level of awareness the soma has at this stage, their account of human life in the embryonic phase is similar. LeDoux says that the embryo lacks sensory systems and has no direct contact with its external environment. However, even within this fragile state of existence where the embryo depends fully on the mother's body to sustain its life, genes can be affected by the chemical environment outside the soma. Gattegno views this period of life as being a time when the slowly evolving soma is consciously aware of the energy that moves in and out of itself

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[50] The cerebrum is discussed in more detail on page 127.

(Gattegno 1973).[51] In contrast, LeDoux is more focused on the biological mechanisms, such as the distribution of neurons and the polarizing of synapses that make such awareness possible.

An embryo is made up of three parts: the ectoderm, which will become the vertebral column; the mesoderm, which will later turn into limbs; and the endoderm, which becomes the protective tissues that line the pharynx and throat, etc. Each of these contains all that is needed to develop its part of the body, including the brain. During the brain's embryonic stage, the main task of genes is to produce proteins, which will serve to create the soma or the "bag" as Gattegno would say (Gattegno 1973, 4). There are different types of proteins in the soma. Some stimulate other genes to make more proteins and others can cause chemical reactions or form blockades, restricting the movement of cells to ensure that they do not go where they are not needed. Some cells even form a glue-like substance that allows them to adhere to another cell while travelling some distance (LeDoux 2002, 66). These cells form a neural tube. As the tube expands, cells leave it and travel to their designated locations in the evolving brain (LeDoux 2002, 69). During this transient cell movement, cells interact with a variety of neurons (LeDoux 2002).

While LeDoux concedes that neurological research has not yet determined how each cell migrates to its designated area, he suggests, based on the research of transplant subjects, that brain cells will function as their chemical environment dictates they should. In other words they will assume the function of the environment they are in (LeDoux 2002, 70).

To understand the relationship between neurological interactions and thought, it is helpful to consider how cells, particularly neurons, interact within the newly developing embryo. A neuron is a brain cell with the ability to relay messages to other neurons and throughout the

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[51] Thinking back to Peirce's state of Thirdness, Gattegno's idea that consciousness begins before the fetus is fully formed is relevant to the null state because even a terminus road, a nothing, is a something through one's conscious awareness of its nothingness. Thus consciousness is the something that comes out of nothing.

brain. It has a membrane-covered cell body that houses genetic material that can make necessary proteins. Nerves project out from the cell body in the form of fibers that resemble wires called axons. Within the evolving embryo, all cells including neurons are covered by membranes and LeDoux says this is like a "spandex suit" (LeDoux 2002, 54). The nerve fibers stretch way out to gain contact with neurons. As the cell's axons become connected, they form networks. The end of the axon is called a terminal, and the sending and receiving of neurons occurs at this terminal (LeDoux 2002, 40). The messages projected out by the axons can affect other neurons and axons nearby. This phenomenon is called "divergence" (LeDoux 2002, 42).

A single neuron can hypothetically receive messages from any number of neighboring neurons. This is called convergence.[52] Thus, in a neuron, some part of it will be sending out messages while the other part is receiving them (LeDoux 2002, 42). When these two functions meet, a synapse, which is a little gap between neurons, is formed. Perhaps a synapse is similar to a bubble between the sender and the receiver neurons. Messages from the sender neuron then float across the synapse to communicate with the other neurons. The first neuron located before the bubble is referred to as the presynaptic neuron, whereas the neuron after the bubble is the postsynaptic neuron (LeDoux 2002, 43). The membrane covers the neurons' axons, dendrites and cell body as well. The transmitter then floats across the synaptic space and unites a dendrite with some other neuron.

Inside the membrane are a variety of chemicals that produce electrical charges. Some of these influence the way in which the cell functions. The chemicals on the inside of the cell are more negatively charged then the chemicals on the outside of the cell, approximately sixty to one thousandth-of-a-volt more negatively charged.

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[52] Neurons are aided in this task by growth cones that protrude like fans from each end of the axon (LeDoux 2002, 71).

Throughout every part of the brain, biologically propagated nerve impulses motivate electrochemical actions. This impulse, called an action potential, will travel down an active neuron's nerve fiber causing the release of a chemical neurotransmitter from its final destination. As the impulse travels down the axon, the axon carries energy of that impulse and the electricity contained in it touches other parts of the axon, all the way down to its end. Typically, these impulses are motivated by synaptic inputs (LeDoux 2002, 44). LeDoux refers to this whole process as the "neurodomino effect" (LeDoux 2002, 44). There can be several axons on neurons; however, more commonly, brain cells have only one axon with the ability to branch out creating several terminals. The chemicals at the axon need to be released to allow axons the chance to complete their work.

Action potentials are synchronized, but as soon as the action potential flows down the cell it then becomes a receiver, otherwise known as a presynaptic neuron. When presynaptic cells converge into a post-synaptic neuron this motivates an action potential. When various presynaptic neurons come to the post-synaptic neuron they must arrive in the cell more or less simultaneously. This role reversal between neurons seems similar to the game of catching a ball. In order for the game to continue, the receiver of the ball must throw it. The brain also contains inhibitory "interneurons" that release transmitters that decrease the chance of action potentials forming in a post-synaptic cell (LeDoux 2002, 51).

Transmitters have two properties. They must be able to change rapidly and they must prime the electrical state of the post-synaptic cell to increase the chances of an action potential to form. The projection neuron must activate the next cell in the sequence. There are also inhibitory neurons which function to prevent synapses from firing action potentials by rereleasing inhibiting impulses all of the time. These serve to deactivate projection cells, making them

inactive unless stimulated by neurotransmitters that are released by the projection cells (LeDoux 2002, 53).

LeDoux says there are different types of neurons such as sensory neurons, motor neurons and interneurons and that each of these have specialized jobs. Sensory neurons deliver sensory input to various areas in the brain. Motor neurons send messages to gross and fine motor systems. Interneurons, such as GABA cells, monitor the flow of neurons. Similarly the amino acid neurotransmitter, glutamate, has two tasks in the body: the first is as a neurotransmitter in the brain and the second is to support metabolic processes that occur throughout the body to sustain its life. The effects of glutamate and GABA are not specific to any one area, but are genetically felt throughout the body (LeDoux 2002, 53). After being released from a presynaptic terminal, glutamate attaches itself to the outside wall of a post-synaptic receiver, and a pathway opens through it. When this happens positively charged ions pass through the channel, entering the cell, causing the electrical charge to shift. If there are enough positive ions to change the inside charge to a positive one an action potential will commence (LeDoux 2002).

LeDoux's research supports Lamb's theory that inputs are transmitted and stored in hierarchal groupings. LeDoux would call these groupings circuits and he contends that local circuits mediate the circuit's connections at each level. The transfer of information from one level of a hierarchal circuit to another typically involves excitatory connection that is regulated by inhibitory local circuits and both hierarchical and local circuits to another. For both hierarchical and local circuits, transmissions are modulated by "single source divergent projections" (LeDoux 2002, 50).

The cerebrum divides into the left and right hemispheres. There are nerve fibers connecting these two halves and each of the halves divide into four sections. The hemispheres

share a half of the frontal lobe at the front of the brain, the temporal lobe at the lower side, the parietal lobe in the middle and the occipital lobe in the back (Danesi 2003). Through the corpus callosum that connects the left hemisphere (LH) and the right hemisphere (RH), the LH controls the right side of the body and the RH controls the left side (Danesi 2003, 26).

The LH is commonly associated with language because Broca's Area is involved in organizing the movements of the mouth and throat necessary for speech production as well as Wernicke's area that controls comprehension (Danesi 2003, 28). Vygotsky later attested that such linguistic components such as phonemes, grammatical categories and words resided in the LH; however, he thought language use and creation was motivated by the interaction of synapses occurring throughout the brain (Danesi 2003).

The popularization of the research of Broca (1861) and the work of Wernicke (1995) has impacted the field of education. Their studies have lead scientists to associate the left hemisphere with logic, language and analysis, whereas the right hemisphere has been connected to creativity, complexity, intuition, emotion and synthesis. This has given rise to the dichotomy of analytic vs. synthetic forms of thought. The notion that people have these two distinct forms of thought has also influenced pedagogy. Arguably, the dichotomous union of thought may have contributed to the motivation for the development of such learning methods as the Montessori Approach as well as Suggestopedia and TPR (Danesi 2003). Danesi argues that TPR utilizes four central "R-mode" principles (Danesi 2003, 40).[53] These are that there should be an emphasis on developing receptive skills, establishing teacher rapport with students, presenting new information through a combination of verbal and kinesthetic modes and that information students have difficulty with should be returned to at a future time (Danesi 2003, 40).

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[53] When Danesi uses the term R-mode he is referring to a mode of thought accessed through right hemispheric functioning.

Currently, the distinctions between analytic and synthetic functioning have been so well established that people may not question them. However, as useful as these distinctions may be, they have been generalized from the research collected about split-brain studies. Such studies have prompted modern neuroscientists to reconsider what human beings know of the brain and delve deeper to investigate how one's genes and neural circuitry continue to evolve to serve to create individuals.

Danesi's (2003) work is a part of a growing trend in applied linguistics to apply the latest neurological discoveries to classroom practice. With neurological studies, such as the Dana Foundation's projects occurring presently, teachers are hoping to improve their students' chances of success by learning what materials and techniques will help their students refine their mental processing (Gordon 2010). Danesi seeks to find a more productive short hand for describing functions that correspond with these traditional views of the LH and RH. He asserts that the brain must have a way of processing different kinds of information simultaneously. He implies that creating a less cryptic way of talking about left and right brain functioning, as it applies to language education, could aid practitioners. While this research is not new, teachers are still trying to find more effective ways of utilizing such information in their reading and learning approaches.

Danesi reviews some of the methods that have attempted to utilize the R-mode in their design. He says that:

> Suggestopedia, TPR, and the NA were the first serious attempts in the history of SLT to base classroom pedagogy on the view that the brain's acquisition mode--the R-Mode--is the crucial one in SLA. In so doing, however, they downplayed the role of the L-Mode perhaps too drastically. They continue to generate much interest and enthusiasm in teacher and learner alike during the initial stages--the stages during which the R-Mode probably dominates the intake of novel information. But their overemphasis on this mode throughout the course of SLA also probably explains why, by the early 1990s, interest in them declined considerably. (Danesi 2003, 42)

Danesi uses the concepts of the L and R modes to describe the functional qualities of each hemisphere. The RH is assumed to be mostly spatial, holistic, non-verbal and intuitive. When one is in an R-mode there tends to be a lack of awareness of the passage of time, sounds are not made into meaningful words, thinking is in pictures and one feels alert and focused yet relaxed. Danesi says the R-mode is the brain's mode of acquisition, whereas he considers the time conscious and analytic-mode to be ideal for learning.

He intimates that when R-mode learning precedes L-mode learning students will shift into L-mode for grammar production naturally. However, he also implies that while some students may need the L-mode more than others, adding L-mode activities are a vital part of the reinforcement process (Danesi 2003, 54-55). While current neurological research still concedes that split brain studies reveal that certain functions and neural activity occur in the left or right hemisphere, they describe this in terms of the specific part within the hemispheres of the brain that is affected. In other words, even though there is ongoing evidence that supports these divisions, current research is more focused on the general plasticity of the brain and how stimulus can activate multiple areas.

Danesi states that the right hemisphere is designed to transmit messages from its neural networks out to the rest of the brain. Therefore introducing new concepts through the R-mode will facilitate the spread of information in the form of impulses to other awaiting neural networks that are composed of signs. In contrast, he argues that the left hemisphere is organized to take in the impulses, catching them and not sending them out (Danesi 2003, 55). He further argues that "neuroscientific research on hemisphericity . . . strongly suggests that the R-Mode is a crucial point-of-departure for activating the appropriate language acquisition areas of the brain" (Danesi 2003, 55).

Danesi's argument is supported by current neuroscientific research. "The emerging picture from the current literature seems to suggest a special role of the right hemisphere in self-related cognition, own-body perception, self-awareness and autobiographical memories" (Uddin *et al*. 2006, 65). A recent book by Narvaez *et al*. (2012), reviews a number of these studies, such as Kasprian *et al*. (2011) neuroimaging studies[54], utilizing them to argue that the infant's early maturing right hemisphere, which is dominant for visual and emotional processing, "… is psychobiologically attuned to the output of the mother's right hemisphere" (Narvaez *et al*. 2012, 35). In other words, the authors argue that the attachment bond between mothers and infants greatly influences the growth of the infant's right hemisphere. This bond helps the infant develop survival mechanisms and therefore they conclude that the right hemisphere needs to mature more quickly than the left. Infants experience rapid hemispheric growth during the last trimester through the post natal period up to 18 to 24 months of age. "Evidence now clearly indicates during this rapid period of brain development, the right hemisphere develops before the left" (Narvaez *et al*. 2012, 33). Narvaez *et al*. argue that there is now a considerable body of research that shows at the non-verbal level the attachment bond between mother and infant structures post-natal right brain development (Narvaez *et al*. 2012, 33). They state that:

> Over the course of the first year, increasingly complex right brain to right brain attachment communications imprint first posterior cerebral areas involved in sensory processing (e.g., right occipital, right fusiform gyrus, right superior temporal sulcus, right temporoparietal regions), and later right anterior cerebral areas. . . . prenatal and postnatal interpersonal events also wire the connectivity of structures in the developing central nervous system (CNS) with energy-expending sympathetic and energy-conserving parasympathetic branches of the evolving auto-nomic nervous system (ANS). There is now consensus that the right brain plays a greater role than the left in autonomic arousal and therefore the somatic aspects of emotional states." (Narvaez *et al*. 2012, 38)

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[54] Kasprian *et al*. (2011) found that at 26 gestational weeks neuroimaging studies showed that right hemispheric functions matured faster than left hemispheric functions.

These are not new ideas, for in 1975, Brown and Jafe said that, "The right hemisphere can be

considered dominant in infancy, for the type of visual and acoustic communication which is

relevant for the pre-linguistic child" (Brown and Jafe cited in Narvaez *et al*. 2012, 35). If one

was to accept Narvaez *et al*.'s (2012) conclusion that the right hemisphere develops first to

promote infant survival, then one would expect that the emotional reactions of fully bilateralized

adults and pre-linguistic children would vary considerably because of all the learning that has

taken place in the adults' lifetime. Lamb notes that one's perceptual structure is, to a certain

extent, inherited through one's learning. Such education includes a complete and yet evolving

impression of the sign systems internalized by an individual's culture. In consideration of this, it

seems that deviations from this known sign system would cause some kind of reaction because

the expectation would be that signs would have a meaningful relationship with other signs.

While it is difficult to determine the distinctions between the rhematic indexical sign as it is used

by children and adults, a child's pre-linguistic signs of surprise and confusion may manifest in

different ways from an adults. In the following paragraph this issue is explored with reference to

rhematic indexical sinsigns.

As pre-linguistic children gradually become accustomed to the somatosensory signs

experienced in their environment, they may build up expectations for what they anticipate they

will experience. When deviations occur, this may motivate dramatic rhematic indexical sinsigns.

For example, consider a six-week-old infant that awakes in the arms of someone who is not

his/her mother and then immediately begins to cry. Neurological studies such as those presented

monthly in Merill Palmer-Quarterly (Palmer 2002), would suggest this infant is reacting to the

lack of the familiar smell (known sign) of their mother and the presence of the unknown scent of

the other person (unknown sign). The infant is responding to strong chemical signs and likely the

lack of mother's scent stimulated the emotion of fear, an emotion that LeDoux (1996) would say has been hard-wired in the genes from early ancestors.

In contrast, while an adult would experience some degree of anxiety after waking up in an unknown environment, they would perhaps try to control their emotional responses, using signs from their environment to ascertain how they should feel in that new environment because they might be in danger. The discovery of a new phenomenon might alternatively intrigue pre-linguistic children rather than frighten them. Infants that may become fascinated by the rattling sound of an object and would not necessarily discern that sound could be attached to danger.

One observing infants, can determine that, to some extent, they are accustomed to not knowing signs and only remember certain signs, presumably those that are essential to their survival and form part of their *umwelt*. Infants rely on their caregivers to protect them from all dangers and fulfill their needs. Because of this, their response to unknown signs will likely be that which can alert another person. Also, as infants have only a first level modeling system their *umwelt* will be less complicated than adults, causing them to react instinctively. From an evolutionary viewpoint, their response to confusion should follow a predictable course in order for their kin to recognize what the infant needed. In light of this fact, Narvea's conclusion that an infant's right hemisphere develops quickly in order to promote strong attachment bonds between infants and their kin seems probable.

3.2 The Personal Semiotic Cultural Consciousness

In order to summarize the research previously mentioned in regards to brain development, semiotics, language teaching and learning in a manner that may make it more accessible to the practitioner, it is proposed that a two-sided synthesis model be considered. The two-sided aspect of the model represents the different functions of the LH and the RH. The

model utilizes some of the neurological research of LeDoux (2002) and Damasio (1999) and some of the child development research of Piaget (1966), Vygotsky (1962) and Gattegno (1973). As the model is described, other influences will be noted where appropriate. The reason for presenting the construct that this model represents is, in part, meant to provide the viewer a visual means of understanding the connections between right and left brain functions as they apply to language learning. With this goal in mind, the R-mode could be associated with individuals' understanding of themselves and their beliefs about their situation in life, whereas the L-mode could be associated with individuals' understanding of the collective's beliefs about life.

From the standpoint of semiotics, one might term this R-mode perspective "personal semiotic cultural consciousness" (PSCC). The L-mode by contrast would then be the "semiotic cultural consciousness" (SCC). It needs to be made clear that the PSCC and SCC are only being used as a short form to discuss processes that are associated with either left or right brain functioning, economically. A personal semiotic cultural consciousness refers to the ability of each person to have a sense of who they are as a sign within and external to language.[55] Information that can be brought into the brain can be interpreted as signs through one's conscious awareness of them. From the point at which an individual begins recognizing the meaning of the sign, a consciousness of him/herself within a culture of pre-existing signs gradually develops. All signs that are formed are directly related to the soma's functioning in the

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[55] People can become aware of themselves as a subject, "I" or "me" within language (Lacan cited in Cobley and Jansz 1998). Halliday called this the personal function of language. However, not all human experience is communicable. For example, one can express that one is in pain, but no person can know exactly what another's pain is like. In this way Benveniste (1971) implies there will always be a part of the self that is inexpressible in language (Benveniste (1971) when he says "… that man constitutes himself as a subject, because language (Langue) alone establishes the concept of ego in reality in its reality which is that of being (Benveniste 1971, 224).

discovery of itself. As the PSCC develops, signs fill up the sign slots and each has a connection to the learning event that occurred for the child to learn it. These signs can be conceived of as residing in different sign levels in the PSCC. Gradually, layers of signs make up one's self-concept. Therefore, according to this theory, the PSCC is the sum of an individual's experiences as mediated through signs.

Damasio (1999) hypothesizes that there is a separate form of the self called the proto-self which is responsible for storing all the ancestral hard wiring that accounts for individuals instinctive reactions to danger. This could be likened to an Animal *umwelt*. These basic functions include: occurrences such as the regulation of hormones, blood sugar levels and reflexes, and does not suggest conscious awareness. Damasio predicts that this proto-self would likely be connected to the amygdale. Gradually the synapses take in information from the external environment and send it to the part of the brain that controls the body's responses to external stimuli; the amygdale. When the amygdale encounters something potentially dangerous from this input, it then signals to the body to react. These reactions may include any number of the following: changes in blood pressure, changes in heart rate, a release of hormones or freezing up, among many others (LeDoux 2002, 7).

The amygdale is designed, in a manner of speaking, to instinctively recognize certain messages such as the sensation of pain (LeDoux 2002). LeDoux predicts that such a defense system could have come about by having a two part system; one system being pre-programmed based on the species, and the other for dealing with individual specific needs. In this way, the amygdale can respond to instinctively known dangers and learned dangers. "All it has to do is create a synaptic substitution whereby the new stimulus can enter the circuit that the prewired

ones used" (LeDoux 2002, 7). LeDoux's work gives the impression that strong emotions, such as fear, are likely produced in the amygdale as a response to signs that are interpreted as dangerous.

The amygdale will respond based on the experiences the individual has had. The brain can also extract from these experiences to decide how to react to a novel stimulus. When information that is not evolutionary coded, but is associated with a strong emotion, this secondary information can produce a similar response. However, the input coming into the amygdale may stimulate the GABA cells as well as a projection neuron. Thus, as cells become more active, inhibiter cells activated which then begin to deactivate the cells in the amygdale. If this does not commence, other formerly not dangerous stimuli may be perceived as such (LeDoux 2002, 63).

Similar to Lamb, LeDoux suggests that the brain organizes things into networks unconsciously (LeDoux 2002, 10). As such, reactions are instinctive and human beings have been evolutionarily hard wired to respond to dangers in this way as a means of survival, therefore it seems likely that the PSCC would develop out of this original simple system. In order for the amygdale to quickly interpret stimuli as dangerous, it would need a strong connection to all sensory networks that would be contained in the different sensory modes.

A quick diagnosis of a situation would necessitate well connected networks with axons stretching to all of the other pertinent networks, ensuring that the synapses could fire their action potentials all the way up the lines of connected neurons like neurological "dominoes" (LeDoux 2002, 307). This might be a significant amount of information for one hemisphere to process, thus it makes sense that the left and right hemisphere may be pre-programmed to interpret certain input or functions while leaving the opposite hemisphere to process the rest. In light of this possibility, it is proposed that right brain functioning may lead to the development of a personal

semiotic cultural consciousness, whereas left brain functioning may lead to the creation of a semiotic cultural consciousness.

As the fear response is the one that is basic to mammalian species and the right hemisphere has networks meant to respond rapidly to incoming dangers and problems (Schutz 2005), it is likely that this function would form part of the PSCC. This would be distinct from Damasio's proto-self stage because that stage occurs before the individual is able to process any references other than themselves. In contrast, although the PSCC develops during the period for Damasio's proto-self, it allows for the interpretation of inputs that exist beyond the soma, but only as far as it refers to the self. Thus, in the PSCC construct, children may be able to recognize there are other people in the world, but only in as far as they relate to themselves. For instance, a child might think: this is the man who lives by my school and gives me cookies.

An individual's PSCC may interpret the presence of a bear as unknown stimuli, resulting in the sensation of their heart racing or the desire to run. In order for individuals to deduce this from the situation, they would need to use previous knowledge of some similar sign and access the brain's imaginative function. Imagining what might happen if they remained in the environment with the bear, would be an important right brain function or as Lamb and LeDoux contend their synapses would have to be pre-programmed through years of evolution to have marked certain inputs as triggers.[56]

LeuDoux's work in regards to fear suggests that at a first level *umwelten* individuals are likely to have similar reactions to stimuli, but as their *umwelten* evolves these will develop into distinct sequences of behaivour. As pre-linguistic children are fully emerged in their PSCC, they

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[56] For an informative and interesting argument about what emotions are and how they arise please read LeDoux's (1996) book *The Emotional Brain: The Mysterious Underpinnings of Emotional Life*. London: Simon & Schuster paperbacks.

would not experience the same kind of discomfort as adults might when confused because infants would not have to traverse between signs in the PSCC and SCC. According to the model, the signs in the infants PSCC would relate to him/her and expressing their ability to express their relation with these signs would be limited to somatosensory expressions that adults could infer as signs. These could include, but are not limited to, changes in pitch and volume of their voice, facial expressions and hand gestures. The fact that infants tend to be more physical and dramatic in their reactions, and perhaps react more quickly than adults, suggests they do not have access to as many levels of signs as adults. Liégeoisa et al's (2000) argument that inter-hemispheric integration does not occur until around age two, would also support the notion that pre-linguistic children may not utilize the same signs as adults.

It seems that as the infant's first brain functions to develop are somatosensory, all sensory inputs would be necessary to the development of the PSCC. It is also possible that once the first sensory inputs are in place, the LH becomes involved in the interpretation process. This is difficult to confirm because right brain functioning also includes interpreting relationships and it is unclear whether a very young child would be able to break up the inputs about the bear coming into their presence into abstract qualities. In fact, one of Piaget's studies on child learning was about a boy who could not separate the moon from the qualities it possesses suggests that young children are not able to divide a concept into components (Piaget 1966, 147). Thus, according to Piaget, it can be assumed that they think in wholes and not parts.

Piaget's study demonstrates how the child automatically perceives the object of the moon in its totality as a "general schema" (Piaget 1966, 147). Though the child is unaware that he is conceiving the moon as a synthesis of its qualities, he is. This could mean that even young children can gain meaning from a concept. They might simply lack the ability to abstract out

other meanings that are associated with it through its parts, because this requires the mental ability to extract smaller parts of meaning from a whole. The fact that children have difficulty with this could support the idea that the PSCC develops out of right brain synthetic functioning and not left brain analytic functioning. Also R-mode functioning is known for its spontaneity/immediacy and intuitive nature and all of these skills would help develop a person's sense of self.

Halliday states that the utterances of children may be represented either as attempts at the adult language, or as independent structures. He says that:

> …the first approach, which is in a sense presupposed if one adopts a nativist view, involves treating many of the child's utterances, perhaps all of them at a certain stage, as ill-formed; they are interpreted as deviations from an eventual norm, resulting from distortions of various kinds, particularly the deletion of elements. . . . This brings out their relationship to the adult forms; but it blocks the way to the recognition and interpretation of the child's own system. (Halliday 1975, 2)

Halliday criticizes the nativist interpretation because it does not address the question of what motivates a child to move from his language to the adult language after he has invested so much time and energy into learning his own. Of course, adults will interpret children's language based on their own semantic system. Through this early transfer of child language into an adult system, the child's language development, especially the knowledge of the language roles of intruder and interpreter within language, is reinforced. Halliday states that when children's use of language is interpreted based on its functional merits, it becomes easy to understand and accounts for the progression to the adult language because he implies that adult language still reflects its functional origins (Halliday 1975, 26-27).

In the following, the PSCC is described in detail. Comparisons are briefly made between the PSCC and several authors' works, notably, Halliday's language functions and Lamb's networks. (For an illustration of what the PSCC could be conceptualized as, see the diagram

provided in appendix A.) Within the PSCC framework, apart from different semiotic levels, there are two overarching spheres of influence in the PSCC. One of them would be considered the core basic nature of a person, which begins to develop from birth; the second is a flexible layer that would not begin to appear until about age three.

As Lamb intimates, the creation of the self is mediated through genes and then sensory inputs that are taken in through the brain and processed by synapses (LeDoux 2002). It seems likely that Lamb is correct in suggesting that people think in terms of signs that are housed in neural semiotic networks (Lamb 1999). The PSCC would be composed of several levels of signs. A level refers to a progression of functioning from simple to more complicated sign organization. It is assumed that each of these levels would possess certain sign slots that have been pre-created as part of the natural development of the brain according to the universal blueprint. In light of Lamb's networks, this would be from the trunk of a tree out to its branches. Each piece is still needed and valid for the concept, but one had to exist before the others were possible. Regrettably, what type of sign slots may reside in each level is beyond the scope of this thesis.

3.3 Sign Levels and Modes in the PSCC and the SCC

In the PSCC model, the first level of signs to develop is the immediate somatosensory level. The metabolic activity, that is the base of cerebral function, is "ontogenetically highest in the posterior sensorimotor cortex" (Narvaez *et al*. 2012, 38) and it processes input that comes into the brain from the senses. This information is consistent with Piaget's sensorimotor stage. The next level to develop would be bodily kinesthetic; essentially the feeling of what it means to exert energy in the body and the recognition that this creates changes in the self. Although bodily kinesthetic senses may have already begun to take shape in utero, as noted by Gattegno, the

soma's awareness of this movement and what it can do with it continues to expand rapidly once the infant is outside of its mother. The next level of signs to develop is spatial orientation, which includes the recognition that the self has an interior and an exterior; thereby, things go into the soma and come out of the soma.

Once infants have an awareness of their bodies' position in space, and through experimentation by doing such activities as putting their fingers and feet in their mouths, they have found the boundaries of themselves, applying that knowledge to objects is a logical next step. Thus, object recognition and spatial orientation are part of the same level of signs. During this stage, the instrumental function, that is referred to by Halliday, is likely present because a child can communicate requests for objects, which is an instrumental function. As Halliday intimates, this instrumental use of language is completely based on the child's social context. Children may also develop the regulatory function so that they can attempt to influence others in order for them to get what they want faster. While this may seem like genuine interaction, the language is used to achieve the children's goals and therefore, it continues to have a direct reference to the self, and as such is still part of the developing PSCC.

Actual memory creation is the next sign level to emerge from this. To clarify, when the actual memory creation level of signs is mentioned, this label refers to the point when the child can create memories that can be actively brought forward or pushed back in the mind. As memories are created through the child's interpretation of what they experience from their senses, they form an important part of the PSCC. The infant's experience of emotions is processed in the right hemisphere during the first stages of brain "ontogeny" (Semrud-Clikeman and Hynd 1990, 198). Arguably, one of the reasons why people can become emotionally scarred for life is that memories that are created at this point are so connected to the pre-linguistic child's

interpretation of sensory input that their effects are felt deeply, but at a level which is inexpressible in language. For example, if a traumatic event such as experiencing terrible illness or pain, whether physical or emotional, occurs during the formation of the first memories, these may have strong effects on the child later in life. The individual will not understand why they feel the way they do because the event may be buried in their subconscious. Halliday's interactional language function begins to form at this level because children start using labels such as "mommy" and "daddy" and remembering individuals to whom they are close. For example, a baby may recognize the scent of its mother while the mother is present, but it is unlikely that the baby could purposely bring back the scent of its mother when the infant is in need of her.

It should be said that any assumption made in regards to which level of signs in the PSCC develops first may vary from one individual to another, but in general these sign levels are fairly consistent with the stages of child development that Piaget laid out. Even still, the capability of the child to create memories is very limited at this point and would likely surround only a few key objects for which the child has emotional attachments, for example, favorite people and toys or actions that their own bodies have performed. Also within this level, Halliday's personal function may commence because a child starts expressing their opinions out loud because possibly they become fascinated with the sound of their own voice and want to experiment with it and through that play, develop their personality.

As an infant develops, right brain functions are needed for the toddler to learn emotional and social functions. Predictable interactions with familiar caregivers provide the infant with a safe environment where they can be curious and engage in self-exploration. These prepare infants for the stage of human socialization in their second year of life when the baby must learn

social information through the transfer of culture (Schore 2001). In Chiron *et al*.'s (1997) study, results showed that functional brain activity was greater in the RH than the LH in infants but then shifted as the child became older, around three and a half years of age (Chiron *et al*. 1997, 1062). They conclude that, "The right to left sequence of asymmetry seems to be related to the consecutive emergence of functions dedicated first to the right (visuospatial abilities), and then to the left posterior associative cortex (language abilities)" (Chiron *et al*. 1997, 1064).

In summation of this section regarding the PSCC, the evidence from split brain and infant neurological studies suggests that the right hemisphere has a vital role in somatosensory development. This includes self-related cognition (what Saussure would perhaps have called *Parole*), own body perception (what Davis might refer to as orientation), self-awareness and "autobiographical memories" (Uddin *et al*. 2006, 65; Narvaez *et al*. 2012) Given all the evidence in reference to the significant role the right hemisphere has in self-related learning, somatic integration, quick maturation, its connection to the limbic system and the emotional implications of this, it seems that the PSCC would be associated with right hemispheric functioning. This is not to suggest that the Personal Semiotic Cultural Consciousness has no relation to the Semiotic Cultural Consciousness, only that it can be inferred from the research that the PSCC, like right hemispheric functioning, necessarily develops first to provide the infant with the necessary somatosensory signs that allow for the attachment bonds which will lead to future socio-cultural learning and future rapid growth of left hemispheric functions.

3.4 The Semiotic Cultural Consciousness

There are two more levels of signs in the PSCC: schema creation and schema creation with object recognition. These are considered the last levels of signs to form in the PSCC before the SCC begins its rapid growth spurt that occurs around age two. During schema creation

children may begin to categorize events. They can have some sense of when it is a special day versus a normal day. For example, a child may begin to build up a schema for a birthday as images of color, special food, other children and celebration. At this age, children may not be able to abstract away from the scene to pick out the individual objects in the schema because he/she thinks in wholes, just like the child in Piaget's moon example that was discussed on pages 50 and 78. This is why in the last level schema creation requires object recognition. This means that children can identify different objects outside of their context.

Object recognition within a social context has implications for the amount of meaning the child can express. Once a child can recognize that different objects can be present during the same events or kinds of events, he/she can build expectations of what they expect to see and experience from event to event, and may evoke the necessity to build categories in order to keep all of these signs readily available. An experience of a new event may prompt very young children to ask questions about the objects they see in the environment, such as whether or not a gift on the table is for them. These expectations will be heavily influenced by the socio-cultural environment in which they reside, and the children will want labels for the things they see or make their own.

There are significant parallels between the PSCC/SCC and Eco's Cognitive Types (CT) and his Nuclear Content (NC). Eco's NC is similar to the PSCC because it refers to people using their intuition about the subject based on their experience of the subject. This personal experience of the subject may include events or topics that share qualities. The NC also supplies the criteria to identify the referent that leads to the CT (Eco 1997, 139) which is similar to the proposal that sign slots in the PSCC are duplicated in the SCC. He says one can be given instructions in order to identify a referent and must wholly rely on this because the individual has

had no experience of it. By this he resolves that the NC leads one to the creation of a "tentative" CT (Eco 1997, 139). This is also the case in the PSCC model whereby signs as somatosensory inputs come into the PSCC and are processed into sign slots and then transferred over to the SCC. Eco suggests that the experiences people have, when expressed, confirm that individuals shares the same CT. This is precisely how the SCC could operate as well. As standard names for subjects are created through collective knowledge and usage of signs, one can recognize a subject without having to name it or be aware of its name (Eco 1997, 67).

Though not a semiotician like Eco, Walrod proposes a similar model, such that there is a cognitive grid in individuals' minds that is responsible for collecting and interpreting information (Walrod 1988, 7). This grid is greatly influenced by one's culture and is enabled through one's exposure to culture to function as a type of culture consciousness that continuously interprets and reinterprets signs.

Walrod's model is also quite similar to Agar's description of *languaculture* with a few exceptions. In contrast to Agar, Walrod does not distinguish between an L1 cognitive grid and an L2 cognitive grid, but only mentions one. He implies then, that people have mental maps of all their experiences in a cognitive grid in their minds, which serve to allow for the recognition of signs (Walrod 1988, 7-8). Agar might refer to this map as a frame because he says, "The meanings that frames organize are expectations not certainties" (Agar 2002, 134). Agar speaks of an L1 and an L2 *languaculture*.

Walrod's model has marked similarities to the SCC in that it suggests people have some kind of mental map that is constructed by their understanding of their culture and their place within it. The cognitive grid may also include a person's ethics and beliefs about how they ought to act in a given situation, as does the SCC. He calls this the "native paradigm" (Walrod 1988,

7). The contents of this native paradigm strongly influence what kinds of information people tend to focus on in a conversation. He argues that because of the existence of this paradigm, people are likely to see what they expect to see. Walrod's research has a significant implication here, which is that the SCC can influence the actions of the PSCC. This is a truly intriguing idea, which is also present in the SCC model. The implication is that a person's cultural lenses will mediate their perceptions based on the framework of this paradigm (Walrod 1988, 8). An effective example of this is L2 learners reading and writing the L2 in an L1 pattern without perceiving they are doing it.

Walrod asserts that one's cognitive grid is not a perfect reflection of the actual world, because one's own physical body and the conventions of one's own culture limit one's perceptual abilities (Walrod 1988, 8). The conventions stored in this grid make up a person's behavioural expectations for any given event (Walrod 1988, 8). He further argues that when people have to see in different ways, this requires direct models that can be observed or experienced, in some way, in order for people to learn to see differently (Walrod 1988). This idea has particular relevance to Chapter 4 where four different learning models that could be viewed as attempting to create bridges from the L1 to the L2 by using different sign forms, are discussed.

Agar's *languaculture* seems similar to the SCC model, but reference to a PSCC-like construct is only implied once, where he refers to the knowledge of the language one receives while still crawling around in diapers. However, throughout his book, he is concerned with the social aspect of language: how it is used to express oneself while addressing the collective and not the inner speech, like *Parole,* that Saussure refers to or the soma-like self that Gattegno and Damasio implicate. Agar's *languaculture* likely manifests during the sign layer of schema

creation and object recognition in the PSCC. This seems sensible because Agar briefly mentions that another potential term for language frames could be schemas.

Although Agar only mentions first language learning briefly, one can imagine that children just beginning to create schemas could be more exacting than adults when events did not unfold the way they expected them too. Thus, children's frames could be either more rigid or more flexible depending on the personality of the child and how many different *languacultures* they are exposed to. Children would likely see rich points everywhere because they would not have as large an inventory of signs as adults do. A Chinese New Year dragon might be an amazingly unique sign to a Caucasian child, whereas to the parents, it would be an accepted seasonal norm and perhaps even an expectation, if the sign is associated with an event they attend every year. In the adults' PSCC and SCC, the Chinese dragon and the New Year event may be permanently linked under the category Chinese culture. However, for the child, the category may be limited to dragon/flying/sharp teeth with any number of labels after that from other imaginary creatures or types of dragons to similar events.

Even though children may have labels, it does not mean their categories will resemble those of an adult. For example, a boy who loves playing with cars may tell his mother there are no toys if he goes to play somewhere where there are no cars. This is because, to the boy, cars may be the only toys that matter. The boy's categories are based on his PSCC. After his mother has corrected him, he may adopt the word "car" for all toys, instead of the term "toys" for all cars. As previously mentioned, sensory data in the PSCC is processed into pre-established sign slots and as signs go into these slots, connective lines like the dendrite branches of axons, expand out touching other slots and signs, forming networks. This will include any sensory experience such as the image or feel of one's own writing and the way the tongue feels in the mouth when

alphabetic sounds are being formed, etc. Here again, it is apparent that the slots are embodied, the pathways metaphorically and perhaps physically strengthened through the compilation of sensory experiences.

In summation, neurons work to create synapses. These allow for the development of synaptic networks where sensory input is later slotted, thus building up groups of signs, which then become semiotic networks as labels are applied to them. These labels reflect the schematic hierarchies that are created through sensory experiences within a social environment. Halliday says that:

> "... once the boundary between the child himself and his environment is beginning to be recognized, then the child can turn towards the exploration of the environment; this is the *heuristic* function of language, the 'tell me why' function that which later on develops into the whole range of questioning forms that the young child uses. At this very early stage, in its most elementary form the heuristic use of language is the demand for a name, which is the child's way of categorizing the objects of the physical world; but it soon expands into a variety of more specific meanings. (Halliday 1975, 20)

Halliday's (1975) imaginative function is established during the creation of this last sign level in the PSCC model, because schema formation is based on one's own creative interpretation of an event. When a parent teaches gender expectations to a boy who plays with dolls, then forces him to give up his beloved dolls and only play with cars, is an example of a gradual category assimilation process. These teachings from the parent can range from just handing a child a particular toy from the toy box, to harsh words and shaming. These events can have a strong impact on the child. Once the boy has accepted this expectation, he may want to regulate others behaviour, particularly that of a younger sibling. The model suggests that from ages 3 to 5 (Santrock *et al.* 2004), children's PSCCs are very well established, though children will continue to organize signs into these slots throughout their lifetimes.

It is predicted that when children begin school, the necessary shift to more abstract modes of thinking, such as math, reading and writing, and a greater reliance on others to attain accuracy, causes a major shift from using signs in the PSCC to parallel sign slots in the SCC. Each year, these slots fill up with signs until there is nearly a parallel sign in the SCC for every sign in the PSCC. The combination of interacting with people constantly in structured ways, as well as the greater focus on analytic functions may cause children to place less emphasis on tasks that utilize the R-mode, the mode of the PSCC.

As aforementioned, it is proposed that the SCC would develop fully after the PSCC. As children begin to notice cause and effect relations, they can understand that when they do a certain action there may be some predictable response, such as when they make a loud noise they may receive attention. When they did this as infants, it was a primal function; one that they had little control over. They were only responding to biological urges, which were hard-wired for the purposes of survival and, as the research suggests, controlled by the right hemisphere. As parents encourage their children's attempts towards language, this is typically an area children receive both attention and encouragement. Thus, using language for communicative purposes is reinforced, and with the collection of prosody signs and emotional cues that are contained in the PSCC, the SCC can grow quickly in order to process ever more diversified forms of language. As the PSCC's response to too much stimuli can be to freeze or have an emotional outburst, sending the information away temporarily for further processing becomes useful and the SCC's analytic ability becomes essential.

In a similar way to the PSCC, the SCC contains two overarching spheres of influence. The first of these is somewhat fixed because as Saussure's work suggests people have a sense that the language they speak is, at any moment, more or less stable through the use of it by the

collective mind of those who use the language. The second sphere is never stable because it allows people to constantly review and analyze signs and synthesize them to create new knowledge and new signs.

The SCC would have the same sign slots as the PSCC because for every sign that is experienced, no two people will experience it in quite the same way and when a sign is shared through any type of media over some period of time, gradually a standard of what the sign is emerges through the discourse of the collective mind. This sign, as well as all the discussion that went with it, develops in the SCC. The soma's communication between its PSCC and SCC is pivotal otherwise a person becomes abstracted from his/herself and this could leave an individual open to the influence of others. An extreme example of this is how Hitler was able to motivate regular people to commit some of the most terrible atrocities the world has seen. Arguably, in Hitler's attempt to create a unified Germany there was a shift from dealing with individuals to one of dealing with the nation, one which in this model would be considered a shift from the PSCC to the SCC. Although, thankfully, PSCC abstraction like Hitler's brainwashing is rare, it does serve to illustrate the potential dangers of individuals becoming disengaged from their PSCCs.

An individual is most effective in life when there is a balance between their PSCC and their SCC. There are real consequences if a teenager, for example, does not have a strong sense of self. They could be caught up in something they would never consider doing away from the group, such as participating in a riot or contemplating drug use. While this is commonly attributed to peer pressure, this response seems simplistic; though true, it does not account for why influences that are external to the soma should cause individuals to forget themselves. There are levels involved in these feelings. When people become distanced from their PSCC they no

longer ask themselves how they feel about what is occurring around them and as such, they do not question what is happening. Alternatively if one's PSCC is so much stronger than one's SCC, this could lead to social isolation, feelings of depression, selfishness and even aggression.

One's PSCC would be very precious and children would fight to preserve their self-concept if they felt it was being threatened. As Festinger states individuals can become defensive toward information that causes dissonance (Festinger 1957, 149). By the time children become teenagers, there are so many bio-chemical bodily changes and they become so reliant on their peer groups that they may not be able to recognize when their self-concept is actually threatened. Festinger's research implies that one's social group can be a major factor in both causing and decreasing the amount of dissonance one experiences (Festinger 1957, 177). The expectation of these pre-teens is to absorb information so quickly that, unless it is directly encouraged by someone close to the student, whether it is a friend, a teacher or parent, adolescents may forget to compare the newly absorbed sign in their SCC with the one in their PSCC. This connection is vital if newly learned information is to have any personal relevance to them. Later in life, if teenagers have become so reliant on their SCC without considering how they feel about information, this can be a very dangerous situation potentially leading to feelings of isolation or co-dependence on another to define them. It is predicted that, at about the grade 6-8 level, or pre-adolescent level, the strength of the SCC would increase, in part, because of the focus on analytic style learning.

As the PSCC is beginning to develop, emotions would be felt quite keenly and deeply but as LeDoux suggests this may serve to influence the growth of certain synapses of which the child may have no recollection when they are an adult. If an individual's PSCC somatosensory level of signs has formed with a traumatic event in it, this may begin to influence the teenager's actions

subconsciously. Adolescents and adults may experience reactions they cannot account for completely, unaware of what has affected them. Repressed emotions from traumatic experiences are prime examples of this.

LeDoux and Lamb's research suggests neural networks are formed through the connection of neural and semiotic networks. Given this, it seems that when the neurons have no memory of a particular sign because it was not gained through the life experience of the organism, a pathway between neurons cannot be formed. Also the information that the sign would contain in that neuron could not travel across the synaptic space. Alternatively, the foreign sign may evoke a flurry of activity in the brain as pre-established sign carrying neurons attempt to integrate it into its pre-existing network.

Pre-existing networks can be thought of as imprints that leave impressions in the mind. For the sake of argument, if for the moment one could consider the brain as a clay ball, the imprints of the first signs from an L1 are placed into the ball and then every other freshly learned sign is placed into those imprints. Here is a hypothetical example. The first sign a child develops leaves imprints in the mental clay. These imprints reveal the patterns of the L1's grammar at a subconscious level. Years later, these original imprints may have hardened and if she is trying to learn a second language, then the new input will be made to fit into those L1 imprints. When this happens, she may be constantly making the same mistakes in the L2 because she is not aware that her brain is trying to use these original imprints. If a person comes across an experience they are unfamiliar with, for example a birthday party, then out of their pursuit to know more about the event, they will attempt to classify the sign by their classificatory system. The sign will become slotted along the imprints of their own language. If it has been slotted incorrectly, then

even when that sign is relocated to a different area, there may be residual traces of it in the grooves of the original imprint.

The construct of the PSCC and the SCC suggest that the bodymind is designed to seek for meaning and to slot it in reference to the boundaries of its self; the organism's immediate functioning, including its identity, as well as in relation to others and the environment. Throughout the literature review in Chapter 2, theorists consistently hypothesized that there were two distinct types of behavior and knowledge roughly composed of internal and external environments. This idea of two separate spheres that impact behaviour was present in Saussure through his *Longue* and *Parole*, Piaget via his egotistical and social thought, Vygotsky through his social learning, Halliday in his social semiotic, Damasio's proto-self, autobiographical and core self, and Eco's nuclear content and cognitive types among others.

Pierce's state of Firstness and Gattegno's somatic awareness, if applied to Piaget's theories concerning child development, might offer insights that could aid in the explanation of how the PSCC must be created before the further development of an SCC is possible. Gattegno's explanation of an infant's active soma, consciously aware of itself and its energies, is similar to Peirce's state of Firstness, as the state of Firstness is one of a vague unconscious sense of oneself. When one considers the gradual learning of infants through object manipulation, such as learning about objects by trying to put them in their mouths, they are gaining knowledge about the world through the embodiment of their experience. Therefore any meaning that they extract from the object comes from the relation of the object to their bodies. Piaget's description of the sensorimotor stage confirms that infants learn in this manner. At first this appears to contrast with Vygotsky's work, which contended that conscious awareness of the external environment had to develop first because children develop language through social learning and by being

helped by those who had superior skills. However, Vygotsky did not suggest that children had no sense of self before they started communicating, only that they learn language from their social environment. Current research of the importance of the infants' attachment bond to its mother confirms that this early learning is the first step towards learning how to communicate (Schore 2001, 13). However, current neuroimaging studies also show that this initial learning occurs chiefly in the right hemisphere (Chiron *et al*. 1997, 1057, 1064). Given the research of Damasio (2010), who implies that a sense of self comes from the brain's ability to convert all sensory information into mental images, Vygotsky may simply have been referring to the fact that children do not begin expressing themselves articulately until they begin interacting with social groups.

The PSCC would function by converting all sensory data into layers that when superimposed on each other serve to create a full mental image of an event or object. As Damasio implies, it is one's first encounter with sensory data as it is felt through the Proto-self that allow for the creation of mental images and later signs. Complementing this, LeDoux asserts that this sensory data will affect the way in which synapses are formed in the brain and will result in unique individuals.

LeDoux's assertion that neural communication and neural networks will occur at some level in everyone suggests that, in principle, Chomsky's UG may still have merit. If there is in fact a UG, as Chomsky has stated on many occasions, it likely forms part of the "neural blue print" that allows for the creation of cells into neurons and then into synapses and into the globalized location of brain elements. It would appear that UG is not specifically about grammar then, but about universal patterns. As alluded to earlier, these patterns can be represented semiotically by sign slots.

The implication of LeDoux's work is that the cultural variation between human beings is a result of both nature; genes that stimulate neurological growth and development, and nurture, the social and environmental constraints that influence an evolving genetic system. Evidence from the countless studies that document the negative effects of poor nutrition, neglect and the use of adverse substances while pregnant on the unborn fetus, support LeDoux's conclusion.

These are not new ideas, but there is an important distinction between the PSCC/SCC and similar models. Perhaps its difference lies in its recognition that Peirce seems to have been correct in stating that people think in signs. Knowing this is important because it gives practitioners a broader perspective on learning and the issues faced by language learners. It seems that generalizing the issues to this seemingly simple framework, as Lamb did with his semiotic network diagrams, can aid practitioners in understanding the source of their students' difficulties. They can perceive the source of their students' confusion as a lack of an equivalent sign in their PSCC.

The first information taken into the brain is somatosensory. This information is taken in through certain brain cells, but then processed by other brain cells. The PSCC model proposes that information that comes in through the senses forms a level of signs within the brain. Lamb and LeDoux's work on neurological hierarchies supports this notion, as does Chevalier's (2002a; 2002b) perspective that sign creation and neural circuit distribution are related. Once sensory information is processed and made into a sign, it is then sent along to become a participant in a network of other signs. LeDoux's work suggests that synapses become active and deactivate all consistently, depending on how much information is coming in from the senses that stimulate synaptic memory.

Several authors, including Saussure, have noted that children do not grow up in a linguistic vacuum, but are born into a pre-existing linguistic system. The recognition of the system necessitated the drawing of Agar's aforementioned circle around language. While it is true that people cannot be raised in culturally neutral linguistic environments, perhaps individuals' admittance into that system is gradual as they must experience a number of different activities before their sign slots activate and take in all the signs they need to establish their unique *languaculture*. As Saussure was unaware of Peirce's work on the triadic function of the sign, perhaps he did not believe that semiotics could be applied to anything in one's environment. If he had, there may have been no reason to draw the circle.

When considering the biological necessity for memory, it makes sense to assume that infants begin creating simple signs such as recognizing the scent of their mother through repeated exposures to her. It seems that the sensory system begins to develop as layer upon layer of the infant's experience touching, hearing, tasting, listening and smelling create a complete mental image of the baby's world. Because sensory information cannot become signs until the neural connections, on which they may attach, are well established and connected, it might take the infant many tries with materials and its body to build up signs. This would cause the activation of pre-determined sign slots which would then absorb new signs until there were so many in the developing baby that they began to activate other signs around them in a like manner to action potentials on neurotransmitters. Lamb and LeDoux would likely say this is the beginning of the child's development of networks. Current research suggests that this sign development is meant to help the infant develop the skills it will need to survive, such as expressing emotions and forming bonds with caregivers which cause rapid growth in the right hemisphere (Schore 2001, 10). The PSCC model predicts that the infant will gradually build up

this first inventory of simple signs until the infant progresses to the point where he/she can view these signs in terms of their relationships with other signs.

From that perspective, until a baby can start recognizing there are relationships between signs, their SCC is not likely to develop at the speed of their PSCC. One might argue with this analysis, saying that the baby's SCC should have started developing from the moment the infant begins interacting with others. This is a valid concern, however, Piaget's work on child studies implies that very young children only view objects in relation to themselves, therefore a child's mother is viewed as merely an extension of the child's own body before true sign creation is possible. Baldwin noted this tendency of children in his paper "Imitation: A Chapter in the Natural History of Consciousness" (1894). He intimates that infants are at first unable to properly recognize objects such as a caregiver as separate and not a part of their own bodies (Baldwin 1894, 42-43).[57] There is a subtle difference between an infant and a child that thinks, "mom may come back because I want her" and "If I want her to, maybe mom will come back." In the latter, the child perceives he/she has control over what mother will do, whereas in the former the child recognizes mother's will is separate from his/hers. The noticing of this separation suggests that the child has reached a point in their development where they are beginning to internalize some of the semiotic systems that operate outside of him/herself. From this example it is perhaps apparent that the infant or child had to possess some understanding of their own needs and desires even at a very instinctual level, such as the inborn skill of rooting, before they were able to recognize the socio-cultural and linguistic systems that people outside themselves operate in.

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[57] Neuroimaging studies offer support of Baldwin's research stating that when monitoring both infant's and mother's brain while interacting with each other they found that both brains exhibited molecular activity in the right hemisphere suggesting that infants' bond with their mothers may be even more vital for right hemispheric maturation than once thought.

The area where sensory information is taken in has a very limited memory, but likely working memory is not established until the infant can convert this immediate information into signs. For example, until the infant can interpret the sensation of being hungry with the sign of milk, episodic memory is unlikely to be possible. Once the child builds up a number of these connections and has several networks, it becomes necessary for the child to label these so that they can be easily recalled when the appropriate situation comes up.

While Damasio (2010) proposes that there are three separate stages of the self: proto, autobiographical and core self; the progression of these suggests that the autobiographical self is a time when the proto-self and autobiographical self overlap. The PSCC model proposes that apart from the time period that Damasio would call proto-self, the PSCC and the SCC continue to interact throughout an individual's life time, just as the left and right hemispheres do. In this way, documented life stages, beyond this proto-self environment, will have a greater or lesser overlap of the PSCC and the SCC.

Split-brain studies demonstrate how individuals can still perform a number of functions yet they also show that common functions have been limited because of the lack of a hemisphere. In a like manner, if an individual were to lack either the PSCC or the SCC, it would definitely cause them some significant limitations. For example, a person with no awareness of where their body was in space would constantly be running into things and people.

The practitioners of multisensory learning know that when an activity stimulates only one sense it will be far less effective than when a multisensory approach is utilized. The PSCC model suggests this is because a learner will not have a complete mental image. Gardner's (1999) work in multiple intelligences would suggest that if individuals were to be given a task that allowed them to use their preferred learning mode then the weakness of the evolving picture may be

limited. However, even a strong sense can only be so useful. For example, a language learner may have an acute sense of hearing, but this may not help them learn how to spell words.

Neurological research in regards to learning is rapidly becoming a robust field of study called "Neuroeducation" (Hardiman and Denckla 2010, 4; Grafton 2010, 2). This includes not only neuroscientists, but also psychologists, medical professionals, etc. Researchers such as those that are involved in the Dana Foundation have various interests within this new field such as second language learning, the effects of physical movement on the brain and the multiple intelligences, just to name a few. The foundational split-brain studies that designate certain parts of the brain as responsible for either analytic or synthetic functions continue to influence a considerable amount of this work.[58] Researchers in this field aim to make neurological discoveries accessible for a larger audience. Danesi is one of the few authors who has applied such neurological research to both semiotics and second language education.

3.5 Semiotic Confusion

Briefly, "semiotic confusion" describes a state of confusion where an enquiry in regards to a sign is sought, yet cannot easily be selected from a presenting body of signs. This confusion can occur in any of the sign levels that were previously discussed. For example, if a person comes across an experience they are unfamiliar with, such as a bar mitzvah, then out of their pursuit to know more, they will attempt to classify the components of that experience in meaningful ways based on a classificatory system provided by their language. If no sign can be found to match the other, a compromise will be made. If they attempt to classify the sign by their own classificatory

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[58]At this point, the pedagogical application of the R-mode and L-mode to the PSCC and SCC may not be that evident. They are critical, however, to understanding the development to come of Semiotic Confusion and how it may impact learners.

system, it will become slotted along the imprints of their own language. Here it will remain until the person gains more sign layers about the sign and then reorganizes its position.

Semiotic confusion (SC) is a state of being whereby a potentially uncomfortable emotional response is triggered by the conflict between hemispheres in response to an unresolved enquiry in regards to a sign that was previously introduced. The state of semiotic confusion may manifest as anxiety, fear or even resentment, among other emotions. These strong emotions could be associated with the state of semiotic confusion because such emotions are associated with any number of signs as they are experienced in a person's lifetime. When a sign is sought out to resolve some question, if a sign cannot easily be selected from the vast plethora of sign forms, the state of semiotic confusion may result. SC is likely a fairly frequent occurrence because human beings are not omniscient and therefore they will come across signs that are unfamiliar to them at some point in their lives.

The academic arena is not the only place where SC can occur. For example, if one is driving to a place where they have never been, the presence of a street name instead of a number when one has only been given a street number may quickly result in SC. Part of the confusion comes about by the difference between the personal experiences that individuals have had with the sign and the understanding of the use and meaning of the sign within the collective and the fact that connective lines between L2 signs will be different from those between the L1 signs. This means that the pre-programmed paths that a student has regularly followed intuitively with success, will now lead them to incorrect forms in the L2. As these connective lines were formed from birth to five years of age as referenced in the PSCC model, the student may be so adept at using them that they are completely unaware that they use the signs in such a way.

The fact that individuals may not be aware of the connections between sign slots and their corresponding signs in the PSCC means that no matter how many times teachers repeat language, students may not hear them or retain what they write, and may not recognize that they are constantly making mistakes, apart from the teacher's feedback. After which, students may come out of class feeling like they have not learned anything and they are more confused than before. If this were a symposium, there might have been some head nodding in the crowd after that last comment. However, teachers can find ways to help struggling students. If students can be helped to form a connection with new signs that do not rely on L2 symbols with their PSCC sign slots, then new pathways may be able to form to existing connective lines through the interactions of their PSCC and SCC. The term "sign slots" could be roughly equated with embodied neural structures in a similar way to Lamb's pre-programmed networks analogy.

As Kay and Berlin's colour study noted, human beings are biologically pre-programmed to see all the colours of the visible spectrum. Therefore as long as the student has not been visually impaired in some way, they should have billions of signs that contain colour. Thus hypothetically, when colour is used to represent different aspects of language, including structural components such as word order and discourse level components such as pragmatics and register, colour may activate the various signs and serve to create a bridge from the L1 into the L2.[59]

Lakoff's work suggests that all human societies use processes of classification and categorization to organize their collective signs. Thus all human societies organize the signs that

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[59] In light of these considerations, for the last three years, I have been trialing a system based on perceptual salience that attempts to do this. See the Colour-form section in chapter 5. Students who have been through the system have ranged in age from 9-19. During these three years, it has grown from a short 20 minute component during regular classes in 2007 to small classes of 1 to 2 students who were having difficulty in their regular classes to having its own class with 5-8 students once a week in the summer and two classes per week this summer of 2012.

are encountered in their lives in ways that are meaningful to them. The classificatory system that they employ to help them with this task is expressed and formed through whatever level of language they utilize. If no sign can be found in their sign inventory to match a new sign then people may attempt to classify it under some of their established categories or a new combination of two categories, even without knowing the actual meaning. For example, when a person comes across a word in their L1 that they do not know, they can make an educated guess as to what the word means by affix patterns or grammatical environment, allowing them to clarify the meaning, slotting it into a more detailed category later. It seems then, that how one's signs are organized in one's mind is largely dependent on the collective consciousness of the people group in which one lives.

Chomsky proposed that individuals have some kind of language acquisition device (LAD) that allows them to learn the unique specifications of their language out of an underlying collective universal grammar. He likened this to a switch box where the parameters would be set for the specific language based on the input the device received. Authors, such as Householder (1965) and Halle (1962), have critiqued this idea because it cannot account for all language phenomena.[60] However, if one was to reconfigure Chomsky's LAD into a malleable, neural, clay-like substance simply for referential purposes, the L1 structure would leave imprints in this neural clay, this new LAD model might demonstrate, in physical terms, why language interference is a common problem for language learners.

In the clay ball variation of Chomsky's model, L1 imprints that are left behind in the neural clay harden as a person becomes older because the basic structure of a language becomes

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[60] For additional authors' opinions on Chomsky's Universal Grammar theory read : Eubank, Lynn, ed. 1991. *Point: Counterpoint: Universal Grammar in the Second Language.* John Benjamins Publishing. This book offers many interesting perspectives.

internalized and is no longer actively tested as it was when they were learning as a child. The language structures are so well known that a person hardly needs to think about the basic structure of their L1 and because of this, the neural clay becomes rigid. This inflexibility makes it more difficult to learn new language items unless there is a one to one correspondence between the L1 and the L2 form. Also, as grammar teaching goes in and out of fashion, learners may not be aware of the patterns their language actually follows and the functions of individual words.

The level of difficulty experienced by the learner will depend on the type of language item being learned, the perceived distance of the L2 from their L1 and, as Krashen's (1987) work would suggest, their emotional state. For example, if a person is learning an L2, they may subconsciously reconfigure the L2 into the grammatical pattern of their L1 as they attempt to make sense of the L2. This would occur because the new signs would travel along the established connective lines. When this happens, unless feedback is given, the learner may not register that their use of the L2 sounded different from their teacher's model of the L2. Essentially, students may push the L2 into the imprints left by their L1, slotting them into their L1's linguistic order in attempt to generate meaning from a foreign semiotic system. Alternatively, learners may have a vague perception that their speech does not match their teacher's model yet not understand why and therefore have no comprehension of how to fix it and feel apprehensive when writing and speaking in their L2.

In light of this, learners would constantly and unconsciously make the same structural errors because without being made aware of their own mental process, they would be left with trial and error methods of learning. Ellis (1997) states that the symbols, that will transfer, are directly affected by L2 learners' perceptions of what is transferable and their stage of language development. Ellis says that learners typically create their own temporary language rules and

then gradually refine them as they receive and process more language input (Ellis 1997, 19). Selinker (1972) called the tendency of learners to create a temporary language an *interlanguage*. This acted as a bridging agent between their L1 and L2. Ellis argued that while there have been many perspectives in regards to the value of analyzing student errors, interlanguage seems one of the most fruitful because it allows errors to be considered "…useful evidence of how the learner is setting about the task of learning, what 'sense' he is making of the target language data to which he is exposed and being required to respond" (Ellis 1997, 66). He suggests that by studying student errors, teachers can learn how best to correct their students (Ellis 1997, 66). "By studying them the teacher may gain insight into the learner's state of knowledge at any particular moment and also into the strategies of learning that the learner may be using. With this understanding, he will be in a better position to devise appropriate corrective measures" (Ellis 1997, 66).

The tendency of an L1 to impede the learning of an L2 has been termed language interference. This is a well documented term within the field of applied linguistics. However unlike Ellis' (1997) label of positive transfer, language interference has a negative connotation because the L1 is presented as the miscreant that prevents the L2 from being learned. This mindset may have contributed to the development of language learning methods such as the Berlitz Method, Suggestopedia, Audiolingual Method and the Silent Way, that endeavor to use the L1 as little as possible, and in the case of the Silent Way, not at all. Perhaps avoiding L1 use to prevent such interference may ignore the actual problem and only treat the symptoms of SC, not its cause. The term language interference also does not reveal what caused the interference as it merely implies that some element has interrupted the underlying process involved. The use of methodologies that discourage students from using their L1 may prevent students from being

able to use the content in their L1 signs. While Gattegno intended for students to be able to use what they know about language to help them make logical discoveries about the L2, arguably it would be difficult for them to express concepts learned in their L1 in the L2 initially. The usage of techniques that discourage students from using their L1 seem to perpetuate the perspective that the L1 is somehow not useful in learning the L2.

The degree of difficulty that students would experience in learning an L2 would vary depending on the level of similitude between the students L1 and L2 and hypothetically how much it deviated from Chomsky's UG pattern. Danesi considers the challenges with Chomsky's UG suggesting that it is not clear whether the theory applies to the development of verbal and non-verbal skills. If one considered UG as pertaining to a broader construct and not simply languages' phonology, morphology, and syntax; then one might find that Chomsky's UG is consistent with LeDoux's argument that everyone has, as Danesi would say, the same "neural blueprint" (Danesi 2003, 46). Danesi says that languages are made to encode concepts differently (Danesi 2003, 21, 66). The greater the distance between cultures and historical relations between languages, the greater the perceived differences between them and the more difficult it will be to learn them.

Braine (1963) cited in Danesi (2003) reveals that when very young children communicate with one word utterances this in fact may be a "holophrastic phrase," where one word can stand for a complete phrase such as, "Daddy, I want it" (Danesi 2003, 18). The use of holophrastic phrases may reveal that sign slots are available long before children can organize the signs into them. The use of such phrases may also support Stokoe's theory that the use of signs evolved from actions and those actions became inextricably linked to the types of information such as

subjects and actions.[61] Also, one could interpret from Stokoe's work that visual texts may have more direct delivery of information between the L1 and L2 because they can relate to mental pictures of events that have occurred.

Two semiotic systems do not simply influence each other randomly, as there are processes involved. The definition of language interference fails to address why there is interference. This is because language interference may only be a symptom of a broader phenomenon of semiotic confusion. Without acknowledging this state as the cause of language interference, one might believe that only linguistic structures can cause language interference when, in fact, any unrecognized sign, whether it is from a written or visual text, can influence the signs of the L2. Thus, any sign form, whether it is visual, kinesthetic, tactile, olfactory or auditory, can cause SC. This means that designers of learning materials must consider the impact of visuals as much as written texts.

Paulo Freire (1994) is famous for being adamant about the need for critical thinking in language teaching. He was aware that the materials used by the learners could have a strong impact on their learning progress. He was sensitive to the fact that there is no universal form of representation, thus in order for a people group to accept learning materials, they had to conform to the people's ideological constraint for forms of representations for images. An image that is considered offensive to a learner will impact how they feel about the language they are learning which, in turn, may lead to anxiety through the state of semiotic confusion.

It is proposed in this thesis that language interference may be caused by the broader set of processes involved in SC. In the SC model, when a sign is not recognized, a person will

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[61] Stokoe has an interesting argument, saying that he predicts sign language may have evolved first before verbal language because it would be useful to be able to communicate to each other quietly via a more direct and less arbitrary route than written language (Stokoe 2001).

subconsciously try to activate certain established connections in their mind in order to grasp the new concept represented by the sign to assist in the production of a full mental image of the concept. This requires the activations of multiple connection lines and hypothetically causes a flurry of activity in the brain. Consider for a moment LeDoux's research about the way synapses can activate and deactivate in the brain depending on the stimulus provided. One can then imagine that L2 signs carried by dendrite branches could connect to the neurons carrying L1 signs, and the resulting action potentials may follow original L1 connective lines because their paths are more established than L2 connective routes. This may result in L2 signs becoming linked to L1 connective lines. These connective lines may be based on L1 morphology, syntax, pragmatics or phonology, among many other possibilities.

When considering an L2 word, this process may chiefly be occurring in a left hemisphere because it has become more frequently used for processing language. However, the word sign will need to be connected with its meaning and this concept may be contained in the SCC and the PSCC. When the L1 meaning represented in an L2 sign cannot be matched or is simply too complicated for the left logical hemisphere to process, the right hemisphere may try to take the task over using creative R-mode means to synthesize the many connections that the use of the L-mode has activated. It seems plausible then, that the clash experienced through the different states of consciousness and functioning in the right and left hemispheres could be contributing to semiotic confusion, as the cognitive shift from L to R-mode thinking occurs as a natural reaction to needing to connect a word to a concept.

As this can happen between different sign modes within an L1, one can imagine that adding an L2 into the equation is only going to complicate matters. Lamb's work on the brain's neural networks and latent pathways could explain why SC can cause language interference in

second language learners and disorientation in learning disabled students. As the L-mode is typically the dominant mode of transmission of new information, a struggle for dominance of a learning task may ensue, until neither mode can be used effectively to compose a full mental image, causing SC to occur. At this time, the learner may experience a sense of uneasiness or lethargy from the experience, depending on the degree of sensitivity of their affective filter.[62]

L2 learning is a complicated process that is full of opportunities to become confused. Sometimes there seems to be such a reliance on trial and error techniques, that students can become disheartened by their lack of progress and conclude they are incapable of learning the L2 or unworthy of learning it. These emotions may come from chastising interactions between learner and teacher or if learning on their own, a lack of confidence in their learning abilities.

Gattegno found that when he taught through his Silent Way method, few of his students displayed the anxiety and lethargy that they had in other colleagues' classes. On the contrary, he found that his students were fully engaged in their learning and each enjoyed their own learning process. He surmised that his students felt empowered by their newly given freedom to participate in the class at the level they wanted to (Gattegno 1963; Gattegno 1962).

One of the elements that Gattegno used in both his Silent Way and Words in Color programs, which are distinct from other methods, was colour. Colour, with the additional stimulus of other senses, seems to have acted as an unparalleled bridge between the right and left hemispheres. Perhaps, in part because it may have united the L and R-modes, it even provided a level of sign with the potential to bypass SC. Colour has no intrinsic content, yet perhaps it could be associated with any other sign level or form, thereby it could be made to represent a sound, a

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[62] The reference to affective filter here refers to Krashen's (1987) work on how the degree to which the learner is "open to the input" will affect their perception of the L2 and how well they are able to learn it (Krashen 1987, 9). This was based largely on the factors of motivation, self-confidence and anxiety.

phoneme, a word class, etc. The stronger the connections can be made between the colour and the sign, the more accessible the meaning of the sign could become.

Gattegno states that using colour can be effective for helping students who are learning how to read and write language (Gattegno 1963, 8, 28, 40). By displaying the words in colour, this seems to decrease the need for students to recognize the grapheme right away. Considering the near remarkable success of Gattegno's programs, it is worth briefly investigating what may have made them so successful. One must consider what was it about colour that allowed it to help students bypass a number of learning obstacles by enhancing the association between the sound and the grapheme. In light of Chevalier's (2002b and Lamb's (1999) research on semiotic-networks, it seems likely that the use of colour was able to activate the RH, which thrives on complexity and allows for creativity (Edwards 1989, 50, 90). The combination of using the L-mode for linguistic signs and the R-mode for colour would allow learners to utilize the strengths of both hemispheres for the learning task.

While Gattegno attributes the difficulty of learning a language's pronunciation to the extent to which it is non-phonetic, future research may show that the degree of difficulty faced in learning a language is directly related to how pictorial the written script is (Davis 1994, 22) and to what extent people are able to use their R-mode to learn it. As Gattegno's Words in Color methodology demonstrates, the rate of learning can be miraculous when an R-mode is utilized. Upon reflection, it seems that the temporary reliance on R-mode for colour allows a person to learn the pronunciation of a second language without activating their L1 sound signs while still stimulating the sign slots. In fact, colour may actually lead to the positive transfer of the sounds from one language into another.

Chapter 4: A Potential Semiotics-Inspired Resolution: Colourful Approaches

In one form or another, practitioners over the last fifty years have had an awareness that stimulating the senses during teaching aids students' language learning. This awareness has come from decades of experience, being exposed to ongoing research, as well as the every-day affirmations in classroom settings from teachers and students. Colour has been used effectively to activate the visual sense, whereas movement has allowed students to learn through their kinesthetic intelligence. Some educators, such as Montessori and Slingerland, use a multisensory assortment of learning materials to capitalize on the malleability of the young child's brain. While each of these approaches has been successful, perhaps there is some question as to how they have been so effective for learning. The following section further investigates the Silent Way and Montessori approaches that were previously mentioned. This also includes a brief summary and analysis of two current (TESOL)[63] approaches: Essential, Haptically-Integrated English Pronunciation (EHIEP) (Acton 2012), and Pronunciation Science (PronSci), (Young and Messum 2011), which is a modified version of Gattegno's Silent Way. Although each of these approaches utilize colour in learning protocols, the utilization of other senses is also mentioned. An analysis from a PSCC/SCC/SC model perspective is presented for each approach immediately following a summary of the approach.

4.1 The Montessori Approach

Montessori, heavily influenced by her knowledge of the brain and experience watching over young children, created an approach that focused on assisting children to develop their sensory and motor skills by using what she called didactic materials. Students of her schools called "child houses" were encouraged to explore a wide variety of materials that focused on the

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[63] TESOL is a well recognized abbreviation for Teaching English to Speakers of Other Languages.

development of a particular sense while utilizing the others in a secondary manner (Rambusch 1965, 9). For example, children learn about tone by interacting with wooden bells or fine-tune their ability to recognize distinctions between colours by placing them one after the other in a scaled line. Montessori asserted that each child would approach his/her learning materials in a different way, with various degrees of interest, concentration and length of focus (Montessori 1965, 18).[64] "Each will respond differently to color, shape and quantity according to his own physical and temperamental make-up. Children reach the goal of self-fulfillment, and self-control by different roads, indirectly prepared by the perceptive adult" (Montessori 1965, 18).

Through interactive but constructive self-focused play, children are able to learn about subtle distinctions between objects such as variations in size, length, colour, shape, texture and weight. After an initial demonstration of how the materials can be used, the teacher merely observes as the child's own curiosity leads him/her to observe the objects closely, make judgments about their similarities and differences, and reason out problems fuelled by his/her own momentum to discover the solution to a problem. When introducing colours "… exercises of the chromatic sense lead, in the case of the older children, to the development of the 'color memory' (Montessori 1965, 86). Montessori says that:

> The children are very fond of this exercise in 'color memory'; it makes a lively digression for them, as they run with the image of a color in their minds and look for its corresponding reality in their surroundings. It is a real triumph for them to identify the idea with the corresponding reality and to hold in their hands the proof of the mental power they have acquired. (Montessori 1965, 89)

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[64] The fascinating history of Montessori's determination to be recognized by the Italian medical community, and her extensive work with children is a topic that deserves its own volume. However, there is insufficient time and space to do that here. After reading a few books on her methodology and biographical details the following works are highly recommended: Montessori, Maria. 1969. *Spontaneous Activity in Education*. United States: Schocken Books Inc. Also, for her own critical reflection of her work read: Montessori, Maria. 2004. *The Montessori Method: The Origins of an Educational Innovation: Including an Abridged and Annotated Edition of Maria Montessori's The Montessori Method*. Edited by Gerald Lee Gutek Lanham: Rowman & Littlefield Publishers, Inc.

It is apparent that Montessori's approach is designed to capitalize on the neural plasticity of the child in order to help children learn effectively, to prepare them to contribute positively to society. Montessori's use of materials and activities that promote the use of the R-mode would have helped the children refine their imaginative function, giving them the sense of freedom and self-fulfillment that can be lost in older grades when L-mode learning tends to dominate classroom activities. When one considers the Montessori approach with reference to the PSCC, it may become apparent that the Montessori approach focuses on the development of the PSCC through a focus on the PSCC's somatosensory sign level. Activities that are meant to stimulate children's natural curiosity about objects in their environment assist individuals to learn distinctions between objects. It seems this knowledge will inevitably transfer into the SCC's matching sign slots as children have to apply this knowledge to solve problems that are meaningful to them.

All of Montessori's demonstrations of materials and use of didactic materials allow the child to work from an inward to an outward motion, moving smoothly from a strong PSCC focus to the establishment of an SCC. Even the act of weighing the children one by one and allowing them to track their physical growth helps support the construction of a strong self-concept, which is the result of a healthful PSCC. Essentially, Montessori's didactic materials appear to be designed to help the child to become aware of the discerning powers of their own senses through the interaction of their body with objects.

4.2 The Silent Way Approach (SW)

As a mathematician and teacher of students from kindergarten to university, Gattegno viewed language in a unique way. He tried to make the invisible process of learning visible to teachers so that they might endeavor to teach more effectively by subordinating teaching to

learning and allowing their students to learn independently at their own pace. He worked on several different approaches to teaching reading and published his "Words in Color" reading program for children in 1963. Later he applied some of the tools utilized in that program to language teaching and learning. Though Gattegno's Silent Way is an approach to language learning, it postulates such a unique set of ideas that it functions more like a theory, in that one has to make certain assumptions about the various elements involved in order to attain the results one expects to see. Without accepting that learners will gain more understanding from their own thoughts about the sound images that they encounter than through direct teaching, the Silent Way approach cannot succeed.

Gattegno's radical ideas were first published in 1963. To propose silence on the part of the teacher as a tool within second language learning was completely unheard of and yet purportedly, Gattegno's classes with his own students showed that students learned quickly and efficiently by using their own powers of observation (Gattegno 1963; Gattegno 1972). Gattegno attested that students were very excited about the program because there was no fear of failure. This meant that students had a kind of learning freedom that they had never experienced before. All types of tests were integrated right into the learning context, just by him observing the progress of his students and allowing them to use their logic to test whether meanings were plausible or not. Gattegno says that "If the learner has any understanding of the words he has met, he will know, because of his general experience, that such strings of words are no more acceptable in the foreign language than in his own" (Gattegno 1972, 49).

> While it is hard to think of an actual situation that is contradictory, it is very easy to produce any number of contradictory statements by pointing the words on the charts, or with pen on paper. These can serve as tests of whether understanding of the meaning of words used in various situations exists to a sufficient degree. A statement may be grammatically correct but logically unacceptable: for example, "the largest of these rods are the smallest among them." (Gattegno 1972, 49)

He allowed them to work through language problems with their classmates, giving an occasional nod to signal to students that their solutions were the correct ones whenever this was necessary (Gattegno 1963; Gattegno 1972).

The basic materials of the initial lessons of the Silent Way classroom are a set of colour-coded sound charts (called Fidel charts), a pointer for the charts, word charts, and colour-coded wooden rods. There is also the mention of word cards that are colour-coded based on grammatical function, but this is only implied and not made explicit. According to Messum and Young, although these existed, they were not seen as useful as other tools and were removed from the system (Messum and Young 2012, personal communication). The following quote from Gattegno's (1972) book indicates the rest of the materials:

- A phonic code chart(s) (Fidel)
- Tapes or discs, as required
- Drawings and pictures, and a set of accompanying worksheets
- Transparencies and a second set of worksheets
- Three texts: sentences to be read separately; sentences to be read consecutively; a Book of Stories
- Worksheets on the whole language, without any restrictions
- Three anthologies
- Films (Gattegno 1972, 15-16)

The first and second anthologies are divided into short texts each, about 500 words in length. Gattegno says these are "… taken from authors who have passed hurdles and have become literary figures of their time" (Gattegno 1972, 69). The third anthology is more focused on critical discussion and academic style writing thus containing longer texts (1972, 71).

The colour coding used in the Silent Way is based on the phonetic sound represented by the letter or symbol, or combination of letters depending on which language is being represented. Gattegno does not explicitly explain the purpose of the colours of the rods; however he uses them to present situations without ambiguity. The distinction in the size of rods seems to be used

more effectively than the colour to make comparisons. Students learn the terms for each of the colours, but based on the explanation provided by Gattengo, it does not seem that a colour is associated with a certain type of word or concept (Gattegno 1963; Gattegno 1972).[65]

As students begin to make progress, reading materials are introduced into the lessons. Students study these texts and compare them to their own sentences, attempting to add to them and modify them by concentrating on making their meaning obvious. Gattegno focuses on helping students achieve a degree of proficiency in the target language suitable for everyday living, as well as for further academic study or employment opportunities, depending on the ages of the students. Once this level has been reached effectively, Gattegno introduces three books of anthologies that contain texts from famous writers. These are used to compare different author's styles and begin asking a number of questions that are designed to stimulate critical thinking. He suggests teachers can make their own anthologies by purchasing the classics in the target language and making them available to students who want them (Gattegno 1972, 75).

An analysis from the perspective of the PSCC model would reveal that, like Montessori, Gattegno also supported the development of the PSCC through the use of somatosensory signs. Though a variety of signs are activated during a Silent Way lesson through the manipulation of rods, the approach utilizes the visual sense through its use of colour. It seems that Gattegno takes advantage of the natural qualities of colour to attract and maintain attention, excite the emotional centers of the brain and to act as a symbol for something else.[66] In a similar way to Montessori,

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[65] At present, after decades of language learning materials development, Gattegno is, perhaps, best known for his use of silence in the classroom, colour coded phonetic and word charts and his use of colour coded Cuisenaire rods (Acton 2011, personal communication).

[66] Young notes that she has also been able to use this approach effectively with blind students (Young 2012, personal correspondence). This evidence speaks to the dexterity of Gattegno's original design and demonstrates that other sensory modes through their relation to the perceptual system can function as semiotic

he also uses size to help students learn to express distinctions. Gattegno used the rods to introduce spatial and temporal relationships, at times using them to represent objects (Gattegno 1972, 47).

A PSCC model perspective would argue that colour acts as a "unifier" between the two separate signs of the grapheme and the sound in Gattegno's SW. In this way, colour provides the referent for the relationship between the sound and the grapheme. As previously mentioned, colour is an element that would be present in each of the PSCC's sign levels and, as such, may be particularly powerful in its ability to carry the L2 pronunciation and connect it to a similar L1 sign. As colour is assumed to be present in each level of signs within the PSCC framework, the use of colour would connect the L2 sound sign with the L1 colour sign. In a manner resembling some neurotransmitters, the L1 information might team up with the colour sign as the colour sign travels through various connective lines moving towards similar signs in the PSCC.

The use of coloured L1 and L2 charts could help learners approximate the L2 sound through assisting them to become aware that they have some of the same sounds in their L1 as a point of departure before working on the sounds in the L2 that are different from the L1.[67]

As a particular colour may have been viewed countless times before during the initial development of the PSCC, its presence could theoretically stimulate multiple L1 networks, even perhaps bringing back memories and sensations and allowing the student to become more

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bridges between L1 and L2 signs. This does not necessarily mean that people without visual impairments would not benefit from the element of colour as a reinforcement of the semiotic bridge between the L1 and the L2 signs.

[67] Hypothetically, if Gattegno's Silent Way utilized two charts one in the L1 and one in the L2 using the same sounds for equivalent colours and different colours sounds that were different colours would stand out, but the places where they were the same would help ease the learner into the process of gaining L2 pronunciations. Students would be made visibly aware of the difference between sounds. This could help them to avoid approximations. For example a Japanese student given a colour coded chart of their L1 sounds and a colour coded chart with their L2 sounds might question their inclination to turn the English [l] into a flap because the colour would visually reinforce their differences.

connected to the sound through the colour. Likewise, although the grapheme could trigger semiotic confusion due to its foreignness, the presence of the colour and its ability to bring the other two signs with it may bypass the need to establish a connection between the L1 and the L2 grapheme.[68] This means that students would only need to remember the colour in order to access both the sound and the grapheme with it. Effectively, then it seems colour is a sign that can connect the PSCC and the SCC

4.3 The Pronunciation Science Approach (PronSci)

Messum and Young have been heavily influenced by Gattegno's methodology and have built their Pronunciation Science (PronSci) approach around Gattegno's SW approach. In general, they take Gattegno's system and modify it to utilize the mirroring technique that would have been used in the learning of a student's first language, based on discoveries made in phonetics and child language development since Gattegno's time. They hold that although the learning of a first and second language is similar in some respects, the learning of an L1 and the learning of an L2 are fundamentally different. They promote the silence aspect of the SW by not allowing the teacher to be an articulate model of the L2.

This reduces modeling to the occasional visual presentation of simple mouth shapes and articulator movements that the student can use as initial guidance towards the articulation of the sounds that they themselves will produce. If the teacher has shown the mouth shape indicating the articulators used through his/her gestures, students are invited to begin making sounds while holding that mouth shape. Then experimentation and practice is meant to gradually help students

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[68] Recent research from the University of California, Berkeley suggests that colour and sound are intimately connected through emotion. The research team found that they could predict with 95% accuracy, which colours they would assign to particular musical pieces despite differences between cultures (Stephen E. Palmer, Karen B. Schloss, Zoe Xu, Lilia R. Prado-León. "Music-Color Associations are Mediated by Emotion." *Proceedings of the National Academy of Sciences*, 2013; DOI: 10.1073/pnas.1212562110).

reshape their sounds through consistent feedback without pressuring them to follow the teacher's pronunciation. They argue that this will free the student from needing to achieve correct pronunciation at once, allowing him/her to concentrate on developing motor skills as well as a knowledge of the location and sensation of his articulators when speaking L2 (Messum and Young 2012a). "Learners can more easily detect what non-native speakers do to pronounce sounds, words and sentences than what fluent, expert native speakers do. They will learn more from watching and listening to other students than from trying to copy the teacher" (Messum and Young 2012a, 15).

Although PronSci's developers borrow many ideas from Gattegno, they have also chosen to make certain aspects of his approach such as the sensing of articulatory positions, more explicit. They do not use Gattegno's original Fidel charts from his "Words in Colour" program that was designed to help native speakers learn literacy in their first language (Messum and Young 2012, personal correspondence) because a different Fidel is required for language teaching. They contend that the original Fidel chart, having been designed for learning to read and write English, became unnecessarily complicated when it formed the basis for a sound/colour rectangle chart, because it then uses too many two-coloured rectangles to represent blended sounds in English, when fewer would be sufficient. Gattegno originally put these on the chart to illustrate spelling combinations. They intimate that the order of these elements in columns are not all needed to reflect the sound pattern of the language adequately, thus their adapted version of his chart removes these. Gattegno actually modified this original chart himself when he began applying his SW approach to other languages. In the PronSci approach, the word charts also use dots to demonstrate when a word can have a weak form, which is not a part of Gattegno's original design (Messum and Young 2012a, 32).

Messum and Young are in agreement with Gattegno about the importance of silence. Silence allows for students to become aware of their articulators. When the teacher is quiet, students may feel more encouraged to talk, listen to each other and attend to the variety of sounds they hear while the teacher observes, encouraging students' attempts with the occasional nod. They assert that:

> … when one's teacher is silent, one is present to and aware of one's own articulators as well as what one produces. So one is learning about what one has to DO with oneself to make a new sound. When a student is copying a model he is asked to attend to the model rather than what he is doing physically, and if he does so he has little or nothing to take away from the experience. (Messum and Young 2012a, 12)

Verbal teacher models are not helpful because students will not know what features of the language are general to the collective and which ones are specific to that particular individual and therefore, in an attempt to imitate their teacher, students may copy irrelevant features (Messum and Young 2012a, 5). Regular speech involves the extraction of meaning from what the speaker has said (Messum and Young 2012a, 12) and therefore it is best that students not be burdened with trying to copy some verbal model. Likewise, given Messum and Young's research, in classes where teachers provide verbal models, one could imply that students may come to judge other English speakers as possessing less standard forms of the language because it does not match language of their teacher. They say that "… although the students know that there are different accents in English, the work they actually do when copying their teacher might well produce the mindset that there is only one correct way to pronounce English: hers. Other perfectly acceptable ways to speak will seem wrong" (Messum and Young 2012a, 13).

They hypothesize that students will also learn about English pronunciation from watching their classmates approximate sounds (Messum and Young 2012a; 2012b).

The PronSci approach has been designed based on the assumption that "listen and repeat" forms of teaching are not effective. Regardless of the program, Messum and Young believe the majority of students will not learn how to pronounce sounds well with the "listen and repeat" approach. They also assert that if a student does succeed with the "listen and repeat" approach, it is because they have been practicing motor skills rather than invoking previously learned skills in sound imitation, and it is this self-practice that has made them successful. They question the long-held assumption that children learn to pronounce sounds by imitating the sounds of more skilled speakers. Instead they imply that children likely learn by trying to produce different sounds and use their mother's mirroring of mouth movements to generate a breathing pace that is suitable for the clear pronunciation of sounds. Gradually as their mothers repeat their attempts reformulated in well-formed L1 utterances, they internalize the rhythm of the language to help later production.

In the explanation of the ideas underlying PronSci, the terms pronunciation, imitation, and mimicking are defined to make the distinctions between them and how they apply to pronunciation learning obvious. According to Messum and Young pronouncing is a motor skill, whereas mimicking involves the recreation of a sensory experience and imitating means to do what one sees (Messum and Young 2012a, 4). Messum and Young assert that children cannot really learn how to speak by imitating the sounds of their parents because this does not allow the children to recognize how the sounds were made.

One of the realities of providing a teacher model is that the veridical sound of the teacher's example will not stay in the student's mind for more than approximately 20 seconds. In contrast, Messum and Young feel that students will come to remember what their vocal apparatus has had to do to create a sound and they can further refine this muscle memory through

practice. This will help students attune their listening and articulators to the English sound system. PronSci teachers also use their fingers and other gestures to guide students toward correct production of strings of words (Messum and Young 2012a).

A vital part of attaining a natural rhythm is stress training. As Young conducts stress training with her students, she uses techniques to help them become aware of their articulators and work on their speech breathing.

> As they speak, she asks them to feel exactly what they are doing with their tongue in relation to their teeth and to the alveolar ridge. She might draw a diagram of the mouth and ask the students to show her where their tongue is. She might use one hand to represent the tongue and the other to represent the roof of the mouth, with her nails representing the teeth. Her other hand can then indicate what the tongue is doing. During speech we can rarely see what happens inside the mouth, so it is the students' job to feel what happens. She repeatedly asks that the students focus their attention on their mouth and tongue, and become more aware of their movements. (Messum and Young 2012a, 36)

Students can learn about stress, in part, by looking at diagrams and engaging in a discussion about where their tongue is; at which point teachers can gesture with their finger or a pointer where their tongue should be for an English stress pattern. During an initial period of time, there is no discussion of what the sentences mean and the teacher's task is to guide the students towards correct pacing and pronunciation of the sounds. Their approach does not use metalanguage in regards to the process at all (Messum and Young 2012a).

The use of a sense-sign form that was utilized as an infant to aid in the discovery of articulators and sounds strongly supports the PSCC construct. From this perspective, the development research that went into designing the PronSci approach is valid. If students are not given signs that will relate back to their first level of somatosensory signs in the PSCC, it will be difficult for L2 signs introduced into the SCC to activate the connective lines between the L1 in the SCC and the L2 signs. Given that Messum and Young acknowledge the difficulty that

students have hearing and holding a model of the L2 signs in their mind long enough to practice them, it seems that they are using the sensory mode of touch, having students concentrate on the feeling of their articulators in their mouths, effectively bypassing semiotic confusion.

From a PSCC/SCC perspective, by choosing to avoid the use of the L1 sound system to introduce L2 sounds, it would likely make them more difficult to learn and also cause them to lack a connection with their deepest levels of signs contained in the PSCC. Without such a connection it may take a considerable amount of time before a learner can gain an intuitive sense of the sound. However, as PronSci uses the mirroring of mouth movements and breathing, both of these processes would have been initiated during the learning of their L1 and as such may allow for the connection of the L2 signs to L1 signs contained in the PSCC.

The difficulty is that the L1 and L2 articulator positions may not be equivalent, thus students will bring in other sound features to approximate the sound. These will likely be influenced by their L1 sounds. Languages that have similar mouth positions in this regard should be easier to learn and there is evidence in the literature to suggest this is the case. For example, Japanese speakers wanting to produce an English lateral approximant [l] will likely produce a flap because this is the closest sound in their L1 to an [l] sound. However, if they were to watch the mouth of an English speaking person as he/she created the sound in their mouths, they might notice a slightly different positioning of the tongue and adjust their aperture trying to make it more like their teacher's visual model. The new sound that they make might be distinct from the first, but perhaps it will still be flap-like. It may require considerable exploration and practice before students achieve an L2 sound.

Without an acoustic model it is difficult to determine whether students would hear the distinction between sounds. Perhaps Messum and Young have foreseen this eventuality and feel

without the distraction of a model, students will pay more attention to the feeling of the sound, and they assume students will associate this feeling with the change in the sound. The fact that they assert silence is a necessary part of this suggests that they have sensed that silence could remove the conflict between the L2 sound signs and the L1 sound signs, using instead the more common signs to both of them, the articulators.

It is very likely that the PronSci approach will be far more effective with the modified Fidel because these charts use colour. It has been argued that colour would be considered a universal sign because the human eye has the ability to perceive all the colours of the spectrum. One could argue that all sounds of language are audible. While this is true for the first six weeks of life, after this time infants begin to specialize on the sets of sounds they hear. At this time language sounds from other languages will be heard in relation to the L1 sound system. Listeners will only hear the distinctions between sounds if they cause the meaning of a word to change. For example, in the following set of minimal pairs [sɪp] and [ʃɪp] in English these are two different conceptual sounds, but in Korean these belong to the same conceptual sound and they never cause a difference in meaning to a word, thus Koreans do not hear the difference between the [s] and [ʃ] when they first begin learning English.

Gattegno's colours, arguably, signify to students that there is a difference between the sounds. In the case of [s] and [ʃ] the graphemes "s" and "sh" help show that there is a difference; however, as the graphemes are L2 signs they lack a connection to the L1 in the PSCC. This means that the learner first has to decipher what the grapheme signifies from the L1 in their SCC and then they have to try and remember the sound from the L1 in their SCC as well as how to produce it. In contrast, if the grapheme is coloured, and that colour represents the sound, then there is a more direct connection between the grapheme and the L1 sounds that need to be

produced. Colours "… make it absolutely clear that there is something new to learn here. The student can't ignore what he sees for himself" (Messum and Young 2012, personal correspondence).

4.4 Essential Haptically-Integrated English Pronunciation (EHIEP)

Acton's "multi-modal" EHIEP approach utilizes movement and touch protocols to help learners internalize the positions of vowel sounds in an imagined matrix that learners visualize (Acton 2007). The matrix essentially symbolizes the standard International Phonetic Alphabet (IPA) chart for vowels, excluding those that are not contained in English. Through the initial orientation video, students gain a sense that there is an invisible matrix in front of them, stretching from the learner's waistline and slightly past their shoulder, as though they were looking out a window into English. The approach has been designed to address several challenges in second language pronunciation teaching, among them the integration of pronunciation learning into their conversations beyond the classroom; a lack of English rhythm in body movement; and the idea that only native speakers can teach this well. EHIEP's goal is to help learners improve the intelligibility of their speech rather than achieve accent reduction.

To assist students in anchoring the vowel sounds to these key locations in the matrix, Acton uses not only movement and touch, but also colour. In a similar manner to Gattegno, the colours represent sounds, specifically the vowels from the IPA chart. One of Acton's graduate students assisted him in the building of a colour-theory inspired visual component for his matrix.[69] Colour theory was greatly influenced by Munsell who was discussed in section 2.6: Colour in learning. The general idea underlying colour-theory in art is that colours can be

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[69] As a graduate student of Acton's, I had the privilege to be trained in one of the first versions of his EHIEP approach in 2007. I found that I could not situate the vowels in the matrix without the addition of colour. After this use of colour Acton found that my division of the matrix into colour values helped learners associate the sound to the colour and situate their torso within the matrix.

divided into tints which are colours mixed with white; tones, which are colours mixed with grey; and shades, colours that have had black added to them. In the colour portion of Acton's system, high vowels, those made at the front of the mouth are represented by tints. This is in part because when spoken these vowels tend to have a higher "brighter" sound. In contrast, low vowels, or what linguists would refer to as back vowels, are represented with a colour that has been mixed with black. The assumption is that sounds made further in the mouth will have a darker sound and students will be able to associate a darker sound with a darker colour. Lastly, central or mid vowels are represented with a tone. Field testing of Acton's work has shown these sound and colour associations to be quite effective in helping students situate vowel sounds within the matrix.

During a class, students are led through various motions that are associated with sounds. These begin as monosyllabic sequences and gradually move up to full sentences. The actual movements are designed to activate certain areas of the body, for example large swooping Tai-Chi like arm movements are meant to activate the torso and most especially the diaphragm to allow the learner to speak with the appropriate intonation and diction. Acton finds that insisting that students focus on refining their movements can distract them from the anxiety students feel when speaking in a foreign language. Likewise, the touch and tap sequences often performed in tandem with arm movement also serve to take students attention away from their voices. However, these also have the critical function of promoting what Danesi calls "bimodality:" the activation of both the left and right hemisphere through activities that engage both analytic and synthetic types of thinking (Danesi 2003, 28). The EHIEP approach ensures bimodality is attained by having the right arm cross into the visual field of the LH and vice versa.

Acton's EHIEP has been influenced by the work of several authors such as Lessac (1997), Guiora (1972) and Morley (2002). The materials of EHIEP are videos of an instructor performing within the matrix. Acton calls these recorded lessons protocols. Each module consists of six steps: a review of the previous video's lesson, a modeling of the new techniques to be learned in that class, intensive training of that protocol, "bilateral" rhythmic practice, classroom practice of the protocol and a contextual practice of the technique in a prepared 12-line conversation (Acton 2012, 5).

Acton's system seems to work through association and internalization. Students learn to associate the vowel sound with the arm movement and internalize the sensation of making the sounds at different levels of their body. For example, students might internalize that the [ɔ] sound was always lower than the [i] sound because of the distance between the arm movements. One could argue that the arm movements represent the tongue position in the mouth and is therefore, a kinesthetic/physiological referent for the actual tactile sign of the sensation of the tongue touching the various locations in the mouth. In this case, the arm movement signifies the sound.

Considering Peirce's concept of unlimited semiosis, the combination of the sound sign and physiological signifier in EHIEP can lead to other signs and referents. Words and even pictures or colours could be associated with the sound signs and physiological signs created through the practicing of the movements. For a basic example, if there was a chart that represented the matrix, the front, central, and back vowels would be present as coloured squares on the chart. A student's arm movements could then be adapted to ensure the students hand could tap the chart as they moved from one vowel to the next. The colour would become associated with the sound through the tapping of the colour with the hand. One might also be

able to have these colours laid out on a flat mat where the movements would involve legs and feet in a type of sequenced dance-like movement resembling a pronunciation teaching Dance Dance Revolution (DDR) video game routine.

Acton's EHIEP tries to assist students in learning pronunciation by anchoring sounds in a haptically-oriented matrix. From a PSCC/SCC perspective, EHIEP would allow students to bypass semiotic confusion by avoiding the clash that will occur between the non-equivalency of the L1 and the L2 sound signs. Through the use of haptic signs, arguably, Acton's approach connects at the somatosensory level of the sign network. This has the potential then to connect to the PSCC through the somatosensory level of signs that contain the signs for movement. However, similarly to Messum and Young's PronSci this connection is only likely to happen if the haptic signs that are being used match those that were used in the student's L1. If they are not equivalent, the assumption is there will be a clash and some degree of semiotic confusion may ensue.

Acton realized the possibility mentioned above and that is why he has also integrated colour into his approach. Acton would argue that due to the universality of colour, for those with standard colour-vision, the placement of sound within the matrix would have the potential to become intuitive and colour signs might transfer between the L2 in the SCC and the L1 in the SCC, which would then connect to the L1 in the PSCC. The PSCC/SCC model predicts that if this connection were to happen, then the learner would feel engaged in their learning (Acton 2012, personal communication). There would also be a sense of ease and freedom through the use of the R-mode and perhaps an emotional response to the signs through the ability of the colour to activate the neural networks involved in memory.

In the case of EHEIP, the presence of afterimages might complicate results because while colours can aid in the retention of sounds by fixing an image in the minds of students, the colour image will be in contrast to the original one that they saw. Though this is a complication, with careful planning of colours, this may not confuse students because the basic premise of using tints, tones and shades to distinguish between front, central and back vowels will remain relatively constant provided that the colours are displayed on a black background. That should absorb the colour of the afterimage, limiting its effects.

Chapter 5: Colour-form Methodology

The design and methodology of the Colour-form approach has been influenced by several theories such as van Valin's (2010) Role and Reference Grammar (RRG), Chomsky's (2006) Universal Grammar (UG) theory and Gattegno's (1972) Silent Way approach, among many others.[70] The Colour-form approach uses a synthesis of generative and functional linguistic theories. This is to help students develop both their analytic skills, such as analysis, and their synthetic skills, such as creation and synthesis, in order for them to grasp how languages can be learned as well as learning them. [71] Colour-form trials have been with Korean students. The Colour-form approach takes Chomsky's idea that language has a universal grammar, a blueprint, whereupon the potential for a finite number of language characteristics may manifest due to the parameters set for it (Chomsky 2008, 295) and converts that idea into colour

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[70] I developed the Colour-form approach first as a game to assist my Korean students to improve their grammatical skills in English grammar in order to help them to learn how to write as well as they hoped because they were frustrated that they could not. They also hated grammar and were afraid to write in English. My first students could hardly write one simple sentence.

[71] Please note that the title Colour-form is the name of the approach where as colourform(s) written with a lowercase "c" and no hyphen refers to the actual pieces that students and teachers pick up and move around that are used throughout the methodology.

patterns.[72] In the Colour-form approach, the visible spectrum represents this blueprint and the colours are selected from it, with reference to the colour terms used in a language. Ultimately, a different genus of language could be represented by a different set of colours used or an alternative colour pattern. The combination of parameters and the degree of importance of each is unique between languages, just as the amount of colour terms a language utilizes is specific to that language.

As languages do not necessarily have colour terms for all the colours in the visible spectrum, the colours chosen for the felt manipulatives might vary markedly from language to language. In the situation where a language has only two colour terms for the entire visible spectrum, then it might be necessary to first teach students alternative terms for colours, perhaps relying on the terms of objects that are always associated with that colour, such as the term blood for red. The (1969) colour word, world study of Berlin and Kay suggests that all people have a sense of base colours. In their study, when people were asked to pick out a good example of each colour, participants consistently selected the same hue, even if they did not have those terms in their language. Kay and Berlin concluded that the people of every culture they tested consistently picked the same colours when asked to identify a pure version of a specific colour, and from this research, they confirmed that there are eleven basic colours. They found that if languages have particular colours, then the spectrum of colour that those colours represent would be consistent. Also, as people are capable of perceiving all the colours of the spectrum, it would not be

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[72] The following quote from Hardin 2009, taken from the forward of Kay *et al*.'s 2009 colour world survey, suggests that others have seen a parallel between colour as a perceptual universal and Chomsky's UG. "And if there are such cross-cultural patterns and developmental orders, do they at least in part reflect the structural features and salience of color perception that human beings have in common? (Here we glimpse the possibility of a semantic analogue to Noam Chomsky's deep grammar, a semantics that might be extended beyond color to terms for other perceptual universals)" (Hardin in Kay *et al*. 2009, forward).

necessary to refer to the colours by name. Pointing to each coloured shape may be just as efficient.

The use of colour in Colour-form reflects Gattegno's idea that colour can be used to make the learning of certain language features easier. Gattegno utilized a set of colours in his SW approach. He would use as many colours as there were sounds in the language (Young 2012, personal correspondence). In the Colour-form approach, colours are introduced as the grammatical function of the category that the colour represents. Young applied this to a colour/symbol/sound correspondence, whereas Colour-form uses colour to represent language features at the word, phrase, clause, sentence and paragraph level.[73] Gattegno says that:

> If we use colors to write each sign, we can at first refer to the sign by its color instead of giving its sound or name. That will reduce our interference with the learning process. In addition to this, we can make use of color in a systematic way to bring out the similarities and differences in sounds that we want the learner to perceive. (Gattegno 1962, 8)

> On the other hand, color saves us the trouble of saying that ough is o, u, g, h, which represents various sounds in various words. If we say that the olive sign sounds as in though, the double-colored as in bough, the green as in through, this supposedly difficult letter group becomes as easy to unlock as the word cat. In this work, all one-sound groups of letters are considered to be one sign only in the English language. We merely increase the number of signs to correspond with the different sounds. Thus, the ay in way, the eight in weigh, the ai in wait, and the a in wane are all considered to belong to the same sign group. They have one sound and, hence, one color only. Pupils learn from the start that color represents something and they pay close attention to it until mastery is achieved. (Gattegno 1962, 9)

> Can the discovery method be used in teaching children to read and write? The most distinctive characteristic of our approach is not so much the use of color to make a language quasi-phonetic, but in the fact that this method uses the dynamic properties of the mind. (Gattegno 1962, 10)

In this sense it seems Gattegno removes some of the burden of symbol recognition on the brain by allowing the student to go straight from the recognition of the colour into the production

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[73] Please note this quote also appeared on page 108 and is repeated here to give an impression of the sequencing and flow of Gattegno's discussion of colour for purposes of clarity.

of the sound the colour signifies. This seems to prevent the student from becoming confused by the different spellings in words. Gattegno's SW colour, in part, seems to function to prevent students from becoming distracted by the spellings of words, thus enabling them to work quickly through their ideas from recognition to production. The Colour-form approach uses this idea, but more broadly.

The Colour-form approach uses colour as a possible means of stimulating L1 signs at various sign levels in the mind to allow students to learn structural patterns without their thought process being interrupted because of L2 symbols that may conflict with their L1 symbols. As the coloured felt pieces, called colourforms, represent word classes and not words, the students can choose from their vocabularies with the guidance of colour patterns to reassure them that they are placing the words in appropriate locations. Colour-form may even decrease the cognitive load language students must maintain in order to progress in their learning.

In a similar fashion to Messum and Young, Laurent has also been influenced by Gattegno's work. Like Colour-form, Laurent's learning system for French also uses colour to represent word classes (Laurent 2012). He does not account for why he uses certain colours and implies in a like manner to Gattegno that his colour choices are arbitrary. In contrast, Color-form uses the separation of warm colours for content words and cool colours for non-content words based on the research of Gengenfurtner *et al.* (1998) and Kay *et al.* (2009).

In Laurent's system, he gestures to words that are on a board on the wall with a pointer while his students observe. Laurent's students watch and listen during the initial lessons as he says a simple sentence such as "cats meow" while pointing to each word as he says it. At this level, Laurent is associating the words with the grammatical categories in the boxes that are outlined in colour. He does not name the category while moving from the word to the coloured

rectangle until every child knows what words belong in it. Perhaps, this allows students to grasp the function of the word based on its placement and how it is used in their speech (Young 2012, personal correspondence).

In Laurent's system, the number of grammatical categories that are represented in the initial sentences will depend on the ages of the students. For example, for students who are in formal schooling at the grade one level, the initial sentences will only use up to four word classes, but for classes of adolescents or adults, the initial sentences will contain at least one word from each word class. After the first sentence has been demonstrated with the pointer, students are gradually invited to come up and use a pointer to generate sentences by pointing to the coloured rectangles in a manner that resembles what Laurent has previously shown them. Laurent provides sentences for his students until they know what grammatical category each coloured box represents. Due to the limitations of software to translate Laurent's work from French to English for this thesis research, it is unclear whether students make their own sentences later by pointing towards the colours in different sequences. At present, it is assumed that when the students understand the grammatical role of each coloured box, Laurent encourages his students to make their own sentences out of the framework he has shown them (Messum and Young 2013, personal correspondence).[74]

Laurent's work with French bears an interesting parallel to Colour-form up to a certain point. He has a similar system in establishing the colours in grammatical categories. He has been influenced by Gattegno's work and his initial lessons are rather Gattegnoesque by introducing

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[74] As I do not speak French, my research is based on the translation of his website. Consequently and most unfortunately, subtle nuances of his methodology may be neglected in the description of his work. In addition, it can be assumed that the educators of other languages and those of non-western cultures may also use colour and other qualisigns in their language teaching methodology. However, the scope of this thesis has been limited to English.

the colour and word class by pointing to the word and the coloured rectangle. Colour-form's initial lessons also focus on helping students associate the colour with the word class, but also the higher-level sentence components such as subject and predicate.

Later in Colour-form, students will become aware of the presence of green Colourforms and question green pieces' role in the sentence. As green represents sentence elements that serve to bring the subject and verb into a relationship with each other by locating them in time and space, this leads to a greater focus on the establishment of relationships between objects and their actions. Such pieces situate objects and events in time and space. Within the first hour of the class during the first week of Colour-form, students write sentences in their native language and with coloured markers they colourize their L1 to identify where these word classes are in their sentence. From here, the class presents their findings and generalizations made about the basic grammar colour pattern. As the basic word order of Korean is subject, object, verb, the colour pattern that Korean students are expected to discover is red, red, green, and orange using this approach.

The engagement and functional load of colours seems to be much greater in Colour-form than in Gattegno's and Laurent's approaches. Gattegno and Laurent's approaches seem highly audio-visual; students are watching and listening to a classmate, themselves or the teacher, while whomever moves the pointer from one box to the other. In their work, colour seems to function more as a mnemonic device to strengthen the student's connection between the word and the grammatical position associated with the word within the sentence. In contrast, in Colour-form, colour serves as a unifying framework between L1 and L2. Apart from the green article, colours represent their membership in a phrase and the size of the colourforms refers to whether it carries a basic meaning such as a noun or expands this meaning by giving more information about the

subject or predicate. As previously noted the Colour-form method also utilizes the shapes of squares and rectangles. The squares represent word classes that carry the primary meaning, such as nouns and verbs, whereas the rectangles represent word classes that are used to express additional meaning. The colours introduced in Stage 1 signify the colourforms' relationship to the broader categories of subject, predicate or locative. For instance, the red rectangle is an adjective because modifiers expand the amount of knowledge one can have about the noun. These are introduced in the first stage or unit of the approach.

The use of colour in the approach has also been inspired by Davis' theories about dyslexia (Davis 1994). Davis has been instrumental in developing programs to aid learning disabled learners. He uses the term dyslexia to cover the whole spectrum of learning disabilities such as ADHD, while excluding physical impairments such as visual or auditory disorders (Davis 1994)[75]. While multiple labels have been assigned to types of dyslexia, when referring to dyslexics he feels that, in general:

1. They can utilize the brain's ability to alter and create perceptions (the primary ability).
2. They are highly aware of the environment.
3. They are more curious than average.
4. They think mainly in pictures instead of words.
5. They are highly intuitive and insightful.
6. They think and perceive multi-dimensionally (using all the senses).
7. They can experience thought as reality.
8. They have vivid imaginations. (Davis 1994, 5)

These observations about dyslexic learners have led to the use of colour in Colour-form to evoke an intuitive sense of language structure through multisensory techniques by helping students to become aware of constituent environments.

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[75] Going forwards, left and right hemispheric functions will be used as a means of a conceptual short hand that is consistent with Davis framework (Davis 1994).

Davis notes that there are differences between verbal and non-verbal thought. He estimates that the speed of verbal thought is about the same speed as speech. Thus a skilled speaker could say and think about 200 words per minute, whereas a non-verbal thinker's thoughts could be thousands of times faster (Davis 1994, 9). Non-verbal thought is intuitive and frequently beneath conscious awareness. While human beings utilize both modes of thinking, people will use one for most of their thinking, utilizing the second when needed (Davis 1994, 9). Davis contends that as language can reflect one's thought process, when faced with the arbitrary relationships between sounds and symbols, dyslexics' inability to think in terms of verbal conceptualizations suggests that their primary thought process is non-verbal.

Davis asserts that dyslexics think with the meaning of the language by creating mental images.[76] These are multisensory images that evolve as more information is added to them. Although this thinking can be 400 to 2,000 times faster than verbal, when any "unpicturable" word is introduced,[77] a non-verbal thinker will not grasp its meaning (Davis 1994, 98). Davis even says, "It is impossible for a non-verbal thinker to think with words whose meanings can't be pictured" (Davis 1994, 11). A prime example of this is the word "the;" no matter how many times a dyslexic reads and writes it, the three letters "t," "h" and "e" do not have a corresponding picture. Saussure would likely say this is because the relationship between letters is entirely arbitrary. For verbal thinkers, these letters should not cause difficulties because a verbal thinking child can work out how they should sound (Davis 1994, 11, 81). In contrast, a dyslexic person

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[76] Though this is a strong claim, from a semiotic perspective images can have many different signs in them thus a picture can display multiple relations, culminating in the representation of some meaning that the individual can interpret based on the relations between signs in the image, but also in light of the signs present in their memories.

[77] Please note "unpicturable" is not Davis' term, but one of my own that is used to describe a sign that one is not able to make a mental picture for. The word "the" for example is not very "picturable," therefore it is unpicturable.

who processes information in the form of an evolving mental image has never heard their thoughts (Davis 1994, 11) and may not be able to express them because they have passed by so quickly. Any "unpicturable" word that appears in a sentence will prevent the image from progressing (Davis 1994, 12). His work suggests that this will make it difficult for the dyslexic learner to see the relationships between the elements in their mental image and linguistic phenomena such as letters; they will become confused (Davis 1994, 13). For example, if dyslexic students come across a verb that they do not know while reading a story, they can have a mental image of two characters perhaps, but have no idea what happened to them.

As the amount of confused signs builds up it can trigger "disorientation." Davis describes this as the mind's eye moving, causing a shift in perception (Davis 1994, 13). When this happens, dyslexics will no longer perceive what their eyes see, only what they think their eyes see. In other words, dyslexics will then experience a distorted reality. When this occurs, dyslexics may see a word forward, backward, upside down or from various other perspectives. This means that if the word is not recognized, dyslexics will mentally dissect it and reassemble it in every possible configuration. They will then feel confused, because of the many incorrect options they have to choose from. Gradually, they will eliminate all potential configurations in their mind, finally arriving at the correct form of the word, but to do this they could have run through more than 3,000 more computations than non-dyslexic children (Davis 1994).

Davis asserts that:

In normal childhood development, the skills for analytical reasoning and logic should begin to develop at around the age of three. These are the skills for consciously recognizing people by seeing elbows, and kittens by seeing white balls of fur. Children who need these skills begin to develop them. But little P.D. already has a system that is faster and more accurate than analytical reasoning and logic ever could be. He has no

need for these skills at all, so they don't develop. (Davis 1994, 79)[78]

In contrast, in a non-dyslexic child the development of logic and reasoning necessitates the

learning of speech. Davis states:

> This explains why verbal conceptualization is many times slower than nonverbal
> conceptualization: The speech and language center of the brain must, of necessity,
> operate at the maximum intelligible speed of speech—at most, perhaps 250 words per
> minute, or about 4 words per second. The result is that the normal child's thinking
> process is dramatically slowing down, while P.D.'s mind continues to race along at full
> speed. (Davis 1994, 80)

Davis says P.D., a hypothetical dyslexic person, will have learned to speak, but when

communicating may try to talk at the speed of his thoughts which are visual.

Thus, a non-dyslexic child has to "… use the speech and language center on the left side

of the brain in his or her thought process" (Davis 1994, 80). He contends that as logic and

reasoning are based in language, these types of thought resemble the language patterns in

sentences (Davis 1994, 80). In contrast, according to Davis, a dyslexic child already has an

effective means of processing this information that is more efficient for recognition tasks than

verbal thinking, and as a result, the development of analytical skills is delayed. Consequently, the

use of verbal conceptualization associated with logical skills is also not utilized.

> Recent research suggests that students who have difficulty learning a second language
> have weaknesses in their oral native language. Thus affecting their performance within an
> English language environment, these weaknesses affect the comprehension of phonetic,
> syntax, and semantics. Dyslexic and other learning disabled students may be affected by
> the same weaknesses… If a child cannot decode letters they will inevitably have
> difficulty reading whether they are learning disabled, learning English as a second
> language, or is in early grade school and presently learning reading skills. (Nosal 2012)

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[78] When Davis refers to little P.D. he is discussing the general process of any potential dyslexic as they
move from underlying unconscious talent to the consequence of dyslexia since being exposed to printed words
(Davis 1994).

In consideration of the similarity between the confusion felt by dyslexics and ESL students while processing letters and their sound correspondences it seems there could be some element that can be associated with the sound or word class that does not cause this disorientation. Replacing the written symbol with a colour, if only temporarily, seems like it might limit confusion. Coloured felt can fit this need because no matter which way it is turned the element always stays the same unlike letters that can change constantly. For example, the letter "p" can change from "b" to "d," etc. The different shapes of the colourforms should also not cause dyslexics to become confused because they have had multiple experiences with shapes and can visualize one easily. Using colour would also serve to eliminate the need for ESL students to recognize and decode foreign symbols so that unknown signs will not distract them.

In light of Lamb's mental activations proposal, it seems reasonable to consider that the shift experienced by dyslexics is not exactly due to the movement of a mental eye, but from the struggle for dominance between the left and the right hemispheres. It may well be that the reason dyslexic people feel this keenly is because, as Davis (1994) asserts, they think in images. Thus, their RH could be "dominant." Certainly, considering Davis' proposal that dyslexics develop the ability to move their mind's eye while still infants (Davis 1994, 104), it would seem that dyslexics rely on their strong right hemispheres more often than their left ones at least for the special talent of disorienting.

Davis argues that the language processing deficits that are commonly connected with dyslexic students are not visible until a child enters school and is faced with the challenge of learning arbitrary symbols like letters. This fact also suggests that the right hemisphere of a dyslexic child is more "dominant" than their left side at this time. The fact that a dyslexic child can look at a three letter word such as "cat" and see the 40 possible configurations of it instantly

(Davis 1994, 84) suggests that the right side of the brain which revels on complexity (Edwards 1989, 90) is quite active in the mind of a dyslexic or that the LH is simply less dominant. Early exposure to Edwards' characterizations of the LH and the RH as the L- and R-mode respectively, has had a profound influence on how to address the tendency towards semiotic confusion. Colour was selected, in part, because of its obvious connection to attention and mood through the somatosensory level of signs as a qualisign. As the early learning of infants is non-verbal and involves the experiencing of qualisigns such as colour and texture, it seems reasonable to consider colour as being associated with the R-mode.

Learners of languages have to recognize letters as well as how they interact to represent sounds. For words to convey the meaning they need to, students must also have the correct sequence of letters, which means the student needs to gain a sense of the rules that allow for the word's creation. If a learner has an understanding of how words are created and the rules that dictate this process, but no understanding of the order they need to be in, they can use, perhaps, the meaning of the content words to form utterances. They can make simple sentences such as "cookie me desire" which are useful when one needs to communicate very little. As human beings are pre-programmed through their evolved ability of symbolic reference (Deacon 1997) to convert symbols into meaning, the natural response for L1 learners seems to be to find an equivalent L1 sign for the L2 sign they are being presented with and place it in a meaningful framework.

In an academic environment, unless there is some degree of awareness of L2 structure, it seems a student will tend to convert the L2 content words into their L1 grammar pattern in order to achieve meaning. Krashen (1987) implies that if learners have a sense that they do not have an understanding of some language form, they may avoid using it or look to their L1 for a solution

(Krashen 1987).[79] This would explain why L2 learners could spontaneously produce L2 words from their newly learned vocabularies in an L1 pattern. Once this process occurs, it seems likely that it would be difficult to disassociate the meaning from the L1 grammar pattern into the L2. The English (L2) words may remain intact through its connection to a L1 sign equivalent. This means that if a student were to see this word they could recognize it and potentially pronounce it if the sound image of it had been part of its network, but without a knowledge of its placement in the L2 sentence, they would have difficulty writing it and potentially speaking it in an L2 grammar pattern. (Please refer to the content in section 5.2 of the Colour-form methodology section for more information regarding this.)

The structurally based grammar of Colour-form has been inspired by Role and Reference Grammar's reconfiguration of Chomsky's generative grammar, and Van Valin, who separates subjects into actors and undergoers. These are the first elements taught in the approach while the obligatory components of sentence structure, subject and predicate, are introduced. Students that have a Canadian Language Benchmark proficiency level of 3-4 are likely to know what a sentence looks like in English (Centre for Canadian Language Benchmarks 2006). Most of the students that come into the Colour-form class know the term "sentence" and what one looks like, but do not have an effective understanding of its parts. While Colour-form is mostly a bottom-up approach, working from simpler elements to more complicated constructions, it actually begins with a brief introduction of the overarching parts of a sentence: subject and predicate. [80] This is to establish a foundation for students as they learn.

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[79]Krashen says that "According to a hypothesis first proposed by Newmark (1966), performers who are asked to produce before they are "ready" will fall back on first language rules, that is, they will use syntactic rules of their first language while speaking the second language" (Krashen 1987, 27).

[80] For a more detailed account of the procedures please refer to Section 5.3 of the Colour-form section.

Top-down and bottom-up learners may find the approach effective. Using an RRG approach at this point establishes a visual framework with actors and undergoers forming a meaningful relationship with the predicate or non-verbal predicate.[81] Van Valin's (2010) model of nuclear, core and clause is transformed into a series of interlocking boxes that learners are able to look into. The symbol of a box is utilized to help students gain a sense of the embedded nature of English letters, words, phrases, clauses, sentences and paragraphs. Beyond these RRG elements, other RRG concepts such as operators are not used specifically.

The methodology of Colour-form is essentially based on multisensory learning where students experience new concepts through different thought modalities such as kinesthetic, tactile, oral and visual. The multisensory approach is largely based on the research of Orton and Gillingham from the 1930s, which was adapted for classroom use by Slingerland in 1935 (Slingerland 1981; Orton and Gillingham 2012). The idea behind it is that the more pathways information can travel through to the brain, the greater the retention of that information there will be. Colour-form uses each of these thought modalities simultaneously. For example, students say their sentence aloud to themselves as they move the pieces around to form it, thus hypothetically, speaking through their movement stimulates a kinesthetic path to their brain, whereas watching the pattern unfold as they place the pieces opens a visual pathway. Hearing themselves say the words that the colours represent opens an aural pathway and finally, the act of touching the pieces and manipulating them into their places opens a tactile pathway. Combinations of thought

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[81] Actors are the subjects in sentence that do an action whereas undergoers are subjects that receive the action. For example in the sentence, "He hit him." he is the actor and "him" is the receiver of the hit.

modalities (sign modes) create a stronger retention of information in each of the sign modes because of the overlap between modes (Shams and Seitz 2008).[82]

Shams and Seitz attest that ". . . multimodal processing reduces cognitive load because information from different modalities can be more easily chunked into short-term memory and used to build long-term representations" (Shams and Seitz 2008, 5). As Sham and Seitz's (2008), research into memory demonstrates that multisensory learning can increase an individual's ability to recognize objects; the Colour-form approach uses a variety of sensory input. Each sensory modality likely becomes layered until a complete mental image of that learning event occurs. Saussure would have considered this a sound image but Leach would view it as a sense image. This would be the sign that is achieved through the combination of sensory information. For example, an infant's experience of a ball involves moving it around, feeling it on their tongue, listening to the sound it makes as it is squeezed and even smelling the scent of rubber. These are all sense-images that are processed through multisensory experiences that help the infant convert the resulting sense-images into a mental image which is itself a sign and a configuration of other sign-forms just as Peirce's Triadic vision of the sign and his unlimited semiosis hypothesis implies.

In the Colour-form approach, the coloured manipulatives attempt to utilize Peirce's idea of unlimited semiosis in that each felt piece, by nature of its colour, refers to itself, what it represents and the label that is assigned to it as well as its relationship to other parts around it. The very fact that these parts have a relationship to each other implies that there is some kind of hierarchy present to dictate that there is a relationship between those elements. Following

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[82] Acton's (2012) work presents contradictory evidence that suggests that modalities may compete with each other. For more information in regards to this please access his Haptic-Integrated Clinical Pronunciation research website at http://hipoeces.blogspot.ca/.

Lamb's work with sign networks, the colour of the felt piece refers to a hierarchal label. Lamb uses tree diagrams to show the relationship between higher and lower level elements, but colourforms are created to represent these simultaneously. The shape of a colourform represents lower level labels such as the function of words, whereas the colour refers to a higher-level label that denotes the relationship.

As in Peirce's unlimited semiosis, labels are never fixed but can always refer to a word on the same level because of its infinite ability to relate back to signs that share the same qualities as signs within that level. For example, the shape of a square signifies a basic content word. This square shape can relate to any basic content word through its shape and label, which connects all other words that serve that function. Once the lower level pieces have been learned, then higher-level constructions are introduced in such a way that the word classes become layered on top of hierarchical structures. This is because it is the hierarchical patterns of the linguistic system that allow for the relationships between lower level items to exist, as is suggested by Lamb's semiotic networks.

Each colourform piece is intended to refer to itself and the hierarchical relationship that it has to other parts of the system. Phrasal pieces of orange and red can then be placed on clausal level structures of blue. Dependant clauses are purple, because purple represents future tense at the clause level and a "child" who is "dependant" will become independent from his/her "parents" in the future. As longer sentences are created, more purple "phrase strip" can be used.[83] By the time paragraphs are being created, the pieces can be layered on a large felt board and students then use a combination of making sentences on the board and writing them in their notebooks in the lesson.

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[83] The term "longies" refers to long coloured pieces of felt that represent clause level structures: purple rectangles for dependant clauses and blue rectangles for independent clauses.

While the theory of bimodality that Danesi (2003) describes has not directly influenced the approach, the original justification for using the colourforms was to strengthen the right hemisphere's (R-mode) ability to process information that would traditionally be handled by the left hemisphere (L-mode) by using a medium that would help stimulate the R-mode. Colour, with its connection to the visual cortex in the center of the perceptual nervous system, was selected to help stimulate the R-mode through its reference to hierarchical relationships.

In light of the research stated above, the methodology for Colour-form assumes grammar can be learned as a set of colour patterns that represent word classes and constituent relations and that this will provide a framework for further language learning. Without a general understanding of word order, language is learned in isolation from the patterns that serve to both frame and dictate where elements are to be put. This order serves to guide speakers and listeners alike to an understanding of meaning in spoken and written language. As patterns are based on the order of elements, Colour-form's structure uses word classes and constituents. Apart from languages that have no fixed word order, word orders such as SOV or SVO could be fairly easy for students to recognize, not only in the language that they are learning but also in their own.

The following paragraph from Danesi (2003) effectively summarizes the underlying structure of the Colour-form approach in any given class. Danesi says:

> In order to make something accessible to the L-Mode, pedagogical experience dictates that the learner should be allowed to explore the new structures and concepts through R-Mode techniques (dialogues, questioning strategies, simulation activities, etc.). Once the initial R-Mode orientation stage has been allowed to "run its course," the teacher must "shift modes" and put the student in a frame of mind that allows him/her to reflect on the new structural patterns *in themselves*. This implies the use of L-Mode techniques such as grammatical explanations, mechanical exercises, etc. Only after it can be ascertained that the students have become familiar with the structural and conceptual features of the new material should they be allowed to use these creatively and meaningfully in communication tasks. (Danesi 2003, 51-52)

5.1 Colour-form Academic Teaching Context - Personal Note

I work at a private Korean institution that employs English and Korean practitioners to teach Korean students English as well as other academic subjects such as math, to students whose ages range from nine to early twenties. Classes usually begin at 4:00 pm and run until 6:00 pm with a ten minute break in between hours. In 2008, after working there for six months, I began to develop a learning system to resolve some of the common errors my students kept making in their homework, such as forgetting articles and prepositions in their sentences, placing the object directly after the subject and violating tense agreement rules. I hypothesized that as they were all making similar errors, there must be some correlation between the errors and the allowable constructions in their first language. I started asking Korean staff members for example sentences in Korean and found that the errors my students made in English correlated with the grammatical structure of Korean. The students did not realize this because they did not know their Korean grammar. The Korean staff told me that Korean grammar is not taught in Korean elementary schools but English grammar is.

My students were afraid to write because they didn't want to make mistakes. Whenever they would try to write, they would lose their idea because they had to think about how to spell each word. Likewise, they would know a concept in Korean, but not know the English word for it. They were embarrassed to show their work, even when they were assured that it was good to make mistakes because that's a great way to learn. Coming from an academic environment where the central goal was to achieve the highest score on tests, this made it difficult for the students to perceive mistakes as a positive product of their learning process. Students wanted to know how to write sentences well before they put pen to paper. There was also an additional important point for consideration: traditional grammar classes could be boring. One could teach

students how to write simple sentences, but then they would only write simple sentences and gradually become uninterested and discouraged because of their lack of improvement. I wanted to give my students opportunities to use the wealth of knowledge they had from their L1 to help them learn the L2. I wanted to make learning grammar easier for them.

I created a game, Colour-form, designed to teach the grammatical patterns of English by using coloured pieces of felt. As my first students were around nine to ten years old, the levels of Colour-form were kept simple to address specific grammar issues. However, as I was given older students, more levels were added to prevent students from making sentence fragments and other clause-level errors. Central to this original design, I was helping my students to become aware of the fact that all languages are sub-systems of relationships between form and meaning. This awareness came about slowly as they worked from Korean colour grammar patterns to English ones. They realized that as they had already learned one system in Korean, they could learn another. My students improved and from that point on, my employer usually sent the students who were having difficulties to my class. During my linguistic training at Trinity Western University, the system has been evolving and I have now been trialing it for three years. Usually there are two to three Colour-form writing classes running per semester.

Colour-form classes are small, commonly ranging from 2-5 students and involve a combination of direct style teaching on the white board, where students take notes and participate in discussions, asking and answering questions. They participate in dialogues about the patterns they see and discover, write, draw and use the coloured felt pieces called colourforms. Depending on the need of the students, multisensory techniques may also be utilized such as writing in the air or tracing words with one's finger and illustrating the meaning of a word with images or clay. When teaching a new grammatical concept such as clauses,

students are first asked to write a sentence in Korean showing the Korean colour pattern. Then they build their sentence out of the colourforms. They are asked questions about their pattern such as "can it be made any smaller?" or "what parts can be moved?" Then students are invited to build what they think the English pattern will look like and are guided to a correct representation. The similarities and differences are discussed. After new information has been introduced or discovered, students are given an activity to practice using the new grammar.

To summarize the lesson, the new pattern rules are integrated into the Colour-form game. The rules are designed to help students attend to certain aspects of the language such as areas they will likely have difficulty with based on how different the grammatical rules are between their L1 and those of the L2. For example, being able to place down a green colourform (article/preposition) in the allowable colour sequence will gain the player fifteen points, whereas placing the red colourform (noun/proper noun/pronoun) in the allowed sequence will only give the player five points. To maximize the amount of points they receive, students pay attention to the pieces that will give them the most points and these pieces correspond with the particular grammatical pieces that students have difficulty with. The purpose of the rules is to make the student aware of the differences in a fun yet focused state.

The students enjoy the challenge of a new level in the game. As they master certain patterns, new colours are added to game. In a similar manner to a video game, the change in level reminds them of how much they have learned since the first level. The dice colour signifies which colour can be placed down as well as the number of points the roller will receive if he/she is able to put the colourform of the dice colour down in accordance with the pattern laws. At each stage the dice colours represent slightly different functions of the language. For example, in Stage 1, the white colour on the dice means that the roller misses his/her turn, but during Stage 3,

the white colour represents clause markers such as the word "when." The Colour-form game

session that occurs near the end of the class is always in English. Ideally, one day students will

be able to play it in Korean, but at present, parental expectations to teach English must be met.

5.2 Making Bridges Between Korean and English Apparent

The initial work of Stage 1 is for students to associate the colour red with the subject slot in a

sentence and the colour orange with the predicate slot.[84] These are drawn on the white board

with coloured markers. As Korean and English sentences have these two elements, the students

learn this quickly. After this, the parts of speech, referred to as units, are linked to this

framework through their identical colours. Beside the red noun and adjective which are

associated with the subject, and the orange verb and adverb, which are associated with the

predicate, the green preposition and article become quite apparent through their contrasting cool

colour. Green represents all functional words in a language: those that serve to clarify the

relationship between words. In English and Korean, the green preposition situates an action or

subject in time and space. In English, the green article shows the relation of the subject/object to

one that has previously been referred to. It also shows a numerical relation with the subject

symbolizing a singular subject. During the "bridging-process" these become important areas for

discussion.[85]

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[84] Although the procedures outlined here follow a bottom-up approach this is mostly reflective of the low level of English proficiency of the students sent to the Colour-form classes. Hypothetically, after the initial colour associations between the L1 and L2 parts of speech are made, a top down approach could be followed depending on the student's prior knowledge of higher-level grammatical forms. Also if students have an understanding of some higher sentence level forms but not the stage 1 unit-level forms then one can begin with Stage 1 and then skip others as needed.

[85] The term bridging-process is being used here to refer to the act of using a commonality established at the level of signs in order to connect a known sign with an unknown sign for the purposes of learning the unknown sign and understanding the relationships it has to other signs. Likely, someone else has coined this term, but presently, time constraints will not allow for such investigations.

The first bridge students discover during Stage 1 is that although English has an SVO word order and Korean has an SOV word order, as presented to the students through colour-forms, this means that they already have two things in common. The students learn that in both Korean and English, the subject comes before the object and before the verb. In terms of colour patterns, this means that all they need to make a Korean pattern look more like an English pattern is to reverse the orange and the red square.[86] In Korean, the subject gives the topic or theme of the sentence, yet the Korean staff contends that the subject can often be omitted particularly in regards to simple sentences such as "this is an apple" [87], which becomes "is apple." Chang (1994) confirms this when he says that "Korean is a topic, as well as subject, prominent language and the topic or known elements are suppressed in a discourse" (Chang 1994, 3).

Likewise, they quickly recognize that their Korean pattern does not have the green English article. They can see that English must have the green article before the noun whereas in Korean the green rectangle may not be needed at all. There was some discrepancy between staff responses when asked whether Korean had articles or not. Most of the staff said Korean had no articles, but one of the students thought there were, and one of the staff members asserted that Korean had articles but that this was restricted to formal academic writing. Since this time, all the staff has confirmed that while Korean has counters and a word for "the," they do not have articles.

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[86] Most of the information about Korean language contained in the Colour-form section has been taken from Chang's (1994) book on Korean grammar. However, for example sentences given from the Korean staff in 2007 please see Appendix B. These sentences have been made from colourforms to illustrate the process and how the bridges are discovered.

[87] Please note that all of the example sentences in this section are either from Chang or the Korean staff members of the institution. All of the staff examples are in an English orthography and are in italics for ease of reading.

After some discussion, students came to the consensus that they did not need the green rectangle that represents the English article, for their Korean sentences to be considered grammatically correct. The student and the staff member also agreed that articles were optional. By trying to remove the green square from their Korean sentences they discovered that they needed the green square because they had words in their sentence that were related to the noun but they were not actually nouns. These were words that marked the noun as a noun in distinction from the verb. The Korean staff refers to these as postpositions. As these words represented a relationship, students chose to colour them green. The meanings associated with this morpheme were very similar to the English preposition that is represented by the green square. Staff members said that postpositions form part of the noun and in this way function a bit like adjectives, giving the reader more information about the noun such as its location. Korean adjectives act more like verbs that would be considered non-verbal predicative adjectives in a RRG model of language description.

The second bridge in Stage 1 occurs when students make Korean sentences that have proper nouns. When presented with the equivalent sentence in English made from the colourforms, students quickly see that in both Korean and English proper nouns are not preceded by quantifiers or determiners and cannot be followed by plurals.

At the word building level during Stage 1, students can quickly see how English and Korean have similar morphological processes such as nouns can be made into adjectives with the addition of suffixes. For example, the suffix -*hata* can be added to a noun in Korean to make an adjective just as the English suffix –ful can be attached to a noun to form an adjective. Students use coloured pens and note paper for this level of Stage 1.

The colours also make differences easier to see. While both English and Korean can have titles such as Miss before personal names, Korean has several different words that can be placed before or directly after the name to indicate the status of the person. Here is an area that students can appreciate the complexity of their own language. It is also provides an effective segue for discussions of cultural practices such as greeting people of different ages.

According to Chang (1994), there are definite pronouns in Korean for things, times, places and people. These are "*i*," "*ku*" and "*ce*" (Chang 1994, 30). These are roughly equivalent to the English demonstrative pronouns of "this," "that" and "there" (Chang 1994, 30). They function in a sentence the same way English demonstrative pronouns do, referring to both the thing it refers to and itself through the relationship between it and the thing it refers to. For example, one could point to an object and say, "that object." In this case, the object is the thing that is referred to and the word "that" refers to it through its conventional relationship. The Korean staff said that while they have these words, "*i*," "*ku*" and "*ce*" are shortened forms of them and the full words are *iguk* 'this,' *geguk* 'that' and *ka gisae* 'there.' The staff asserts that these are only used in very informal conversation, the type of language my students know. When they are used, they come before the noun just as they appear in English.

As they are in English, verbs in Korean can also be inflected for tense. However, in contrast to English, Korean verbs can be inflected for status as well (Chang 1994, 40). Both English and Korean have main and auxiliary verbs. Both languages also have intransitive, transitive and ditransitive verb forms (Chang 1994).

Stage 2 bridges are usually discovered quite quickly, now that students have figured out their constituents and colour patterns. In terms of noun phrases, Korean and English patterns are quite similar. According to Chang, definite pronouns of *i*, *ku* and *ce* come before nouns such as

"book." Adjectives such as colours follow the *i*, *ku* or *ce* as in the following sentence *i ppalkan chayk i* "this red book" (Chang 1994, 61). Noun phrases in Korean have a head noun with the addition of optional adnouns. These come before the head and any classifiers that precede it. Proper nouns can be a full noun phrase by itself just as in English. Students can trace their finger from the colourform that represents proper nouns in a Korean sentence straight down to the English, noting that they occupy the same position and have the same meaning.

According to Chang (1994), phrases in Korean consist of a verb and optional adjectives or auxiliaries as they do in English. However, the Korean staff asserted there are no verb phrases in Korean. Korean has auxiliary verbs and auxiliary connectives. Adjective phrases in Korean can have verbs, adjectives, auxiliary-connectives and auxiliary-adjectives. The head of an auxiliary phrase is always at the end of the auxiliary phrase. Adverb phrases have an adverb and modifiers such as *acwu manhi* "very much" (Chang 1994, 65).

Stage 3 clauses begin with students making long and short verb phrases and noun phrases. When they begin to move these phrases around, behind, and in front of other constituents, they are guided to discover dependant and independent clauses. Chang (1994) says there are three criteria that can be used to determine whether a clause is subordinate or coordinate: "reversibility," "insertability" and "enumerability" (Chang 1994, 136). The students physically test whether elements in phrases are reversible by moving them in front or behind the other phrases in the clause. Likewise, they pick out phrases and try to insert them elsewhere in the clause.

Stage 4 bridges are learned through moving around certain patterns of colours to see which colourforms have to move together and which ones do not. In the lesson, the subject is

represented by a long red rectangle and the predicate is represented by a long orange rectangle, the same model that was drawn on the board during the first week of classes.

As in English structure, the central meaning of a sentence in Korean is carried by the predicate. Korean is a verb final language. Students quickly discover that the verbal or non-verbal predicate such as an adjective comes at the end of their Korean colourform pattern. Simple sentences consist of a subject and a predicate just as they do in English. The predicate in Korean is often verbal and it will include its modifiers, compliments and objects. According to Chang (1994) there are three classes of simple sentences in Korean: adjectival, verbal and copular (Chang 1994, 70). His examples of each of these are provided below in **Figure 9**.

(3)

	Subject	Predicate	[Adjective S]
a.			
	Kulim-i	*yepputa*	"The picture is pretty."
	Picture-SM	pretty	
	Mia-ka	*cengcikhata*	
	SM	honest	'Mia is honest'

	Subject	Predicate	[Copular S]
b.			
	Mia-ka	*Pancang ita*	"Mia is the class-leader."
	SM	Class leader is	
	Yong-i	*Pancang-i anita*	
	SM	SM not-be	'Yong isn't the class-leader'

	Subject	Predicate	[Verbal S]
c.			
	Hay-nun	*Tongccok-eyse stunta*	"The sun rises in the east."
	Sun-TOP	East at rise	
	Mia-ka	*Yenge-lul cal hanta*	
	SM	English-OM well speak	'Mia speaks English well.'

The subject is normally a noun phrase (NP) or a noun clause (NC) marked with the subject marker *i/ka* or the topic marker (*n*) *un*. The NP marked with *nun* (in 3.c) is the subject as well as the topic.

Figure 9. Chang, Suk-Jin. 1994. *Korean.* Amsterdam, Philadelphia: John Benjamins Publishing Company. 1994: 70.

In Korean, adjectival sentences that use transitive adjectives require the subject to be marked twice with a subject marker (Chang 1994, 74). Note the example in **Figure 10** from

Chang.[88]

(12) Transitive Adjectives
    a.
      Khokkili-ka   *kho-ka*   *kil-ta*
      Elephant-SM   nose-SM   long-SE
      Elephants   noses are   long/Elephants noses

      'Elephants have long noses'

    b. *Yong-i ki-ka khu-ta*
      SM height-SM long-SE

      'Yong is tall'

    c. *Mia-ka melt-ka aphu-ta*
      SM head-SM ache-SE
      'Mia has a headache.'

The outer (or the first) subject may be called 'large subject' or Subject-1, the inner one the 'small subject' or Subject-2. The first subject is normally marked with the topic marker *nun*. There is another type of transitive adjectives that require double subjects—emotive adjectives: *mipta* 'be hateful', *cohta* 'be likable', or the like.

        Figure 10. Chang, Suk-Jin. 1994. *Korean*. Amsterdam, Philadelphia: John Benjamins Publishing Company. 1994: 74.

When emotive adjectives are used, this double marking of the subject also occurs. When my students first come they often say sentences such as "me homework is hateful to me." I used to interpret this as "my homework, I hate" or rather "I hate my homework" instead of "I hate homework." The students had to negotiate how to represent the double subject marking in their L1 colour patterns.[89]

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[88] Chang's (1994) examples have been retyped in Figures 9 and 10 to resemble the original ones as much as possible. It is likely that there are some minor stylistic differences such as the font that is used.

[89] One of the consequences of having no formal Korean language instruction is that I must rely on my students' own perceptions of their grammatical patterns. However, frequently if there is some question as to whether a student has represented some part of the pattern correctly, there will be other students that have slightly different patterns. This is not a negative outcome because it always seems to facilitate a class discussion and students gain a clearer and deeper appreciation for their L1 grammar as well as English. Also knowing less about Korean helps me utilize some of the silence both Gattegno and Messum and Young feel is necessary.

The most useful bridge at the sentence level is that both Korean and English sentences are made up of an independent clause or a combination of a dependant and independent clause. By this time, students are aware of the colour patterns contained in English and Korean noun, verb, adjective, adverb and prepositional phrases. They understand their similarities and differences and how they combine to create clauses; thus sentence creation is, for the most part, merely an extension of the same processes they have been refining since Stage 1.

Chapter 6: Conclusions

For decades, theorists in a wide variety of disciplines from branches of cognitive semiotics to clinical psychology to education have sensed that the mind has two or more mental modes: one that relates to the internal environment of the soma and another that concerns the external social world. For Saussure, this was *Langue* and *Parole*; for Lacan, the big S and the little S; for Piaget, social and ego-centric thought, whereas for Eco, it was the NC and the CT. In each case, one of the two implied an internal sense, whereas the other contained an external sense. Edwards in consideration of Sperry's (1973) work proposes that these internal and external senses are actually two different types of consciousness that result in L-mode and R-mode functioning. Relating L- and R-mode functions with their corresponding hemisphere makes it possible to conceive of a PSCC as representing the right hemisphere and an SCC as symbolizing the left. It makes sense that the hemisphere with R-mode functioning would be the place of the self due to the qualities of intuitiveness, creativeness and emotiveness it is said to have.[90]

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[90]The PSCC/SCC model might possibly be useful as a tool to synthesize the wide body of research that has been done in regards to language learning such as neurology, psychology, semiotics, anthropology and linguistics for language teacher understanding.

Semiotics allows individuals to see how meaning is constructed through the formation of relationships between signs. As Lamb's work suggests these relationships involve hierarchies with sub-nodes reaching downward to production or upwards to recognition. The implication of Lamb, Lakoff and Chevalier's work is that hierarchies will develop as a natural outcome of the embodiment of meaning through daily experiences, resulting in the formation of categories. Symbolic reference allows people to create categories that help them interpret these experiences.[91] When signs combine they can impact how individuals perceive the world through conventional patterns, natural patterns or both. These are translated into codes that form part of a social semiotic. Signs gain meaning through their relationship to other signs. Without knowledge of this code, language learners may not be able to express and, at times, comprehend concepts in their L2 that have been formed through their life experiences because the concepts were first learned in their L1. Ultimately, in terms of transfer, the problem is not L1 structural interference, but an inequality between L1 and L2 signs.[92] A solution then is to consider language at the level of referents. When signs are not equivalent, every effort should be made to find some aspect of the language's signs that can aid the learner in establishing a bridge from the L1 to the L2. Alternatively, teachers could use a mode of presentation that could bypass the SC, such as using a qualisign such as in Montessori's approach, where colour and texture provide a sensory context that capitalizes on the young child's aptitude for embodied cognition.

Since natural patterns are those that are based on individuals' PSCCs and conventional patterns are connected to the SCC, practitioners should assist students in becoming aware of such

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[91] The term create here is being used to refer to individuals' own perception of this process. This is also to acknowledge that categories do not simply exist but are actively constructed by those who will use them.

[92] The term structural is being used in the broadest sense here to refer to any sort of organized conceptual apparatus and not simply grammar in the linguistic sense.

patterns in their L1 and L2. The brain translates sensory information into sense-images. Sense-images form networks in the brain, as well as hierarchies that gradually touch other senses, motivating the activation of sign slots, according to a universal blueprint, and as part of the process of neural/corporeal human embodiment. In this way, individuals have a personal information system that is a part of the internal world of the soma. Connections between signs need to be activated and periodically strengthened, if L2 users wish to retain the information they have learned. The interactions between neurons and synapses resemble semiotic processes. Practitioners should employ approaches and materials that allow students to use their L-mode utilizing their SCC and R-mode engaging their PSCC in a manner that is both captivating and productive. As colour is a qualisgn associated with early R-mode learning, the inclusion of this element may be particularly effective for engaging students' PSCC.

The effective use of colour in the different programs created by Gattegno, Montessori and Acton that are designed to assist students in learning relationships between forms and meaning, suggest that colour may function to prevent semiotic confusion. Wilkin's work with coloured overlays supports this because it presents colour as a preventative to the visual distortions experienced by readers when the quality of the text is insufficient. This seems very similar to Davis' disorientation theory where disoriented students are instructed to hold an image of their orientation point in their mind and use it to establish their bodies' position in space. Wilkin's coloured overlays provide a steady orientation point for students that limits the effects of visual distortion. The implication of this similarity is that many, if not all, people may experience some form of this disorientation; perhaps only during times of great personal stress, although Festinger's research suggests dissonance can occur when ever there is a decision to be made. In any case the magnitude of feeling that not grasping the meaning of a sign can cause in any three

of these theories is strong support for the existence of the state of semiotic confusion. Davis and Festinger's theories in particular could explain the emotional reaction people can have to semiotic confusion.

Festinger made his theory so broad in its scope that it could effectively encompass any manner of information that involved "nonfitting relations" (Festinger 1957, 3). Thus, semiotic confusion could be viewed as a facet of his greater theory. However, it is important to be aware of SC's distinctions. Cognitive dissonance is largely linked to behaviour, but SC is not limited to this as SC may occur subconsciously without any change in outward behaviour. A person may be terribly confused but not wish anyone else to know, thereby effectively hiding their semiotic confusion. Using the sign as a specific element involved in the cognitive process narrows the focus of the research in the hopes that it will reveal more about how the sign can be interpreted in relation to other signs. Festinger's theory seems too broad and may miss the idiosyncratic details that combine to create a sense of either dissonance or consonance in the individual. For example, Festinger lists events and beliefs among the information that can be involved in dissonance. However, an event or belief can be composed of multiple signs, perhaps even hundreds, both conscious and subconscious, that contribute to the level of dissonance experienced by an individual. Therefore the distinct title of semiotic confusion seems warranted. To use an analogy, in the manner that a telescope and a microscope reveal different information, so too may a theory of semiotic confusion offer a different perspective of "nonfitting relations" than cognitive dissonance theory.

Like Uexküll, who does not link his *umwelten* to specific brain areas, Festinger mentions that dissonance refers to "nonfitting relations" between cognitive elements, and gives little explanation as to what these elements are. This is a distinction between Festinger's cognitive

dissonance theory and semiotic confusion as in contrast to cognitive dissonance theory, integral to semiotic confusion is the idea that individuals have a PSCC and a SCC and the functioning of these consciousnesses is likely embodied in the left and right hemisphere. Without a focus on the sign and a semiotic perspective such a hypothesis would be untenable; thus the focus reveals something distinct from Festinger's theory and merits a different label despite the fact that it contains several principles used in cognitive dissonance theory.

It is hoped that an investigation on a smaller scale than Festinger's cognitive dissonance theory will better reflect the linguistic needs of students and teachers. As previously mentioned, both PSCC and SCC are required for individuals to become fully functioning members of society and a lack of either will cause definite problems. If one is stronger than the other, this can also have serious consequences, but only if the degree of difference is significant. In the case of second language learning, the introduction of L1 signs through the SCC cannot ignore the necessity of a connection between the L1 signs in the PSCC and the L2. Even if the L2 sign being taught is learned, without establishing a connection to the L1 signs in the PSCC, the language may not be felt. In Damasio's words, they will not know "… the feeling of what happens" (Damasio 1999, 26). This is precisely what learning methods such as TPR and Suggestopedia seemed to be trying to achieve. In a way, practitioners of these methods attempted to utilize a first-language learning situation where one learned through the experience of doing.

Arguably, seen from a PSCC/SCC perspective, practitioners of TPR and Suggestopedia used action signs that would have linked up to students' L1 action signs thus establishing a connection between the L1 signs in their PSCC and SCC and the L2 sign, the label for the action being introduced. Also if one assumes that Stokoe's prediction that sign language was developed before oral language could be correct, human beings may already have a predisposition for

creating signs from perceivable movements through their ability for symbolic reference. The fact that infants begin learning through movement also suggests that this behaviour has been biologically inherited from early hominids. Acton's EHIEP seems to use touch and motion in a similar way but uses it, in part, as a distraction away from the L2 conflicts.

As Libby (1974), Mollon (1991) and Gegenfurtner (1998) hypothesize that the human eye may have been shaped by evolution to notice warm colours first and cool colours second, making content words such as nouns and verbs in warm colours seems logical. Also because languages break-up the spectrum into warm and cool divisions of colour, it might be considered semi-natural for function words such as articles and prepositions to be represented by cool colours such as they are in Colour-form. As human beings have the same capacity to perceive the colours of the spectrum, colour signs may serve to connect L1 and L2 signs in the SCC and the PSCC. Practitioners may be nervous that using colour may only appeal to visual learners. This concern may be warranted; however, as Gardner's (1999) work on multiple intelligences suggests, the use of less frequently used intelligences can help to build up those intelligences. As visual skills are required for writing and reading, it is important students be given opportunities to strengthen this skill. Considering the advantages in speed and creativity that those who think in pictures can have, it seems likely that any temporary discomfort in utilizing an infrequently used intelligence would be worth it for such gains. Also reading, writing and spelling demand a certain level of visual skills.

Danesi concedes that currently technology does not allow teachers to have access to an empirical way to measure how much a particular learning approach can activate certain brain areas in the classroom. Not even Montessori has this kind of budget. He implies that even if practitioners lived in a futuristic era where MRI scans were readily available and we could

monitor our students' brains, there is so much to learn about how the brain responds to stimuli that we would not be able to interpret the resulting data. Perhaps with the advances in neuroeducation, one day there might be some rendition of a high-tech classroom, but for the present, it is enough for language teachers to concentrate on making decisions that are informed by both neurological advances and the close observation of their students. With this in mind, Danesi strongly suggests that teachers should employ "intermodal learning," a combination of R-mode techniques, priming students for activities that require L-mode thinking (Danesi 2003, 119), to set students up for a successful learning experience.

The Colour-form approach attempts to promote "bimodal" learning by using a combination of colours that are based on linguistic patterns, L-mode math and reasoning and R-mode drawing and creative writing. While at present, the Colour-form approach has only been used with Korean students learning English, it is hoped that like Gattegno's (1972) Silent Way approach, Colour-form will be adaptable to other languages in the future.

Practitioners cannot ignore the fact that children create for themselves a language system. They develop it from their somatic beginnings and it shapes them. The presence of an interlanguage whereupon not all errors can be attributed to either the L1 or the L2 may reveal that there is some proto-language and other things. Given this perspective, the PSCC/SCC construct seems as though it could become a useful perspective from which to consider such ESL topics as the critical period hypothesis, UG, interlanguage, transfer, grammar, pragmatics, sociolinguistics and material design, among many others.

The external world is an immense tapestry of signs, continually reweaving itself to both reveal and conceal the conventions that make it; thus human beings have been equipped to be able to categorize all manner of external and internal objects into groups and terms. Until

someone proves otherwise, Deacon seems correct in assuming that the ability to refer to things symbolically within a cultural context composed of the integration of frames is uniquely human.[93] Is this the basis of the neural circuitry that allows for the development of something so complicated as language and culture? If one concedes that there is a universal blueprint in the form of embodied neural structures due to common human embodiment which is then shaped through human experience then Chomsky's (1977) UG has merit, certainly, at the level of neurotransmitters and synapses of neurological patterns; however, whether that applies to overarching constraints on structure remains a question.

Typological studies of languages and Optimality theory would suggest that there are strong commonalities between languages and possibly some marked forms that are uncommon across languages (Kager 2004, 2-3). This is hardly surprising, considering each human being begins as a somatic entity which gradually builds itself and sets in motion the processes that have fine-tuned it through centuries of evolution in order to create its brain and shape its thinking. At the heart of the matter, is that a universal capacity may dictate the presence of a set of sign slots, thus no matter how different a language may seem, teachers will be able to help their students discover commonalities that may help prevent dissonance. Likewise, students can share the events in their lives that have served to make connections between those slots, for it is not sign slots that determine the distinctions between languages, but the connective lines that are formed through the experiences of daily life achieving the appearance of consonance within the collective. Can we now travel beyond Agar's "aforementioned" circle (see Chapter 1) that was

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[93] Deacon is careful to differentiate between the type of gesture communication animals engage in and the type of third-order symbolic modeling processes that human beings communicate through in such products of culture as rituals, frames, and syntax (Deacon 1997).

forged by Saussure and gravitate towards some place that is perhaps new yet simultaneously as ancient as embodied cognition? We can, indeed.

Appendix A: Colour-form Description

This version for the Colour-form approach is intended for a 3-5 month course with Korean learners of 9-14 years of age.

<u>The initial stages of the Colour-form Approach (the first five classes):</u>

In Gattegno's Silent Way approach, the basic philosophy is that there should be a "subordination of teaching to learning" (Gattegno 1972, 1) As a teacher, I have been influenced by Gattegno's belief that a teacher should only need ". . . to watch, challenge, encourage, and study the products of the individual and collective efforts of the learners" (Gattegno 1972, 78). Consequently, during the approach there are many times I simply watch and ask the students to describe their process guiding each one to make discoveries about language.

The basic philosophy is "learning as cultural sharing." Everyone is both a learner and a teacher (Vella 1995) and learners will guide each other through a series of activities in order to discover patterns in language.

<u>During the first classes:</u>

Colours are introduced and their associated grammar/Korean/English and the pictures coded in the colour.

- There are distinct colour terms for orange and red in Korean so distinguishing red from orange is not viewed as a potential difficulty. Colours can also just be pointed at.

- Word creation activities - word building used with writing and spelling in the air (learners rely on size and colour in these lessons).

- Explanation of root words - these words are like seeds because each seed has the potential of growing different word classes. Some seeds produce the same leaf colour

such as the verb seed (leaf colours of verb prefixes/suffixes can be used to create scaffolding for Stage 3 work).

- Discovering rules - which words can change and what do they change into (always searching for patterns). For example, "create" verb root becomes "creation" –noun or "creationism"-noun or verb root "create" becomes adjective "creative".

- Learning is somewhat repetitive in that they trial many different words in order to discover, test and recognize patterns.

- Various games designed to reiterate patterns the students have found are utilized to help them solidify concepts.

- The Korean numerals for 5, 6, 10, 15 and the + and – symbols can be utilized to keep track of points during the game (students keep track of points earned by each member of the class).

For the Colour-form game, these general considerations apply:

- In game sequence, coloured pictures are replaced by coloured shapes

- First game sequence at pre-game level uses only green, red, and orange

Stage 1: Units

Materials used:

- Red square - nouns

- Small red rectangle - pronoun + proper noun

- Small brown rectangle - demonstrative pronoun

- Orange square - verbs

- Green rectangle - articles

- Green square - prepositions/post-positions (depending on language)

- Red rectangle - adjectives

- Orange rectangle - adverbs

- Small orange rectangle - helper verb

- Colour grammar patterns 1-A + 2 (students see this pattern)

- Coloured pens and markers

Learning about types of words and the jobs that they do. Colours represent word classes (basic grammatical categories).

Level 1

- Students associate green pieces with function words and orange and red with content words - orange for verbs and red for nouns (warm colours stand out while cool colours recede)

Level 2

- Modifiers such as adjectives and adverbs are introduced

- Helper verbs are introduced

- Colour-form game at level 1 is played again—this time with students clapping out the rhythm each time if they choose – add level 2 with red rectangles and orange rectangles (meant to internalize patterns through visual and body memory.)

Stage 2: Phrases

Korean has noun phrases and verb phrases.

Materials used:

- Yellow rectangle - conjunctions

- Colour grammar pattern 1-B and 1-C

- All Stage 1 materials are used

Students discover there are rules as to which colours can come beside each other and learn that units are grouped into certain colour patterns. Students should begin to recognize the patterning from the Colour-form game.

Level 1

- Students learn colour combinations for NPs, PPs, VPs, AdjPs, and AdvPs

- Students learn which colours are allowed in each phrase type

- NPs= red or green + red – Example: [she] or [the duck]

- VPs=orange or orange + NP(green + red) –Example: walk or walked down to the river

- AdjP=red + red –Example: [beautiful girl]

- AdvP=orange + V(orange) or orange + NP(green+ red) –Example: [quickly walking] or [[walking quickly] [to [the store]]

Level 2

- The yellow rectangle (coordinating conjunction) is introduced to help students make longer sentences in their game.

- Students learn that a coordinating conjunction joins like-phrases together.

- The game can be played with level 2 or 3 of the game which includes stealers (opportunities to add modifiers and add the points from the shape next to it) and coordinating conjunctions, students try to make the longest sentences they can to receive many points.

Stage 3: Clauses

Materials used:

- White rectangles - clause markers ("wh" words) and corresponding colour patterns.

- Yellow rectangles-subordinating conjunctions/coordinating conjunctions.

- Pictures + time cards.

- Tense and aspect colour-forms –pink circle (present), blue circle (past), green circle (progressive), purple circle (future). (If suffixes were written with coloured pens in the world building pre-stage 1 for verb prefixes and suffixes there is already scaffolding and the colour should help make this connection).

- Blank desk space to represent negation (depending on word/phrase/clause level of negation).

- Colour-form reference charts for all patterns and pieces.

- All Stage 1 materials are used.

- All Stage 2 materials are used.

Stage 3: Grouping of Phrases into Clauses

Clauses Level 1

- Students learn that there are dependent and independent clauses.

- Students discover which colours are missing from an independent clause through investigating and recording the patterns they see.

- What colours need to come together to make a sentence? Students answer questions such as, "is there a word that does not act like the others? Do we need to use a different colour for it?"

- Students identify these words and label them.

Clauses Level 2: Tense and Aspect

- Tense and aspect are introduced. These colour-forms are strikingly different from the Stage 1 set because tense and aspect modify the verb. These color-forms are small circles that can be placed on top of the orange verb square and helper verb rectangle

- Pictures and actions are used to help students understand that verbs in English are coded for time.

- Students place coloured circles on the verb to code them for time. Different colours represent past, present and future.

- Students are asked how time is marked in a sentence in Korean. The teacher knows the answer and ensures learners are able to discover for themselves how Korean marks time.

- Students practice making sentences with a tensed verb. As they become longer, students should discover that the colour of tense has to match if you have more than one verb.

- Students examine what exceptions there are to this and generate grammatical rules to describe what they see.

Clauses Level 3: Negation

- Negation is also introduced by showing the affirmative sentence first and then the negative and asking the students to identify the difference.

- The students can also be reminded of the word building pre-fixes "un" and "dis" that they used during the word building stage where they negated certain kinds of words.

- Now students will learn that not only words can be negated, but whole phrases and clauses as well.

- The students will see that a space has been left in front of the verb (it should be immediately apparent to them that this is different). Having a blank space between the colourforms signifies negation as there is nothing there.

- Students practice making their own negative sentences in the present tense and then with each of the newly learned tenses.

- Colour-form reference charts are provided to the students for tense and aspect and every other colour and pattern law they have learned up until this point for it.

- Students identify these words and label them.

Clauses Level 4: Clause Markers

- Clause markers are introduced as white rectangles.

- Students learn how to write statements and questions using white clause markers.

- Subordinating conjunctions are introduced as other joiners of clauses, but different from the coordinating conjunction. These are still represented by the same yellow rectangle.

- Students learn that there are clauses that can stand alone and clauses that need other clauses through manipulating their colour pieces and answering a number of guided questions such as which phrases can you move around without changing the meaning? Does one phrase seem clearer than the other? Are we left with any questions etc. . . ?

- Students learn that there are different kinds of dependant clauses – ones that tell them about time, locations or people.

Stage 3 Portfolio Project: Students create the beginning of a story in both English and Korean by creating a character or using one from life.

Stage 4: Sentences and Sentence Units

Materials are:

- Tiny yellow triangles-commas.

- The Colour-form family:

    o Grandfather- a tall brown rectangle with white triangle at the top and cane shape

- o Father - a tall brown rectangle with a white triangle at the top

- o "Big Brother" - a brown rectangle with an up-side down white triangle

- o "Little Sister" - a brown rectangle with a right side up triangle looking like a skirt

- o Mother- a tall white rectangle with a white upside down triangle

- Images of different sizes of bricks.

- Picture of a house.

- Notebook paper for students to write down their stories.

- Students receive tiny yellow rectangles to represent commas. Semi-colon and colon are not taught at this stage.

- All Stage 1, 2 and 3 materials are used

Students are introduced to family relations between sentences

Sentences Level 1:

- Students receive Colour-form family members: Grandfather, Father, "Big Brother" and "Little Sister".

- Father gives his children their identity and direction (He is made of the same colour brown as the demonstrative pronoun from Stage 1). The demonstrative pronoun brown is made from its two colours: red, because it is a pronoun; and green, because in a similar way to a green preposition it gives the direction of the actor/undergoer.

- In Korea, children receive their last name from their fathers and their fathers influence the direction they will take in life.

- Students are told that in Colour-form, a special family is used to teach them how to write paragraphs. Each member of this family has a special skill: they can make a type of block out of thin air.

- Father makes a heavy foundational block that no one else can lift except him.

- "Big Brother" can make several smaller blocks at one time but they are not strong enough to form the base of the family's paragraph house.

- "Little Sister" can make the most blocks at once, but these are quite small and easy to carry. However, if she tries to load too many into the same sentence, her sentence will fall apart (sentences are meant to explain one complete thought; too many thoughts in the sentences destabilizes it).

- Father represents the topic sentence because in a topic sentence one must identify the topic and give the direction for the reader so the reader knows where the author is going.

- The paragraph, using building a house as a metaphor, is introduced.

  - Father carries the foundational blocks of identity and direction, if he tries to carry the blocks of support and reason as well it is too much for him to carry and the foundation will not be strong.

  - "Big Brother" must carry the supporting blocks of reasons (statistics, definitions, facts and possibly descriptions) and if he tries to help Father carry the heavy foundational blocks, then he will not be able to carry his own blocks of reasons. Likewise, if he tries to carry "Little Sisters" as well, he will have too many blocks to fit in the row of his sentence.

- Students are warned that if they let "Big Brother" carry too much, "Little Sister" will be angry because she wants to help out too. "Little Sister" carries examples, further descriptions and details that support Big Brother's block of reasons.

  - This metaphor is to help students visualize and understand what will happen to their paragraph house if they try to put too many ideas in the first one to two

sentences. If they want a well-shaped paragraph (house) then they must make sure that foundational blocks come first, followed by the support blocks and finally their secondary support blocks of examples or their paragraph will be unbalanced.

Sentences Level 2:

- Students discover that the content words, nouns and verbs, are common to some of the sentences.

- Teacher assists students in making sentences into groups of related sentences to make a simple story.

- Students write a statement and then isolate the content words.

- Teacher demonstrates how to generate questions about the content words - using the Wh question words: when, what, where, why, who and how.

- Each student is asked to come up with an answer for one of these questions in the form of a statement.

- These are written down and made with the colourforms.

- Stories are generated and students are encouraged to write longer and longer stories.

- The Colour-form game is played for level 4 with tenses added to points. For example, orange is worth 6 points but with a tense, it becomes 16 points.

Stage 4 Portfolio Project: Students write about the actions their character does in their story.

Stage 5: Longer Paragraphs and Multi Paragraphs

Materials used:

- Pink heart

- Yellow circle

- Brown triangle

- White diamond

- All materials from Stages 1-4 are used

Sentences Level 1: Stage 5 discourse structure- moving from stories into types of essays

- Students learn there are different types of writing; stories are not the only kinds.

- They talk about the types of writing they have in Korea and how these types are similar and different from the types of writing in English.

- Students discuss how the degree of realness is assigned to a statement and story. How can students hear or read a story in Korean and know that it is true or not? Is it the content that tells them or some mark?

- Students discuss discourse markers, if any, in Korean and the consequences of using them in the right and wrong location in the sentence. If I were to read a Korean book, how would I know I am reading a serious essay verses a narrative about someone's life?

Sentences Level 2: English essay types are introduced

- Pink heart for narrative - Narrative involves feelings of some kind either from the characters or from the reader, thus pink heart symbolizes feelings here. If students become confused with the use of the present tense "pink circle," you can always explain to them that presence means the idea that a person has an energy, a presence, a heartbeat and narratives are about living beings and their feelings.

- Yellow circle for informative - Informative is a circle because it simply states a topic and proves it through its body by restating it at the end - there are no jagged bits – it's just the presentation of information. The yellow coordinating conjunction simply joined the information and did not negate it like the empty space.

- Brown triangle for persuasive - A triangle is used for persuasive because it is meant to convince the reader of one thing so that the one thing is always jutting out at the reader. All foundational arguments lead the reader to believe the one thing. Quite literately, you are making a point. Students can be reminded that just as in the demonstrative pronoun, the brown colourform, it is vitally important that a persuasive essay identify the argument for the reader and make it clear why they are trying to convince the reader.

- White diamond for evaluative - A diamond represents evaluative because it contains the persuasive essay of the triangle, but unlike the triangle, it also works backwards taking the beliefs of those who would argue against it and acknowledging them while down playing them in order to make their point at the top seem even stronger. A diamond is also known to be a very valuable stone so it helps students remember that there is "value" in evaluative arguments.

Appendix B: Bridges Between Korean and English Colour Patterns

Please note Korean will always be presented first and the second example will be from English

Stage 1 Word Building Bridge Using an Example of Making Verbs

Korean	
Nore	-hada
noun	verb suffix
song	do
"sing"	

English	
paint	-ing
noun	Progressive aspect
paint	doing
"painting"	

nore-hada=   norehada =

paint-ing =   painting =

Stage 1 Word Building Bridge using an example of plurals

Korean	
sagwa	-deul
noun	plural suffix
apple	more than one
"apples"	

English	
apple	-s
noun	Plural suffix
apple	more than one
"apples"	

sagwa- deul =   sagwadeul =

apples-s =   apples =

<u>A few items to note:</u>

During Stages 1 and 2, students are likely to see the most similarities between the languages because at base levels, languages have more in common. However, at the later stages students are learning with the framework of broader structures such as independent and dependent clauses. It is assumed that students can still be aided by colour patterns during these later stages because the same principles apply and they will be able to recognize the earlier patterns. There is a general consensus among students in regards to what words should be coded orange to represent the predicate, and which words need to be red to represent the noun and its modifiers.

Deciding which elements in the sentence should be green is particularly difficult because one is trying to represent something that everyone has a sense of, but they find it difficult to articulate in words. Chiefly, my students struggle with the decision to code noun suffixes red or green. Some of them want to make it red because they are used to seeing it attached to the noun, but suffixes vary so they know it is not a permanent part of the word because different suffixes can be chosen and thus, some of them want to make it green because they have an intuitive understanding that the suffix on the end of nouns does something other than give the subject or action.

When students are questioned in class, they have a sense that the noun suffix is situating the noun in either time or space. That is a relational function and would therefore be green. The need to take the time to discuss all of these issues is not a flaw of the approach's design, but a necessary and integral part of Colour-form's framework. I want them to be able to use what they know, but first, as they have had no formal grammar teaching, they need to develop an awareness of their L1 grammar system by discovering they already know so much more than they thought. Students enjoy the opportunity to be the expert. When similarities are not

immediately clear, inevitably discussions and critical thinking follow. This tends to lead to a deeper appreciation for both languages and a drive to understand them.

The examples presented in this section are only samples of the bridges my students have discovered and note that there are a number of others. However, a sampling should be sufficient to attain a general understanding of the types of bridging my students have discovered.

Stage 1: Subject and predicate bridge

Korean				English		
ku	-neun	ppalli	muck-utda	he	ate	quickly
1st person pronoun	Subjective postposition	adverb	eat-past	1st person Pronoun-male	predicate	adverb
he/she	SMarker	quickly	eat-past	he	eat-past	quickly
"he/she quickly ate"				"he quickly ate"		

Korean-subject   +   predicate

ku-neun		ppalli muck-utda

English-subject   +   predicate

he		ate quickly

Stage 1: SOV and SVO Bridge

Korean					English		
Na	neun	kimchi	-rul	joahanda	I	like	spicy cabbage
First person pronoun	Subjective post position	noun	Objective postposition	verb	First person pronoun	verb	noun
I	Designates subject	Spicy cabbage	Objective postposition	like	I	like	spicy cabbage
"I like kimchi"					"I like spicy cabbage"		

na-neun

kimchi-rul

joahanda

I

like

spicy cabbage

Stage 2: Noun Phrases Bridge

Korean		
Areumdaun	san	
adjective	noun	
beautiful	mountain	
"beautiful mountain"		

English		
the	beautiful	mountain
article	adjective	noun
One/specific	beautiful	mountain
"The beautiful mountain"		

areumdaun

san

the

beautiful

mountain

Stage 3: Dependant Clauses Bridge

Korean		
oenu	maeul	-ae
unspecific	noun	Postposition
some	village	location
"in a village"		

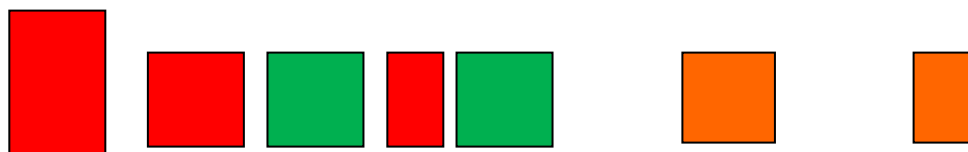| English		
in	a	village
preposition	article	noun
in	singular	village
"in a village"		

oenu

maeul

-ae

in

a

village

Stage 4: Sentences

Please note that postpositions that attach to subjects and objects are indicated with dashes rather separate boxes.

	Korean				
bun	don	-euro	iPhone5-reul	sa-go	ship-seup-nida
adjectival	Noun	post position	noun-objective postposition	verb	auxiliary verb polite
earned	money	with	iPhone 5	buy	want to
		"I would like to buy the iPhone 5 with the money I earned"			

bun   done- uro iPhone5-reul sa-go ship-seup-nida

I would like to buy the iPhone 5 with the money I earned
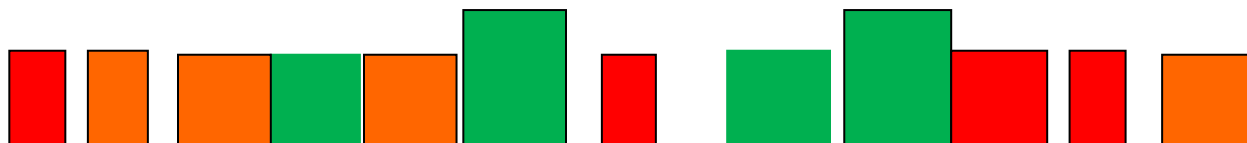
English											
I	would	like	to	buy	the	iPhone 5	with	the	money	I	earned
1p-sing	Auxiliary verb-hypothetical	verb	prep	verb	art	noun	prep	art	noun	1p-sing	Verb-past
			"I would like to buy the iPhone 5 with the money I earned"								

The following example shows the relationship between the main parts. Students would not necessarily draw connecting lines between the Korean and English because they would move the felt colourforms around. It is challenging to show in an example like this; however, one can imagine that the lines depicted below represent the direction of the student's finger pointing from

one constituent in the Korean sentence to the corresponding one in the English version of the sentence. When first learning how to construct clauses the students begin by building up and breaking down small sets of recognizable patterns. Thus, bottom-up and top-down processes are utilized.

bun done-uro iPhone5-reul   sa-go ship-seup-ni-da

I   would like to buy the iPhone 5 with the money I earned
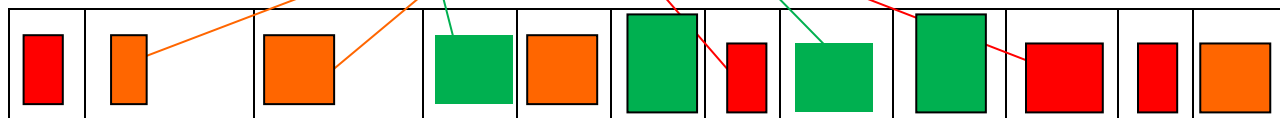
Appendix C: Preliminary Coloured Figures of the PSCC/SCC Construct Model

Accounting for all of the facets of the diagrams in relation to the research

The following paragraphs present each of the main elements in the PSCC/SCC model such as sign slots. An underlined title precedes each paragraph to ensure readers know which component of the model is being discussed. Figures 11-16 illustrate these various concepts within the PSCC/SCC construct model.

Sign Slots

Sign slots are being used to represent the broad properties that make up Chomsky's neural blueprint. Chomsky says that:

> Let us define "universal grammar" (UG) as the system of principles, conditions, and rules that are elements or properties of all human languages not merely by accident but by necessity—of course, I mean biological, not logical, necessity. Thus UG can be taken as expressing "the essence of human language." (Chomsky 1977, 29)

If one is to concede that Peirce is correct in his belief that people think in signs, then this suggests that there is some intellectual capacity in the bodymind that designates the raw input people receive from their senses as signs. This seems to be what the research of Chevalier (2002a) suggests. Given Chevalier's argument to liken sign processes with neural processes, one can perhaps conclude that a sign designation function must be part of the biological endowment of the human species as Deacon asserts. As the ability of symbolic reference is viewed as a human trait across cultures it can be thought of as both universal and biological and in this sense is comparable to Chomsky's UG, and perhaps sign slots function like his deep structure.

From an Optimality perspective it seems that sign slots would be near analogous to constraints. Optimality holds that human languages have the same constraints, but it is only the ranking of these constraints which is based on the experience of the individual cultural groups that accounts for both the similarities and the differences found in human languages. These UG

constraints seem equivalent to sign slots. The ranking of constraints could be likened to the connective lines that form between signs and sign slots as these connections come about through the experience of objects and events.

The development of sign slots as mental models that allow one to infer meaning from certain stimuli begins as the soma develops in utero. Thinking processes come to be through experiences with sensory input. Lamb says that:

> Every normal human being is a model builder, building a model of the world and the self and of the self's position in that world. This model-building process, largely unconscious, begins in infancy, perhaps even before birth, and continues into adulthood, to some extent even to old age, subject to the limitations of senility. Our thinking works along with our senses and the hearsay reports that we get through our linguistic systems to give us pictures of the world. (Lamb 1999, 105)

Signs

Signs are the basic mode of thought and involve relationships between sensory input. As Deely says signs are "… something which, on being perceived, brings into awareness another besides itself" (Deely 1994, 58), they have three interrelated aspects. Peirce says the following in regards to the nature of sign relations:

> The easiest of those which are of philosophical interest is the idea of a sign, or representation. A sign stands for something to the idea which it produces, or modifies. Or, it is a vehicle conveying into the mind something from without. That for which it stands is called its object; that which it conveys, its meaning; and the idea to which it gives rise, its interpretant. The object of representation can be nothing but a representation of which the first representation is the interpretant. But an endless series of representations, each representing the one behind it, may be conceived to have an absolute object at its limit. The meaning of a representation can be nothing but a representation. In fact, it is nothing but the representation itself conceived as stripped of irrelevant clothing. But this clothing never can be completely stripped off; it is only changed for something more diaphanous. So there is an infinite regression here. Finally, the interpretant is nothing but another representation to which the torch of truth is handed along; and as representation, it has its interpretant again. Lo, another infinite series (Peirce nd [1994], CP 1.339).

> All thought being performed by means of signs; logic may be regarded as the science of the general laws of signs. It has three branches: 1, Speculative Grammar, or the

general theory of the nature and meanings of signs, whether they are icons, indices, or symbols… (Peirce 1903, CP 1.191)

… as a necessary deduction from the fact that there are signs, […] there must be an elementary triad. For were every element of the phaneron a monad or a dyad, without the relative of teridentity (which is, of course, a triad), it is evident that no triad could ever be built up. Now the relation of every sign to its object and interpretant is plainly a triad. (Peirce 1905, CP 1.292)

Quota for stimulus into sign slots before nodes start connecting with signs in other slots

In the diagram, sign slots are presented as the properties of Chomsky's neural blueprint. It is proposed that they can be thought of as properties of the mind that take in information from the senses. In a manner of speaking, sign slots could function like Lamb's nodes because each sign slot is conceptualized as having a quota for sensory stimulus and once that quota is filled, the slot opens to begin making sign networks. Lamb attests that:

. . . I also proposed the hypothesis that each node has a threshold function such that a greater amount of incoming activation leads to a greater amount of threshold satisfaction, causing the node to send varying degrees of activation out to other nodes: strong activation if the threshold is strongly satisfied, weak if only slightly satisfied, none if the incoming activation doesn't reach the threshold at all. (Lamb 1999, 178-179)

Although researchers, such as Weirzbicka through her work on semantic primes, have tried to postulate what basic meaning these nodes would embody, further research is needed to present a hypothesis at this time. However, in light of Lamb's research it seems likely that any additional signs and networks that form out of the original sign slot should only serve to strengthen the underlying meaning of the slot, whereas a peripheral network attached to it may not. In this regard, the meaning designation of the slot could be likened to Lamb's "central coordinating node" (Lamb 1999, 156, 254). Lamb intimates that:

So a prototypical exemplar of an object category will provide a higher degree of satisfaction of the central coordinating node for the category than will a peripheral exemplar. It follows that a part of the learning process has to consist of

adjustments in the threshold so that the node will be neither too easily satisfied nor too stringent in its demands. (Lamb 1999, 179)

<u>Sign Levels</u>

Sign levels have been based directly on Piaget's developmental stages. While the work on child development by Case (1985; 1987; 1992), Vygotsky (1962; 1978) and Erikson (1963; 1968) was also considered, Piaget's sensorimotor stages seem to provide the clearest relationship to sign levels. Please note the accuracy of when these stages occur is not viewed as essential to these arguments, thus it is understood that these sign levels are only approximations of what the actual process may be like. Also, one must keep in mind that the PSCC/SCC is only a model to gain a perspective as to why signs are interpreted in certain ways at various stages of development. The idea is that regardless of culture, people are born with the same set of sign slots in their PSCC due to their common embodiment and *umwelten*. However, as a person's development is impacted by external influences such as culture, the connections between signs in networks and sign slots will be distinct. As individuals take in more sensory input, they are likely to develop certain skills and understandings about the world around them through their experiences with stimuli as conceptualized through the interaction of their PSCC and SCC in their bodymind.

Essentially, during the different stages of development, sign slots are pre-programmed to take in certain types of stimuli and to interpret them in certain ways. It is important to note that despite the discovery of that certain signs develop in tandem with a particular stage; this is not to say they are no longer needed after the stage has passed. On the contrary, Piaget's stages are being used only to designate the beginning of each of the PSCC/SCC sign levels because they will continue to develop throughout a person's life.

There are clear definitions of Piaget's stages in Santrock *et al*. (2004).

The Sensorimotor Stage

Santrock *et al*. states: "The Sensorimotor stage lasts from birth to about two years of age. In this stage, infants construct an understanding of the world by coordinating sensory experiences such as seeing and hearing) with motor actions (reaching, touching)" (Santrock *et al*. 2004, 44).

During this stage infants gain the understanding that objects and events continue to occur even though they cannot see them. Piaget calls this "object permanence" (Santrock *et al*. 2004, 44).

The Somatosensory Level of Signs

The somatosensory level of signs involves the soma taking in information in from the senses. The mental representation of this input becomes somatosensory signs. These signs begin to form from the infant's interaction with him/herself and his/her environment. Two other sign levels, body kinesthetic and spatial orientation, are achieved during this stage as well. This level forms the core of an individual's personal semiotic cultural consciousness.

The Preoperational Stage

The Preoperational stage begins around age two and continues to about age seven. The child's thoughts at this point are essentially intuitive and ego-centric rather than logical. During this stage, children gain the ability to mentally represent an object that is not present. This can be seen through the highly imaginative family drawings of a three year old (Santrock *et al*. 2004, 44). During this stage, it is difficult for the child to understand that other people have different perspectives then they do. They may also attribute actions to inanimate objects, saying something like "the mean flower bit me" when they prick their finger on a rose. At around age

four, children also develop intuitive thought; they feel they have knowledge, but they don't know how to express their understanding (Santrock *et al.* 2004, 45). As the child progresses through this stage it is difficult for the child to understand that some quality of an object will stay the same even though it may look different. This stage is characterized by the need to understand how things work in the world. Consequently parents of young children are serenaded with the seemingly endless din of whys starting around the age of three (Santrock *et al.* 2004).

The Actual Memory Creation and Schema Creation Levels of Signs

The levels of signs associated with this stage are actual memory creation and schema creation. During this stage of development, sign networks would be becoming more complex through the connections of sign mode networks, producing conglomerate mental conceptualizations of objects and events. Memory creation refers to the process of noticing certain signs and unconsciously focusing on them in order to retain those signs for some future purpose. Despite the research that has been done on the phenomenon of memory such as the work by LeDoux (1996; 2002) and Damasio (1999; 2010), there is still very little known about how memories are made. As such, memory research is beyond the confines of this thesis. For the present, it is only important to know that it is an important sign level to a developing child in part because it will aid children in developing cultural expectations in the form of schemas. Children at this stage would come to expect particular objects to be present during certain events. The schema they create is entirely based on their own experiences as they assume everyone's experiences will be the same as theirs. This is perhaps one of the reasons why children and sometimes adults can become emotionally troubled if an event does not match their expectations for it. This is the last level of signs to be developed in the personal semiotic cultural consciousness because the next level of signs, schema creation with object recognition, requires

that children be able to extract objects from their contexts in order to understand another person's perspective. Until this level of signs is reached it could be difficult for children to accept other's ways of doing things as equally valid.

The Concrete Operational Stage

The concrete operational stage begins about age 7 to about 11 years of age. Concrete operational thought is about using mental representations to mentally reverse actions. An important skill developed during this stage is the ability to classify objects based on their relationship to other objects. For example, children of this age can understand that their parents have multiple familial roles such as father, brother and uncle simultaneously. This stage is characterized by the use of logical thought as opposed to intuitive reasoning in order to solve concrete problems. Where abstract concepts are involved, children will have difficulty figuring them out.

Schema Creation and Object Recognition Level of Signs

When children are able to process signs at the schema creation with object recognition level, their attention would shift from using their own schemas to contemplating others'. When this occurs they may become interested in how other people are different from them. They will also perceive that they are unique from others, separate from the systems they now seek to operate within. When this occurs it is proposed that the sign slots in the PSCC become particularly active and that this triggers an identical set of sign slots to activate in the left hemisphere which is the beginning of a personal semiotic cultural consciousness.

Formal Operational Stage

The formal operational stage occurs from about 11 to 15 years of age. Adolescents begin to think in more abstract and idealistic and logical ways during this stage. They develop

hypothetical-deductive-reasoning which is essentially the ability to systematically carry out tests to come to a conclusion about some stimulus. An adolescent form of egocentrism develops as well, giving the teenager a heightened awareness of themselves and the belief that everyone else should notice them too (Santrock *et al.* 2004, 48).

Sign Networks

Experience allows for the development of neural connections between signs making it possible to form networks. Lamb calls these networks "nections" because they involve many connections between nodes. He intimates that meaning comes out of the nodes' relation to other nodes. This reflects Peirce's triadic vision of the sign as well as his unlimited semiosis. Lamb says that:

> A connection is a connection, and a nection is a nection, no matter where it is. What makes one nection subserve the concept ^{c}CAT while another makes the hand pick up a pencil and yet another recognizes the opening bars of Beethoven's Fifth Symphony is not what they contain but what they are connected to. And the great diversity of accomplishments of our cortices can be attributed to the two kinds of connectional proliferation, the first shared with other mammals: the variety of inputs they can receive from the senses and the varied output elements (not just muscular but also glandular) to which different nections are connected. And the second, which sets us apart from our mammalian cousins, not a qualitative but a quantitative difference: expanded hierarchical structure, with its multiple layers of integration and divergence, allowing us to combine elements in infinitely diverse ways; along with the bounteous abundance of available nections and of the latent bidirectional connections to and from both local and distant destinations. (Lamb 1999, 370)

> By virtue of feed-backward activation from a category node to the nodes for its relevant properties, activation of a category subnetwork will provide heightened activation to that subset of nodes currently receiving activation from the senses to which it is connected. Perception is thus a bidirectional process…. Feed-backward activation will also trigger inferences, correct or otherwise, by activating nodes for properties which have acquired strong connections to the central category node because of prior experience even if not currently receiving sensory input…." (Lamb 1999, 378-379)

Sign Modes

Sign modes are the ways in which signs can travel through sensory pathways. For example, visual information can be processed through one's sight, and sight would be considered a visual mode. Information can be converted from one mode to the another.

> The basic argument is that the messages which we receive in different modes (through our various senses of touch, sight, hearing, smell, taste etc.) are readily transformed into other modes. Thus we can visualise what we hear in words; we can convert written texts into speech; a musician can transform the visual patterns of a musical score into movements of the arms, mouth and fingers. Evidently, at some deeply abstract level, all our different senses are coded in the same way. There *must* be some kind of 'logical' mechanism which allows us to transform sight messages into sound messages or touch messages or smell messages, and vice versa. (Leach 1986, 11)

> The analogical principle can account for much of the ability of people to interpret and form new combinations; they simply make appropriate substitutions in previously learned combinations used as exemplars. This analogizing ability would appear to be innate and universal. Moreover, the term 'universal' here may apply not just for language, as the process of forming and interpreting new combinations seems to be a very general mental ability, used in a wide variety of modes of behavior and perception. (Lamb 1999, 263-264)

> Feed-backward activation from a category node to the nodes for its relevant properties provides heightened activation to that subset of nodes currently receiving activation from the senses, resulting in increased awareness of the properties relevant to that category; and it also triggers inferences, as activation of properties normally associated with the category but not currently receiving sensory input (e.g. a portion of a cat's body which is obscured from sight by an intervening object). Some such inferences may be unwarranted in the particular instance; this is the source of errors in thinking associated with 'thinking in categories'. (Lamb 1999, 337)

The PSCC/SCC Construct Model

Please note that the following diagrams are merely representations of what sign formation could look and function like according to this model, and within the confines of current neurological research. The inclusion of the following images is to help the reader visualize the mental process as it may be taking place.
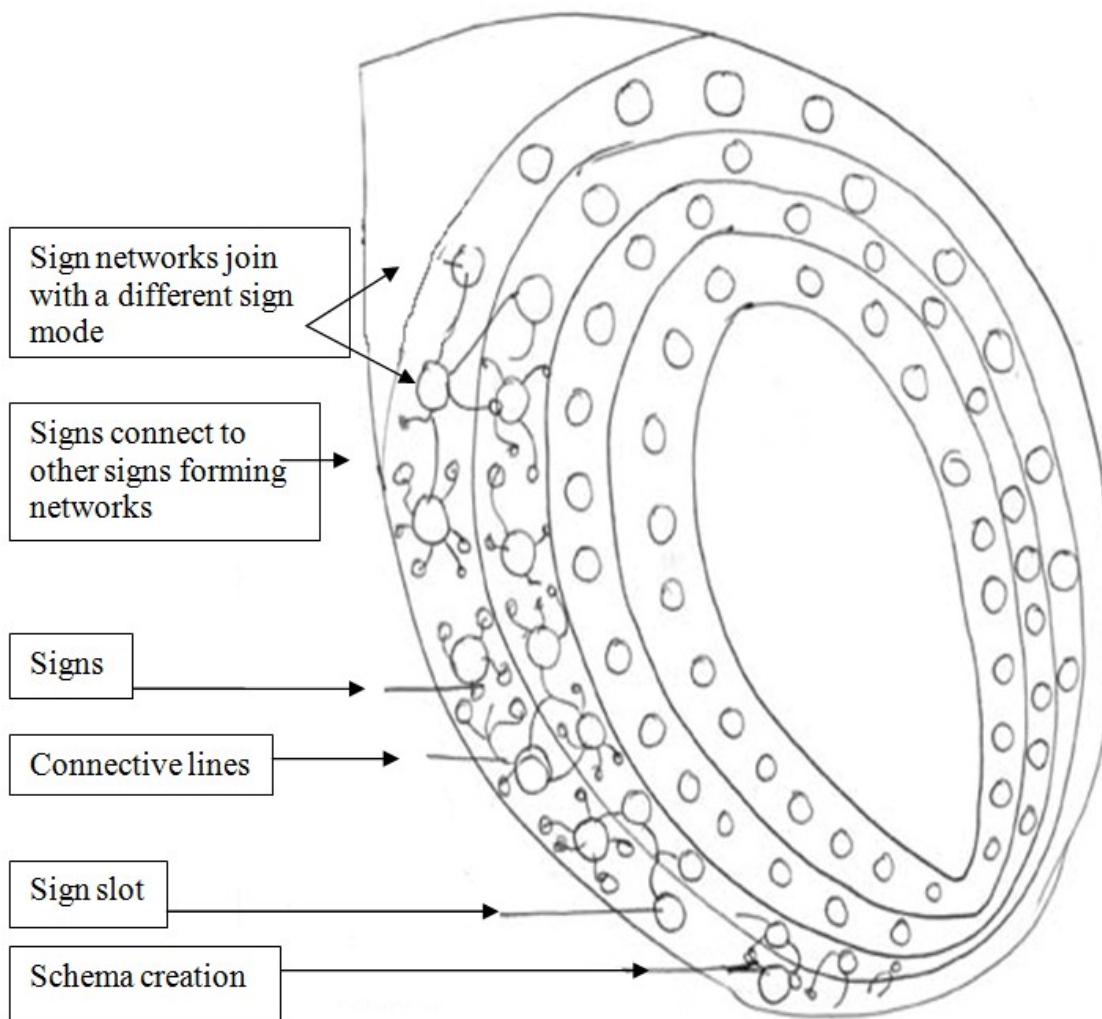

Figure 11. The PSCC with activated sign slots
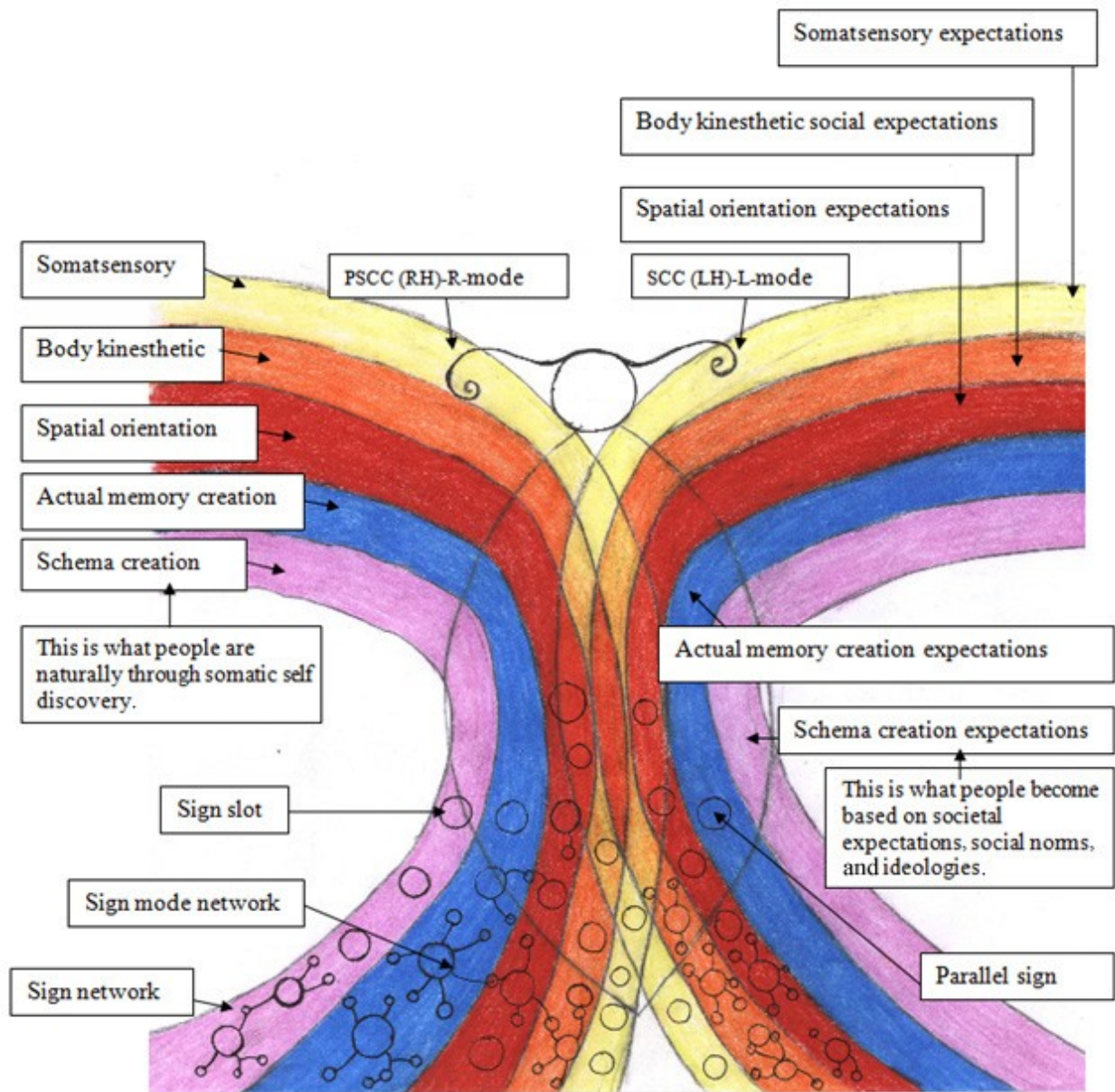
Figure 12. The PSCC and SCC's connection to L-mode and R-mode

When the pre-sign branches out baby begins to recognize there are relationships between things

Warmth + certain scent = mother = milk

The sign slot motivates the infant to be aware of certain things, vital to its survival such as the instinct of rooting.

As babies encounter signs they fill the slots. As infants grow the signs inside the slots will connect with other pre-signs. Until they start to have connections to one another they are not quite signs. That is, in the Peircian sense, they have not yet become a sign because they are not yet recognized as a sign.

When enough connections are made the sign slot is full and it opens up, letting the connections expand. It then attaches to other signs and the networks keep becoming larger.

Figure 13. Sign slots with signs beginning to form networks

The sign slot with the sense-sign mode

The sign slot with the sense-sign mode of touch

So many connections are made with the sign networks between the sense modes that ultimately neural pathways could be made. Once the highway is built, unless damaged, new signs can travel back and forth on the high-way in a way that is reminiscent of neurotransmitters, provided they seem like they belong. If they do not then the connective lines may not activate and the neuron passing the messages to the sign may not activate or die.

The sign slot with the sense-sign mode of sight

Figure 14. Sign slots with strong sign networks forming road ways

Smell, touch, taste - body memory (the feeling of what happens)

Visible motion

The L2 may have the same sign slots through the universal blueprint but it will not have shared slots with the PSCC L1 and SCC L1 because this will not actually happen; natural sign modes need to be utilized. Colour is in the shared sign slot so it can be used as a bridge.
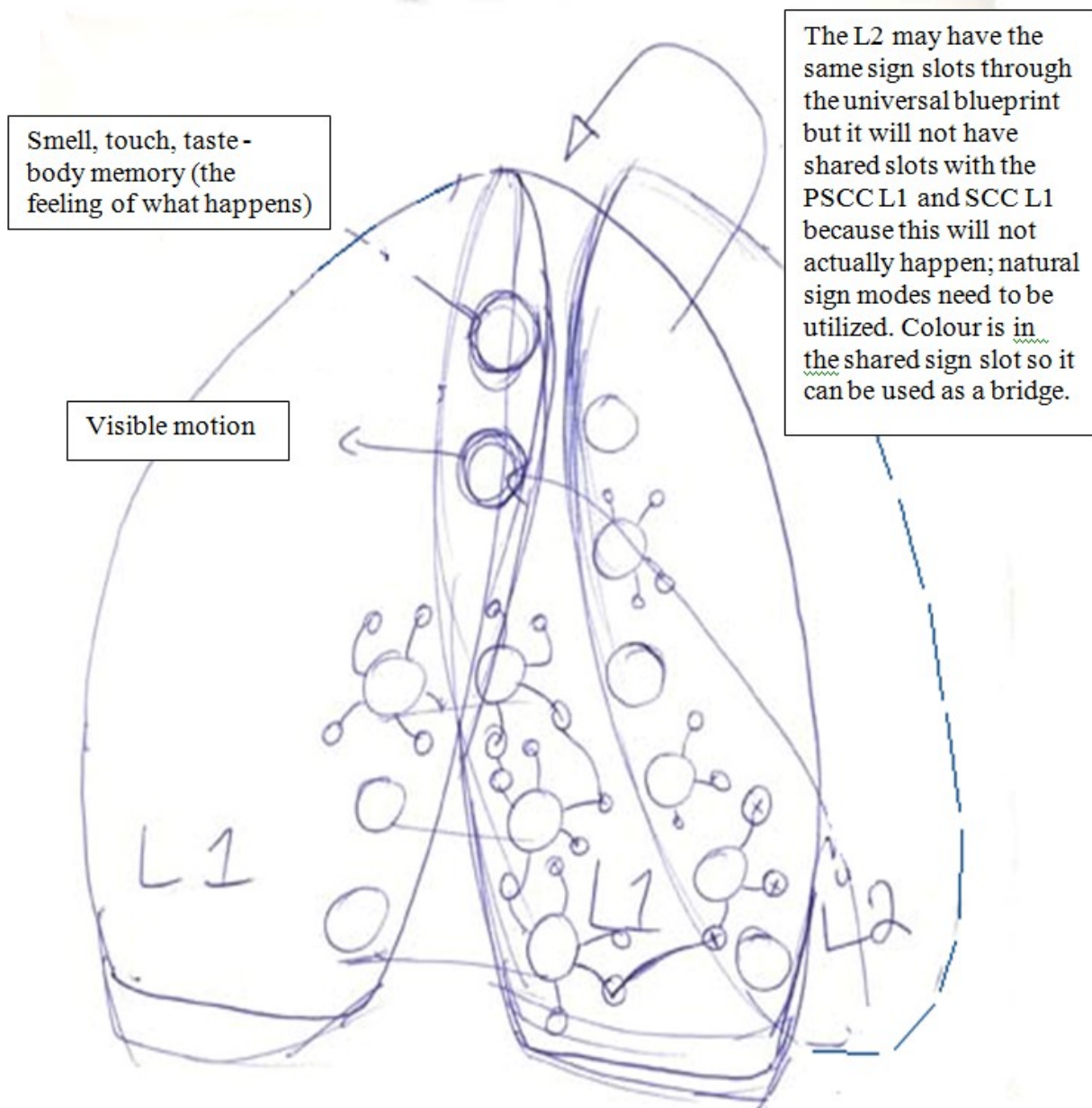
L1

L1

L2

Figure 15. L2 introduced through the SCC

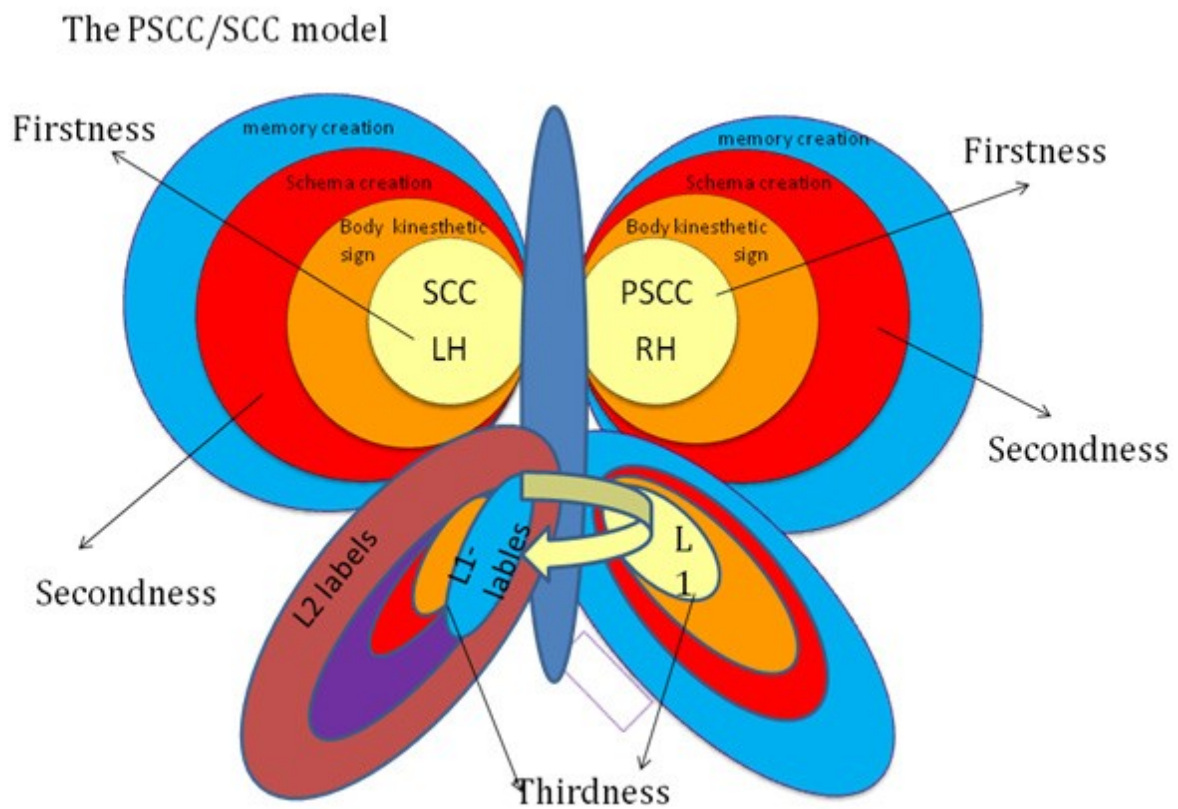Figure 16. The full PSCC/SCC Construct Model

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