

California State University, San Bernardino

CSUSB ScholarWorks

Theses Digitization Project

John M. Pfau Library

2006

Stimulating intrinsic motivation: Brain-based pedagogy for the second-language writing classroom

Kristin Marie Kucia-Stauder

Follow this and additional works at: <https://scholarworks.lib.csusb.edu/etd-project>



Part of the [Rhetoric and Composition Commons](#)

Recommended Citation

Kucia-Stauder, Kristin Marie, "Stimulating intrinsic motivation: Brain-based pedagogy for the second-language writing classroom" (2006). *Theses Digitization Project*. 3010.

<https://scholarworks.lib.csusb.edu/etd-project/3010>

This Thesis is brought to you for free and open access by the John M. Pfau Library at CSUSB ScholarWorks. It has been accepted for inclusion in Theses Digitization Project by an authorized administrator of CSUSB ScholarWorks. For more information, please contact scholarworks@csusb.edu.

STIMULATING INTRINSIC MOTIVATION: BRAIN-BASED
PEDAGOGY FOR THE SECOND-LANGUAGE
WRITING CLASSROOM

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
English Composition

by
Kristin Marie Kucia-Stauder

June 2006

STIMULATING INTRINSIC MOTIVATION: BRAIN-BASED
PEDAGOGY FOR THE SECOND-LANGUAGE
WRITING CLASSROOM

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

by
Kristin Marie Kucia-Stauder

June 2006

Approved by:



Caroline Vickers, Chair, English

5/10/06
Date



Sunny Hyon



Rong Chen

ABSTRACT

This thesis explores inherent mechanisms of learning, and how second language teachers may motivate these mechanisms in order to fuel their students' intrinsic motivation to learn a second language. Second Language Acquisition research on intrinsic motivation in the L2 classroom is reviewed, demonstrating the significance of learner goals as an impetus in L2 learning. This thesis also considers biological and cognitive perspectives on learning which highlight connections between intrinsic motivation and emotional worth in language learning tasks. Brain structures and body systems specifically associated with intrinsic motivation are detailed, and brain-based learning strategies are outlined. This thesis concludes with a sample application for the university writing classroom that reflects a brain-based approach to L2 learning. By presenting connections between neuroscience and L2 pedagogy, this thesis suggests a framework for future empirical research in inherent systems of learning, the importance of student emotional value in language learning tasks, and classroom strategies that biologically stimulate intrinsic motivation in L2 students.

ACKNOWLEDGEMENTS

I have grown as a writer, become a more informed member of the conversation, and been challenged as a scholar because of my rich experiences in the California State University, San Bernardino English Department. I especially offer my deep appreciation to Caroline Vickers, Sunny Hyon, Carol Haviland, Maggie Cecil, and the CSUSB Writing Center Tutor community for the wisdom, support, and guidance.

To Robert, Ursula, and Thaddeus.

For your love, commitment, and patience. Thank you for
believing in me.

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES.	viii
CHAPTER ONE: INTRINSIC MOTIVATION IN SECOND LANGUAGE ACQUISITION	
Introduction	1
Intrinsic Motivation to Learn Second Language from a Cognitive Perspective	6
Intrinsic Motivation to Learn Second Language from a Biological Perspective	17
Emotional Value	18
Stimulus Appraisal	24
Mental Foraging	27
Summary	29
CHAPTER TWO: BRAIN RESEARCH, INTRINSIC MOTIVATION, AND POSSIBLE PEDAGOGICAL APPLICATIONS	
Introduction	31
Innate Learning Structures	33
Brain Structures That Support the Intrinsic Motivation to Learn	37
Inherent Somatic Mechanisms That Support the Intrinsic Motivation to Learn	41
Brain-Based Learning	45
Brain-Based Second Language Pedagogy	50

CHAPTER THREE: IMPLICATIONS OF BRAIN-BASED PEDAGOGY
FOR THE SECOND LANGUAGE WRITING
CLASSROOM

Introduction	56
Sample Illustration of Brain-Based Pedagogy in the Multilingual University Writing Classroom	58
The Assignment Topic	58
Brain-Based Pedagogical Rationale for the Assignment.	70
Classroom Activities	73
Conclusion	82
APPENDIX A: ASSIGNMENT	86
APPENDIX B: TRIPLE ENTRY JOURNAL.	90
REFERENCES	92

LIST OF TABLES

Table 1. Cognitive Models of Motivation	7
Table 2. Framework of Inherent Learner Values	20
Table 3. Vocabulary Items Found in "Creating the Myth".	70
Table 4. Two Kinds of Questions	74

LIST OF FIGURES

Figure 1. Neuronal Connections - How Learning Occurs
Biologically 35

Figure 2. Brain Structures Associated with Intrinsic
Motivation 37

CHAPTER ONE
INTRINSIC MOTIVATION IN SECOND LANGUAGE
ACQUISITION

Introduction

In this thesis, I consider how the cognitive and biological perspectives of Intrinsic Motivation (IM) could collaboratively engage second language (L2) students in the university writing classroom. When L2 writing pedagogy is informed by human biology, it can increase the L2 student's physical will to go and "do something to learn" in the language-learning environment by enhancing the emotional value students attach to language learning tasks. Drawing on neuroscientific research, I will explore possible innovative avenues in purposeful L2 pedagogy with a sample classroom application.

Previous Second Language Acquisition (SLA) research in motivation has addressed many important factors such as learner goals (Noels, 2001; Noels, Pelletier, Clement & Vallerand, 2000); psychological states of the learner (Krashen, 1985), and attitudes about the L2 culture (Dornyei & Skehan, 2003; Gardner, 2001). This L2 research on motivation has established a foundation of psychological

motives that attempt to explain how learners act in response to cognitive stimuli in the second language-learning environment.

Specifically, SLA researchers have identified intrinsic motivation as a powerful stimulus in second language (L2) learning (Deci & Ryan, 1985; Dornyei, 2003; Gardner & Lambert, 1959; Gardner, 2001; Noels, 2001; Noels, Pelletier & Vallerand, 2000). Deci and Ryan (1985) define "Intrinsic Motivation" as "motivation to perform an activity simply for the feelings of pleasure and satisfaction that accompany the action," (p. 24). When L2 students attach an emotional value to information they find important, they work harder in the learning environment, pay more attention to the task, and therefore are more successful in learning the L2.

In addition, recent research by Schumann (2001) has examined the role of inherent learning structures, defined as "innate mechanisms," in developing intrinsic motivation for L2 learning (p. 22). Bridging human biology and L2 acquisition, Schumann's research provides a biological perspective on learning, analogizing learning as a form of "mental foraging for knowledge," and posits that the intrinsic motivation to acquire knowledge "must translate

into activity in order to acquire the desired information or skill" (p. 21). In other words, a student must attach an importance to the task of learning the L2, and subsequently, do something in order to learn. Relating this process to inborn physical structures, Schumann (1997) argues that particular areas of the brain assess a positive or negative value in the learning experience. Based on the positive or negative assessment, the student will decide how hard, how long and how diligently she will work on the task. According to Damasio (1994), new knowledge is subconsciously paired with an emotional value, and catalogues in the body as acquired knowledge (i.e. how the student feels about the information).

Though Schumann discusses the innate mechanisms involved in the stimulation of intrinsic motivation for L2 learning, he does not extend the implications to classroom pedagogy. However, Brain-Based Learning (BBL), which also takes a biological perspective on learning, has shown promise in the stimulation of intrinsic motivation in the K-12 classroom. This connection between the SLA research in Motivation and Brain-Based Learning could suggest a compelling approach to pedagogy that considers cognitive as well as biological factors in the creation and

implementation of classroom strategies. This correlation of BBL and SLA research could have innovative pedagogical implications for university multilingual writing classrooms.

Brain-based learning is an educational paradigm that uses neuroscientific research to support a learning environment that purposefully attends to student learning needs. BBL is an interdisciplinary approach to pedagogy that asks educators to become familiar with specific brain and body structures with the purpose of developing classroom strategies that stimulate these innate mechanisms of learning. BBL in the L2 classroom could be useful because the stimulation of IM is a catalyst to get students to want to learn, and then, physically do something about it. In a language-learning environment, students must actively participate in their linguistic development inside and outside of the classroom.

To build a foundation for pedagogical brain-based applications in the L2 classroom, I will establish a connection between IM research in the SLA classroom and BBL by discussing research that substantiates the importance of IM in the successful L2 classroom (Dornyei, 1994; Dornyei, 2003; Oxford & Shearin, 1994; Tremblay & Gardner, 1995),

and present previous research in the psychological dimensions of IM research, or "the cognitive perspective of IM." Furthermore, I will highlight the significance the new research on "the biological perspective of IM," specifically addressing innate mechanisms that play a critical role in language learning (Damasio, 1994; Schumann, 1994; Schumann, 1997; Schumann, 2001; Schumann & Wood, 2004). I will then substantiate the importance of neuroscientific research as a consideration in classroom teaching by discussing the interdisciplinary research surrounding classroom applications of Brain Based Learning (Hannaford, 1995; Jensen, 1998a; Jensen, 1998b; Jensen, 2000; Sousa, 2001; Zull, 2002). Finally, I will synthesize these bodies of research, developing possible connections between the two fields and the questions that they might ask each other. I will illustrate these parallels and their pedagogical implications in a sample application of brain-based pedagogy for a multilingual basic writing class, such as ENG 86A/B at California State University, San Bernardino.

Intrinsic Motivation to Learn Second Language from a Cognitive Perspective

Research on "Motivation" in SLA has found that learners contend with different types of motivational forces, impacting their language learning experiences. Researchers speculate that these motivational forces affect the learner on multiple levels, which could identify the underlying mental forces that determine student choices in the learning environment. The cognitive processes employed in successful SLA require IM as a catalyst to encourage the learner's active participation in their own linguistic development. Several motivation models (described in Table 1 below) purport that the advancement of language skills and L2 usage necessitates conscious engagement from the learner. In other words, the student must select information to be learned. In order to acquire this new knowledge, the student must then use this information autonomously to further interaction with the L2 by "doing something."

Several studies demonstrate the crucial role of motivation in SLA. In Table 1 below, the features of major cognitive models of motivation are defined.

Table 1. Cognitive Models of Motivation

Representative Publication	Motivation Model	Features
Gardner & Lambert (1959)	Integrative vs. Instrumental Orientation	<ul style="list-style-type: none"> • Asserts that integrative (motivation from a desire to integrate into the L2 culture) and instrumental (motivation from a specific goal) are equally viable motivations to learn L2
Deci & Ryan (1985)	Self-Determination Theory (Amotivation, Extrinsic Orientation, Intrinsic Orientation)	<ul style="list-style-type: none"> • Posits that the IM to perform a task is based on the perceived rewards that will follow
Dornyei (1994)	Physical will	<ul style="list-style-type: none"> • Connects IM to the physical will to complete a learning task
Markus & Nurius (1986)	"ideal and possible selves"	<ul style="list-style-type: none"> • Connects IM to a "future self" that one might become if the learning task is successful
Kramsch (1998)	"what if" factor	<ul style="list-style-type: none"> • Connects IM to an "ideal self" that one might become if acquisition occurs

Gardner and Lambert (1959) made the first attempt to measure the psychological variables of motivation (Gardner

& Lambert, 1959). Gardner and Lambert's data is taken from questionnaires given to anglophone grade 11 students studying French as a Second Language in Montreal, Canada. The questionnaire asked the students to rate motivations for L2 study on a scale of 1-4. Gardner and Lambert found that "Motivation" is prefaced by "Orientation" which relates to the "relative importance of different reasons" (Gardner, 2001, p. 3) to study the L2. Gardner and Lambert posited two learner orientations, "integrative orientation" and "instrumental orientation." Whether a learner exhibits integrative or instrumental orientation stems from a complex variety of positive attitudes based on the learner's perception of the L2 community. "Instrumental motivation" is concerned with learner motivation from utilitarian stimulus and goals, such as getting a job. Conversely, "integrative motivation" attempts to deconstruct learner reasons for wanting to put in the effort to learn, such as the desire to assimilate into or make friends in an L2 culture. This study is important because it was the first to examine the role of motivation in L2 learning, which laid the foundation for future empirical research on motivation. Though the study examined a limited population, anglophone learners of

French, the constructs of integrative and instrumental motivation have been influential in the field of SLA.

The study of integrative and instrumental motivation has gone through multiple revisions, and ultimately Gardner and Lambert argued that "Integrative Motivation" could be a possible cognitive incentive for students to consciously choose important information based on "self-determined" goals and emotional worth. "Integrative Motivation," establishes the factors of "motivation," "attitudes toward the learning situation," and "integrativeness" as reasonable impetuses for learning a second language. When a student decides that specific new knowledge satisfies a self-determined need, intrinsic rewards follow. The student is compelled to continue the quest and the intrinsic desire for new knowledge is ideally translated into a physical act associated with the acquisition of this new information. Gardner and Lambert concluded that "Integrative Motivation" had the definite potential to be a driving factor in SLA and determinant of success or failure in the language learning experience. According to this cognitive construct, the following three elements comprise integrative (i.e. self-determined goal-oriented) motivation as described above:

1. The motivated individual expends effort to learn the language.
2. The motivated individual wants to achieve the goal.
3. The motivated individual will enjoy the task of learning the language (p. 6).

"Integrativeness" is "a genuine interest in learning the second language in order to come closer to the other language community" by the "emotional identification with another cultural group" (p. 5) as a social reason for L2 learning. Integrativeness assumes a desire for more knowledge about the L2 community, its language, and people. The "integrative" construct accounts for the learner's ambition to know more about this community or to be associated with this community in some way. Furthermore, the "instrumental" construct is viable in this discussion because the important quality that "integrative" and "instrumental" motivation share is the potential for intrinsically motivated behavior that could manifest in the student in response to a language-learning task.

Deci and Ryan (1985) developed the "self-determination theory" of motivation by positing that the learner validates or disregards language input based on motivation that comes from intrinsic interest in the learning activity

or in perceived rewards extrinsic to the L2 task. The individual makes conscious choices based on the perceived rewards that will follow, and the force behind the learner's perception of the language-learning task is paramount. According to Deci and Ryan's self-determination theory, the learner's response is based on internal and external stimuli, and corresponding emotions that elicit reactions into 3 categories: Amotivation, Extrinsic Motivation, and Intrinsic Motivation.

The positive attributes of intrinsic and extrinsic motivation contrast with the void of motivation seen in "Amotivation." A teacher's worst nightmare, the amotivated student sees no connection between his personal goals, and the language-learning task at hand. The student sees the "work" of L2 acquisition as just that. This student may also see the extenuating circumstances of the learning of an L2 as out of his control and adopt an "it's out of my hands" approach.

"Extrinsic Motivation" describes external stimulus, such as a reward or punishment (i.e. grades), as a determining factor in a student's impetus to learn L2, and is usually seen to have a tangible, finite end. Deci and Ryan (1985) illustrate levels of extrinsic motivation,

organized from lowest to highest on a continuum of the extent to which they are internalized as a self-determination (i.e. self-concept driven) factor, and posit that these models should be accepted measures of meaningful motivation in the L2 classroom.

“Intrinsic Motivation” stems from innate desires inside the learner to have deep, meaningful language learning experiences. Research on IM has shown that when a learner seeks out information, motivated by aspirations of challenge (i.e. learning an L2) and the dream of conquering this challenge, a sense of internal worth is derived. This aspect of motivation reveals critical components of the language learner’s internal dialogue and the power of the body’s response to such stimulus. The magnitude of a valued goal propels the student forward, and also gives importance to the process of educational development as a key to learning success. Extending the possibilities of the motivational constructs specifically to the L2 classroom, Vallerand et al. (2000) proposed three types of IM to amplify the discussion of intrinsic motivation:

IM knowledge—the motivation of doing an activity for the feeling associated with exploring new ideas and developing knowledge (i.e., the

pleasure of mental stimulation associated with learning).

IM accomplishment—the motivation of sensory-based (i.e., feeling good inside about what you did, and the progress you have made) reward related to the mastery of a task.

IM stimulation—the motivation associated with the elicitation of feeling that happen during the performance of the task (i.e., the enjoyment, excitement, and aesthetic value of speaking a foreign language) (p. 61).

It is interesting that all three types of intrinsic motivation listed above value feelings of mental advancement as a pleasurable reward.

In the Noels et. al. replication study (2000), student questionnaires on motivation were used to test the reliability of Deci and Ryan's motivational construct listed above. The questionnaire asked students in a bilingual university in Canada for a self-assessment, with quantitative results measured on a 4-point scale. They were asked to identify motivational factors associated with the motivation to learn French. The study validated Deci and Ryan's theory of IM as a critical component in language

learning, and provides a solid framework for further empirical research to confirm the viability in the classroom environment.

Emerging with current, progressive hypotheses regarding motivation, Dornyei (1994) calls for "a more pragmatic, education-centered approach to motivation research" by observing the limitations in earlier motivation constructs in the foreign language classroom, and addressing a gap in research concerning the "cognitive aspects of motivation to learn...a direction in which educational psychological research on motivation has been moving during the last fifteen years" (p. 273). Dornyei posits that by extending the application of motivation into the foreign language classroom, the connection between a student's desire to learn, and the subsequent success in the learning endeavor strengthens.

Dornyei and Skehan (2003) define "motivation" as a concept that asks the student to do "something" related to the language-learning task in order to succeed. They posit that motivation is "the direction and magnitude of human behavior, or more specifically (i) the choice of a particular action, (ii) the persistence with it, and (iii) the effort expended on it. In broad terms, motivation is

responsible for why people decide to do something, how long they are willing to sustain the activity, and how hard they are going to pursue it" (p. 614). Dornyei and Skehan's research is influential in my research because they allude to motivation as a cognitive and a biological construct, and they discuss implications of motivation in the classroom. The previous considerations could link the cognitive and biological perspectives of motivation as viable future empirical research considerations.

Congenial partners in a learning scenario, the cognitive and biological perspectives of "Motivation" could be seen as mutually supportive. The following two cognitive motivational constructs provide theoretical support for the classroom illustration in Chapter Three. The pedagogical application of these constructs could link the motivational force of "aspirations of a future self" and the subsequent implications of a positive outcome in the language learning experience. Markus and Nurius' (1986) socio-psychological notion of "possible and ideal selves" is the learner experiencing dreams, hopes and aspirations directly linked to the possibility of learning the L2. As Markus and Nurius define them, "possible selves represent individuals' ideas of what they might become,

become, what they would like to become, and what they are afraid of becoming, and thus provide a conceptual link between cognition and motivation" (p. 954). In the classroom, this could be a helpful avenue in pedagogy that asks the students to consciously consider the academic path that they have chosen, and purposefully engage in discussions and writing assignments that address the successful completion of the learning task.

Kramsch (1998) also discusses this type of "ideal self" that one "might become" if successful language acquisition happens. The motivation of "what if" is a strong factor, considering the limitless possibilities of ideal situations the mind can conjure. It is a powerful driving force of human cognition when the learner chooses to internalize this type of image to stimulate and advance her L2 work. The emotional investment in L2 learning requires the learner to consciously consider the factors associated with the task, basking in thoughts of ultimate goal fruition.

Cognitive and biological perspectives on second language learning motivation provide strong theoretical support for the role of intrinsic motivation in the task of language learning. Recent research has further

demonstrated the biological basis of motivation and its importance as a new consideration in the learning scenario. The following section describes the significance of a biological perspective on learning.

Intrinsic Motivation to Learn Second Language from a Biological Perspective

Schumann's empirical research using language-learning diaries (Schumann, 1997, p.xx) provides a bridge for SLA into the exploration of biology as a valuable avenue in pedagogical application. In a review of Schumann's book The Neurobiology of Affect in Language, Dornyei (1999) asserts that intrinsic motivation to learn L2 from a biological perspective could "offer a new type of validity for SLA theories by connecting abstract theoretical constructs to concrete biological mechanisms detected in the brain" (p. 279). This significance of a biological perspective of IM in L2 pedagogy could connect IM and L2 learning, strengthening implications in the second language classroom.

This section details three significant aspects provided by Schumann's research in the consideration of a

biological perspective on learning: Emotional Value, Stimulus Appraisal, and Mental Foraging.

Emotional Value

According to Edelman (1992) and Schumann (1997), "intrinsic motivation" and "learning" originates in "the biological notion of value." Value is a predisposition within human biology that prompts an individual to find environments and tasks that are pleasing, and to make choices based on preferred or favored alternatives. These choices become favored to the emotional worth placed on the task by the student. Schumann and Wood (2004) argue, "Some aspects of value are so important that evolution has selected for them and they have become innate. Value is the basis for all activity; we perceive, move, cognize, and feel on the basis of value" (p. 24). The mechanisms of emotional value could be a powerful impetus in L2 learning relying on the notion of human nature to try harder at an emotionally valuable task.

Schumann situates himself in the conversation by drawing on research from education, SLA, and neuroscience to ultimately name a value appraisal system that is based on physical, mental, and social value systems inherent in the student. The 3 types of value supported in this

construct are: "homeostatic value," "sociostatic value," and "somatic value." Schumann's research claims emotionally driven value as a powerful factor in positive stimulus appraisal of a language-learning task. The perspective on student-driven motivation being based on learner values is significant to my research because it reinforces the importance of classroom pedagogy that stimulates the conscious engagement of these inherent value systems. (See Table Two below).

Table 2. Framework of Inherent Learner Values

Inherent Learner Value Systems	Schumann and Wood's (2004) Definition of Features (p. 24)
Homeostatic Value	Involves preferences that promote an organism's survival and thrival in the world. It is a biological tendency for an organism to maintain its physiological system within a certain range, to move outside that range to survive, and to return to that range to thrive.
Sociostatic Value	Might be seen as an interactional instinct. It involves inborn tendencies to interact with conspecifics, to pay attention to faces, voices, and body position, to make hypothesis about the intentions and dispositions of others, and to seek attachment and social affiliation.
Somatic Value	Involves preferences and aversions acquired in the lifetime of the individual through experience, socialization, enculturation, and education.

The "homeostatic value" acknowledges the importance of movement in the learning scenario. If we apply Schumann

and Woods' concept to the L2 classroom, we can view the language risks an L2 student takes as he moves outside his comfort zone. The "sociostatic value" enhances human inherent tendencies to want to communicate with others. In the classroom, this desire to communicate is important because interaction with other students is a requirement in most L2 classroom, and speaking the L2 provides practice and confidence in the learning tasks. "Homeostatic" and "sociostatic" value systems are inherent systems in place at birth. Conversely, the "somatic value" system is developed through human interactions, socialization, and educational experiences, and therefore, may be of most interest to teachers.

"Somatic value" is the basis for an innate system of learning that is shaped by and from experience. The student picks the information that is perceived to be important, and draws on previous internal information from experience that was perceived as important. Because students do not come to the classroom as blank slates, this trove of previous knowledge could fortify and affect the intake of future L2 information. The significance of this innate system of learning being based on emotion is important because the information that is learned depends

on what is important according to the student. So, the IM to do something about something to further the L2 emotional worth is important in the learning environment. Because this value system is acquired in the lifetime, it is based on a wide variety of educational and life experiences.

Somatic value is learned value, and could be learned by students from teachers' purposeful attention to emotionally pleasing tasks. This system of value appraisal amplifies the significance of student emotion in the language learning environment, and demonstrates the importance of positive worth towards the L2 for sustained L2 learning and long-term acquisition. This means that specific classroom pedagogy directed at the purposeful stimulation of these inherent mechanisms of learning could affect change and growth at a deep level.

Emotional value connected to successful learning experiences is inextricably linked to students' positive self-perceptions and feelings of accomplishment. So powerful are the implications that surround the stimulation of these innate systems that some researchers claim that these emotional appraisals in the learning environment have the ability to literally change a student "neurobiologically." According to neurologist Gerald

Edelman (1992), "The brain's selection process creates the mind" by the constant value appraisal of new information. Because the brain structure can actually strengthen and create new synapses in response to its stimulus, the brain can literally change neurobiologically due to the choices made based on the perceived importance of incoming information. Edelman's theory of "Neural Darwinism" describes the educational choices that students make, and how they are based on self-determined values and could have the power to affect the outcome of a learning experience in exponential ways.

Brand (1998), a professor of writing, interested in expanding the use of brain science in the classroom, challenges educators to critically examine their pedagogy by stating, "Given that we purport to teach things of value, students are expected to learn and remember things of value" (p. 296). With this in mind, purposeful attention to teaching strategies that incorporate emotional value could provide students with the intrinsic motivation to work harder in the second language classroom. Student-driven attention to worth and value regarding the process and further effort required in learning a new language

could ultimately drive and determine success in second language learning.

Student-determined preferences, solidified in the brain based on positive classroom experiences and subsequent related emotional appraisals of incoming stimulation, could reinforce student IM. The intrinsic motivation to perform a language-learning task stems from within the learner, and is scaffolded by the educator who provides relevant and contextual worth in classroom tasks. A teacher's purposeful attention to the emotional value of learning tasks in the classroom could enhance present and future student-driven L2 goals.

Stimulus Appraisal

Schumann (1994) "speculates that motivation, at its most basic level, is made up of individual stimulus appraisals" (p. 234), and argues that motivation is a neurobiological process. The central theory behind Schumann's hypothesis is based on the assigned value or worth to a target language, learning situation, or even a teacher based on past experience. A "stimulus appraisal" could be defined as a series of individual value assessments towards a stimulus. In the L2 context, for example, a student may consider the emotional worth of the

L2 in every interaction, weighing its importance. This theory of stimulus appraisal could be applied to pedagogy on a micro-scale, such as an appraisal regarding a specific classroom activity, or it could be applied on a macro-scale, such as a general feeling toward learning the L2 itself. Thus, stimulus situations are appraised according to the accrued history of an individual's preferences and aversions (Schumann, 1997, p. 2), and could be a powerful resource in the classroom. This perspective harkens back to the notion of "somatic value," which is learned by experience—learned if it is good or not. An emotional tag or "value" is applied to the stimulus, and affects the success of the language task. This concept is based on a model of stimulus appraisal developed by Scherer (1984), and identified by the following five stimulus evaluation checks:

1. Novelty – assessment of degree of unexpected or novel patterns.
2. Intrinsic Pleasantness – assessment of whether an event fosters interest or promotes avoidance.
3. Goal/ Need Significance – assessment of relevance, expectations in the current situation, quantification

of conduciveness to satisfying individual goals, and how urgently a response may be required.

4. Coping Potential – assessment of the cause of stimulus, ability to cope, the ability to avoid or change the outcome, and the ability to psychologically adjust to the outcome.
5. Norm/ Self - Compatibility—assessment of the compatibility within social, cultural, and interpersonal norms.

The features identified in the "stimulus appraisal" model acknowledge the emotional component critical in intrinsic student motivation, and could be extended into applications that address value on a biological level. Scherer posited that positive stimulus appraisal is determined by the learner from a criterion based on worth and emotional value. In the context of survival, a person selects specific information from the environment that will further sustain his or her physical and emotional well-being. Because of the importance of a positive emotional appraisal by the student of a learning task, Schumann (1997) asserts stimulus appraisal as "a common denominator for motivations and motivational theories" (p. 174). In other words, because the brain is an efficient machine, it

does not learn things that it does not deem important. If we apply this idea to an L2 classroom, we might imagine that the attitudes and emotions associated with the language learning experience, or the future perceived language-learning experience, produce a basic sentiment manifested mentally and physically that could enhance or inhibit successful L2 learning. The importance of students' emotional connection to classroom material fortifies my argument that human biological foundations should be considered in L2 classroom pedagogy.

Mental Foraging

Schumann further develops the importance of the biological foundations of language with the theory of "mental foraging," a term that equates the primal physical needs of foraging for food and companionship with "foraging for knowledge," another basic biological need. Gamon and Bragdon (2002) remind teachers of the significance of human biology. In particular, they emphasize the role of human biology in the development of long-term memory of classroom materials because "evolution designed the brain so that it identifies events perceived as essential to survival by creating a strong emotional reaction" (p. 113). Learning and foraging may share the same neural mechanisms because

both processes involve translating an incentive motive (i.e., goal) into relevant motor activity in order to achieve said goal (Schumann, 2001, p. 23).

Mental foraging is the active manifestation of searching out knowledge and assessing its importance based on stimulus received. A learner must actively seek out a learning environment, evaluate the reward return involved in further investigation, and decide if this is the best possible mental food source. The second language learner must then choose to further this goal by participation in classroom activities and homework, for example. A motivation module kicks in at this point because the learner must devote effort and attention to the task at hand, constantly reassessing if this morsel of knowledge is worth the effort that is needed.

This "generation of an incentive motive (i.e. goal) and the transformation of that motivation into motor and cognitive activity" (Schumann, 2001, p. 26) are realized in the translation of the incentive motive into a reward recognized in the brain as the completion of an important task. Both learning and foraging involve "1) the same neurobiological mechanisms for transforming motivation into action, 2) the same dopaminergic, [dopamine-release],

responses to stimulus appraisal, and 3) the same kinds of decision-making" (p. 21). These considerations integrate evolution, biology, and learning into a new perspective on student motivation. Because positive emotional factors and brain-produced chemicals, such as dopamine (a brain chemical that is released signaling a pleasure reward from the brain), reinforce the affective state of intrinsic motivation, it is interesting to consider our biological base as a stimulus for the need to communicate with others. Further discussion in Chapter 2 will give an overview of some of the biological processes and mechanisms of learning, and their subsequent value as a source of pedagogical consideration in the classroom.

Summary

Chapter One provided a synopsis of previous research on IM in SLA research. The empirical research that supports the various models of a cognitive approach to IM in the L2 classroom were discussed. The significance of new research in a biological approach to L2 classroom strategies suggests a powerful new direction for educators to consider in purposeful classroom pedagogy. The

following chapters examine the cognitive, as well as biological, motivations to learn.

Chapter Two will detail the foundations of brain-based classroom strategies that are derived from interpretations of neurobiological research from different disciplines. Several aspects of Brain-Based Learning pedagogy will then be outlined, along with their connections to Intrinsic Motivation and emotionally valued tasks as critical aspects in successful classroom strategies. I will then discuss how BBL, as a biological approach to L2 pedagogy, could inform SLA.

CHAPTER TWO

BRAIN RESEARCH, INTRINSIC MOTIVATION, AND POSSIBLE PEDAGOGICAL APPLICATIONS

Introduction

The importance of Intrinsic Motivation (IM) in successful learning has been emphasized in both Second Language Acquisition (SLA) research and Brain-Based Learning (BBL) research. Jensen (1998a) claims that BBL is "an educational paradigm that uses hard science to support classroom practices...by focusing pedagogy on ways that the brain learns best" (p. 2). Brain-based instructional strategies are created with "the brain in mind," meaning that educators can present learning opportunities enhanced with brain-based, as opposed to brain-antagonistic tasks.

In this thesis, I specifically use the term "BBL" to define research directions that support a mutual interest in the biological perspectives of learning and possible classroom applications. The term "Brain-Based Learning" encompasses ideas from various fields of research, such as neuroscience, education, sociology, psychology, and biology. Because the brain is a complex machine and the scope of this discussion is limited to mechanisms that

support IM, a succinct overview of some of the human innate structures is provided for the purposes of (i) giving an overview of some of the brain and body structures that biological research supports as innate structures of learning, (ii) considering IM as a powerful catalyst in classroom pedagogy and (iii) exploring how research on innate structures of learning could inform second language learning.

Because of recent advances in brain-related technology, such as fMRIs and EEG scans, scientists are now able to see human brains in action. BBL is the result of interdisciplinary inquiries into ways that pedagogy could be informed by brain science. Zull (2002) hypothesizes that learning can "change the brain" by strengthening and adding neural synapses in the brain, the neurological definition of "acquisition." Conditions that allow educators to peek into the inner workings of the learner's mind could encourage thoughtful directions in pedagogy that might stimulate IM in the L2 learners.

Both Schumann's IM work in SLA and BBL draw on similar bodies of brain research conducted by neuroscientists, such as Damasio, Hannaford, LeDoux and Pert, and highlight the significance of a biological

perspective of learning with IM as one of its foundations of learning. Though BBL and Schumann both address a biological perspective on learning, they do not cross-reference each other. Therefore, the two bodies of work might have many parallels and could have the potential to inform each other further. A biological approach to IM could inform pedagogy by opening up innovative avenues of consideration in the development of classroom teaching materials.

In this chapter, I will (i) detail the theoretical foundations and the biological importance of IM in learning, (ii) discuss BBL research, (iii) explore how pedagogical strategies associated with BBL could inform SLA pedagogy.

Innate Learning Structures

This section introduces some of the innate learning structures involved in the biological process of learning, specifically those involved in IM.

According to neurobiological research (Hannaford, 1995; Sousa, 2001; Zull, 2002), learning alters the brain by changing the number and strength of the neuronal connections in the brain. Neuronal connections can be seen

as webs of knowledge that connect, communicate, and form structures within the brain. It could be said that these "connections" are the biological process of learning. As learners increase these neuronal connections, they have more of the brain working on every task. Interestingly, as you read this thesis, you are connecting neuronal pathways. For example, as you read, your brain recalls "neuron" from Biology 101, and everything that you remember about this piece of information. Then, your brain may begin to connect "neuron" to the new information that is being presented. New neuronal networks are created, and learning occurs. Figure 1 below shows how learning happens in a neuron.

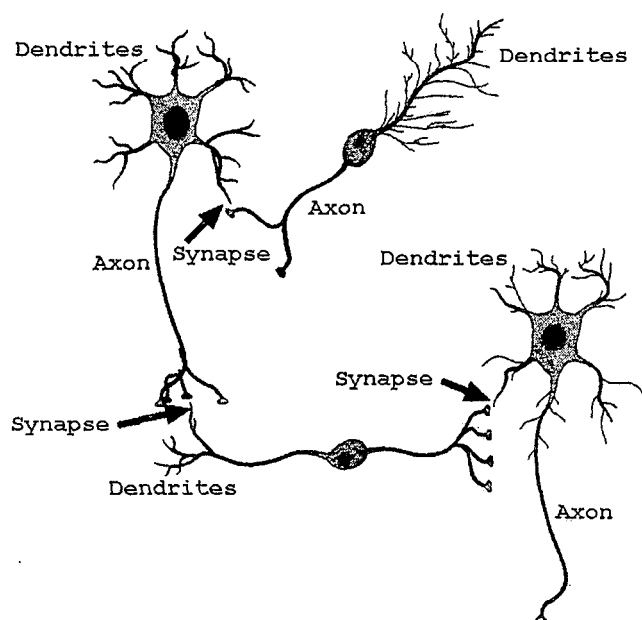


Figure 1. Neuronal Connections - How Learning Occurs Biologically
 (Jensen, E. 1998b, p. 12. *Teaching with the brain in mind*. San Diego, CA: The Brain Store).
 Reprinted with author's permission

The physical structure of a "neuron" could be likened to the shape of a tree. The trunk is the "axon," the branches are the "dendrites," and the "synapse" is the gap between the dendrites, where the electrical pulses transmit information using chemicals called "neurotransmitters." As more connections occur, learning happens. In other words, learning happens when dendrites attach to each other, forming "synaptic connections." Because the brain is an efficient machine, when there are neuronal pathways that

are not used, the body reabsorbs them in a process known as "synaptic pruning" (Ackerman, 2004, p. 39). Relying on the tree analogy, synaptic pruning could be visualized as literally the brain cutting away unused dendrites (branches), and redirecting the energy. According to Zull (2002), "The two things that signal change in synapses are (a) how much they are used and (b) how important the signals are" (p. 114). Based on this hypothesis, Zull argues that "value" and "emotion" could be important to the biological process of learning because the ability to learn new information is crucial to survival, and individuals learn things that are perceived to be important. In other words, an emotionally valued language task might be repeated because it is emotionally pleasing. This repetition of the language task could strengthen synaptic connections, and increase the production of dendrites, further deepening the learning experience.

The following two sections give an overview of some of the innate structures found in the brain and the body, and their relationship to Intrinsic Motivation.

Brain Structures That Support the Intrinsic Motivation to Learn

The physical structures of the brain and body that are involved in a learning event are varied and complex. Accordingly, there are many structures that support different aspects of learning and language production. This section provides an overview of significant inherent structures of learning in the brain and body. To illustrate the strength of IM in the learning environment, I will discuss some of the many physical structures, such as the amygdala, the Reticular Activating System, and the prefrontal cortex, as well as the brain chemical, dopamine.

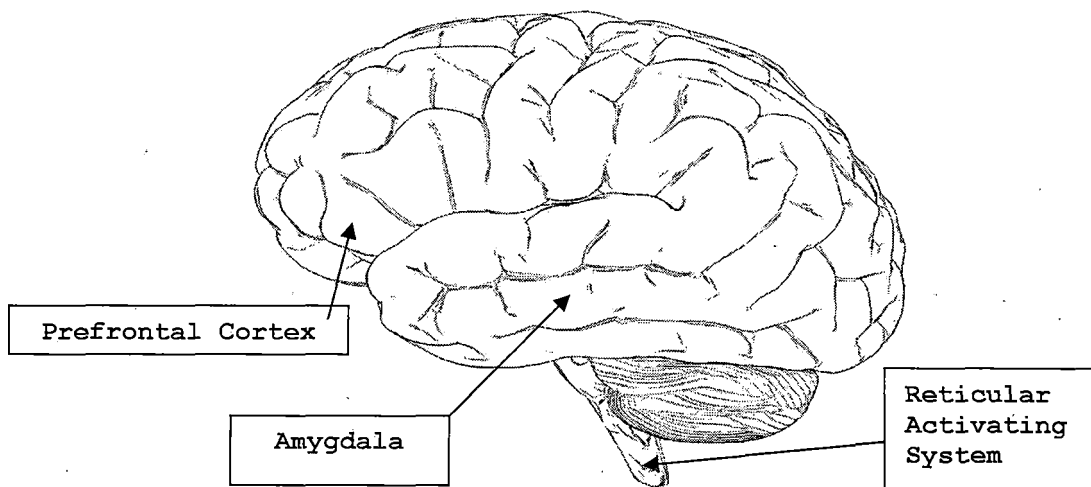


Figure 2. Brain Structures Associated with Intrinsic Motivation

BBL research supports the amygdala as the "the repository for emotional memory [because] the amygdala scans experience, comparing what is happening now with what happened in the past" (Goleman, p. 21) and makes emotional appraisals accordingly. The amygdala is an almond-shaped structure in the brain's limbic system. Researchers say that its primary task could be the responsibility of attaching emotional meaning to memories (Hannaford, 1995; Damasio, 1994; Sousa, 2001; Zull, 2002; Wolfe, 2001). There may be a relationship between the amygdala and IM in L2 learners because the amygdala gives emotional significance to experiences, which could stimulate IM in the student. In the classroom, learning experiences and students' perceptions of these experiences "produce strong emotional reactions that the brain's amygdala encodes and stores with the cognitive event. These emotional cues are so strong that [students] often reexperience the original emotion each time [they] recall an event" (Sousa, p. 52). A student could accept or reject new information based on the self-determined appraisal of the learning experience.

The reticular activating system (RAS), located at the base of the brainstem, is responsible for sorting through incoming sensory data to the brain. This brain structure

filters the incoming information. The RAS "wakes up the neocortex, increasing excitability and responsiveness to incoming sensory stimuli from the environment" (Hannaford, p. 35), and prepares the learner to receive new information and learn. The RAS is a processing center for the data an individual receives in any learning environment. The RAS may be important for IM because the RAS decides what information is significant enough to acknowledge and remember in incoming sensory stimulus.

Newberg, D'Aquili and Rause (2001) assert that the prefrontal cortex of the brain is the home of the attention association area, a major determinant in governing complex, integrated bodily movement and behaviors associated with attaining goals. This brain structure is "so heavily involved in such intentional behavior, in fact, that a number of researchers think of the attention area as the neurological seat of the will" (p. 29). Considering the potential of this area of the brain, it is interesting to contemplate that this could be the location where motivation to succeed in learning might actually be translated from intrinsically motivated thought into physical manifestation of the goal.

Brain chemicals also play an important role in the process of learning new information. Neuroscientist Candace Pert argues in her book Molecules of Emotion (1997) that neurotransmitters are chemical signals that could be found not only in the brain, but in the body itself. These neurotransmitters might be able to transmit information throughout the body. This proposed biological connection between brain chemicals and emotions could be significant because according to neurosurgeon Richard Bergland (1986), "Thought is not caged in the brain but scattered all over the body" (p. 205). The neurotransmitters act as messengers to the cells, floating through our bodies, and could deposit emotional value to new information.

Zull (2002) argues that "some neuroscientists suggest that the role of dopamine, [the brain chemical associated with pleasure in action], in reward is to produce a 'go' signal. That is, the dopamine may not be the reward itself, but rather it may produce action, which is the reward (p. 61)." Two of its primary functions are "to control conscious motor activity and to enhance pleasurable feelings in the brain's reward system" (Wolfe, 2001, p. 60). The parallels between dopamine and intrinsic motivation could strengthen the connection between the

brain and the body in the learning experience, relying on the potential of dopamine being perceived as an intrinsic reward in successful learning.

Inherent Somatic Mechanisms that Support the Intrinsic Motivation to Learn

The somatic ("soma" is Greek for "body") dimension of learning involves the connection between incentive motives and the potential physical manifestation of the goal. A positive stimulus appraisal of the learning task remembered in the body could be a catalyst to the motivation of the physical will to succeed in the learning environment. A connection between the cognitive desire to perform a task, and the actual physical will to perform the task, as described in Chapter One, reinforces the notion of the brain and body being equally important in learning. The Somatic Marker Hypothesis, the "as-if loop" and attention toward the importance of movement in the learning environment in the paragraphs, which I discuss below, all suggest the importance of considering the body proper in the learning scenario.

The "Somatic Marker Hypothesis" critically links the physical body to the learning process (Damasio, 1994). According to Damasio's hypothesis, the emotional value of

an experience is determined by past experiences with same or similar stimuli, and given a "somatic marker," the brain's representation of information manifests as an emotional "tag" in the body. If the previous task is seen as worthwhile to expend the effort needed for success, then the learner will consciously remember this and actively decide to devote the extra effort needed to complete a learning task.

Damasio explains the "as-if loop" by hypothesizing that if there is an emotional tag already in place related to a specific piece of information, even if the new stimulus is not recognized, it could take on that same positive tag because the brain could interpret it as similar, and therefore positive. If we were to apply Damasio's concept to a classroom context, we might imagine that the "as-if loop" could positively affect learning in the classroom if a teacher were to present more advanced concepts of known information because "the neutral entity that has acquired somatic value, when it is experienced in the future in association with another neutral item, any result in the novel item receiving a similar value" (Schumann, 1997, p. 5). In other words, the learner might be more likely to pay closer attention, and work harder to

learn the new verb forms because a positive appraisal was assessed in the previous lessons in a similar topic. A positive appraisal in the learning experience could solidly ground a student's feelings towards future learning events.

In addition to the "as-if loop," the catalyst of the movement, or the perceived movement, toward a goal could be seen as intrinsic motivation in the context of BBL because "pleasure in learning comes from the perception of progress toward a goal" (Zull, 2002, p. 234). A student's future success in a task could be seen as anticipated movement towards the goal, or an intrinsic desire to move forward toward the accomplishment of a learning task. The assertion that movement is critical in the learning environment harkens back to Dornyei's argument that the physical will to perform tasks in the learning environment is crucial for the student. In other words, the student could translate this desire to learn the L2 into the physical will to perform the language learning tasks.

Similarly, the actual physical movement could produce the same positive physical feelings. Could educators stimulate positive "tags" of emotion through movement in the classroom? Could the feeling of anticipated movement (motivation) and actual physical movement be the bridge

between IM and physical will to complete a learning task? Hannaford (1998), a neurobiologist and educator, names the vestibular system as the physical system that uses motion/movement for learner advancement, and asserts, "movement integrates and anchors new information and experience into our neuronal networks" (p. 96). To experience learning in the body proper, students could remember important concepts on a physical level, further reinforcing the neuronal connections in the brain. Zull (2002) argues that "physical movement is needed to link our abstract mental notions with new concrete experience, [and] biology backs up this dual role for action in learning" (p. 204). The IM to physically work towards a goal in the learning environment could support the learner through both cognitive and biological perspectives.

Considering brain research as a pedagogical resource, the next section defines the learning paradigm BBL and its importance in classroom application. Specifically, the significance of emotion as a foundation in IM and learning is addressed.

Brain-Based Learning

Instructional strategies that are posited to operate according to innate physical structures are often termed Brain-Based Learning (BBL). These principles consider "teaching with the brain in mind" (Jensen, 1998) through the stimulation (motivation) of systems and structures in the body specifically through the practice of teaching in ways that the brain is most receptive. Using neurobiological research as a foundation, some educational specialists (Jensen, 1998; Jensen, 2000; Wolfe, 2001) support the possible connections between innate physical structures and the significance of emotional value. By using learning tasks that stimulate the intrinsic motivation to learn, BBL educators have developed specific strategies for the classroom.

The BBL paradigm is not formulaic because it would be in direct opposition to the principles of BBL to prescribe a finite list of activities or parameters. In fact, BBL is a way to think about learning that uses brain science as a consideration in pedagogical application. For teachers, this means that in the creation and application of classroom strategies, curriculum design could be structured

in accordance with the way the brain is naturally organized to learn.

BBL research attempts to link the importance of IM and the emotional worth of classroom tasks to successful learning in the classroom. Brain research suggests that human beings are biologically hardwired with inherent mechanisms that possess the unique power to attach worth and value to tasks and to gain knowledge from these tasks. It could be theorized that these structures in the brain that control the physical will and IM to do something determine the ideal learning environment. In addition, a student determines what will be remembered based on its perceived emotional worth.

For an example of a brain-based classroom activity that stimulates brain chemicals, we might imagine a vocabulary-building exercise that uses music, rhythm, or drama to encourage the release of adrenaline, a brain chemical associated with strengthening the encoding of memory (Sousa, 2001). The pedagogical strategy of using multiple memory pathways to learn and remember also provides the learner various neural pathways of recall. This is significant because the brain does not store memories; it recreates them.

According to proponents of BBL, learning should be contextual, meaningful, and applicable to a student's life (Jensen, 1998a, Jensen, 2000, Wolfe, 2001, Zull, 2002). Accordingly, students decide what is important to them based on the perceived relevance to their life situations. The previous statement reminds us of Chapter One's discussion of student-driven motivational factors based on students' self-determined worth of task, and the task's subsequent emotional worth. Neuroscientific research tells us that emotion is inextricably linked to cognition and perception (Damasio, 1999; Goleman, 1994; LeDoux, 1996; Pert, 1997), the meaningful, contextual connections necessary in a salient learning scenario might propel the student into action, whereby he or she could become an active participant in the learning experience.

Action research on brain-based instructional strategies has been conducted by educators in the K-12 classroom environment, and subsequently reported in publications detailing ways that teachers have used brain-compatible pedagogy. For example, the teacher book Brain Gym (Dennison & Dennison, 1989) details physical exercises called "Brain-Gym Lengthening Exercises," that "help students to develop and reinforce those neural pathways

that enable them to make connections between what they already know in the back of the brain and the ability to express and process that information in the front of the brain" (p. 16). The book Sensorcises (Glazener, 2004) also demonstrates physical classroom activities, such as "Hooking up to Rewire your Emotions," which "helps calm the emotional response by activating [neuronal] pathways that were established in infancy" (p. 37). Both of these examples rely on neuroscientific research to undergird the creation of these classroom activities aimed primarily, but not exclusively, at K-12 learners.

Vanderbilt (2005), a K-12 school librarian, discusses brain-based strategies involving visual learning tools called "advance organizers," which are also used in the Chapter Three sample classroom illustration. "Advance Organizers" could be described as any way to organize thoughts about an assignment by organizing them on paper. There are many frameworks developed from writing thoughts on paper in order to organize. Advance organizers could be considered sound from a brain-based perspective because they visually connect ideas, engaging the brain into multiple physical pathways of recall. Also, the various pathways of recall, such as visual, neuronal, and somatic,

and various ways that the student interacts with the data could further strengthen the neuronal connections. The previous examples are a small sample of the variety of BBL-influenced applications in the K-12 classroom. I suggest that the use of "advance organizers" in the L2 classroom might stimulate IM in students by allowing them to visually connect emotionally valuable information and the academic expectations of the assignment. As the student writes personal information, and text references on the Advance Organizers, he or she connects common themes between the two, and could internalize their importance on an intrinsic level. The classroom application of Advance Organizers will be further developed in the sample lesson in Chapter Three.

Although brain-based methods of instruction are used widely in the K-12 classroom, conscientious educators still caution against the "avalanche of speculative 'brain research' assertions from nonscientists, propagating numerous misunderstandings and myths in the guise of science," and warn teachers to "recognize the limitations of the fledgling cognitive-neuroscience movement as it currently can contribute to our profession" (Jorgenson, 2003, p. 364). In other words, educators should read and

interpret research claims carefully, making informed pedagogical choices based on common sense and solid research studies.

Contextualized classroom tasks and the IM of their subsequent execution are critical in the L2 classroom. As teachers, the purposeful stimulation of biologically automated learning enhancers could provide long-term learning by attaching emotional meaning to the contextualized learning task. Therefore, in Chapter Three, I describe a contextualized writing prompt and supporting activities for L2 university students that could help students attach emotional worth to L2 tasks.

In the following section, I present specific suggestions on how a conversation between brain-based pedagogy and SLA could inform each other and L2 pedagogy. The corollaries between BBL and SLA research on the stimulation of the intrinsic motivation to learn could mutually enhance further research on the biological bases of pedagogy, intrinsic motivation and L2 learning.

Brain-Based Second Language Pedagogy

The term "Brain Based Learning" is under theorized and represented differently in different research areas. The

term BBL is used in L2 research in disparate ways, describing various processes on different levels in the brain. "BBL" is interpreted sometimes to equate "learning + brain process," which is true, in part, but BBL values the body as much as the brain. For example, in *Tesol Matters*, Christison (1997) uses the term BBL in conjunction with defining Gardner's "Multiple Intelligences" model. Joyful Fluency (1998), a book about language acquisition and BBL, cites teaching strategies such as Suggestopedia as a model for BBL, attributing BBL to cognitive methods used to stimulate the brain. Therefore, we could say that BBL has been conceptualized in SLA, but it is the biological aspect of brain-based pedagogy in L2 that has yet to be truly explored. In order to make it a viable construct for pedagogical consideration, we need to qualify, reinforce and explicitly define the term "brain-based learning" for the SLA context.

Considering brain science as a source for purposeful L2 pedagogy could be useful in a variety of classroom applications. The brain-based learning model could be considered in multiple learning situations and various aspects of learning, and might show great promise in an international community of language learners because the

innate systems of learning are presumably present in all human beings. Empirical research specific to the L2 classroom could study the stimulation of inherent mechanisms of IM, and develop a rationale for inherent human biological structures as a viable consideration in pedagogical inspiration and application. This application could broaden the significance of BBL into the L2 university writing classroom by emphasizing the importance of intrinsic motivation to learn.

Recalling Schumann's application of value-stimulus appraisal in Chapter One, the assessment of emotional worth of the perceived task demonstrates how positive appraisals of the new knowledge give the brain and body the green light to proceed in the acquisition process. Schumann (1997) asserts "the motivational machine is biological" (p. 178) because "the brain makes stimulus appraisals, and patterns of appraisal constitute motivation" (xx). What we know about the innate structures could guide the presentation of the information, but more importantly it could mean that the educator should act in support of the learning physically, cognitively, and emotionally. However, we need more research on both the role of innate structures in the learning process and eventually on how

the biological process of learning should inform pedagogical practice.

I assert that brain research will eventually influence L2 pedagogy. Though Schumann has introduced biological processes of learning to an SLA audience, he has not made the leap to classroom practice. One reason that Schumann has not made this leap might be the fact that the SLA research community has not yet defined learning theories associated with "brain-based second language learning." To make any significant claims when it comes to pedagogical practice, a learning theory must be adapted in future testable applications to look at the validity of the pedagogical application through the lens of the learning structure. One learning theory that could illuminate the effects of BBL pedagogical activities is connectionism. According to Ellis (2003), connectionists use "massive parallel systems of artificial [brain] neurons...to statistically abstract information from masses on input data" (p. 85), and use a brain model to study brain processes associated with learning. Connectionism and BBL research have the potential to inform each other further because of their common interest in brain functions. Therefore, I argue that connectionism is a testable SLA

learning theory that could undergird future empirical research on BBL in the L2 classroom.

Yet, there is currently no learning theory associated with the BBL learning paradigm. To properly understand the significance of BBL in SLA, it must be empirically tested and supported by a learning theory, which could amplify the significance of "biology" as a resource in L2 classroom pedagogy.

Despite the lack of empirical work, I assert that BBL could be valuable in the second language classroom. By considering Schumann's research on "somatic value & stimulus appraisal-value system" as a resource for classroom strategies, teachers could apply a framework of "emotional worth" in L2 pedagogical applications, possibly strengthening and positively affecting specific outcomes of intrinsically motivated learning behaviors.

Brain-based learning strategies will not be a productive SLA pedagogy until it is studied in the L2 classroom. The need for concrete research and application of BBL in the L2 classroom underscores an important research gap. Empirical research could solidify the connections between IM scholarship in SLA and BBL, and corroborate the significance of these connections within

the education, neuroscience, and SLA bodies of research. Therefore, in the following chapter, I have developed a set of classroom activities that draw on principles of both IM in SLA research, and Brain-Based Learning in order to stimulate further conversation about BBL in the field in second language acquisition.

CHAPTER THREE

IMPLICATIONS OF BRAIN-BASED PEDAGOGY FOR THE SECOND LANGUAGE WRITING CLASSROOM

Introduction

Chapter One outlined research on IM in SLA, including scholarship suggesting that teachers can influence student motivation by identifying learner goals. The chapter also considers a biological perspective on IM focusing especially on Schumann's research that considers students' positive value assessments of learning tasks. Schumann's research describes how the connection between basic biological needs and emotional value appraisal might stimulate IM in the learner.

Chapter Two gave an overview of the biological basis of IM and a review of Brain-Based Learning (BBL). BBL is described as a teaching paradigm that attends to multiple physical and emotional factors in the learner. Moreover, Chapter Two addressed how L2 pedagogy and brain-based learning relate. BBL researchers and some SLA researchers (e.g., Schumann) corroborate the claims of IM as a critical foundation in successful learning, and could inform each other and pedagogy through empirical research on the

significance of BBL in the L2 classroom. This biological perspective of learning illustrates how the stimulation of the students' IM to work harder in the learning experience could manifest in the classroom, which will be applied in a sample teaching application in Chapter Three.

Based on the information in the first two chapters, I propose that both cognitive and biological perspectives on IM in learning inform L2 teaching. The cognitive angle of IM can help a teacher interpret students' choices based on the way the students perceive language learning stimulus. In addition, because "the brain [is] increasingly amenable to direct psychological investigations" (Dornyei, 2003, p. 10) and because of the recent technological advancements in neuroimaging, the biological perspective of learning could provide educators more information, in the form of neuroscientific data, to draw from when creating L2 pedagogy. Supported by psychological and neuroscientific data, this synthesis of cognitive and biological perspectives of IM in learning could add another distinct aspect to the creation of innovative L2 pedagogies.

In order to synthesize BBL and SLA, I have developed a set of classroom activities that draws on principles of IM research in both SLA and BBL. The classroom application

below illustrates an L2 assignment that uses the biological approaches of "somatic value," "mental foraging," "synaptic strengthening of neuronal connections through task repetition" and explores the usage of "the as-if loop." This lesson also uses the construct of "future and possible selves" outlined in Chapter One, and considers "positive stimulus appraisal" as an integral part of the learning process.

Sample Illustration of Brain-Based Pedagogy
in the Multilingual University Writing
Classroom

The Assignment Topic

This academic writing lesson is designed for advanced multilingual students in a university basic second language writing class, such as ENG 86 at California State University, San Bernardino. *California Pathways* "Second Language Proficiency Descriptors" describes writing abilities in the Intermediate-High level in the following manner:

- Produces consistently comprehensible text
- Addresses topic, but relies on formulaic essay structure to maintain focus

- Development may be uneven; may support ideas with some specific details
- Has good command of vocabulary; error in word choice or word occasionally interferes with meaning
- Uses a range of sentence structures; makes some grammatical errors, but they rarely interfere with meaning
- Has good control of sentence boundaries, spelling and mechanics.

I have chosen to develop an assignment for an argumentative essay entitled "My Journey in Writing" in order to acquaint the students with one another, assist the students in concretely defining their goals in academic writing and establish personal predictions for success in the university. The writing assignment requires students to write an argumentative essay about their upcoming journey in the world of academics and the university experience by synthesizing the multiple sources, which include a reading text, visual images, data collection through in-class interviews, and personal predictions. The essay will be presented as the first formal writing assignment of the quarter because it

highlights the unique journey multilingual students travel through in the American academic experience. Highlighting the uniqueness of this academic experience could be significant because learners come to the writing classroom with different backgrounds to draw from, and potentially different "somatic values" regarding certain academic tasks already in place.

The format of the assignment is typical of undergraduate essay assignments. The organizational structure of the assignment sheet could activate formal schemata in the students, reminding many of them that they have seen this type of assignment before. If it does not activate content or formal schemata, then a stimulus appraisal could occur, and somatically mark this experience. Through classroom discussion, teachers could scaffold the appraisal process by reminding students that they have seen academic writing assignments before. The students could participate equally in a multi-cultural perspective discussion with questions such as, "Because of my previous academic experience, what did I expect in a university level academic writing assignment sheet?" and "How will I attend to the requirements on the assignment sheet based on what I already know about academic writing?"

These questions may elicit very different student experiences and allow students to situate their own experiences with the present learning task. If students do not recall this type of essay assignment, perhaps an "as-if loop" appraisal could remind them of similar assignments, and the fact that the student has experienced "academic writing" previously.

This assignment will build the students' rhetorical, linguistic, and grammatical abilities in many ways. Horowitz (1986), an EAP scholar, defines seven categories of undergraduate tasks found in university writing courses: summary of/ reaction to a reading, annotated bibliography, report on a specified participatory experience, connection of theory and data, case study, synthesis of multiple sources, and research project (p. 449). By developing student skills associated with undergraduate writing tasks, this assignment could help develop the neuronal connections regarding this task set. A BBL approach to pedagogy suggests that the more that the student experiences these types of writing tasks, the stronger the synaptic strength of the connection. The subsequent learning and familiarity with the tasks could benefit the student with long-term acquisition.

The writing assignment (Appendix One) develops skills in three of these important tasks, depicted below with reasons and quotations from the assignment sheet:

1. "Summary of' or 'reaction to' a reading" is significant to the writer because "[u]sually the summary was to be followed by a reaction" (p. 449), which integrates critical thinking skills in a controlled practice environment. In the examples below, the student is asked to notice connections between the text and his or her personal feelings toward the impending academic experience.

"Read 'Creating the Myth' and notice the different types of myth, reflect, take notes on and make connections between your academic journey and the text."

"Notice the connections, and how these connections describe you and your hopes and plans for your education in English writing."

2. "Connection of theory and data" is an important skill for the writer to know because it provides a "systematic approach" to the organization of data through theoretical perspectives, and provides a framework for the student to use information garnered

outside of the classroom to make conclusions. In the examples below, (a) the student is asked to surmise new information based on personal data, and (b) to use a "theory," the myth as a framework, to make textual connections (p. 450).

(a) "Use the information that you have gathered about yourself and the interview answers to find unique qualities that you possess that will help you succeed in your academic goals."

(b) "The myth will serve as the framework for your story."

3. The "synthesis of multiple sources" is a valuable academic writing skill for students because they are asked to identify useful information in the sources, and discard the rest. In other words, the student must decide on and incorporate relevant information from multiple sources, which harkens back to Chapter Two's discussion of the Reticular Activating System and its function to filter information and process information that the student marks as significant. This assignment leads the students to use sources that have emotional value because the students choose their own myth, and collect and interpret information about

them. In the examples below, the students are asked (c) to consider carefully and discern important information, and (d) to individually choose relevant pieces of the assignment text to support their claims, which reinforces a student's exposure to academic concepts, potentially strengthening synaptic connections regarding undergraduate writing expectations, and academic words.

(c) "Look at the answers from the interview and carefully consider what personal characteristics of you that were brought out."

(d) "Incorporate and paraphrase from Seger for a strong well-written essay."

As this could be the students' first university class, the exposure to various assignment classifications could be extremely helpful. A brain-based perspective might say that exposure to these common academic writing tasks strengthens neuronal connections which will help them in future writing assignments.

Because this writing assignment incorporates the use of multiple sources, I have listed the multiple sources that will be used in the assignment, and their implications below to demonstrate how this writing assignment and the

correlated in-class activities could support a brain-based classroom assignment. I have detailed the following activities to further reinforce the possible brain-based foundations of this assignment, and to suggest "inherent mechanisms of learning" as a potential support in the classroom learning experience:

1. In-class interview - Students are asked to discern five qualities from their present life, and five qualities from their future prediction that will help them succeed in their journey through college.

The learner must retrieve information from the other students during the interview, and apply this newly found information about him to the assignment. The motivation to communicate with others is enhanced by the fact that the information must be extracted from others. It is impossible to retrieve this information from a book. In other words, the learner must "do something" in the assignment to learn, and fulfill the requirements of the assignment. The classroom is seen as a "patch of knowledge" from Schumann's notion of learning as "mental foraging" in Chapter One. From a brain-based perspective, active participation in the learning task is crucial because "the person doing the work is the one growing the dendrites." (Wolfe, 2001, p. 187).

2. Visual image - Students are to brainstorm ideas from the picture that they chose, regarding personal characteristics that they see in themselves or predict to see in themselves in their academic future.

The learner must search for a visual image, critically considering its representation of the learner, and how it could be interpreted in his or her future goals and "future self." The Somatic Marker Hypothesis and a potential future "as if loop" might interact, and affect the learner in at least two ways by (i) strengthening the neuronal connections for aspirations associated with the goals of success in the university and (ii) engaging potential future stimulus appraisals of aspirations of success outside of this assignment. The student will most likely choose something that is emotionally relevant, and this choice could stimulate IM towards the assignment because the students already feels positively towards the topic because of background knowledge from previous life experiences.

3. Text: Students are to read and reflect on the Seger text. Using the concept of "myth" as a framework, they are to consider which types of myth resonate most

with their aspirations of future academic success, and trace this journey.

The use of "myth" could reinforce student motivation by the possible stimulation of previous positive stimulus appraisals towards the myth chosen by the students. Using a myth as data for the assignment could be an interesting aspect of the activity, tapping into the emotional value of myths found in the student's family or cultural background.

4. Grammar support of "future tense" – Using the "triple-entry journal" (TEJ) (Appendix Two), students connect their own unique characteristics, future aspirations and personal rationale with assignment text through quotation and paraphrase.

The use of the TEJ makes visual connections between text and personal opinions, and encourages neuronal connections that associate future academic success and the explicit plans that the learner will describe in the journey. The task also leads students to use the future tense repeatedly.

The "argumentative" undergraduate essay helps develop student understanding of the structure and organizational features associated with this genre. For example, the features of the genre of argumentative undergraduate essay,

such as, "thesis sentence," "topic sentence" and "deductive paragraph writing" are all skills professors assume students have in undergraduate university classes. At both the essay level and the larger academic writing level, it is possible to consider that students might regard previous experience as a guide toward future appraisals, as is suggested in BBL literature.

Teachers of basic academic writing classes are challenged by the varied backgrounds, life experience and learning styles of the students, and must find the academic reading and writing gaps and give appropriate academic experiences in meaningful ways. Not only should classroom tasks be "meaningful," but they should also be "practical," reinforcing the synaptic connections of tasks that will be relevant in the future. The basic academic writing class is a training ground of sorts for the introduction of the features of structure and organization. As educators of this important population of basic writers, we should consider the incorporation of emotionally valuable classroom tasks, and the stimulation of innate structures of learning in the creation of L2 classroom pedagogy.

Typically, "emotional value" is not a resource that educators consider in classroom strategies. But, to

emotionally connect classroom materials to the students' lives outside of the classroom might trigger an intrinsic desire to autonomously continue learning outside of the classroom, a potential direction toward successful L2 acquisition. A student might be more likely to work more diligently with sources that have some level of emotional value, and are deemed important by the physical structures of learning in the brain and body.

With the incorporation of key vocabulary and command words used in college-level written tasks, students will understand and have command of certain vocabulary words and grammatical features that are reinforced in this assignment. It is important to note that the vocabulary features studied in this English class are found in written tasks across the curriculum. The growth of neuronal networks between academic words and concepts could positively mark academic words, and provide subsequent future positive appraisals of related learning tasks. Students could find intrinsic pleasure in these types of academic learning tasks in the future because of their confidence in their knowledge of academic words. The following Table 3 gives examples of vocabulary words found

specifically in this text, words or phrases that could also be found across the curriculum:

Table 3. Vocabulary Items Found in "Creating the Myth"

Transformation, trappings, fulfillment, twists and turns, subconsciously, make-believe, dramatic, similar, composite, significance, universal, mundane, defeat, adventure, catalyst, motivated, extraordinary, mentor, obstacles, humility, to outwit, to confront, to integrate, rebirth, innumerable, variation, pursuit, rejuvenation, mysterious, receptive, opportunity, inadvertently, reminiscent, comradeship

Brain-Based Pedagogical Rationale for the Assignment

I consider attention to the IM to learn an L2 in this assignment by asking students to make predictions about their "future selves." This concept reminds of us of the "possible selves" motivation construct from Chapter One, in which the motivational impetus to learn is based on self-predicted future success in the learning endeavor. Because the assignment leads the learner to think about a future "event-to-come" and to define the reasons he is studying at the university, the student gives careful consideration and personal analysis to the forthcoming academic experience, and makes future predictions of success. As this could be

the first university class and a potentially daunting moment for the student, the parameters of the assignment are loose in order to generate ideas and build confidence in the writing process.

Because it is critical that first impressions of learning tasks be positive for students, this assignment provides supportive tasks where the learner interacts with new text and new academic words and expectations in an emotionally pleasing environment. The teacher provides support to the student through a detailed assignment sheet that uses tasks that could stimulate IM by asking students to consciously think about their internal motivations to study English. Because this essay assignment asks the student to write about a "future self," the student must consciously consider his or her future self, reflecting on the emotional relevance of their academic future. The synaptic connections in the brain that encode "success," "positive appraisal," "the L2" and the "IM to do something about the learning task" could join in one mental web of knowledge as discussed by Schumann (1997).

The writing prompt could be helpful because it addresses a real situation with real emotional worth already attached to it. Perhaps a student's future goal is

proficiency in English. A synaptic connection between writing in English, a positive stimulus appraisal, and the success in the physical action of writing the essay could be a powerful advantage to the student who visualizes her academic aspirations and physically takes steps towards its manifestation, and succeeds. Positive L2 interaction in the in-class interviews might create a positive stimulus appraisal regarding L2 acquisition and the associated learning tasks. The learner may then experience positive internal feedback, and subsequent positive value assessments toward future learning tasks.

Because students do not enter ENG 86A/B as blank slates when it comes to academic writing, teachers have to take into account students' backgrounds in order to influence their academic writing futures. Building on what students already know, repeated exposure to academic expectations could strengthen neuronal pathways.

The value-stimulus appraisal happens when the positive appraisals are somatically tagged in the learner's body. For example, this argumentative essay experienced successfully in ENG 86A/B could be somatically valued and marked with a positive stimulus appraisal. Following the positive appraisal, if the students were to encounter this

type of essay in ENG 101, the emotional appraisal could be positive due to the pleasing previous encounters. If the student were to encounter a similar academic essay, such as a "persuasive essay," although she had not seen this exact essay structure, the "as if" loop gives similar, or perceived to be similar, value appraisal to the incoming stimulus (Damasio, 1994). This experience could further the creation of neuronal connections and strengthening the mental web being created by and for past, present, and future appraisals made by the student regarding the academic experience. Therefore, if an essay in ENG 101 (the course after ENG 86A/B) were presented to the students, they would be more supported because the students had seen something similar to it before, valued it positively, and associated it through the "as if" loop. The repetition of previous information could strengthen the synaptic connections made in the learning process, making academic writing concepts easier to recall and longer lasting.

Classroom Activities

This section details the brain-based foundations of the two supporting classroom activities, "Tell me about yourself," an in-class peer interview and discussion of

personal myth, and "Predictions about my success in college," a homework assignment that uses the future tense to connect ideas.

Activity One – Tell Me About Yourself. "Tell me about yourself" is an activity that helps students generate ideas and source material for the writing assignment. To set up the activity, the teacher provides vocabulary support by giving in-class direction on the differences between a "yes-no" question and a "WH" (who, what, when, where, why, how) question. Examples of each type of question are shown, and appropriate usage is discussed. Table 4 is an example of what the teacher could write on the board to show differences between the two types of questions, and their appropriate usage.

Table 4. Two Kinds of Questions

Examples of "yes-no" questions:	Examples of "WH" questions:
<ul style="list-style-type: none"> • Do you like to read? • Are you taking classes this fall? • Will you see your sister this summer? 	<ul style="list-style-type: none"> • What do you do on the weekends? • Where do you study? • Who do you eat lunch with?

For homework, the teacher then asks the students to answer the prompt below:

Write 5 "WH" (who, what, when, where, why, how) questions about you and your unique characteristics in the present, and write 5 "WH" questions about your future predictions of self after the prescribed course of university is completed.

The students return to the following class, and the activity begins as they are paired up in groups of two. The students then "interview" one another with the questions they have written. For example, Student A asks Student B Student B's first question - "What is your favorite hobby?" Student B replies, "Reading." Student A writes down this information. This data along with the information garnered in the subsequent nine questions becomes personal data that Student B will use to write the argumentative essay.

Because this meaningful activity attends to the collection of source material for the written essay, interpersonal in-class interactions are manifested as peer interviews. The interesting aspect of this data is the fact that the questions are taken from another student, which gives a different perspective of self to Student B,

who might not have thought about or considered the question asked by Student A. Therefore, we see that this data collection includes questions written and asked by a classmate. This activity occurs before the first draft is written as it is part of the data collection process.

The activity continues with a series of discussions focused around the students as human beings with unique characteristics and abilities to predict success in their academic futures. The instructor introduces the assignment text, "Creating the myth," by Linda Seger (2003), and asks the students to use the text, and information from the discussion to write the assignment essay. The teacher then describes the construction of the essay as follows: Trace your unique personal experience and predict your future, using the "myth" criteria as textual support, all familiar topics.

If we consider a brain-based interpretation of Activity One, we might point out the significance of the role of the amygdala as a location for emotional value. Because the students choose their own myths based on personal relevance, the students are asked to consciously consider worth by drawing on past meaningful experiences, combined with their own interpretations of the myth. This

combination of the discussions of emotionally valued personal stories, communication with peers about self in the interviews, and classroom text could stimulate the RAS to receive new information, signaling the importance of the academic words and concepts of the assignment. As the student positively appraises this learning task, he or she could be motivated work harder at the task, and potentially receive intrinsic rewards, such as the neurotransmitter, dopamine. Also, the integration of "searching out new information," "emotionally valuable material," and "academic writing task" could somatically mark a positive stimulus appraisal for university-level writing classes.

Activity Two—Predictions About My Success In College.

Because at the Intermediate-High writing level, students' paragraph "development may be uneven, and [they] may support ideas with some specific details" (*California Pathways*), this activity is designed to provide "scaffolding" at the beginning of the writing process by helping students organize personal thoughts, important data, future predictions and textual support through the use of a "triple-entry journal" (TEJ). A type of advanced organizer as described in Chapter Two, the TEJ is a learning device to help students visually organize their

thoughts by writing them down. This activity is not annotated on the assignment sheet because it contains oral in-class directions. The TEJ is distributed (Appendix Two) and explained in class with additional support in class. To recapitulate the process so far, the student has collected data on "present self" and "future predictions" in the form of "interview answers" and "brainstorming page." The student has also read and critically considered the assignment text, "Creating the myth." With these sources in hand, it is here that the student can begin to thoughtfully attend to incorporating multiple sources.

The TEJ handout helps students carefully organize data, which includes material from the text and students' personal experiences, clearly attending to the integration of multiple sources, and scaffolding the learner into "text-responsible" writing. This visual mnemonic device, the TEJ, asks the student to take important aspects of personal data found in the "in-class interview" and the "brainstorming page," and plug these answers into the "Now" and "Future Predictions" columns, and then gives the student the "Why" column to respond in the form of inferences, interpretations, reasons and personal experiences. Seen as the framework of the "journey through

the academic experience," the "Myth as the framework" box at the top is a place to write textual quotations and paraphrase. A visual cue of two arrows that spans the page reminds the student to integrate the assignment text into the essay.

The students are asked to come to class with the personal data collected through the in-class peer interviews (Activity One), the brainstorming page of personal characteristics the student found in the visual image, and the assignment text annotated with important supportive information regarding the "myth" of their journey. The teacher models on the board how to appropriately "load" the information into the proper columns. The three columns are filled in, and the information in "Myth as the framework" is recorded. The teacher explains how to use the "triple-entry journal" to integrate sources in the writing of the essay. Students then spend about twenty minutes adding information to the journal. The teacher walks around, and gives individual guidance. After this, the teacher shows the students various sentence structures that can "make future predictions." A sample of the examples written on the board is seen below:

Because I am _____, I will be

_____.

If I _____, I will _____.

If I don't _____, I won't be able to

_____.

In the future, I will _____.

The professor checks the students' comprehension of the task by asking the students to plug in examples with careful attention to grammatical structures in each example. The students are then placed in small groups of 3-4. For 5-10 minutes, the students work together with the goal of each student in the group polishing up their "best/favorite" personal prediction of success. To conclude, each student stands in front of the class, and gives their one sentence long "best/ favorite" prediction of personal academic success. This aspect of the activity provides peer feedback, and can help students generate more ideas by hearing other students' ideas.

This activity provides learner support by helping students consciously attend to the grammatical structures of future predictions. In the TEJ, visual support is provided for the grammatical feature, future tense, and ways of predicting the future. It is in this environment

that educators must provide grammatical structure and support for the students, as they take steps crucial to critical thinking and analytical success. The TEJ task also helps students expand their L2 verbal repertoire through the exploration of connecting "present self" and "predictions of self regarding academic goals." The use of the TEJ could be an interesting aspect in the reinforcement of the future tense as an empowering move toward expanding writing potential, creativity and rhetorical force. The student could potentially connect her "self" and her emotionally valuable "future goals" somatically. If a future essay required the integration of text and personal opinion, a positive stimulus appraisal would intrinsically motivate the student based on previous similar academic writing experiences. The TEJ is a classroom material that could reinforce these connections.

Spack (1993) discusses various ways that a student might ignore a text when attempting to create discourse together, and cautioned about the reasons for lack of integration of text and personal writing, saying that some students might not understand the assignment, but "others may do it because they are not yet ready to make the leap into more academic uses of prose," (p. 192). In order to

support these students, a BBL-perspective suggests that repeated experiences with the integration of text and personal writing could strengthen neuronal connections, making meaning and laying a foundation for positive stimulus appraisals in future academic writing. The motivation to write in an academic context could be stimulated by the innate systems of learning that every learner possesses inherently.

Conclusion

Understanding the forces that stimulate intrinsic motivation and give emotional value to language learning tasks could help teachers design pedagogical strategies that facilitate the learning process. Pedagogy that purposefully stimulates the IM to learn a second language on cognitive and biological levels could be seen as an optimal learning and teaching environment. Because Crookes and Schmidt (1991) see motivation as "an important determinant of [mental] resources" (cited in Schmidt, 1993, p. 36), this strong presence of motivation in the brain and the body could determine the focus of cognitive and physical will. Therefore, the complementary connections between the cognitive desire of L2 acquisition, and the

physical ability to manifest such desires could motivate students to work hard in and out of the classroom. It is the human ability to place emotional value not only on past experiences, but also on future goals that gives the learner a unique possibility to influence and affect the outcome of language learning endeavors. In other words, a deep meaningful learning experience can happen with intrinsic motivation as the impetus to learn, and a positive emotional value placed on the language stimulus as a conscious reinforcement of the final goal of acquisition.

As educators, we ideally want our students to become "authors of their own worlds" (Pennycook, 1997, cited in Champagne et. al., 2001, p. 49), motivated to take the knowledge from the classroom, and extending it into their personal lives. Motivational research from a biological perspective provides a foundation for L2 pedagogy that is based on scientific data that reinforces a need for attention to multiple physical, emotional, and cognitive factors in the L2 learning environment. This synthesis of IM in SLA and BBL research alludes to a relationship between the biological and cognitive approaches to motivation that could blur the line between the two constructs. Or, conversely, could it strengthen the

implications of considering both cognitive and biological perspectives of IM concurrently? The explicit link between the physical will and IM is significant in my research because it provides a bridge between the two constructs of cognitive and biological perspectives of IM to learn L2.

Zull (2002) illustrates the connection of "brain," "cognition," and "emotions" in the learning experience in the following excerpt:

The human brain is a learning organ; learning is what it does. The main task for the teacher is to help the learner find connections. Once a student encounters things that connect with her life, her emotions, her experiences, or her understandings, she will learn. She won't be able to help herself. Her brain will change. (p. 242)

Do we ever stop learning about something that we value emotionally? Could IM be hypothesized as an equivalent to lifelong learning? When a student consciously attends to a task that is important, the job is not seen as large or difficult because it is lavished with emotional meaning. Its completion is perceived in the brain as a mental reward. As educators, we can use "biology" to support L2 learners by providing meaningful intersections between

learners and the language stimulus, which could help them see important connections between the academic assignment and the students' own unique lives.

In sum, cognitive and biological perspectives of IM are mutually supportive constructs in SLA motivation research because "the brain, emotion, and cognition are distinguishable but inseparable" (Schumann, 1994, p. 232). The ways that BBL could inform L2 pedagogy, and support second language learners more fully in their experiences in the undergraduate university writing classroom could enhance the L2 classroom, and establish "biology" as a resource in purposeful pedagogy. This hypothesis of the cognitive and biological systems as equally important collaborative structures that support and intersect in L2 learning processes should be studied in future empirical classroom research.

APPENDIX A
ASSIGNMENT

My Journey in Writing: An Argumentative Essay

Essay #1—Eng 86A

Rough Draft Due (At least two full typed pages, along with the picture and interview results): Friday, 9/30

Typed Full Submission Due: Wednesday, 10/12

Revision Due: Wednesday, 10/26

Assignment (4-5 pages, typed, double-spaced, 1 inch margins, 12 pt. Times font)

In order to get acquainted with our classmates and ourselves, you will have the opportunity to write your own argumentative essay for this assignment. *Write an essay that best describes your upcoming journey into the world of academics and the university experience.* You will follow your process of becoming an academic person, predict your success based your personal characteristics you possess, and support your claims with the assignment text. Use the information that you have gathered about yourself (from the visual image you selected), and the interview answers to find unique qualities that you possess that will help you succeed in your academic goals. Use this information to support your journey story. The myth you choose (or a combination of myths) will serve as the framework of your story.

Please address the following three aspects of the italicized prompt above, not necessarily in this order:

- How I am now
- My journey in writing/ The “myth” of my experience
- How I will be when I complete my goals

In keeping with the theme of “myth” and remembering the stories of personal journeys we read in class, your journey into the experience of being a university student will allow you to predict the future outcomes of your university experience based on personal qualities you notice in yourself and that others have noticed in you. Which myth best describes your story? What aspects of the myth do you identify with? Incorporate quotation and paraphrase from Seger for a strong well-written essay. Your audience is your fellow students, who are interested in knowing about you and skills you possess that will help you in your English writing goals and success in being a student at CSUSB.

In writing your essay, you should specifically do the following:

Consider the three aspects of this essay—the present, the process and the future results. Using multiple paragraphs for each section, and fully develop each part.

Use the picture you choose, and the interview results as data to thoughtfully construct a written description of you at the beginning of your journey in academia. Think about aspects of you today that are important—qualities that you determine from the picture, and information that was revealed to you in the interview. Discuss this as an accurate depiction of you.

In discussing the type(s) of myth that best describe your upcoming journey into the life of a university student, show features of the myth stories that are and/or will become true in your life. What “characters/forces” in your life help you on your journey to academic greatness? Be creative and have fun with your story! You may construct a realistic journey path or a fantasy path, as long as you support your claim with paraphrases and quotations from the reading.

Show the results of this journey by connecting the personal characteristics that you possess now and demonstrate how these traits will help you succeed in English. For example, you could talk about how your quality “outgoing” will allow you to make friends and therefore, have more English interaction. Or you could talk about your musical ability, and how using this as a memory device, you sing your vocabulary words to remember them better. Be as creative as you like. Always remember to attend to clarity, continuity and the flow of your sentences.

Other Guidance

- When you quote or paraphrase from Seger, use proper MLA citation style in your essay.
- Include a Works Cited page in MLA style
- Include the original picture, double-entry journal, brainstorming page and interview results with the essay.

Evaluation Guidelines

- **Assignment**—you have completed the assignment, and successfully answered the question.
- **Thought**—you have deeply considered the various aspects of your topic, make thoughtful observations and make insightful connections.
- **Organization/ Unity**—there is a clear thesis, the use of transitions and a unity between paragraph bodies.
- **Support/Development**—you support your ideas and claims with paraphrase and quotations from the reading, and personal examples.
- **Language/ Grammar**—your essay demonstrates control of sentence structure, punctuation, and spelling, with varied sentence style and structure and a wide range of vocabulary choices.
- **Revision Effort**—your essay shows that you put a lot of effort into the revision.

Getting Started

Part 1—HOW I AM NOW

1. Find a picture (magazine picture, art, drawing, any visual image) that describes you.
2. Brainstorm or cluster the qualities you see in the picture that represent you—
 - *As you are now*, and
 - *As you aspire to be*.

3. Answer the 10 WH- (who, what, when, where, why, how) interview questions (5 about your present life, and 5 about your future predictions) about you to find out information about you in the present, and predictions for your academic future. These interview answers will be used as data for your essay, as they provide information about you from a different perspective.

4. Look at the answers from the interview and carefully consider what personal characteristics of you were brought out.

5. Using the important information that you found from the picture and the results of the interview pick 10 qualities you found that will help you achieve success in your academic goals.

Part 2—MY JOURNEY IN WRITING/ THE “MYTH” OF MY EXPERIENCE

6. Read Linda Seger’s “Creating the Myth,” and notice the different types of myth, and the ways they succeed in telling a story of someone’s exciting life journey.

7. Reflect on which types of myths seem to tell your story, and take notes on important connections that you notice. Also, think about any powerful and/or meaningful stories or myths you remember, and explain why.

Part 3—HOW I WILL BE

8. Using a triple-entry journal, place the 10 personal characteristics that you found about yourself in Part 1, in the left column and under the heading “Now.” Then, in the right column, under the heading “Future Predictions,” write ideas about how each personal quality will help you to achieve success in your university experience.

9. Notice the connections, and how these connections describe you and your hopes and plans for your education in English writing. Write these reactions and responses in the “Why” column.

Part 4—WRITE YOUR PAPER

Checklist

Quotation and paraphrase from Seger

Works Cited sheet in MLA style

Title page

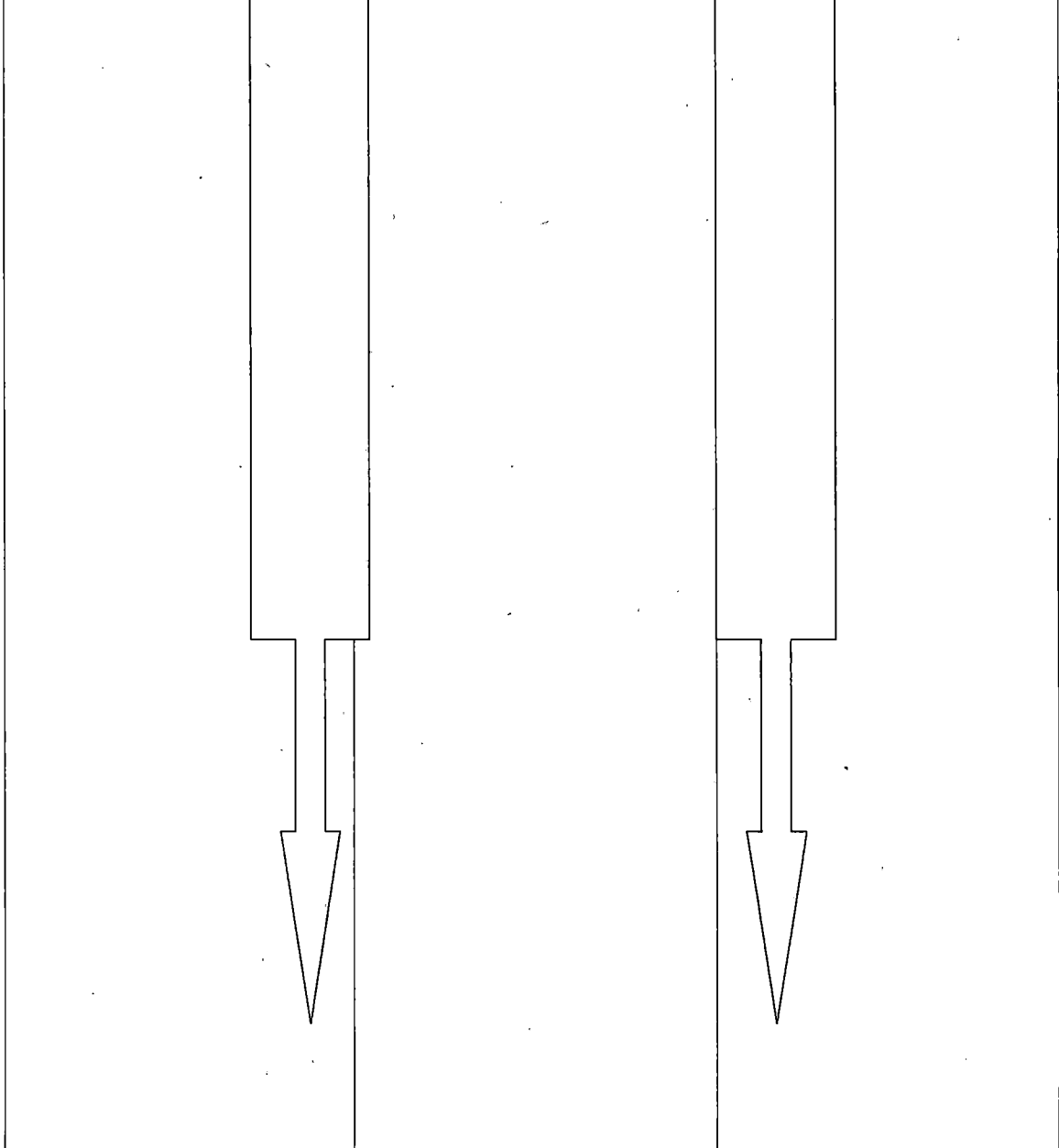
Original picture, double-entry journal, brainstorming page and interview results attached.

Proof-read and checked for grammatical accuracy.

APPENDIX B
TRIPLE ENTRY JOURNAL

MYTH AS THE FRAMEWORK—

NOW FUTURE PREDICTIONS WHY



REFERENCES

- Ackerman, D. (2004). *An alchemy of mind: the marvel and mystery of the brain*. New York: Scribner.
- Bergland, R. (1986). *The fabric of the mind*. Harmondsworth Middlesex, English: Viking.
- Brand, A. (1998). Values: understanding writing through brain biology. *Rhetoric Review*, 16, 290-309.
- Browning, G. et. al. (2000). *California pathways: the second language student in public high schools, colleges and universities*. Sacramento, CA: CATESOL.
- Carter, R. (1998). *Mapping the mind*. University of CA Press: Los Angeles, CA.
- Champagne, M. et. al. (2001). The assessment of learner autonomy and language learning. In L. Dam (Ed.), *Learner autonomy: new insights* (pp. 45-55). AILA review 15. United Kingdom: The Charlesworth Group.
- Christison, M. (1997). Applying mind-brain principles to L2 teaching. *TESOL Matters*, 7, 3-7.
- Crookes, G., & Schmidt, R. (1991). Motivation: reopening the research agenda. *Language Learning*, 41, 469-512.
- Damasio, A. (1994). *Descartes' error: emotion, reason, and the human brain*. San Diego: Quill.

- Deci, E. L. & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum.
- Dennison, P. & Dennison, G. (1989). *Brain gym*. Ventura, CA: Educational Kinesiology Foundation.
- Dhority, L. (1998). *Joyful fluency: brain-compatible second language acquisition*. San Diego, CA: The Brain Store.
- Dornyei, Z. (1994). Motivation and motivating in the foreign language classroom. *The Modern Language Journal*, 78, 273-283.
- Dornyei, Z. (1999). [Review of book *The neurobiology of affect in language*]. *SSLA*, 22, 275-281.
- Dornyei, Z. (2003). Attitudes, orientations, and motivations in language learning: advances in theory, research, and applications. *Language Learning*, 53, 3-32.
- Dornyei, Z. & Skehan, P. (2003). Individual differences in second language learning. In C. Doughty & M. Long (Eds.), *The handbook of second language acquisition*. Malden, MA: Blackwell Publishing.
- Edelman, G. (1992). *Bright air brilliant fire: on the matter of the mind*. New York: Basic Books.

- Ellis, N. C. (2003). Constructions, chunking, and connectionism: the emergence of second language structure. In C. Doughty & M. Long (Eds.), *The handbook of second language acquisition*. Malden, MA: Blackwell Publishing.
- Gamon, D. & Bragdon, A.D. (2001). *Learn faster, remember more: how new and old brains acquire & recall information*. Cape Cod, MA: Brainwaves Books.
- Gardner, R. C. & Lambert, W. E. (1959). Motivational variables in second language acquisition. *Canadian Journal of Psychology*, 13, 266-272.
- Gardner, R.C. (2001). Integrative motivation and second language acquisition. In Z. Dornyei & R. Schmidt (Eds.), *Motivation and second language acquisition* (Technical Report #23, pp. 1-19). Honolulu: University of Hawai'i, Second Language Teaching and Curriculum Center.
- Glazener, L. (2004). *Sensorcises: active enrichment for the out-of-step learner*. San Diego, CA: The Brain Store.
- Goleman, D. (1995). *Emotional intelligence: why it can matter more than IQ*. New York: Bantam Books.

- Hannaford, C. (1995). *Smart moves: why learning is not all in your head*. Atlanta, GA: Great Ocean Publishers.
- Horowitz, D. M. (1986). What professors actually require: Academic tasks for the ESL classroom. *TESOL Quarterly*, 20, 445-462.
- Jensen, E. (1998a). *Introduction to brain-compatible learning*. San Diego, CA: The Brain Store.
- Jensen, E. (1998b). *Teaching with the brain in mind*. San Diego, CA: The Brain Store.
- Jensen, E. (2000). *Learning with the body in mind*. San Diego, CA: The Brain Store.
- Jorgenson, O. (2003). Brain scam? Why educators should be careful about embracing 'brain research.' *The educational forum* (67).
- Kramsch, C. (1998). *Language and culture*. Oxford: Oxford University Press.
- Krashen, S. D. (1985). *The input hypothesis: issues and implications*. London: Longman.
- LeDoux, J. (1996). *The emotional brain: the mysterious underpinnings of emotional life*. New York: Simon and Schuster.

- Markus, H. & Nurius, P. (1986). Possible selves. *American Psychologist* (41) 9, 954-969.
- Newberg, A., D'Aquili, E. & Rause, V. (2001). *Why God won't go away: brain science & the biology of belief*. New York: Balantine Books.
- Noels, K. (2001). New orientations in language learning motivation: towards a model of intrinsic, extrinsic, and integrative orientations and motivation. In Z. Dornyei & R. Schmidt (Eds.), *Motivation and second language acquisition* (Technical Report #23, pp. 43-68). Honolulu: University of Hawai'i, Second Language Teaching and Curriculum Center.
- Noels, K., Pelletier, L. G., Clement, R. & Vallerand, R. (2000). Why are you learning a second language? Motivational orientations and self-determination theory. *Language Learning*, 50, 57-85.
- Oxford, R. & Shearin, J. (1994). Language learning motivation: expanding the theoretical framework. *The Modern Language Journal*, 78, 12-28.
- Pennycook, A. (1997). Cultural alternatives and autonomy. In P. Benson and P. Voller (Eds.), *Autonomy and independence in language learning*. Essex: Addison Wesley Longman.

- Pert, C. (1997). *Molecules of emotion: the science behind mind-body medicine*. New York: Touchstone.
- Scherer, K. R. (1984). Emotion as a multi-component process: a model and some cross-cultural data. In P. Shaver (Ed.), *Review of personality and social psychology: vol. 5. Emotions, relationships and health* (pp. 37-63). Beverly Hills, CA: Sage.
- Schumann, J. (1994). Where is cognition: emotion and cognition in second language acquisition. *Studies in Second Language Acquisition*, 16, 231-242.
- Schumann, J. (1997). *The neurobiology of affect in language*. Michigan: Blackwell Publishers.
- Schumann, J. (2001). Learning as foraging. In Z. Dornyei & R. Schmidt (Eds.), *Motivation and second language acquisition* (Technical Report #23, pp. 21-28). Honolulu: University of Hawai'i, Second Language Teaching and Curriculum.
- Schumann, J. & Wood, L. (2004). The neurobiology of motivation. In Schumann, et. al. (Eds.), *The neurobiology of learning: perspectives from second language acquisition*. New Jersey: Lawrence Erlbaum Associates.

- Seeger, L. (2003). Creating the myth. In S. Maasik & J. Solomon (Eds.), *Signs of life in the USA: Readings on popular culture for writers*. Bedford/ St. Martin's: Boston.
- Sousa, D. A. (2001). *How the brain learns: a classroom teacher's guide*. Thousand Oaks, CA: Corwin Press Inc.
- Spack, R. (1993). Student meets text, text meets student: Finding a way into academic discourse. In J. G. Carson & I, Leki (Eds.), *Reading in the composition classroom: Second language perspectives* (pp. 193-196). Boston: Heinle & Heinle.
- Tremblay, P. & Gardner, R. C. (1995). Expanding the motivation construct in language learning. *The Modern Language Journal*, 79, 505-518.
- Vanderbilt, K. L. (2005). Connecting learning: brain-based strategies for linking prior knowledge in the library media center. *School library media activities monthly*. (21) 7.
- Wolfe, P. (2001). *Brain matters: translating research into classroom practice*. Alexandria, VA: Association for Supervision and Curriculum Development.

Zull, James E. (2002). *The art of changing the brain: enriching the practice of teaching by exploring the biology of learning*. Sterling, VA: Stylus Publishing.