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*The Neurobiology of Affect in Language* by John H. Schumann. Malden, MA: Blackwell Publishers, 1997, 341 pp.

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In his recent book, *The Neurobiology of Affect in Language*, John Schumann integrates neurobiological approaches to affect and cognition with Second Language Acquisition (SLA) research on motivation. From this synthesis of fields, Schumann develops a notion of motivation that identifies five key categories which may account for differential rates of acquisition among second language learners: novelty, intrinsic pleasantness, goal/need significance, coping potential, and norm/self compatibility. According to Schumann, second language learners use these categories to appraise stimuli. In fact, Schumann believes it is this dynamic process of appraisal that constitutes the affective basis for motivation in SLA. Although in Chapter 6 he does relate his theory to First Language Acquisition, the main focus of this book is the influence of motivation on the success of second language learning. Schumann attributes his initial interest in this area of research to Spolsky's *Language Learning* (1969) and Gardner's (1985) work on integrative motivation. The influence of these researchers is apparent as Schumann develops his theories and relates them to second language learning. He effectively builds a cognitive model for SLA that is based on biological processes and structures that purportedly determine a learner's propensity for second language learning as determined primarily by motivation.

Although his book contains complex theories from the field of neurobiology, Schumann presents his points in clear and understandable terms that should be well received by a wide audience. He does this in part by providing numerous schematic charts of neurobiological phenomena and also by glossing specific words that may otherwise be too technical. For those readers familiar with Krashen's work on the monitor model, black box, and affective filter (1985), this book may also serve as a bridge to help one transition from the more metaphorical models of Krashen's theories of affect and motivation to a more substantial understanding of the actual neurobiological structures that these metaphorical models often fail to account for.

Crucial to an understanding of Schumann's model of motivation is the premise of his theory: Emotion underlies most of what we consider cognition and accounts for variable success in language acquisition. Explaining the psychological and biological structures that account for such variable success becomes Schumman's goal in chapters one and two. Although many theories in psychology and SLA have often relied on computational or purely metaphorical models, Schumann in


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chapter one delves into the actual structures of the brain that drive the second language learner's cognitive and emotional makeup. Central to this explication is the amygdala. As Schumann notes, the amygdala works in concert with other parts of the body to help the individual make some significant assessment of experience. The amygdala does this by assigning motivational and emotional value to the different experiences encountered by the individual. Such assessments are initially controlled by systems called homeostats and sociostats, which guide the young child to meet biological and basic social needs. As the child grows, she is socialized by the mother and consequently acquires somatic value (Edelman, 1992). For the child, somatic value is equivalent to knowing what the mother likes and dislikes. Unlike the innate sociostats and homeostats, somatic value is learned and develops over the lifetime of the child. It is the somatic value of a child that provides access to the mother's appraisal of the environment. As the child becomes less dependent on the mother, the child's associations are expanded and her own personality develops to reflect specific preferences. Superordinate to these systems is value-category memory. This system integrates the external stimuli from the outside world with the internal set of values (homeostats, sociostats and somatic value) that have been schematically associated with past experiences that moment by moment guide the individual's actions. Anchored to neurobiological structures, these categories depend mainly on the amygdala and limbic system, which integrate emotion with meaning.

In chapters three, four, and five, Schumann cites evidence from different studies that show how and why stimulus appraisal constitutes the affective basis for motivation in SLA. In chapter three, he compares his theory with work done by other researchers who have studied the issue of motivation. Although Dornyei (1994) and others are mentioned, the bulk of this chapter focuses on questionnaires designed by Gardner et al. (1985) to measure a learner's stimulus appraisal system. In chapter four, Schumann employs diary studies and autobiographies to more closely examine the role of stimulus appraisal in SLA. Schumann first provides the reader with numerous learner accounts of second language learning and then explains how these diary studies provide the researcher with a window of analysis into the learner's perceptions of novelty, intrinsic pleasantness, goal/need significance, coping potential, and norm/self compatibility with respect to the language learning environment. Although admitting to several weaknesses inherent in the use of such a device, he makes a strong case in this chapter for how stimulus appraisals help or inhibit the cognitive effort during second language acquisition processes.

In chapter six, Schumann explores the issue of affect in first language acquisition and suggests his stimulus-appraisal approach may be "a common denominator for all motivations and motivational theories" (p. 174). Although this may seem tenuous when one takes into account the still speculative nature of this field, Schumann reminds the reader that one day, with more advanced neuroimaging technology, we will be able to put his hypothesis to empirical tests. In some ways,

this may be one of the more compelling reasons to familiarize oneself with Schumann's work on the neurobiology of language, as opposed to other theories that seek to account for the role motivation has on SLA by solely metaphorical means.

Chapter seven examines the role of affect in cognition in a more general sense. In this chapter, Schumann juxtaposes the different concepts of cognition and then explains how they are all intimately related to affect. He also offers an intriguing explanation of how the body is used in cognition by citing evidence of congenitally blind children using gesture when they speak and by mentioning a discourse analysis study, which examines scientists and their use of gesture (Ochs, Gonzales, & Jacoby, 1996).

In sum, Schumann takes an immensely complex subject and makes it accessible to a wide range of readers. To further develop the concept of motivation, Schumann builds on his earlier theories of pidginization and acculturation and bridges what had seemed to be an insurmountable chasm between the fields of neurobiology and applied linguistics. Schumann's attempt to show how motivation—inseparably bound to cognition and emotion—heavily influences variable success rates in SLA is highly successful. This is a must read for anyone interested in the field of SLA.

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