ABSTRACT

As humans, we are constantly bombarded with vast amounts of information and experiences, requiring us to make sense of them and respond appropriately. Event segmentation theory (EST), developed over the last two decades, suggests that our brains process this flow of information by dividing it into distinct segments (Zacks et al. 2007; Zacks and Swallow 2007; Speer et al. 2009). The brain identifies boundaries between these segments when the current understanding of an event becomes insufficient to explain what's happening. At that point, the brain updates its interpretation to a new mental model to make sense of the situation, through a prediction error system (Zacks et al. 2007). According to EST, this process involves integrating multiple sources of information: some are drawn from our immediate sensory input and working memory, so-called working event models (Zacks et al. 2007; Richmond and Zacks 2017), while others come from our long-term memory (Hard, Tversky, and Lang 2006; Baldassano, Hasson, and Norman 2018), where past experiences and knowledge are stored, known as event schema. These memory systems work together to shape how we perceive and react to events as they unfold. Previous research has explored the neurophysiological foundations of EST with the use of functional magnetic resonance imaging (fMRI) (J. M. Zacks et al. 2001; Hasson et al. 2004; Zacks et al. 2006, 2007; Kurby and Zacks 2008; Zacks et al. 2010; Magliano and Zacks 2011; Baldassano et al. 2017), focusing on key concepts like prediction error, working event models, and event schemas. However, significant gaps remain in understanding how various neuroimaging techniques, such as electroencephalography (EEG) measurement, and different factors might affect each of these core principles. This dissertation focuses on age as a primary developmental factor influencing how individuals perceive the world around them, with event schemata emerging as the central mechanism driving these changes. Drawing on empirical evidence, it becomes clear that perceptual efficiency evolves across the lifespan, and that perception in childhood and adolescence is less refined than in adulthood, largely due to the progressive development and more efficient use of event schemata. This developmental trajectory is examined across three key life stages, including adolescence, adulthood, and older age, allowing for a thoughtful comparison of changes in event perception over time. Beyond age, the dissertation also highlights the role of other biological systems, such as the catecholaminergic system, which undergo significant maturation and contribute to changes in the dynamic neural mechanisms underlying perception, primarily by modulating how event schemata are accessed and integrated with incoming information, as conceptualized in EST. Lastly, the practical and clinical relevance of this theory

is explored through the lens of attention-deficit/hyperactivity disorder (ADHD), to identify potential new tools to support faster diagnosis and more targeted treatment of such neurodevelopmental conditions.