

Is visual lexical decision a dynamic and competitive process? No, if we look at reaction times. Yes, if we study how it unfolds in time

Laura Barca^{1*} and Giovanni Pezzulo²

¹ ISTC-CNR, Institute of Cognitive Sciences and Technologies, Italy

² ILC-CNR, Istituto di Linguistica Computazionale "Antonio Zampolli", Italy

Visual lexical decision is a classical paradigm in Psycholinguistic, and numerous studies have assessed a so-called "lexicality effect" (i.e., better performance with lexical over non-lexical stimuli). Far less is known relative to the dynamics of choice, as many studies measure overall reaction times which are not informative of the underlying processes. To unfold visual lexical decision in time, we measured participants' hand movements toward one of two items alternatives by recording the streaming x,y coordinates of the computer mouse. Participants categorized as 'lexical' or 'non-lexical' four kinds of stimuli: high and low frequency words, pseudowords, and letter strings. Spatial attraction toward the opposite category was present for low frequency words and pseudowords. Increasing stimuli ambiguity lead to enhanced movements' complexity and trajectories' attraction to competitors, as no such effect was present for high frequency words and letter strings. Results fit well with dynamic models of perceptual decision-making describing the process as a competition between alternatives guided by the continuous accumulation of evidence, as well as with a recent neural model of visual word recognition that highlights the role of top-down influences and predictions on perceptual processes. More broadly, our results point to a key role of statistical decision theory to study linguistic processing in terms of dynamic and non-modular mechanisms. Finally, we discuss two aspects that make our set-up challenging for current dynamical models of decision-making: 1) not all information (e.g. orthographic, phonological and semantic) is available at the same time, therefore the accumulation process is nonstationary; 2) the choice is not completed at the action onset, but can be revised at any time during the movement.

Keywords: computational neuroscience, psycholinguistic, statistical decision theory

Conference: Neural Coding, Decision-Making & Integration in Time, Rauschholzhausen, Germany, 26 Apr - 29 Apr, 2012.

Presentation Type: Poster Presentation

Topic: Neural Coding, Decision-Making & Integration in Time

Citation: Barca L and Pezzulo G (2012). Is visual lexical decision a dynamic and competitive process? No, if we look at reaction times. Yes, if we study how it unfolds in time. *Front. Neurosci. Conference Abstract: Neural Coding, Decision-Making & Integration in Time*. doi: 10.3389/conf.fnins.2012.86.00001

Received: 12 Jan 2012; **Published Online:** 16 Jan 2012.

* **Correspondence:** Dr. Laura Barca, ISTC-CNR, Institute of Cognitive Sciences and Technologies, Rome-Italy, Italy, laurabarcapst@gmail.com