

QUANTIZED SECOND LANGUAGE ACQUISITION: ELECTROPHYSIOLOGICAL AND BEHAVIORAL CUES OF L2 DEVELOPMENTAL DISCONTINUITY IN ADULTHOOD

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1. The Discontinuity Hypothesis (DH). I present the embryonic stage of a L2 developmental hypothesis. The DH¹ is based on the interpretation of ERP responses and behavioral data in longitudinal studies where subjects act as their own experimental controls over time. The DH proposes that Second Language Acquisition (SLA) of morphosyntax in adulthood is not piecemeal because it abides by the law of discontinuous dispersion/accumulation of energy in nature, which is a *quantized* process featuring coefficient values. An adult L2 learner's morphosyntactic competence is made of a superposition of two representation/processing coefficients. These are Statistical Learning (SL) and Grammatical Learning (GL). SL and GL work as multiplicative factors on developmental variables (any learnable morphosyntactic items). SL is learning by chunks. It is a bottom-up, frequency-driven process based on learners' early and lifelong sensitivity to forward and backward transition probabilities among adjacent and nonadjacent words in a sequence. GL is learning by abstract features (gender, number, aspect, tense etc.) working as labels²³ that learners attach to statistically significant (but up to that point) still unheaded, *concatenations* of words. A discontinuous *quantum leap* in SLA occurs when SL and the brain structures that support it are superposed by GL and its representational/processing mechanisms. At this point, statistical representations in a learner's competence geminate and have a grammatical counterpart. A steady-state condition is achieved when learners can process the same things twice (statistically and grammatically) switching in real time between coefficients – like native speakers do¹⁴⁻¹⁷ – depending on factors such as the degree of entropy of learned items²¹⁻²² individual attitude and environmental variables. **2. Distinctive feature of the DH.** The DH is alternative to stage-models of “interlanguage” and of “stages/order of acquisition” which entail the idea that targetlike forms gradually substitute learners' errors. The DH proposes instead that both correct and incorrect forms are initially the result of a statistical pre-treatment of the L2 input by learners. Statistical forms (shallowly processed²⁵ chunks, formulas and constructions) and their grammatical counterparts are *entangled* in a learner's competence: a grammatical, targetlike item and its many possible statistical counterparts interact in ways such that one cannot be described independently from the other. A *quantum state* of a learners' morphosyntactic competence can indeed be described only as a whole (statistical and grammatical). **3. Electrophysiological cues.** Longitudinal ERP studies²⁻¹⁰ in the last ten years have shown that at low proficiency levels, the L2 processing of morphosyntactic features (such as agreement in the VP) only involves N400 components, which are often coupled with the declarative memory system and with associative, statistical learning¹⁸⁻¹⁹. As L2 proficiency increases, the processing of the same features involves P600s and sometimes even LANs. The electrophysiological shift between N400-P600 ERP components has been often assumed to mirror the passage from a learners' capacity of detecting statistically-based patterns in the input to the capacity of inducing productive rules. Recent findings¹¹⁻¹³ have shown instead that both very advanced learners and native speakers may remain either N400 or P600 dominant (as to the violation of the same morphosyntactic rule), opening up to the possibility that also a near-native competence encompasses a dual-route processing mechanism alternating SL and GL under different circumstances. **4. Behavioral cues:** advanced regression models (e.g. ISIE and VNC²⁰), when applied to the study of large longitudinal learner corpora, have revealed that the acquisition of a given grammatical feature may be preceded by phase in which only its statistical counterparts (targetlike and non targetlike *chunks*) are used. Regression analysis applied to relatively short time-series²⁴ (time-series reported in SLA studies are often shorter than those of neuroscience or biology studies) shows that some parametrically unrelated features of L2 morphosyntax are acquired almost simultaneously and within a very short time. **5. Developmental predictions:** (a) There are parts of the L2 grammar (dubbed “noncombinatorial”) – those involving *internal Merge* and external interface phenomena – that are less likely to be learned by adults because their computation cannot be supported by backward and forward transition probabilities; (b) When discontinuity occurs, L2 processing direction becomes head-driven and top-down²⁶, rather than jumpy (like when it is driven only by transitional probabilities and by a learners' lexical knowledge). **6. A flaw in explanatory adequacy:** the issue of learners' *evaluation metric* is not addressed in the DH, so the crucial question of why learners eventually choose the targetlike grammatical form rather than its statistical counterpart has not been addressed properly so far. Suggestions from the audience would be welcome.

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