

Rethinking developmental cluster ‘errors’: A synthesis to inform clinical practice

Consonant clusters are targeted in phonological acquisition research because they concentrate issues of structural complexity, markedness, and developmental timing (Greenlee, 1974). Cross-sectional studies view cluster development as non-linear and representationally complex, involving simplification, restructuring of underlying representations, and shifts in prosodic organization (Becker & Tessier, 2011), often explained through sonority- and constraint-based models (Ohala, 1999; Pater & Barlow, 2003), but not only (Dziubalska-Kołaczyk, 2019). Traditional models underrepresent dynamic aspects of development and the impact of language specificity. Recently, mastery of language-specific inventories was shown to be sensitive to representational status, with phonemic clusters behaving differently from allophonic ones, despite shared surface similarity (Babatsouli & Geronikou, 2025). In parallel, usage-based approaches highlight the role of frequency and distributional regularities in phonological learning (Babatsouli, 2024; Barlow, 2004). Children’s developmental clusters include sequences formed by epenthesis and driven by psycholinguistic processing (Babatsouli, 2016). Collectively, these reports call for an integrated perspective that treats so-called developmental cluster “errors” as systematic indicators of learning with implications for phonological theory and clinical practice. This paper addresses the gap by synthesizing evidence from longitudinal bilingual data to map cluster developmental paths and describe stages, aiming to reframe developmental cluster productions as theory-informative and clinically diagnostic indicators of phonological learning.

The paper draws on a longitudinal corpus of a simultaneous Greek–English bilingual female child, followed from 2;7 to 4;0. Spontaneous speech was digitally recorded over 17 months and transcribed in IPA in CLAN (MacWhinney, 2000). Specifically, the paper examines word-initial clusters in English (#CC: /pl, kl, pr, tr/; #sCs: /sp, st, sk, sm, sn/, and sCCs: /spl, str, spr, skr/), and in Greek (#CC: /ps, ks, vl, vr/, falling- and level-sonority sequences: /ft, xt, fθ, xθ, γð/, sCC: /skl/, allophonic clusters (/CiV/ → [CC]), and clusters by consonant epenthesis.

Cluster development is found to be non-linear, multi-strategic, and representationally layered. Reductions are systematic and often sonority-governed, consistent across English and Greek despite phonotactic differences, but sonority alone does not reliably predict acquisition. Instead, outcomes are shaped by an interaction of cluster size/type, representational status, markedness, and language-specificity. Level-sonority, three-member clusters show delayed acquisition and extended periods of simplification. Allophonic clusters are acquired earlier. Frequency (/st, sp, spr, skr/) is not a primary determinant compared to complexity. Non-targeted clusters (e.g., *nt*, *ps*) reflect how prosodic complexity facilitates phonological learning with generalizable effects in targeted cluster contexts. The systematicity and sensitivity to phonotactics suggest that children exploit distributional regularities while testing emerging structures. Overall, different cluster patterns coexist as parallel developmental strategies and paths rather than sequential stages or a single trajectory.

Concluding, the evidence-based synthesis reframes cluster “errors” as evidence of phonological learning in progress; by espousing a hybrid approach to theoretical grounding, inferences seek to close the gap between theory and clinical practice. The developmental patterns discussed are interpreted as clinical diagnostic markers that guide the identification of clinical red flags. When interpreted through this lens, distinguishing typical from atypical “errors” becomes a more manageable task. (489 words)

Keywords: clusters; development; longitudinal; bilingual; clinical implications