Productive but Disfluent: Individual Fluency Trajectories in Child L2 English

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This study investigates developmental changes in fluency during early second language (L2) acquisition, focusing on the relationship between language productivity, exposure, and disfluency in bilingual children. Prior research shows that disfluencies – particularly mazes such as filled pauses, repetitions, and self-corrections – occur more frequently under increased processing demands, including syntactic complexity and task difficulty (Guo et al., 2008; Rispoli et al., 2008; Fiestas et al., 2005). Cross-sectional studies suggest bilingual children may produce more disfluencies than monolingual peers, though findings vary by task, input, and learner profile (Taliancich-Klinger & Bedore, 2019). Longitudinal patterns of disfluency and their link to language growth remain underexplored in child L2 learners (Paradis, 2005). This work advances prior research (Martinez-Nieto et al., 2023) by focusing on child L2 English learners and combining individual longitudinal modeling with clustering analyses to capture developmental trajectories and profiles.

We analyze spontaneous speech transcriptions from the CHILDES English-L2 Paradis Corpus (Paradis, 2011), which includes 25 children aged 3-7 acquiring English through everyday interactions. Seventeen contributed speech samples across at least three of five collection rounds, enabling within-child tracking of fluency trajectories. Fluency was operationalized as breakdown fluency – both stall-type (e.g., filled pauses, repetitions) and revision-type (e.g., lexical or grammatical repairs) – alongside productivity measures: Mean Length of Utterance in words (MLU(w)) and Type-Token Ratio (TTR) (Wijnen, 1990; Benson-Villegas, 2015).

MLU(w) increased across rounds for most children, consistent with prior findings that utterance length grows with age and exposure (Paradis, 2005), though a subset showed plateaued growth despite ongoing exposure. Disfluency rates did not consistently decline. Peak disfluency often occurred during middle rounds (2–4), though timing varied across children, reflecting individual developmental pacing. We observed a positive relationship between MLU(w) and disfluency: children who produced longer utterances were often more disfluent. Sixteen of seventeen children showed a positive slope in individual regressions, with four reaching significance ($p < .05$). Group-level linear and quadratic models explained little variance ($R^2 < .09$), highlighting the importance of individual-level analysis. Greater variability in MLU(w) correlated with higher peak disfluency, suggesting that fluctuations – not just growth – may heighten planning demands. No significant differences in disfluency were found based on gender or L1 background.

To identify developmental pathways beyond group averages, we combined K-means clustering with growth analysis of MLU(w), TTR, and disfluency rate. Clustering identified three profiles: one with high productivity and low disfluency, another with lower MLU and more frequent disfluencies, and a third with intermediate characteristics. TTR was less predictive of cluster separation, consistent with findings that lexical diversity stabilizes earlier (Kormos, 2011). Some children showed persistent disfluency without clear MLU(w) growth, suggesting disfluency is not solely tied to utterance length.

Trajectory plots of MLU(w) and disfluency further illustrate the non-linear, heterogeneous nature of development. These findings align with dynamic systems and usage-based models of bilingual development, which predict individual variability, non-linear growth, and trade-offs between expansion and fluency (de Bot, Lowie, & Verspoor, 2007; Paradis, 2005; Kormos, 2011). These results suggest that growing more productive does not necessarily mean growing more fluent – at least early in bilingual development.

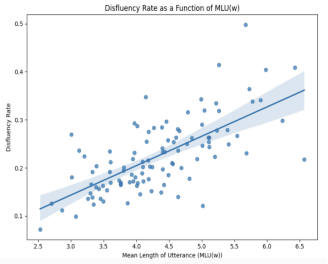

Figure 1. Scatterplot showing the relationship between disfluency rate and Mean Length of Utterance in words (MLU(w)) across child speech samples. A positive linear trend is observed, indicating that utterances with higher MLU(w) are associated with higher rates of disfluency. This pattern may reflect increased cognitive and planning demands during periods of early language growth. Shaded region represents the 95% confidence interval of the regression line.

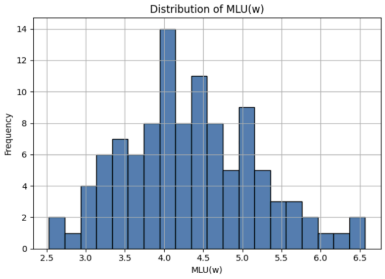

Figure 2. Histogram showing the distribution of Mean Length of Utterance in words (MLU(w)) across all child speech samples. Most values fall between 3.0 and 5.5, consistent with early multi-word stages of language development. This distribution confirms that the dataset captures children producing structurally elaborated utterances rather than initial one- or two-word speech.

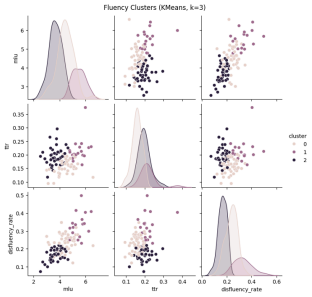

Figure 3. Pairplot showing fluency clusters derived from K-means clustering (k = 3) on child speech samples using Mean Length of Utterance in words (MLU(w)), Type-Token Ratio (TTR), and disfluency rate. Cluster 0 (light pink) is characterized by lower MLU and higher disfluency; Cluster 2 (dark purple) shows higher productivity with lower disfluency; and Cluster 1 (medium purple) reflects intermediate patterns. TTR contributed less to cluster separation than MLU or disfluency rate, consistent with previous findings that lexical diversity stabilizes earlier than structural elaboration in L2 development (Kormos, 2011). These clusters suggest that child L2 fluency development follows multiple, distinct pathways.

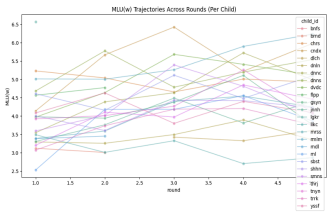

Figure 4. Line plot showing developmental trajectories of mean length of utterance (MLU) in words across five collection rounds for 17 children who contributed data to at least three timepoints. While most children exhibit growth in productivity over time, some show plateaus or temporary regressions, highlighting the non-linear and heterogeneous nature of bilingual language development (Bayona et al., 2019).

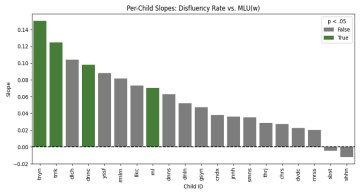

Figure 5. Bar plot showing the slope of the relationship between mean length of utterance (MLU) in words and disfluency rate for each child who contributed data at three or more timepoints. Sixteen of eighteen children showed a positive slope, indicating that longer utterances tended to be more disfluent. Green bars indicate children whose slope was statistically significant ($p < .05$). The dashed line marks zero slope. This consistency across individuals supports the group-level trend and suggests that fluency breakdowns may increase as utterance length expands.

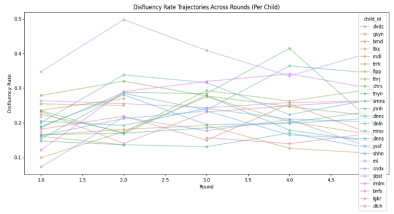

Figure 6. Line plot showing disfluency rate trajectories across five collection rounds for 24 children. While the overall group trend appears stable, individual trajectories vary widely. Some children show decreases in disfluency over time, others show increases or oscillations. These patterns further support the conclusion that L2 fluency development is highly individualized and non-linear, with fluency breakdowns fluctuating across development.

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