

Emergence of Strict Domination Effects with Weighted Constraints

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Weighted constraints can interact cumulatively to produce gang effects, which can result in patterns that cannot be modeled with ranked versions of the same constraints. Here we show that gang effects are reduced in probability when a typological model includes learning. We generate gradient typological predictions using a weighted-constraint grammatical model (Maximum Entropy grammar) paired with an agent-based learning model with agent interaction. In this interactive learning model, agents exchange data and learn from one another, rather than an external stable distribution. One consequence of agent interaction is a pressure towards more categorical grammars, favoring accumulation of probability on one output candidate over its competitors. This pressure in turn leads to an avoidance of gang effect patterns, where multiple violations of lower-weighted constraint(s) cumulatively outweigh a violation of a higher-weighted constraint. We present results of modeling on case studies in phonological typology, showing that incorporating the interactive learning model allows for accounts of typological generalizations that escape the grammatical theory working alone, including the under-attestation of patterns that correspond to gang effects in weighted-constraint grammars.