Some Orientation Theorems for Restricted DP-colorings of Graphs

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DP-colorings of graphs (originally called correspondence colorings) are a generalization of list colorings that were introduced by Dvorak and Postle in 2015 and have since been a popular topic of study. The Alon-Tarsi Theorem is a well-known theorem that relates orientations of graphs to list colorings, and though it is known that the Alon-Tarsi Theorem does not carry over 'as is' to DP-colorings, we define classes of correspondence assignments that admit DP-coloring analogs and generalizations of the theorem. We discuss some algorithmic implications and questions arising from these generalizations.