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Biology Students Use Gestalt Grouping to Evaluate Evolutionary Relatedness

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Abstract

We hypothesized that college biology students difficulty interpreting relationships depicted in evolutionary trees (cladograms) at least partly reflects their responding based on Gestalt grouping principles. Students from non-majors introductory, majors introductory, and upper-level biology classes ($N = 310$) evaluated two pairs of cladograms after classroom instruction on evolutionary trees. The cladograms in each pair depicted the same evolutionary relationships among three target taxa but grouping of those taxa differed due to Gestalt principles. Students were asked which cladogram best represents the specified relationships among the target taxa or whether both cladograms are equally good (the correct answer). As predicted, for all three biology groups, students responses most often were consistent with the Gestalt principles of grouping rather than with the pattern of evolutionary relationships ($M = 1.28$ out of 2; $t(309) = 13.55$, $p < .001$). Clearly, biology instruction needs to address the potentially interfering role of Gestalt grouping.