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• Cognitively diagnostic models are based on attribute (skill) mastery profiles, which can provide precise information about learning strengths and weaknesses
• Can provide rich information beyond latent trait models (e.g. IRT score)
• Flexible and broadly applicable: can be applied across subject areas and target populations
• Adaptive testing: can be fast and accurate in CDMs, faster rates of convergence than in IRT; these rates depend on model complexity
• Neuropsychological assessment: analogous statistical setting
• Understanding of theoretical properties of CDMs gives clarity on capabilities and limitations
• Number of attributes that can be modeled is limited by number of items that can practically be administered
• Models grow in size exponentially in relation to the number of attributes
• They keep changing depending on age groups and student population, so may need many models even for same set of items
• Deciding on attributes is very hard work, as attributes must parsimoniously describe item response performance while being detailed enough to be succinct and useful
• Confounding of attribute profiles systematically arises, which means that certain profiles may not be distinguishable given an item pool
• Items and item pools thus need serious design considerations in order for classification performance of students to be accurate
• Methodological “Wild West”: lots of proposed CDM methods have no theoretical support: lots of “over-modeling” in relation to information available in the response data (e.g. 1’s and 0’s), ignoring of key technical issues such as confounding
• Need for careful model fit and validation
• In sum, while CDM models are promising and can provide precise detail on cognitive processes in learning, they are painstaking to develop, and a particular model may have limited scope in terms of target populations