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Oriented Matroids in Psychology

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A fundamental dilemma of psychology is that the variables they can measure (e.g., a subject's performance on a task) are typically not the variables that truly interest them (e.g., the degree to which the subject used a certain psychological process to perform the task). So, if you have a theory about these unmeasurable variables, how do you determine whether your theory is consistent with the data? Dunn and James (two psychologists) pioneered an approach which they called "state trace analysis", which amounts to a very natural application of oriented matroids. I will describe their work from a mathematician's perspective.