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Concrete Models as Aids to Representational Translation of Molecular Diagrams

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Abstract: Chemists use many different types of diagrams to represent molecules and must develop skills to accurately translate between such diagrams. Translating between such diagrams can potentially involve the intermediate step of forming an internal 3-d representation of the molecule, so we hypothesized that performance would be enhanced when concrete models were used. Thirty students were provided with models as they translated one molecular diagram into a second and their spontaneous use of the models was recorded. Students' model use was coded for behaviors, such as moving, holding, reconfiguring, pointing to, or gesturing about the model. Results showed a great diversity in whether and how students used the models. Although performance on the representational translation task was generally poor, using the models was positively correlated with performance. We will also report the results of a follow-up study that compares student performance with and without models.