

DESCRIPTIVE AND PRESCRIPTIVE INTERACTION WITH DIAGRAMS AND CUSTOMARY SITUATIONS OF PROVING IN GEOMETRY

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I introduce a distinction between two possible patterns of interaction between an actor and a diagram applicable to situations of conjecturing and proving. I call **prescriptive** a pattern whereby a diagram provides an initial set of conditions and constraints for the actor's making of an argument in which he or she prescribes a more complex (reading of the) diagram. In this pattern, arguments propose meanings and diagrams react to those proposals. The label prescriptive aims at emphasizing that the making of the argument prescribes one among many ways of reading or constructing the diagram—what could or should be true. I call **descriptive** a pattern whereby a diagram supplies a final system of referents (things) for the actor's making of an argument in which he or she supplies signifiers (words, statements) that describe the diagram. In this pattern, arguments describe diagrams and diagrams display meanings. The production of the diagram in its entirety precedes the making of an argument by the actor—and the role of the argument is to produce a reading of the diagram that follows the logical organization of signifiers (e.g., the postulates, definitions, and theorems known by the actor), asserting what is true.

I argue for a hypothesis that describes the customary pattern of students' interactions with diagrams while proving: Whereas in classic geometry proving practices engage mathematician and diagram in a prescriptive pattern of interaction, customary proving practices in geometry class engage students in interactions with diagrams that are descriptive. This hypothesis is used to explain the negotiation of task a teacher promoted as she managed students' making and proving of a conjecture in the context of an instructional intervention in a high school geometry classroom. That negotiation involved the teacher in introducing an ad hoc task that led her to separate the making of the conjecture from the discovery of the reasons why the conjecture might be true and enabled her to hold students accountable for the development of a proof for that conjecture.

The hypothesis stated above is used to suggest grounds on which that phenomenon could have been anticipated. Differential interactions with diagrams on situations of conjecturing and proving point to the possibility that the enduring custom of separating proof from conjecturing in geometry classrooms may be so enduring because it supports holding students' accountable for proving while it increases chances to have them produce the proof that is on the teacher's agenda.

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