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A hypothetical learning trajectory is a plausible storyline about teaching and learning that details learning goals, instructional tasks, students' learning progression, and the role of the teacher. In this presentation, we articulate a hypothetical learning trajectory (HLT) designed to support students' development and elaboration of a transformation view of matrix multiplication. The major learning goals of this HLT are (a) conceptualizing a matrix as a mathematical object that transforms input vectors to output vectors, (b) interpreting matrix multiplication as the composition of linear transformations, and (c) developing the imagery of an inverse as "undoing" the original transformation. Furthermore, the instructional tasks are designed to support students in coming to view matrices as objects that geometrically transform a space. Within this HLT, we aim to extend students' conceptualization of the "matrix acting on a vector" view of a matrix times a vector to a more global view of a matrix transforming an entire space, as opposed to the localized view wherein matrices are conceived transforming one vector at a time. (Received September 22, 2011)