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## Learning to argue via apprenticeship



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### ABSTRACT

We examined apprenticeship, in the form of interaction with a more capable other, as a mechanism of development of higher-order reasoning skills, specifically argumentation. Over a 1-year period, middle school students engaged in twice-weekly electronic dialogs with a sequence of different peers on a series of social issues. In one group, unbeknownst to participants, a highly capable adult substituted for peers in half of their dialogs. Beginning immediately, increasing with time, and extending to peer-only dialogs on a new topic, the quality of argumentation shown by the experimental group exceeded that of a comparison peer-only group, highlighting the power of apprenticeship as a mechanism in the development of reasoning, a demonstration of both theoretical and applied significance.

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### Introduction

The question of how more advanced forms of reasoning develop has been a fundamental one to developmental psychologists throughout the field's history, its significance being both theoretical and applied. The opposition that persists today between internal and external mechanisms of intellectual development might be traced back even as far as Socrates' introduction of his dialogic method and certainly to the contrast that evolved during the mid-20th century between Piaget's constructivist mechanisms of change and Vygotsky's sociocultural ones—a contrast that for 21st-century developmentalists has largely replaced an earlier opposition of Gesell's maturationism and empiricist accounts that reduced development to the accumulation of learned responses.

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On the theoretical front, the field has seen some rapprochement between constructivist and socio-cultural accounts during recent years, with modern constructivists, and even neo-nativists, drawing on both Piaget's and Vygotsky's ideas. Children do not construct new ways of thinking in a solitary vacuum, but neither do they simply incorporate what they observe without transforming it via their own constructive powers in order to make meaning of it. In more applied work, however, an opposition between direct instruction and more self-directed mechanisms of conceptual change continues to be sharply drawn, as seen in multiple domains of investigation that involve higher-order reasoning such as scientific thinking and inquiry learning (Dean & Kuhn, 2007; Klahr & Nigam, 2004), problem-based learning (Hmelo-Silver, Duncan, & Chinn, 2007; Kirschner, Sweller, & Clark, 2006), and argumentation (Asterhan & Schwarz, 2016; Mercier, 2016), the form of reasoning we focused on here. A related unresolved question in each of these domains is that of the role of peer collaboration as a mechanism of change, emphasized by both Piaget and Vygotsky, with Vygotsky's emphasis on the role of more capable others and Piaget's emphasis on peers of equal ability.

It may well be, as proposed recently by one of us (Kuhn, 2015), that the answers to these questions and the roles played by different mechanisms depend on the forms of higher-order thinking being investigated. In the case of our current focus, argumentation, both intra- and inter-individual factors would appear to warrant attention. Argumentation can be construed as being capable of taking place within a single mind (Billig, 1987), but it ordinarily is treated as a social activity. As such, the role of the other (or others in discourse involving more than two people) assumes a prominent place. We probed here exactly what that role might be. Constructivists may claim that argumentation serves cognitive development by providing engagement and practice that allows both participants to develop their reasoning skills via shared exercise. A further possibility arises, however, in the likely case that the skills of one discourse partner exceed those of the other. In this case, in addition to the exercise provided by participation alone, will this interaction also offer the less capable participant benefit in terms of skill development? If so, this suggests a mechanism of development that we might refer to as apprenticeship, a mechanism that has not received a great deal of attention with respect to the development of higher-order reasoning. This is the question we addressed in the work reported here.

In addition to being fundamental from a theoretical standpoint, the investigation of mechanisms of developmental change is significant with respect to application. Argumentation has been claimed to be an umbrella under which all reasoning lies (Mercier, 2016; Mercier & Sperber, 2011; Oaksford, Chater, & Hahn, 2008) but also an essential 21st-century skill according to both the 2010 Common Core Standards and the Next Generation Science Standards. However, there is less consensus regarding how young people can best be helped to develop proficiency in argument. Research has reported direct instruction as the most effective method (Larson, Britt, & Kurby, 2009; Marin & Halpern, 2011), whereas at the other end of a continuum of approaches are interventions centered around extended engagement in discourse with peers in an intellectually rich environment (Asterhan & Schwarz, 2016; Kuhn & Crowell, 2011; Mercer & Littleton, 2007; Resnick, Asterhan, & Clarke, 2015). A third intermediate approach is engagement in an environment of explicit highly structured (usually electronic) scaffolds designed to support novices' argumentative efforts (Andriessen, Baker, & Suthers, 2010). A fourth approach, represented here, is closest to the engagement and practice approach (without explicit scaffolding) but is unique in that the argumentation engagement and practice take place in discourse with a more capable other as well as with equally capable peers—an approach that accordingly falls within a Vygotskian framework as well as a contemporary sociocultural framework (Ford, 2012; Rogoff, 1990). The question we asked is whether argumentation with a more capable individual as well as with peers will enhance the development of skill in argumentation beyond that achieved through an equivalent amount of time spent in argumentation only with peers of similar capability.

## Method

### *Participants*

Participants were 48 11- and 12-year-old students (38% female) from two sixth-grade classes at an urban public middle school. Participants were randomly assigned to an experimental group or a

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