Later research has shown that the simple form of the strategies approach was incorrect: Almost everyone uses multiple strategies, and the different groups of people shared many if not most strategies. This result was first described by Reder (1982, 1987, 1988) and has been found to be true of almost every domain in which it has been studied (see Siegler, 1996, for a review). The newer form of the strategies approach is that groups vary in their distribution of use of strategies (i.e., when each strategy is used). For example, both older and younger children do simple addition problems using retrieval and counting. The way they vary is that older children use retrieval more often, especially on difficult problems.

A third, less popular approach to individual differences is the strategy adaptivity approach. This strategy builds on the multiple-strategies approach and assumes that people vary in how adaptive their strategy selections are. That is, although two individuals may have the same set of strategies, they may differ in their abilities to select the best strategy for a given situation. One reason for the lack of popularity of this approach is the currently popular assumption of the multiple-strategies approach that everyone is adaptive in their strategy selections (e.g., Anderson, 1990; Lovett & Anderson, 1996; Reder, 1987; Siegler & Shipley, 1995). That is, it is assumed that each individual selects the best strategy for them on the particular problem and that individuals may vary because of learning in the domain and, perhaps, process parameter differences that change with strategies are most adaptive for them. For example, young children choose to count for difficult addition problems because they have not learned answers sufficiently well and are likely to make an error if they try to retrieve. By contrast, older children know the answer and use retrieval because it is less effortful.

When various groups were compared on the adaptivity of their strategy selections, the groups were typically found to be equally adaptive. That is, all groups were equally able to select the most appropriate strategy for them. For example, Siegler and Lemaire (1997) found that young adults and the aged made equally adaptive strategy selections. Similarly, Kerkman and Siegler (1993) found that middle-income and lower-income children were equally adaptive. In only one case did people vary in their adaptiveness: adaptiveness improved with practice in a domain (Adolph, 1995; Lemaire & Siegler, 1995).[1] However, even at the beginning of practice, strategy selections were still quite adaptive.

This is in contrast to the metacognitive view (e.g., Case, 1985; Flavell, 1979; Kuhn, 1988; Sternberg, 1985), which postulates that some individuals use less sophisticated strategies because they have poor metacognitive knowledge of why and when different strategies are effective. Although this view seems quite plausible, empirical research has found that there is at best a weak relationship between metacognitive knowledge and the adaptiveness of strategy selections (e.g., Cavanaugh & Perlmutter, 1982; Schneider & Pressley, 1989). Instead, it has been argued that the people who use less sophisticated strategies are selecting appropriately because those strategies are best ones for them—either because the more sophisticated strategies are too effortful or because those strategies are too error prone because of lack of practice.

In this article, we explore a variant of the third approach—that individuals vary in their strategy adaptivity. In particular, we explore the proposal made by Reder and Schunn (1999) that individuals vary in their ability to adapt strategies to changing rates of success. That is, some people may be slow to change their strategy selections as the relative successfulness of the strategies change over time. Reder and Schunn's proposal is not that these participants suffer from lack of metacognitive knowledge of the particular strategies; rather, the proposal is that the participants vary in their general ability to detect and make use of changing rates of strategy success.

To understand this proposal, one must first understand how adaptivity in strategy choice relates to strategy rates of success. Many factors influence strategy choice (cf. Lovett & Anderson, 1996; Reder, 1987; Siegler & Shipley, 1995). One of these factors is the strategy's rate of success. For example, Reder (1987) found that participants' strategy preferences were influenced by the proportion of trials for which a given strategy had been working in the recent past. In Reder's experiments, participants were to answer true–false questions based on short stories they had read. Two strategies were especially common: directly retrieving the answer (a close match to the query) from memory and judging the plausibility of the statement. Participants adjusted their tendency to adopt the plausibility strategy over the direct retrieval strategy as a function of the proportion of questions in the experiment for which a given strategy would work (i.e., proportion of trials in which the statement to be judged or its exact contradiction had been explicitly stated as part of the story). This proportion was varied across blocks of the experiment, and participants adjusted their use of the two strategies accordingly. This basic finding of participants adapting to shifting proportions of features of the experiment has now been seen in a number of other contexts, such as arithmetic verification (Lemaire & Reder, 1999) and in a problem-solving task (Lovett & Anderson, 1996).

There are several reasons why sensitivity to success rates is an important skill. First, many tasks in the world change dramatically independently of the actions of the individual, and in such dynamic tasks, the ability to shift strategies is crucial. To provide a few examples, one must change driving habits when it begins to rain, change hitting strategies as the tennis ball becomes soft, change walking strategies when the sidewalk is icy or when one is wearing high-heeled shoes, and change negotiating strategies when the opponent becomes irate. Second, even in tasks in which the structure of the task stays constant, the individual must shift strategy use as he or she becomes increasingly expert at the task (Adolph, 1995). For example, skiers begin with a snowplow strategy and only much later attempt parallel turns. Similarly, an algebra student shifts from implementing all the steps in an algorithm to skipping or combining simple steps (Blessing, 1996; Blessing & Anderson, 1996).

Are all individuals roughly equally sensitive to success rates, and do they all change strategies equally quickly? This article seeks to investigate whether there are systematic differences among adults in their ability to adapt strategies using success-rate information. Two related questions that will also be addressed are the following: (a) Is adapting or shifting strategies based on the success of the strategies indeed optimal (i.e., does increased strategy shifting produce higher levels of task performance)? and (b) What cognitive abilities underlie this strategy adaptivity?

Sensitivity to success rates can be measured at two levels: micro and global. At the microlevel, there is sensitivity to the success-

[1] An interesting related phenomenon is the case in which children start using a new strategy that will become the more effective strategy but temporarily is more effortful and more error prone (e.g., Miller & Seier, 1994).