Children Don't Remember What They Don't Understand

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Cognitive Operations as Cues in Children's Source Monitoring

Children of various ages looked at pictures and thought about the depicted objects. They were asked to categorize some pictures, and to seriate others by size.

One day later, they were asked to identify which pictures they had tried to categorize and which ones they had tried to seriate.

Those who had demonstrated good seriation skills were more accurate at this source monitoring judgment than those who had not.

On the other hand, little or no such developmental difference was observed in recognition or location memory (another kind of source monitoring).

Apparently, the children who struggled with seriation failed to encode and/or retrieve cues that could have reminded them about it later.

These results support two related hypotheses:

- Source monitoring judgments can be based on cognitive operations in memory.
- Children who have not mastered a particular cognitive operation will therefore be at a disadvantage for making such judgments.

Source Monitoring

According to the Source Monitoring Framework (SMF; Johnson & Mitchell, 2002), you can recognize something without remembering its source, meaning the external (perceptual) or internal (reflective) context in which it was originally encoded.

For example, you may remember a painting but not the gallery you saw it in, or what it made you think about.

Nevertheless, you can infer the encoding context of information in memory by evaluating qualitative cues such as perceptual details, spatial representations, and cognitive operations (records of the mental processes that were engaged during the original experience).

Children's Source Monitoring

Even young children are good at source monitoring if the sources are dissimilar (Lindsay, 2008), like the perceptually distinct pitches of parents' voices.

On the other hand, young children are not as good as older ones when they try to distinguish between similar sources (Lindsay, Johnson, & Kwon, 1991), or actions performed by themselves and others (Foley, Ratner, & House, 2002).

Young children also have difficulty with reality monitoring judgments, a special case of source monitoring that involves distinguishing between memories for real and imagined actions (Foley, Johnson, & Raye, 1983).

Hypothesis

According to the SMF, reality monitoring depends on the relative availability of perceptual details and cognitive operations in memory (Johnson & Raye, 1981). Therefore, developmental differences in cognitive operations should influence reality monitoring. After all, if a child can't perform a particular operation, it won't be an effective cue in a reality monitoring judgment.

In this account, young children should have trouble with other kinds of source monitoring that depend cognitive operations in memory, especially when the operations involved are not well developed. In fact, prior research has shown that children have impoverished memories for events that are difficult for them to understand (Pillemer, Picariello, & Pruett, 1994).

We predicted that children who have not yet mastered the cognitive operations of categorization and seriation will have difficulty remembering which of those processes was engaged during an earlier experience.

Method

Participants

Twenty-six children (12 boys and 14 girls) at a Massachusetts day camp completed both phases of this experiment. They ranged in age from 5 to 13 years (mean and mode = 7).

Materials

There were 20 sets of color pictures printed on cards. Each set included 4 objects that ranged in size, with 3 belonging to a recognizable category like "food" or "furniture." A response board was marked with 4 locations to place the cards.

Encoding Phase

The Experimenter worked one-on-one with each participant. At the beginning of each trial she presented 4 pictures, naming each object aloud, in random order.
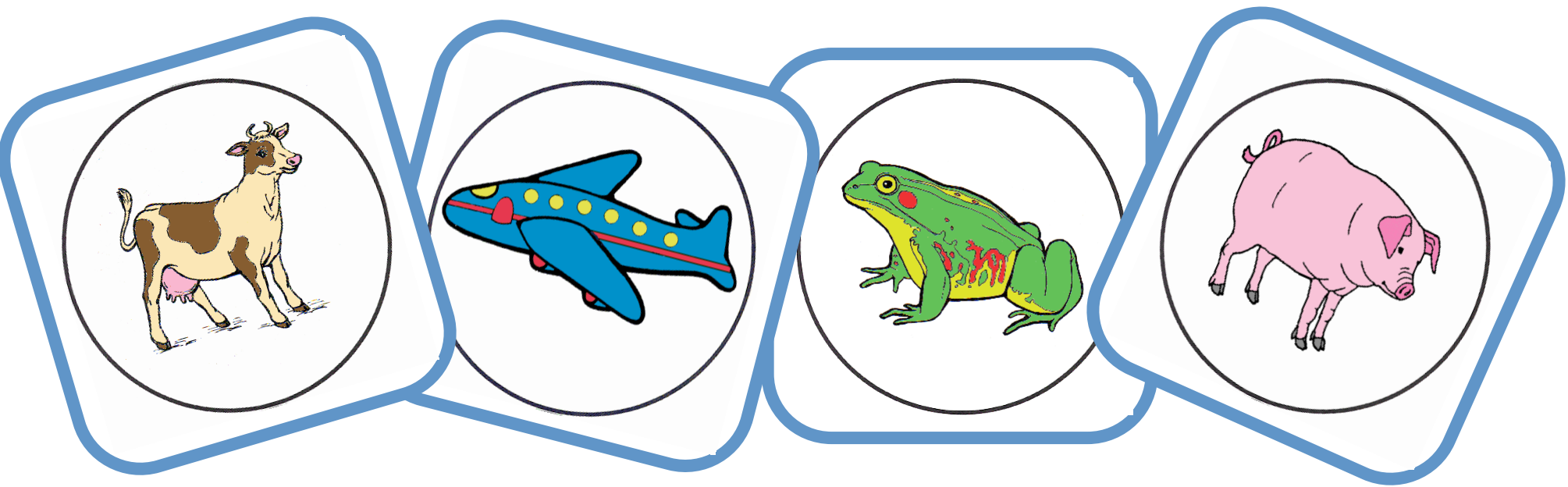
The participant was then asked to help arrange the cards on the response board, depending on the trial type.

On categorization trials, the participant was asked to decide which object "does not belong with the others," and place it in its own location.
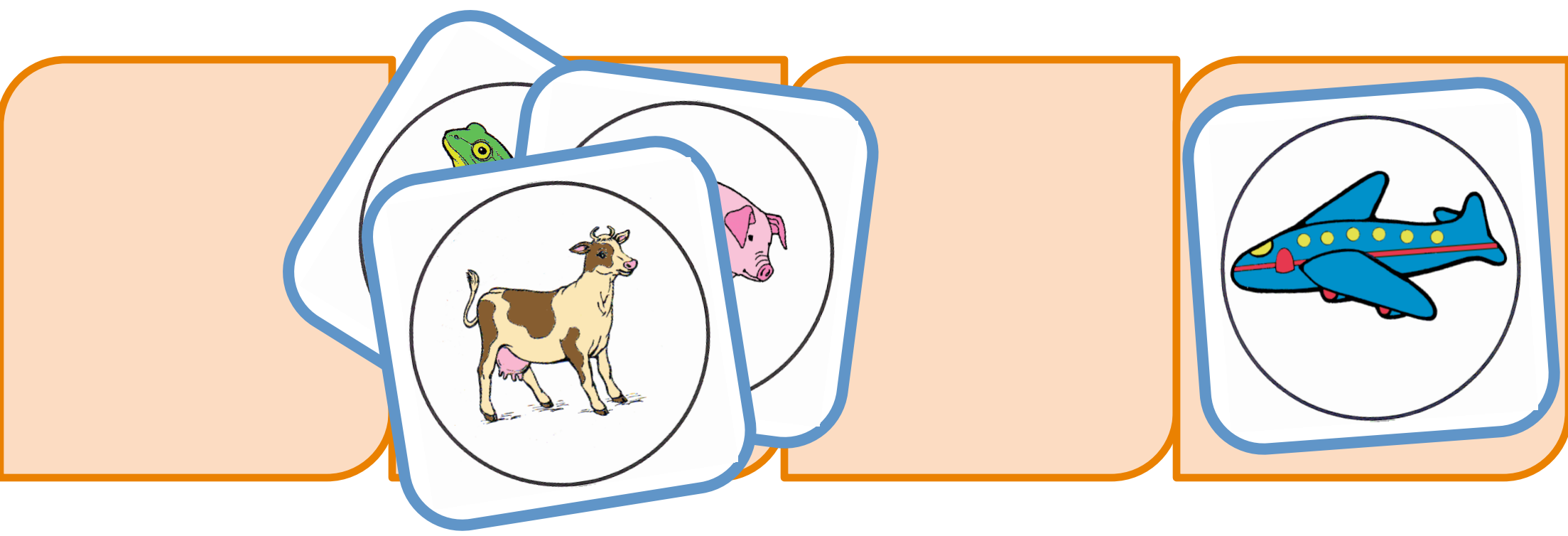
On the randomly intermixed seriation trials, the participant was asked to arrange the objects in order of their real-life sizes, from smallest to largest.
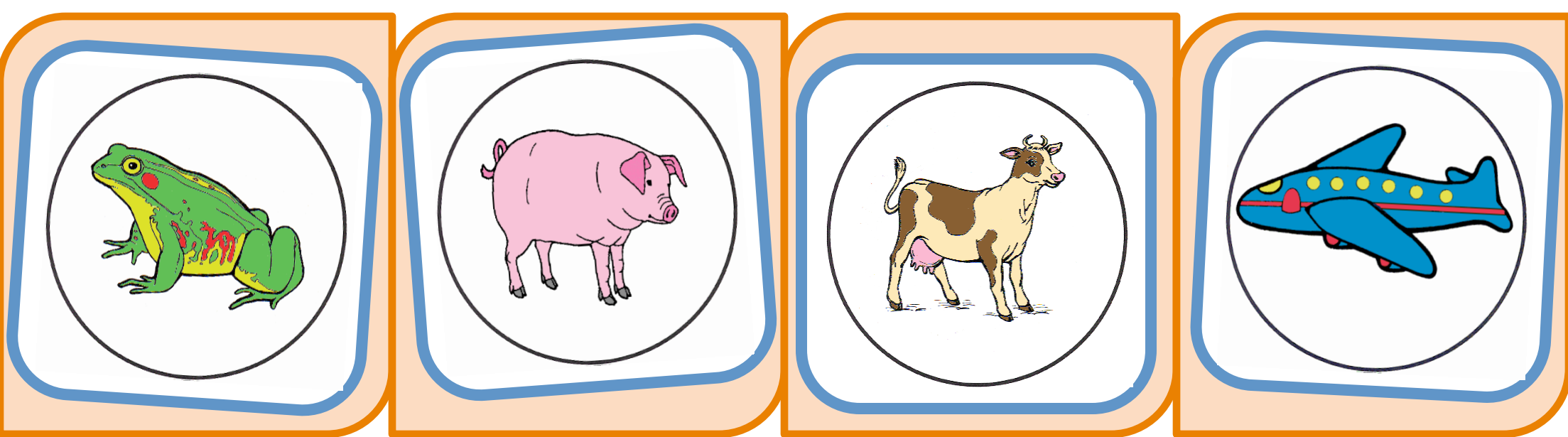
Note that a participant never categorized and seriated the same pictures.

The sets were incompletely counterbalanced such that each appeared on categorization trials for 8-10 participants and on seriation trials for 8-10 others.

Retrieval Phase

After about 24 hours, each participant was presented with a sequence of test pictures that included the "odd" objects from the encoding phase along with previously unseen distractors.

On each trial, the Experimenter asked the participant whether the picture had been included in the previous day's activity (recognition).

If the participant responded "yes," the Experimenter asked one of two randomly intermixed source monitoring judgments:

- location judgment
  ("Where do you remember putting it?")
- operation judgment
  ("Did you think about its size, or if it belonged with other things?")

Results

All children achieved 90-100% accuracy on the categorization task.

They varied more widely in seriation ability, but performance was only moderately correlated with age ($r[24]=.48$, $p<.05$).

Based on a binomial decomposition analysis (Erdfelder, 1993), the 20 children who achieved 70% (or greater) accuracy on the seriation task were identified as good seriators, and the other 6 as poor seriators.
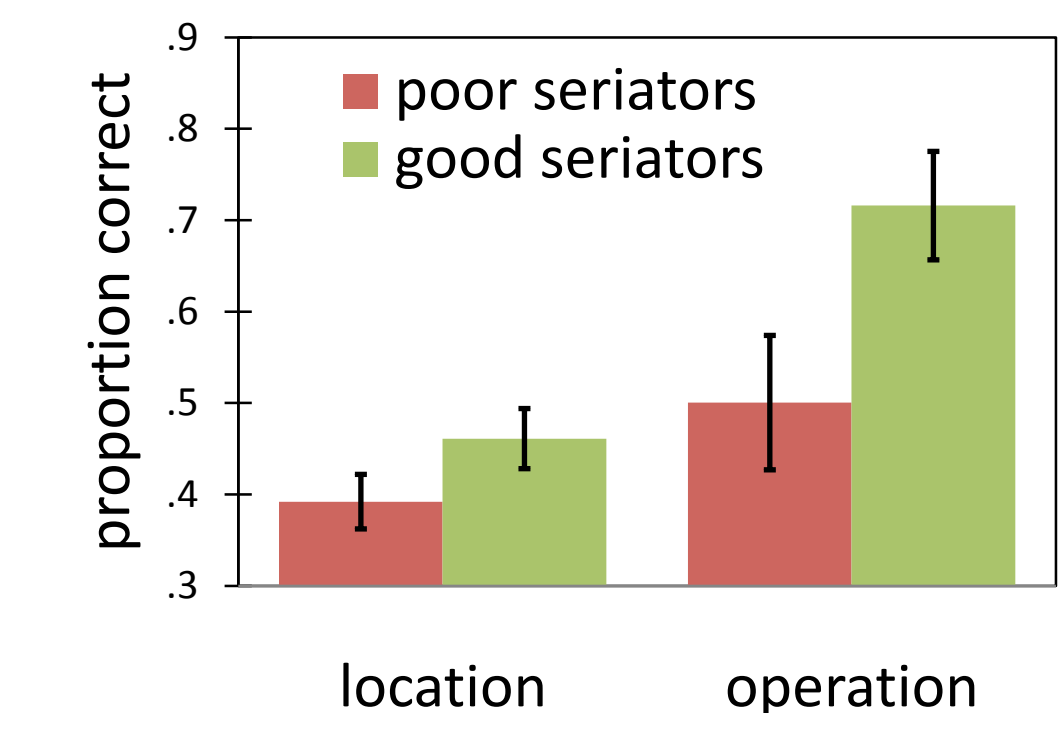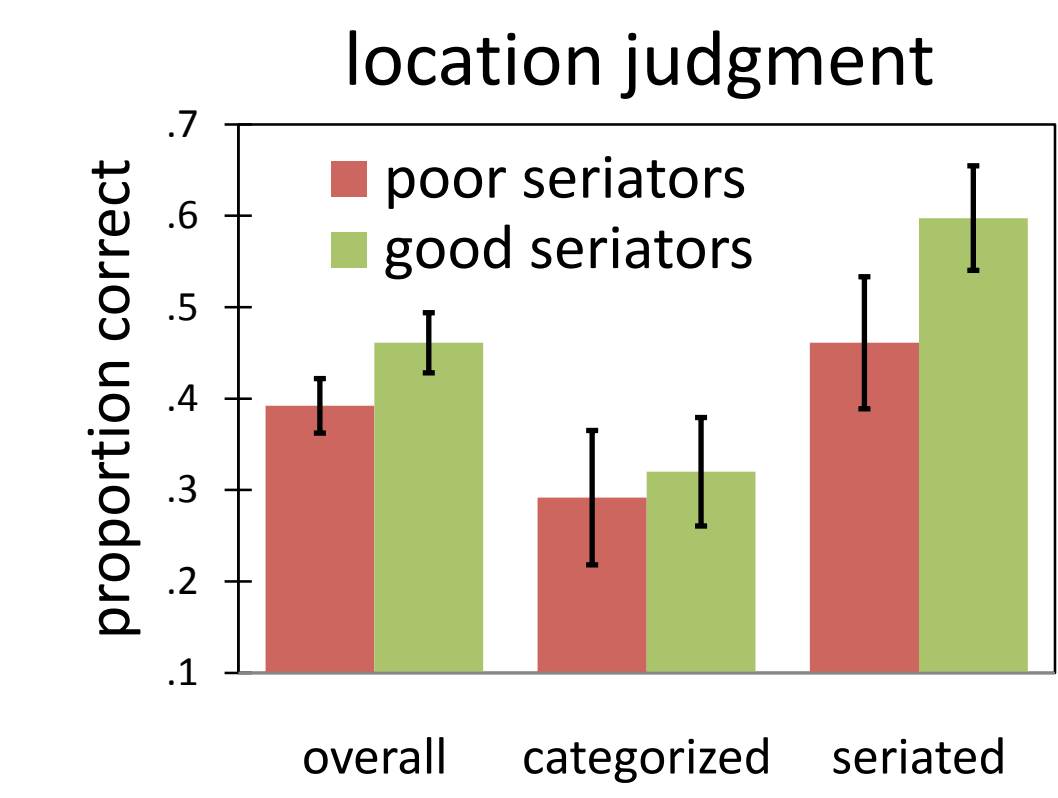
Age × Seriation
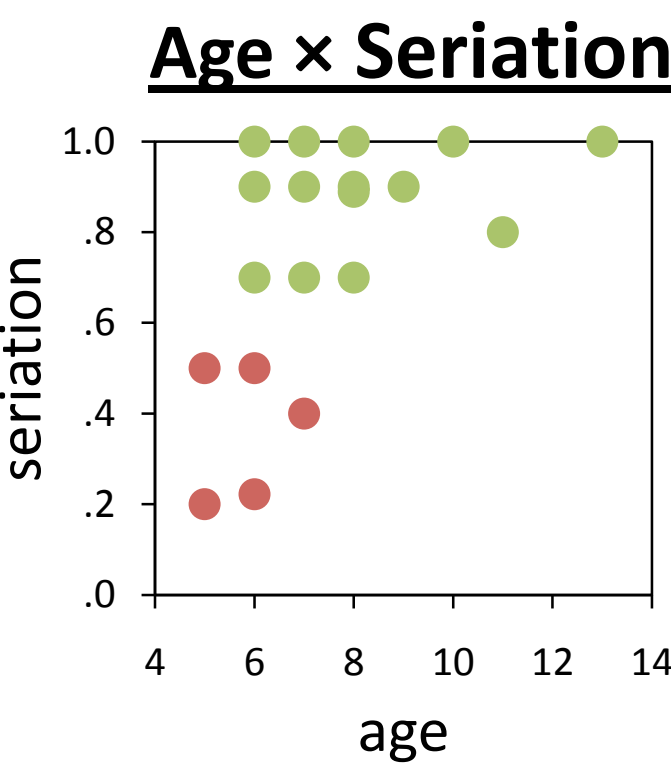
Old-New Recognition
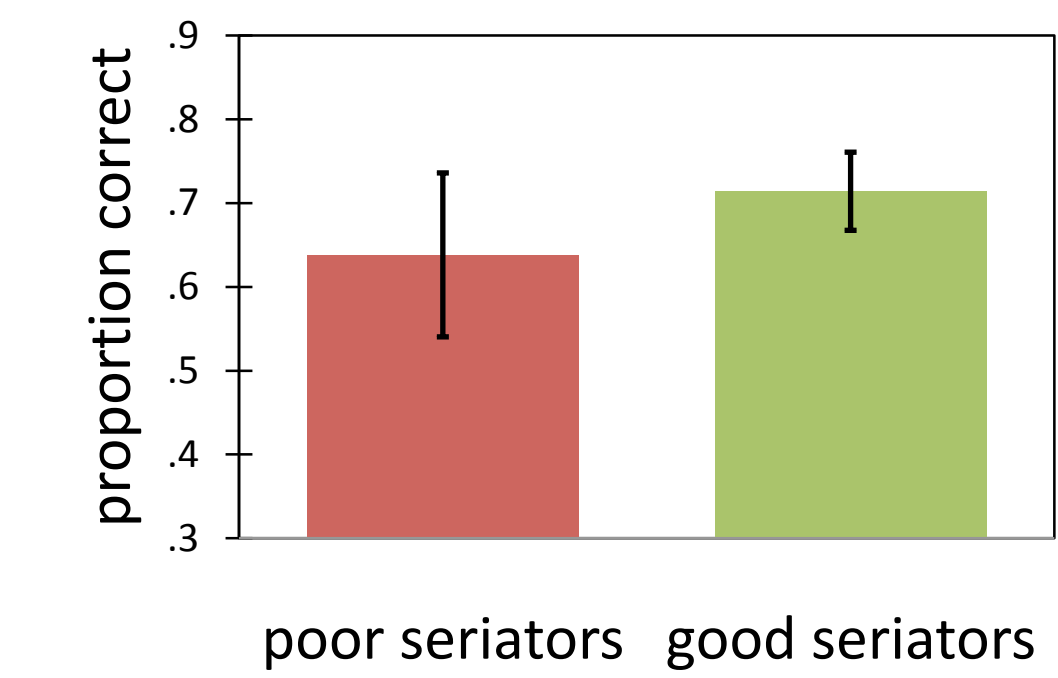
Good seriators were no better than poor seriators at recognizing previously-seen pictures.

Source Monitoring

Performance was higher for the operation judgment than the location judgment ($p<.001$).

Good seriators were better than poor seriators at source monitoring ($p<.05$).

There was also evidence that the good seriators' source monitoring advantage was larger for (or even specific to) the operation judgment.

The interaction was not significant, but a planned comparison revealed that good seriators only remembered locations better than poor seriators if they had previously seriated the pictures ($p<.05$), but not if they had categorized them. Thus, memory for the seriation operation (and not location per se), accounts for the good seriators' advantage in the location judgment.

Discussion

The pattern of developmental differences observed in this experiment was consistent with predictions based on the SMF. Children's ability to remember their own cognitive operations depended on how well developed those operations were.

In other words, they couldn't remember thinking about what they didn't understand.

The results suggest that source monitoring does not develop all at once, as a singular memory function. It depends on source-diagnostic cues that only become available as the relevant cognitive operations are sufficiently developed. Thus, a child may become proficient at some forms of source monitoring (like remembering location) before others (like remembering a thought process).

In a source monitoring judgment like remembering location, the diagnostic cues are the kinds of perceptual details and spatial arrangements that most children encode and retrieve readily.

In a source monitoring judgment like remembering the operation, however, the diagnostic cues are cognitive operations in memory. If those cognitive operations cannot be skillfully performed, they will leave impoverished records in memory, and they will be ineffective as source cues.

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