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Journal
Proceedings of the Annual Meeting of the Cognitive Science Society, 28(28)

ISSN
1069-7977

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Publication Date
2006

Peer reviewed

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The knowledge partitioning framework holds that knowledge can be held in independent, mutually-exclusive parcels (Lewandowsky & Kirsner, 2000). The occurrence of knowledge partitioning has been confirmed in a variety of domains including expert decision making, function learning, and categorization (see e.g., Lewandowsky, Roberts, & Yang, in press). In these experiments, an irrelevant context cue (such as stimulus color) was used to gate access to knowledge (or rules) held in separate parcels.

Presently, knowledge partitioning was investigated in a probabilistic category learning task, specifically multiple cue probability learning (MCPL). MCPL is a complex cue-criterion learning procedure widely thought to be representative of real-world decision making in which cues are not perfectly predictive of outcomes (see e.g., Juslin, Olsson, & Olsson, 2003). The two experiments reported here utilized different gradients of shading as the relevant cue, colour as the irrelevant context cue and category outcome as the criterion (see Figure 1).

Table 1: Stimuli from Experiments 1 and 2

Experiment 1										
Stimuli	1	-	-	-	2	3	-	-	-	4
Shading	0 %	-	-	-	25 %	75 %	-	-	-	100 %
Context	1	-	-	-	1	2	-	-	-	2
P (A)	.30	-	-	-	.70	.70	-	-	-	.30
Experiment 2										
Stimuli	1	2	3	4	5	6	7	8	9	10
Shading	0 %	05 %	10 %	20 %	25 %	30 %	60 %	75 %	90 %	100 %
Context	-	1	1	1	1	2	2	2	2	-
P (A)	T	.2	.4	.6	.8	.8	.6	.4	.2	T

Method

In each experiment, 20 participants were trained on the stimuli shown in Figure 1. Participants were trained on four stimuli in Experiment 1 and eight stimuli in Experiment 2. During transfer, participants were shown the training stimuli in both contexts. In Experiment 2, participants were also shown a non-shaded stimulus and a fully shaded stimulus in both contexts to test extrapolation.

Results & Discussion

In both experiments, a k-means cluster analysis on the data from participants who accurately learned the training probabilities revealed two distinct performance patterns (see Figure 2). Panels A and C display the performance of participants who employed a selective attention strategy (n = 10 & 6, respectively); that is, these participants ignored the irrelevant context dimension and only utilized the relevant shading dimension. Panels B and D (n = 9 & 6, respectively); display the performance of participants who employed a knowledge partitioning strategy. These participants extrapolated their training knowledge by increasing the proportion of A responses as shading level increased in context one and decreasing the proportion of A responses as shading level increased in the context two; that is, these participants developed two contrasting rules and used context to determine which rule was applied.

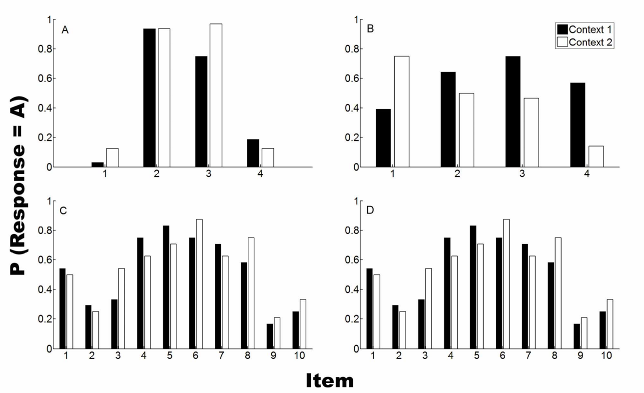

Figure 2. Results from Experiments 1 (Panels A & B) and 2 (Panels C & D).

These results are inconsistent with models that have selective attention mechanisms but no mixture-of-experts representation (e.g., Kruschke & Johansen, 1999). By contrast, models which have rule and exemplar-based representation could accommodate both performance patterns in these experiments (e.g., Erickson & Kruschke, 1998).

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