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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 19(0)

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Publication Date

1997

Peer reviewed

The role of element location and position in implicit contingency learning

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Introduction

The cognitive system requires knowledge of the patterns of regularity and structure of external stimuli in order to perform effectively. One focus of implicit learning research explores the nature of this representation. Participants exposed to sequences of letters generated according to an artificial grammar, accurately classify novel test items as valid/invalid examples of the grammar but are unable to explain their decisions (Dienes, Broadbent & Berry, 1991; Reber, 1967). Accounts of implicit learning attempt to explain the representation formed. Reber, (1969) proposes that knowledge of the grammar is abstracted across the learning set; on the other hand, Perruchet and Pacteau (1990) posit that knowledge consists of fragments of learning items (groups of letters, in particular bigrams and trigrams), and participants base judgements on the presence of the fragments in test items.

Simple contingency grammars (key elements separated by random elements) provide a method for exploring the represented knowledge. Knowledge of bigrams or trigrams would not provide useful information on which to classify strings containing remote contingencies. On the other hand, knowledge of the contingency relationship per se would result in accurate classification judgements over any number of random elements.

A number of experiments explored the role of fragment knowledge, extending the findings of implicit learning of remote relationships in a reaction time task (Cleeremans, 1994) to a classification task, and examining the role of location and element order in implicit learning. Participants were shown items generated either from contingency grammars, the Reber (1967) grammar, or received no prior exposure. Test items varied as to whether order was the same as the learning set, in reverse order to the learning set or there were violations in the positions of key contingent elements.

Results and Discussion

Participants exposed to a learning set generated from the contingency grammar were significantly better at classification than controls. These participants were only slightly impaired in performance on items in which the elements appeared in a novel order, indicating that subjects

can learn remote contingency relationships. However, participants exposed to the Reber grammar were not able to make accurate classification judgements when the letter order was altered, indicating that the more complicated the structural relations, the less flexibly they can be applied to transformed stimuli. If the position of a key element was invariant throughout the learning set, the contingency relationship was not learned, suggesting that participants may come to rely exclusively on the presence of a simple salient feature.

The representation which develops may be related to the stimuli, where there is sufficient information to use primitive, fragment based strategies these will be applied as a primary strategy, however, if there is insufficient information in the learning set to draw about the repeating fragments then a more complex knowledge of the rules governing the combination of the elements may develop, at least of the simple rules considered in these experiments.

The implicit/explicit nature of subjects' knowledge was determined in these experiments by using the Guessing and Zero Correlation criteria.

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