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Proceedings of the Annual Meeting of the Cognitive Science Society

Title

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Permalink

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 26(26)

ISSN

1069-7977

Authors

Finlayson, Mark Alan
Winston, Patrick Henry

Publication Date

2004

Peer reviewed

A Model of Analogical Retrieval Using Intermediate Features

Mark Alan Finlayson (markaf@mit.edu)

Patrick Henry Winston (phw@mit.edu)

Computer Science and Artificial Intelligence Laboratory, MIT
32 Vassar St., Cambridge, MA 02139 USA

We present a model of analogical recall in people which draws inspiration from recent work in visual classification by Ullman (2002). Our model is intended to unify two bodies of evidence regarding recall in people: on the one hand, we seek to cover a body of evidence that indicates people drawn from a population without regard to task expertise are heavily influenced by surface similarity during retrieval; on the other hand, we also seek to account for the fact that experts are able to achieve analogical recall on a consistent basis. Our model works by breaking the symbolic graph representation of an input situation into sub-graph structures (structures we call *features*), and looking for these features in other situations. By varying the informativeness of the features we use to retrieve situations, we are able to promote or suppress analogical retrieval.

Our model is consistent with previous models of recall (Thagard, Holyoak, Nelson, & Gochfeld, 1990; Forbus, Genter, & Law, 1994) which indicate object similarity, first-order relations, and some small amount of structure dominate recall in normal subjects. These models were primarily intended to account for evidence of the predominance of so-called “mere-appearance” matches in normal recall (Gick & Holyoak, 1980; Rattermann & Gentner, 1987), while still acknowledging some structural effects (Holyoak & Koh, 1987; Wharton et al., 1994)

In contrast to these previous models, however, our model indicates an explanation for certain results in the field of expert problem-solving and retrieval, which has received less attention to date. Evidence drawn from this literature (Chi, Feltovich, & Glaser, 1981; Schoenfeld, 1982; Shneiderman, 1977) indicates that certain sorts of people do consistently achieve analogical recall in particular domains: while these people often fall under the heading “expert,” non-experts are also able to attain structural reminding under particular circumstances.

We run our model on a dataset of descriptions of complex political scenarios, and show the predicted switching of preference from mere-appearance to analogical matches when moving from low average feature informativeness to high average feature informativeness. Furthermore our results indicate, as Ullman’s did, that features of an intermediate size and complexity provide the most robust recall within analogical category.

Acknowledgments

This work is supported in part by the National Science Foundation under Grant Number 0218861.

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