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ABSTRACT

Transfer of training in the construction and use of knowledge maps to text comprehension was investigated. Knowledge maps (k-maps) are spatial/verbal arrays that represent information in the form of node-link diagrams. K-maps make the macrostructure of a body of information more easily available to the learner. Because k-maps emphasize relationships and organizational patterns, training a person in the construction and utilization of these displays may help them implicitly structure and encode information in a variety of other presentation formats. If training in k-mapping results in improved ability to learn without explicit use of the strategy, then this expensive training would be more cost-effective. Participants who received extensive training in the production and processing of k-maps were compared to controls (N=53). Differences in ability and motivation were controlled. Participants who received the training recalled significantly more macro and micro level ideas. Results indicate that k-map training facilitated recall for ideas; however, students may not have been aware of the advantages they received from the training. Apparently, training in mapping promotes students to utilize a top-down learning set that facilitates their acquisition of text information. (Contains 7 references.) (EMK)

Node-Link Mapping Promotes Top-Down Learning

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Node-Link Mapping Promotes Top-Down Learning

Knowledge maps (k-maps) are spatial/verbal arrays that represent information in the form of node-link diagrams (see Figure 1). Over the past decade, semantic arrays such as k-maps have evolved as alternatives to traditional linear presentations of information, and as the basis of effective study/learning strategies (Lambiotte, Dansereau, Cross, & Reynolds, 1989). One of the main benefits of k-maps is their ability to represent a variety of relationships and structures in a single display.

Early work with knowledge mapping (e.g., Holley & Dansereau, 1984) focused on assisting students with acquiring knowledge from text and/or class lectures by training them to produce their own maps. The idea was to transform purely verbal information into node-link diagrams that were presumably compatible with long-term memory (see Larkin & Simon, 1987). Findings from studies such as these indicate that mapping text and lectures leads to better delayed recall than other study strategies, including students' personal study methods.

Although k-maps are effective communication aids and study devices, it remains unclear if utilizing knowledge mapping techniques alters a person's information processing strategies and skills when these techniques are not actively used. Does using k-maps improve the manner in which people interact with other information formats? If this is indeed the case, then one problem associated with using learning strategies such as knowledge mapping would be ameliorated -- that is, the considerable time and effort it takes for mapping training and production. If knowledge mapping training results in people's ability to implicitly improve their learning (i.e., improved learning without explicit strategy usage), then training would be made more generalizable and cost effective.

Because k-maps emphasize relationships and organizational patterns, training a person in the construction and utilization of these displays may help them implicitly structure and encode information in a variety of presentation formats. Informal feedback from persons receiving mapping training suggests that implicit transfer does take place.

One way in which mapping training may facilitate recall of information presented in a more traditional manner (e.g., text) is to alter students' expectations during comprehension (i.e., their learning set). By focusing on named links and the use of the gestalt principles such as symmetry and good continuation (see Chmielewski, Dansereau, & Moreland, 1998), knowledge maps emphasize how the concepts and ideas in a body of information are interrelated in an overall structure. In effect, they make the macrostructure of the information more easily available to the learner (c.f. McCagg & Dansereau, 1991). In order to test this hypothesis, we investigated whether or not training participants on the construction and use of knowledge maps transferred to text comprehension when there was no explicit use of the mapping strategy.

Procedures: Fifty-three students recruited from undergraduate psychology courses received experimental credit for their participation.

The experiment consisted of three sessions. At the start of Session One, participants were randomly assigned to one of two conditions: map training or control. Participants in the mapping group received extensive training in the production and processing of knowledge maps. Participants in the control group completed a number of engaging individual difference measures. Following these activities, all participants completed the Delta Reading Vocabulary Test (Diegnan, 1973).

Forty-eight hours later, participants returned for Session Two. The map training group was given a 10 min review session, while control participants completed more individual difference activities. These activities were followed by a multiplication test designed to detect differences in motivation between the groups. Participants completed as many problems as they could in 4 min. If there were no differences across groups on the number of problems they completed on this power test, then we could assume that motivation levels were consistent between the two groups. Next, participants from both groups were informed that they were going to be given two text passages to study, and that they would later be tested over that material. They were also informed that they were only to read the information and not take any notes. Participants were given 6 min to read a passage on cocaine (483 words). They were then given another 6 min to read a passage on the human nervous system (263 words). Next, participants completed a post study processing questionnaire designed to detect differences in participants' self-monitored perceptions of their comprehension and their overall motivational level.

Five days later, participants returned to their study rooms. Participants were given a free-recall test on the cocaine passage first (6 min) and then on the nervous system passage (6 min). All participants completed the recall tests in the time allotted. Following testing all participants were debriefed and dismissed.

Results: Free recall proportions were broken down into macro and micro idea units. Means and standard deviations of the recall proportions are presented in Table 1. A 2 training (mapping vs. control) x 2 passage (cocaine vs. nervous system) mixed-model multivariate analysis of covariance was conducted on the recall scores. The passage (cocaine vs. nervous system) served as the within-subjects factor, macro and micro level ideas were the dependent measures, and performance on the Delta served as the covariate.

Results indicated that participants who received knowledge mapping training recalled significantly more macro and micro level ideas. No differences between the training and control groups were found on the post study processing questionnaire or the multiplication test, nor were there any significant interactions.

Conclusions and Implications: The results indicate that knowledge map training facilitated recall for macro and micro level idea units. However, the lack of differences on the post study processing questionnaire seems to suggest that participants may not have been explicitly aware of the advantages they received from the mapping training. The fact that there were also no differences found on the multiplication test or self-reported motivation indicates that the significant difference on the recall test was not accounted for by differences in motivation across the two groups. Apparently, mapping training promotes students to utilize a top-down learning set that facilitated their acquisition of the text information (c.f., Winn & Sutherland, 1989).

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Table 1

Observed and Adjusted (based on Delta) Means and Observed Standard

Deviationsfor Free-Recall Macro and Micro Information by Treatment Group

	Passage					
	Cocaine			Nervous System		
Group and Information Type	M (observed)	SD	M (adjusted)	M (observed)	SD	M (adjusted)
Control						
Macro	.17	.14	.17	.09	.13	.09
Micro	.12	.07	.12	.03	.04	.03
Mapping Training						
Macro	.27	.15	.27	.19	.12	.19
Micro	.13	.06	.13	.06	.05	.06

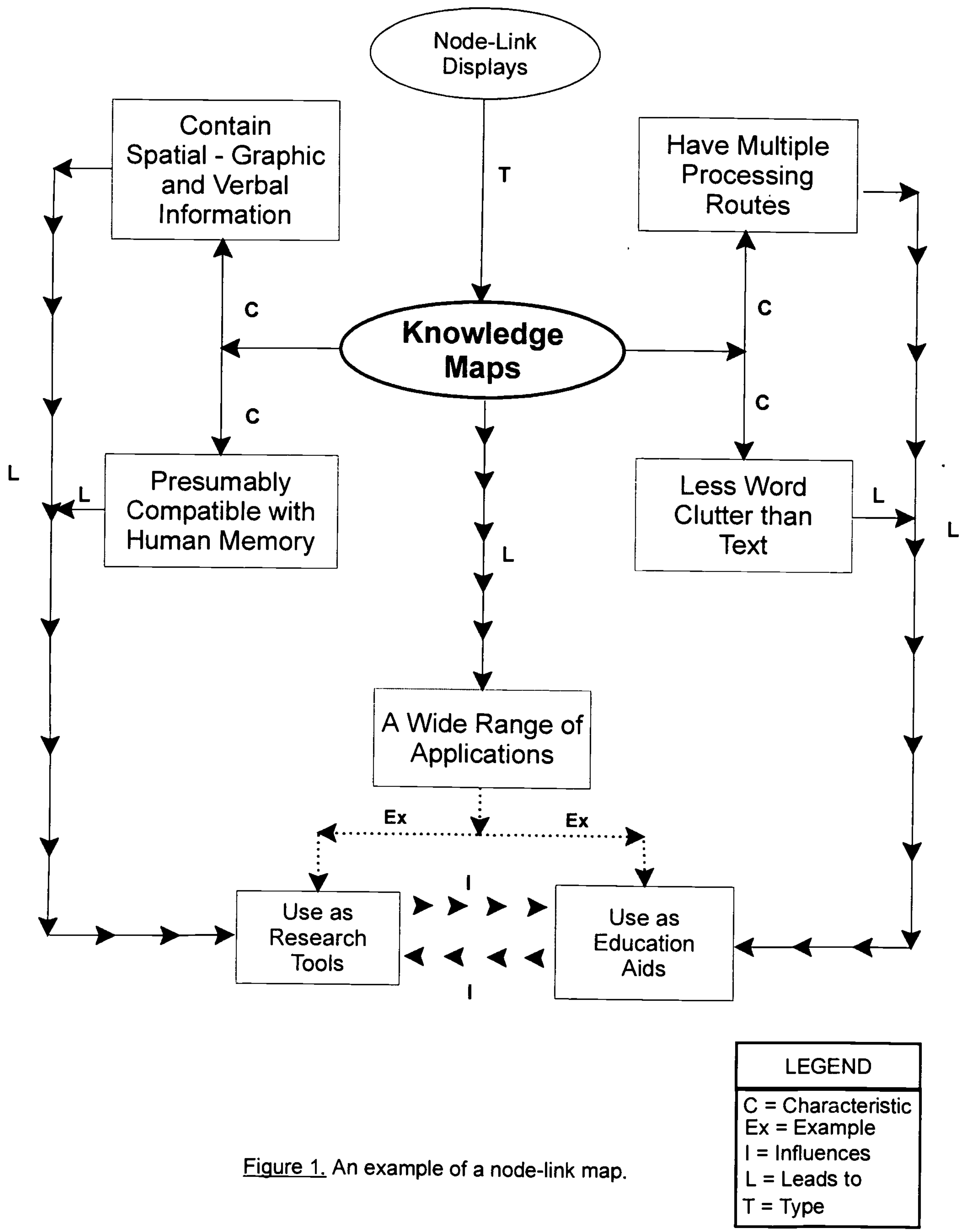

Figure 1. An example of a node-link map.

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