CODING AND PROCESSING
NUMERICAL INFORMATION

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Degree of Doctor of Philosophy

LEONARD JACK WHITE
(B.Sc. (Hons.) Adelaide University, 1978)

Department of Psychology
University of Adelaide
South Australia

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SUMMARY

The broad aim of this research is to examine the effect of mental coding on performance in storage/processing tasks, and to rationalize the function of mental coding within the human memory/information processing system.

Specifically, the research considers tasks involving digit information, and compares individuals whose coding is predominantly 'visual' (i.e. those who code numbers as 'digit-images' (e.g. "87")) with others whose coding is predominantly 'auditory' (i.e. those who code numbers as either 'number-words' (e.g. "eighty-seven") or 'digit-words' (e.g. "eight-seven").

From an experimental perspective the research developed in three stages: first, with the examination of factors that affect a person's perceived mental coding (Experiment 1); second, in the development and evaluation of an individual difference measure that quantitatively assesses mental coding of digit information (Experiments 2, 3, 4, 5, 6, 7, 8 and 9); and third, examining whether differences in mental coding affect performance in a range of storage recall tasks (Experiments 10 and 11) and storage/processing tasks (Experiments 12, 13, 14 and 15).

From a theoretical perspective, the research aims to rationalize the function of mental coding in the context of a general information processing model. Several axioms
about mental coding are proposed on the basis of experimental results. It is proposed that neither coding form offers greater memory storage capacity capabilities, but 'auditory' coded information appears more durable. Relating to memory rehearsal functions, it is suggested that 'visually' coded information decays more rapidly, and therefore requires more frequent rehearsals than 'auditory' coded information. It is further suggested that 'visually' coded information is more speedily rehearsed.

Following on from models proposed by Dansereau (1969), Hitch (1978a) and Hollnagel (1978) a specific information-processing model is developed which describes the general flow of information between components of memory during the solution of complex mental multiplication problems. The model is defined within a computer program to enable simulation testing. After minor modifications the proposed model generates results consistent with those found experimentally, and offers a logical structure for describing the mental stages involved in the solution of complex mental arithmetic problems.