

Tversky B. Pictorial and verbal encoding in a short-term memory task.
Percept. Psychophys 6:225-33, 1969.
[Hebrew University, Jerusalem, Israel]

The encoding modality, pictorial or verbal, of schematic faces was manipulated by subjects' expectations of the retrieval task, either face or name recognition, and verified by faster 'same' reaction times to the expected modality and slower 'different' reaction times to similarity along the expected modality. [The *Science Citation Index*® (SCI)® and the *Social Sciences Citation Index*® (SSCI)® indicate that this paper has been cited in over 150 publications since 1969.]

Barbara Tversky
Department of Psychology
Stanford University
Stanford, CA 94305

February 16, 1984

"In the 1960s, under the direction of Arthur Melton and Paul Fitts, the Human Performance Center (HPC) of the psychology department of the University of Michigan was a lively place. There were new ideas, new questions, new measures, and new paradigms; the field of information processing was wide open. Photocopying was new and cheap, so reprints and preprints were readily available from enormous filing cabinets. If you listened to the buzzing, you could hear: 'Melton says short-term memory (STM) and long-term memory (LTM) are just ends of a continuous phenomenon,' 'Conrad and Wickelgren claim STM is acoustic but LTM is semantic,' 'Sternberg showed that STM is scanned serially and exhaustively,' 'Neisser showed that with practice, memory scanning is parallel,' and so on. Issues waiting to be explored and settled. HPC was bustling with graduate students, undergraduates, young faculty, old faculty, short-term visitors, and long-term visitors. The names on the reprints and preprints appeared in real life to share their wisdom and inspire more experiments.

"Of all the issues buzzing in the background, the one that captured my attention was the claim that STM is acoustic (or articulatory or verbal). Since STM was the gateway to LTM, that implied that memory for sights and sounds and smells was verbal description. I set out to find evidence for pictorial encoding in STM. In order to do so, I needed stimuli that could be represented pictorially or verbally, and a way to tell them apart. Faces and names seemed appropriate, where pictorial similarity of the faces and verbal similarity of the names could be varied orthogonally. I induced subjects to encode pictorially by giving a pictorial test ('Did you just see this person?') or verbally by giving a verbal test ('Was that so-and-so?'). In the experiments that were never sent for publication, I looked for pictorial or verbal errors of memory depending on task expectations. Although I found them, they were not very numerous, so I turned to a young measure gaining in popularity, reaction time. That worked, providing a useful demonstration of flexible pictorial or verbal encoding of the same stimuli in accordance with task demands.

"Although the fields of picture memory and imagery have since burgeoned, the issues are still with us in the guise of the so-called propositional-imagery debate. This is a war between dualists, who maintain that there are imaginal and linguistic representations in memory, and unitarians, who maintain that propositions represent both verbal and pictorial events. By now, the agnostics have entered the field, declaring the dispute undecidable in principle. Of course, there is only one underlying representation, and that representation is neural. But I believe that there is a level of analysis where it makes sense to talk about different kinds of representations, and where different and interesting consequences of such representations can be demonstrated (for a cogent review, see Shepard and Podgorny¹).

"It seems to me that the bias that led psychologists in the 1960s to posit that STM is acoustic and rehearsal is verbal is the same bias that leads psychologists in the 1980s to maintain that knowledge is represented in propositions. When we think about thinking, we think we are thinking in words."

1. Shepard R N & Podgorny P. Cognitive processes that resemble perceptual processes. (Estes W K, ed.) *Handbook of learning and cognitive processes. Volume 5. Human information processing.* Hillsdale, NJ: Lawrence Erlbaum, 1978. p. 189-237.