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A Summary:

Picture Recognition Memory: A Review of Research and Theory

1. Keywords
   1. Ceiling effects
   2. Pictorial superiority effect
   3. Memorial representation
   4. Verbal encoding
   5. Dual-code memory model
   6. Single-code memory model
   7. Semantic code
   8. Sensory code
2. Picture Recognition Memory Experiments
   1. Two phases
      1. Study phase
         1. Subjects look at a series of pictures one after the other at a controlled rate
      2. Test phase
         1. Subjects see some of the study pictures mixed in with new pictures(distractors)
         2. Asked to discriminate the study pictures from the distractors
         3. Two kinds of tests
            1. Forced-choice test

Each test item consists of one study picture paired with one or more distractors

Subjects are asked to indicate which picture they have seen before

* + - * 1. Single-item test

Study pictures and distractors are shown singly

Subjects respond “old”or “new” to each item

* 1. Early Research
     1. Shepard 1967
        1. Showed subjects a series of 612 color pictures taken from sources such as magazine ads
        2. Two-alternative forced choice test
        3. Subjects picked out the old picture with a median accuracy of 98.5%
     2. Standing, Conezio and Haber 1970
        1. Showed college students 2560 color slides over a two or four day period
        2. Recognition accuracy averaged 90%
     3. Standing 1973
        1. Showed 10,000 slides
        2. Recognition accuracy 83%
  2. Researchers must take precautions to avoid ceiling effects that might mask the effects of the variables being studied
     1. Ceiling effects
        1. The distribution of scores results in a large number of scores clustering near the top of the scale
        2. The mean + 2 standard deviations is greater than or equal to the top score

1. Variables in picture research
   1. The relationship between words and pictures in picture recognition memory research
      1. Highly reliable finding that pictures are remembered better than words
      2. Bird and Bennett 1974, Borges Stepanowsky and Holt (1977), Cobb Tanhauser and Johnson 1980, …
      3. This finding is called the “pictorial superiority effect”
         1. Haber and Meyers 1982
            1. Although pictures were recognized better than words pictograms were recognized even better than pictures
      4. **Experimenter-provided or subject generated words in addition to pictures**
         1. Experimenter provided words
            1. Depends on earner age and abstractness of the stimuli
            2. Mowbray and Luria 1973

Providing names of pictures helped young children remember pictures

* + - * 1. Nelson and Kosslyn 1976

Laabels helped 5 year olds more than adults and were more helpful for abstract than realistic stimuli

Adults performed at ceiling for realistic pictures both with and without labels

* + - * 1. When an added label increases the meaningfulness of a picture , recognition is improved
      1. Elaborating on the picture
         1. Kerr and Winograd 1982

Accompanied pictures of faces with short phrases about the person

* + - * 1. Captions affect how subjects perceive and remember the parts of pictures

Jorg and Hormann 1978

Whether drawing was labelled a flower or a tulip affected recognition for particular aspects of the picture

**Specificity** of the label alerts the perceiver to a particular level of processing

Specificity of a verb

Gentner and Loftus 1979

Walking vs Hiking

* + 1. Subject generated words
       1. Naming pictures during study results in improved recognition (Kurtz & Hovland 1953)
       2. Kunen and Duncan 1983
          1. Had 4th and 8th graders and and college students briefly describe what they saw as they viewed pictures
          2. The verbal descriptions increased recognition of the study pictures but also increased false recognitions of similar distractors
       3. Loftus and Kallman 1979
          1. Instructed some subjects to name the details they saw in briefly presented pictures
          2. Subjects who named pictures performed better
          3. Strengthening a verbal code during initial viewing augments the memorial representation of a picture
       4. Some research indicates that the presentation of a picture will not necessarily activate its verbal label

1. The relationship between words and pictures in picture recognition memory research**: Dual code vs single code memory models** 
   1. Pictures vs words and pictures plus words
      1. Alan Paivio;s dual-code hypothesis
         1. Postulates the existence of two symbolic systems
            1. A verbal system specialized for processing and storing linguistic information
            2. A nonverbal system specialized for **spatial information** and mental imagery
            3. Can function independently bat are also richly interconnected

A person may engage in covert verbalization

* + - 1. When a concept registers in both memory systems it is said to be dual coded
      2. **Memory for concepts that are dual coded should be superior** to memory for concepts that are entered into only one memory store
      3. **Paivio 1971, 1986**
         1. Dual code model predicts the results of memory experiments: pictures are remembered better than concrete words
         2. Which in turn are remembered better than abstract words
      4. Ten major classes of experimental findings to support dual code hypothesis
         1. Studies showing differences in memory for pictures and words
         2. Differences found when subjects are instructed to use either verbal or imagery learning strategies
         3. Studies on mental rotations
         4. Studies showing differential effects of interference on verbal and nonverbal processes
         5. Individual differences in imagery and verbal ability
         6. Functional differences between the cerebral hemispheres of the brain
    1. Criticism
       1. All information is represented in memory in a single code
       2. This code underlies ability to interpret both pictures and words
       3. Single code theorists
          1. Do not regard experiental data such as pictorial superiority effect as eveidence for separate systems

Different activations of a common system

* + - * 1. In memory retrieval tasks subjects subjects **cannot distinguish** information that was presented pictorially from information presented verbally
        2. Interference techniques affect memory for verbal and pictorial material in a similar way
        3. Snodgrass 1984

A multilevel model in which information from separate verbal and nonverbal systems is passed on to a single propositional store

* + - * 1. Dual-code is too narrow

Deffenbacher, Carr, Leu 1982

Human faces constitute a special class of stimuli that might be handled by yet a third memory system

Kolers and Brison 1984

Knowledge can be represented in a variety of ways depending on the task , the modality and mental operations

* 1. The relationship between words and pictures in picture recognition memory research**: Summary**
     1. Depending on the circumstances effects on picture recognition have been attributed to :
        1. dual coding
        2. ability of added words to enhance meaningfulness
        3. direct attention to specific aspects of the picture
        4. stimulate the **rehearsal**  of pictorial information.
     2. The addition of words can imporve picture recoginiton, picture redundant labels will probably result in very little improvement in adults picture recognition in simple experimental situations

1. Pictorial Stimulus Variables
   1. Manipulation of pictures
      1. Distinctiveness
         1. Better recognition for vivid pictures
         2. Farley, Cohen, Sanfeliz 1979
            1. Analyzed data relating recognition accuaracy to ratings of several aesthetic qualities of pictures concluding that distinctiveness was the underlying dimension relating **recognition and aesthetic quality**
         3. Faces
            1. Pictures of faces are better recognized if they are rated as being “unusual” , “atypical” or high or low in “attractiveness” or “distinctive”
         4. **Sensory-Semantic Model**
            1. The presentation of a picture involves interpreting and storing two aspects of an item

A sensory code that is concerned with the visual appearance of an item

And a semantic code that concerns the meaning of the item

Semantic code for a concept presented as a picture or as a word label may be the same

Sensory code for the two stimuli differ

Sensory code for pictures is more distinctive

* + 1. Meaningfulness
    2. Visual richness
    3. Other pictorial stimulus variables
       1. Complexity , color, motion
          1. The figure-ground relationship
       2. Color
       3. Motion
       4. Figure-ground separation
          1. Franken and Davis 1975

Rank pictures in terms of interestingness

Pleasingness

Complexity

Clarity

Figure-ground

The degree to which the central object stands out in a lively and impressive manner

* + - 1. Interstimulus similarity
         1. Similarity among pictures
      2. Luminance
      3. Others
         1. Blurring
         2. Upside down

1. Memory for Parts and Attributes of Pictures
   1. Loftus & Bell 1975
      1. Pictures contain two types of information
         1. Holistic
         2. Specific detail
            1. Act as recognition cues only if they are fixated during the study phase
         3. Eye movement research shows fixations are most likely to fall upon the “informative areas” of pictures
            1. Objects that one does not expect to find in the scene
      2. Orientation of objects
2. Encoding strategy
   1. Perceiver’s mental activities
   2. Level of processing
      1. Subjects level or depth of processing as a manipulation
      2. Depth of processing
         1. Semantic processing
         2. Shallow non semantic processing
      3. Information processed at a semantic level will be remembered better than information processed at the sensory surface level.
      4. Faces
         1. When asked to make infrerences on character traits recognition increased
      5. Interference tasks
      6. Research design factors
         1. Time intervals
            1. Between photos
            2. Between study face and recognition test
            3. Visual rehearsal

What happens during the blank period between pictures

* + - 1. Form of the dependent measure
         1. Forces choice
         2. Single item methods

1. Individual Differences
   1. Age, style aptitude, ability
   2. Experience with the class of stimuli
   3. Face recognition
      1. Does a special memory system for faces exist
      2. Eyewitness research

References

W. Howard Levie & Susan N. Hathaway (1988) Picture Recognition Memory: A Review of Research and Theory, Journal of Visual Verbal Languaging, 8:1, 6-45, DOI: 10.1080/23796529.1988.11674426