FIRST ESCP SUMMER SCHOOL ON "COGNITIVE APPROACHES TO MEMORY"

STUDIES OF EPISODIC MEMORY

ENDEL TULVING

UNIVERSITY OF TORONTO

ABSTRACT

In the first lecture, I discuss a conceptual framework for the study of (episodic) remembering of events. Such remembering begins with the perception of an event and ends with a recollective experience or memory performance, or both, corresponding to the event. Multiple determinants, and interactions among them, of what the individual remembers of the event, and how well, are discussed within the framework dubbed General Abstract Processing System (GAPS).

The second lecture will deal with empirical facts concerning the interaction between encoding and retrieval processes, and the theoretical implications of these facts. The basic thesis is that the understanding of the remembering of events requires the understanding of encoding processes, retrieval processes, and their interaction. The phenomenon of recognition failure of recallable words will be discussed from the point of view of encoding - retrieval interactions and encoding specificity.

The third lecture will deal with the relation between memory and consciousness, with particular reference to phenomena of organic amnesia. Most of the research on memory done to date in cognitive psychology has been concerned with memory performance rather than with mental experience. If we wanted to take an interest in experience, or consciousness, or awareness, how would we go about it? Would it make any difference to what we study and how we study it? Would it make any difference to our theoretical interpretations of memory? An attempt will be made to answer these questions in light of evidence from the study of "normal memory" and memory and consciousness in amnesic patients.

FIRST ECSP SUMMER SCHOOL ON "COGNITIVE APPROACHES TO MEMORY"

STUDIES OF EPISODIC MEMORY

ENDEL TULVING

UNIVERSITY OF TORONTO

SUGGESTED READINGS

1. Chapter 7 of Elements of Episodic Memory (Conceptual Framework) might make a suitable piece of background reading for the first lecture, and Chapter 11 of the same book would be appropriate to the second lecture. For the third lecture, I recommend E. Tulving, Memory and Consciousness, Canadian Psychology, 1985, 26, 1 - 12. If that article is not available, another relevant one is E. Tulving, Ebbinghaus's memory: What did he learn and remember?, Journal of Experimental Psychology: Learning, Memory and Cognition, 1985, 11, 485-490.

2. A criticism of levels-of-processing framework is found in A.D. Baddeley, The trouble with levels: A re-examination of Craik and Lockhart's framework for memory research, Psychological Review, 1978, 85, 139 - 152. Encoding specificity notions have been criticized by J.L. Santa and L.L. Lamwers, Encoding specificity: Fact or artifact, Journal of Verbal Learning and Verbal Behavior, 1974, 13, 412 - 423, as well as J.L. Santa and L.L. Lamwers, Where does the confusion lie? Comments on the Wiseman and Tulving paper, Journal of Verbal Learning and Verbal Behavior, 1976, 15, 53 - 57. Although somewhat dated, these papers do contain a discussion of the kinds of initial reactions that people at least used to have to encoding specificity. The article by Baddeley, and the two articles by Santa and Lamwers, may constitute an appropriate starting point for criticism of levels of processing and encoding specificity ideas.

   The topic of memory and consciousness is quite recent, and there has been little criticism of it. But some of the commentators who wrote about Precis of Elements of Episodic Memory, Behavioral and Brain Sciences, 1984, 7, 223 - 268, dealt with the issue of episodic vs. semantic memory, which is not totally unrelated to the issue of memory and consciousness. The most relevant of these commentaries are perhaps two that, at this moment, are still in press with The Behavioral and Brain Sciences: R.G. Crowder, Remembering experiences and the experience of remembering, and N.E. Spear, Conscious constraints on episodic memory. A very thorough critical treatment of the concept of episodic and semantic memory, related to the issue of memory and consciousness, has been provided by G. McKoon, R. Ratcliff and G.S. Dell, A critical evaluation of the semantic-episodic distinction, Journal of Experimental Psychology: Learning, Memory and Cognition, 1986, 12, 295 - 306.

3. One book that is most closely relevant to the concept of my three lectures is E. Tulving, Elements of Episodic Memory, London: Oxford University Press, 1983. The book is also available in paperback.

Summer School Lectures on Working Memory

Alan Baddeley
MRC Applied Psychology Unit, Cambridge, England

Lecture 1: Short-term Memory

This lecture will review the research carried out on short-term memory during the 1950s and '60s. The "modal model" will be described and its advantages and problems discussed. Some responses to these including the Levels of Processing approach will then be reviewed.

Lecture 2: Working Memory

This will give an account of the development of a model of working memory, discussing evidence for the separate slave systems of the Articulatory Loop and the Visuo-spatial Sketchpad, together with the problem of investigating the controlling Central Executive system.

Lecture 3: Applications of Working Memory

This will be concerned with attempts to use the working memory framework to investigate other problems. Topics covered will include reading, dyslexia and the development of working memory; the use of working memory in task analysis, and applications of working memory to neuropsychological patients.

Reading:

Crowder, R. (1982) The demise of short-term memory. Acta Psychologica, 50, 291-323.

Baddeley, A.D. (1983) Working memory. Philosophical Transactions of the Royal Society of London B, 302, 311-324.

If this is not available, a briefer overview is contained in:

Baddeley, A.D. (1981) The concept of working memory: A view of its current state and probable future development. Cognition, 10, 17-23.

A much more extensive coverage of the topic is given in:

Baddeley, A.D. (1986) Working Memory. Oxford: Oxford University Press.

Computer Science Department Carnegie-Mellon University

412-268-2573

Pittsburgh, Pennsylvania 15213

5 February 1987

Dear Dr. Strube,

Alan Baddeley and I have agreed to swap places so that I will lecture from june 22-24 and he will lecture from june 25-27. He may have already informed you of this. I will arrive on sunday 21 june and leave on the evening of june 24.

My reading list is simple. It is chapters 1, 2, 3, 4, and 8 of

D. E. Rumelhart & J. L. McClelland (Eds.) *Parallel Distributed Processing: Explorations in the Microstructure of Cognition. Volume 1: Foundations.* Cambridge, MA: MIT Press, 1986.

A very brief description of my lectures is enclosed.

Yours sincerely,

Geoffrey Hinton

Geoffrey Hinton

Lecture 1: Parallel models of associative memory

I will describe a variety of different theories of how memories can be stored and retrieved in massively parallel networks of neuron-like units. These theories will be compared with respect to the following criteria: Damage resistance, capacity, efficiency, interference, generalization, ease of storage and ease of retrieval.

Lecture 2: Learning procedures for constructing representations

I will describe recent theories of how items can be encoded in such a way that the system exhibits good generalization. This involves discovering features that are not at all apparent in the initial encoding. These features and the interactions between them explicitly represent the underlying regularities in the domain from which the items are taken.

Lecture 3: The functions of rapidly modifiable memory

Rapidly modifiable memory can be used to deblur old associations, to discover good encodings of new material, and to traverse complex hierarchical structures. Slow changes in the way items are encoded in long-term memory can reduce the need to explictly traverse hierarchies and this may correspond to a change from conscious to automatic processing.

Telephone Bristol ~~xxxxx~~ 0272-303030 ext M352

UNIVERSITY OF BRISTOL

DEPARTMENT OF PSYCHOLOGY
8-10 BERKELEY SQUARE
BRISTOL
BS8 1HH
England

Dr Gerhard Strube
Max Planck Institute for Psychological Research
Leopoldstr. 24
D-8000 München 40
WEST GERMANY

22 December 1986

Dear Dr Strube,

Thank you for writing about the ESCP Summer School "Cognitive approaches to Memory". I enclose a short abstract of what I shall be talking about.

Probably the best publication for an overview of the talks is:

Jones, G. V. (1983). Structure of the recall process. Philosophical Transactions of the Royal Society, Series B, 302, 373-385. Reprinted in D. E. Broadbent (Ed.), Functional aspects of human memory (pp. 135-147). London: Royal Society.

Unfortunately, I have some difficulty in thinking of a really appropriate article for tutorial purposes. One reasonably wide review is:

Alba, J. W., & Hasher, L. Is memory schematic? Psychological Bulletin, 1983, 93, 203-231. I'm not sure whether this might be your intention in any case, but it strikes me that it may be useful to consult the tutors as well as the lecturers on the choice of tutorial articles.

Some books which it could be useful to have available are as follows:

Anderson, J. R. (1983). The architecture of cognition. Cambridge, MA: Harvard University Press.

Anderson, J. R., & Bower, G. H. (1980). Human associative memory: A brief edition. Hillsdale, NJ: Erlbaum.

Broadbent, D. E. (Ed.) (1983). Functional aspects of human memory. London: Royal Society.

Cohen, G., Eysenck, M. W., & Le Voi, M. E. (1986). Memory: A cognitive approach. Milton Keynes, England: Open University Press.

Eysenck, M. W. (1984). A handbook of cognitive psychology. London: Erlbaum.

Lloyd, P., Mayes, A., Manstead, A. S. R., Meudell, P. R., & Wagner, H. L. (1986). Introduction to psychology (2nd corrected impression). London: Fontana.

Tulving, E. (1983). Elements of episodic memory. Oxford: Clarendon Press.

I hope this reaches you by 31 December as requested, and look forward to meeting you in June.

Yours sincerely,

Gregory V. Jones

Dr Gregory V. Jones

ESCP Summer School "Cognitive Approaches to Memory"

G. V. Jones: Abstract

These lectures will examine how the principles of organization of complex memories may be explored both experimentally and theoretically. One influential idea here is the schema, and the lectures will consider both this and an alternative unit of memory organization, the fragment. There will be some emphasis on formal methods of theoretical analysis, coupled with discussion of model-testing procedures (including the computational implementation of these procedures). In addition, several possible strategies for guiding the direction of experimental research into cognitive problems will be distinguished, and illustrated with regard to investigating the organization of memory.

Walter Kintsch: Lectures on

Knowledge Representation and Memory

1st ECSP Summer School - 1987

1. Knowledge representations.

Knowledge representations in psychology: associative nets.

Issues: Control processes
Structure

1.2. Knowledge representations from artificial intelligence:

Semantic nets
Frames, scripts, and schemata
Production systems
Associative nets reconsidered

1.3. Issues

Levels of abstraction
Decomposition
Emergent structures

1.4. Some relevant experimental data - priming studies:

Swinney (1971), Kintsch & Mross (1985), Till, Mross & Kintsch (1987)
The time course of word identification
A model for word identification in discourse

1.5. Associative nets and the literal meaning hypothesis.

2. Knowledge use in discourse comprehension and problem solving

The construction - integration model.

In contrast to expectation based, predictive views of discourse comprehension, a model is developed in which the initial processing is strictly bottom-up. Word meanings are activated, propositions are formed, and inferences and elaborations are produced without regard to the discourse context. However, a network of interrelated items is created in this manner, which can be integrated into a coherent structure through a spreading activation process. A simulation of arithmetic word problem understanding provides a plausible account for some well-known phenomena in this area.

PS: References

Brachman, R.J., & Levesque, H.J. Readings in knowledge representation. Los Altos, CA: Morgan Kaufmann, 1985.

Minsky, M. A framework for representing knowledge. In P. Winston (Ed.), The psychology of computer vision. New York: McGraw Hill, 1975.

Kintsch, W. Semantic memory: A tutorial. In R.S. Nickerson (Ed.), Attention and performance VIII. Hillsdale, NJ: Erlbaum, 1980.

Muenzinger Psychology Building • Campus Box 345 • Boulder, Colorado 80309-0345 • (303) 492-8662

ABSTRACT

Memory Development: Universal Changes

F.E. Weinert

The question of age-related changes in memory development and memory performance is an old issue in developmental psychology. Most of the experimental studies conducted are based on the free recall paradigm and use verbal material. This makes it easy to overlook how different the results can be depending on the use of differing learning contents and performance criteria.

However, even within the favored framework of the verbal-learning-and-free-recall paradigm we find contrasting theoretical assumptions about "what is memory development the development of?": Quantity and quality of the knowledge base, availability of effective strategies and their appropriate use, changing conditions across the life span for intelligent processing when encoding, recoding, and decoding information.

In addition to these various hypotheses currently dominating the discussion in the field, there is also considerable speculation but only a few empirical studies that have addressed the development and role of memory capacity as largely unrelated to the learning history of the individuals.

The lecture will provide a short review of the status of these questions in current research, and present a model that provides theoretical integration of several apparently contradictory empirical results, and will finally offer some conclusions concerning as yet settled issues in research.

Reading:

Chi, M.T.H. (Ed.) (1983). Trends in Memory Development Research. (Vol. 9). Basel: Karger

Perlmutter, M. (1986). A life-span view of memory. In P.B. Baltes, D.L. Featherman & R.M. Lerner (eds.), Life-Span Development and Behavior. Vol. 7, Hillsdale: Erlbaum, pp.271-313.

Weinert, F.E. (1986). Developmental variations of memory performance and memory-related knowledge across the life span. In A.B.Sørensen, F.E.Weinert & L.R. Sherrod (eds.), Human Development and the Life Course: Multidisciplinary Perspectives. Hillsdale, N.J.: Erlbaum, 535-554.

ABSTRACT

Memory Development: Individual Differences

F. E. Weinert

Descriptions and explanations of individual differences in learning and memory performance have traditionally played a minor role in memory research. The lecture will review various conceptualizations of differences in memory performance within and between people. The extent to which developmental investigations can draw on universal conditions of memory development to explain individual differences is discussed, considering regression and path-models for the analysis of individual differences in performance, as well as training studies. The studies cited focus on two age-groups: preschool/school children and elderly adults.

The problems and perspectives of future research into individual differences in memory development are discussed in terms of a critical evaluation of the current status of research.

Reading:

Weinert, F.E., Schneider, W. and Knopf, M. (in press). Individual differences in memory development across the life span. In P.B. Baltes, D.L. Featherman & R.M. Lerner (eds.), Life Span Development and Behavior. Hillsdale: Erlbaum.

Wolfgang Schneider

re.: Abstract of talk
1st ESCP Summer School "Cognitive Approaches to Memory"

Title: The Development of Metamemory and its Interrelationship with Memory Behavior and Memory Performance

Since the early seventies, the concept of metamemory, that is, one's verbalizable knowledge about various aspects of memory, has stimulated many studies in the field of memory development. The major issues to be covered in my talk concern (1) conceptual problems, (2) developmental trends in declarative and procedural metamemory, and (3) developmental trends in the metamemory-memory behavior relationship.

Although several attempts have been made to provide a clear-cut definition of metamemory, there is no doubt that the resulting taxonomies are still "fuzzy". Meanwhile most researchers agree that aspects of declarative knowledge typically inferred from metamemory interviews should be separated from procedural knowledge, that is, from monitoring activities and self-regulatory processes observed during the course of memory experiments. A description of typical assessment procedures for both components of metamemory will be included in the talk to illustrate the different meanings of "metamemory".

Next, the discussion will focus on developmental trends in both components of metamemory. According to early studies into metamemory development, major changes should take place during the early school years. However, more recent studies have lead to a different view: mostly depending on the type of task and task difficulty, quantitative as well as qualitative changes in metamemorial knowledge have also been demonstrated for older school children and adolescents.

Undoubtedly, one of the major reasons for studying metamemory was the assumption that there should be a close relationship between metamemory and memory behavior. Whereas a "first generation" of investigations into this relationship proved by and large unsuccessful, the "second generation" of studies yielded more encouraging findings. The crucial differences between the two types of studies will be discussed in detail. Here, the major aim is to identify the conditions that seem favorable for positive and stable links among metamemory, memory behavior, and memory performance.

References:

(1) First overview:

Cavanaugh, J.C. & Perlmutter, M. Metamemory: A critical examination. Child Development, 1982, 53, 11-28.

(2) More thorough treatment of the issue:

Pressley, M., Borkowski, J.G., & O'Sullivan, J. Children's metamemory and the teaching of memory strategies. In: D.L. Forrest-Pressley, G.E. MacKinnon, & T.G. Waller (Eds.), Metacognition, cognition, and human performance (pp. 111-153).

Schneider, W., Developmental trends in the metamemory-memory behavior relationship: An integrative review. In: D.L. Forrest-Pressley et al., pp. 57-109.

(3) Books that should be ready:

D.L. Forrest-Pressley et al., Metacognition, cognition, and human performance. New York: Academic Press, 1985.

S.R. Yussen (Ed.), The growth of reflection in children. New York: Academic Press, 1985.

W. Wagenaar:

Autobiographical memory

The lectures will cover three general problems related to autobiographical memory.

- The first problem is related to how autobiographical memory can be studied. Evidently a true picture of recall accuracy can only be obtained when it is known what really happened. In some instances, like medical or legal records, there is independent evidence. But in most other cases one should rely on confirmation by others, which is as unreliable as the memories themselves, or on recordings like written diaries, or on written records made specifically to this purpose. The technique first introduced by Linton and extended by myself has several drawbacks. It is for instance, virtually impossible to study many subjects, for an extended period of time. The first recording of what happened could already be biased, and the same is true about subjective judgment of emotionality, pleasantness, and so on. The question 'how reliable is autobiographical memory?' cannot be studied without consideration of the question 'how reliable is research on autobiographical memory?'
- The second problem is that facts may retroactively change, just because life goes on. A discrepancy between my recall now, and the original recording of the event could wrongly be scored as a memory failure. The constant updating of memory records, even when they result in blatant discrepancies, does not mean that something has been forgotten. How can we distinguish updating from forgetting. When autobiographical memory is episodic in its truest form, each updating would result in a new episode, a new record, that is stored in parallel with the other records of the same event. There is, however, some evidence that the 'act of recollection' affects the original records of an event. So the question is: is the first records of an event unaffected by later events, or later recollections?
- The third problem is that facts can be reproduced through reconstruction, rather than through retrieval from a store. The recall of dates as illustrated by Linton's protocols, is a clear example of this process. Is biographical memory, in fact biographical inference? Which psychological function are we studying? Can we make a distinction between retrieval and reconstruction on the basis of the data?

I would like the participants to read my paper on autobiographical memory (enclosed). As a tutorial about the relevance of all these problems for applied cognitive research I would like to discuss the enclosed preprint by Dawes and Pearson. You will find this paper extremely challenging.

The books that could be ready on the shelves are:

Rubin: Autobiographical Memory (Cambridge)
Tulving: Elements of Episodic Memory (Oxford)
Gruneberg et al.: Practical Aspects of Memory (AP)
Wells & Loftus: Eyewitness Testimony (Cambridge)
Neisser: Memory Observed (Freeman).

--ooOoo--

Willem A. Wagenaar
14 January 1987

ESCP Summer School 1987: COGNITIVE APPROACHES TO MEMORY

Gerhard Strube: AUTOBIOGRAPHICAL MEMORY

Complementing Willem Wagenaar's lectures, my talk will concentrate on autobiographical memory and related functions in developmental perspective, and on memory in the context of personal identity.

1. How different is memory for important, or 'critical' life events from, say, memory for TV shows or memory for word lists?
   Involved are issues of self-reference, or integration of memories into a 'self-schema', and of stress & emotional quality of experiences. For example, numerous studies have cited effects of arousal, or strength of emotion, as the main reason for 'unforgettable' memories. In contrast, our data show no influence of those factors, but classical forgetting (and also an effect of emotional quality), when memory for details of important events is assessed. Those facts instigate a theory of 'normal memory for specific material under specific circumstances'.
2. How does autobiographical memory relate to normative knowledge about the life course?
   Biographical knowledge might provide a frame of reference for autobiographical memories. However, the development of that knowledge displays some striking discrepancies when compared to memories for important life events.
3. Must we treat autobiographical memory and temporal skills, like dating events from memory, or reconstructing their order, as different psychological functions?
   Our recent research demonstrates how temporal skills, although linked to memory at age 5-6, gradually develop into an independent function by age 8-9. Independence of autobiographical memory for and dating of events is shown to explain a lot of disagreement in former experimental results.
4. How different is the development of autobiographical memory from memory development in general?
   Everyday memory of 4-6 year old children for some well-controlled events is related to sort-recall and other laboratory tasks in the context of the Munich longitudinal study, LOGIC. Again, the pattern of results is taken to support the argument that autobiographical memory is special with regard to materials and circumstances, but not a special sub-system of memory, nor yet another 'store'.

Reading:
- Enclosed are English summaries of recent research, not yet published in English, that forms the empirical base of the argument.
- cf. reading lists by Wagenaar, and Schneider.