PRACTICAL ASPECTS OF MEMORY: CURRENT RESEARCH AND ISSUES

Volume 1

MEMORY IN EVERYDAY LIFE

Edited by

M. M. Gruneberg
P. E. Morris R. N. Sykes

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EDITED BY

M. M. Gruneberg
University College of Swansea

P. E. Morris
University of Lancaster

R. N. Sykes
University College of Swansea

JOHN WILEY & SONS
Chichester · New York · Brisbane · Toronto · Singapore

Proceedings of the 2nd International Conference on Practical Aspects of Memory held under the auspices of the Welsh Branch of the British Psychological Society, in Swansea from August 2nd–8th 1987

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British Library Cataloguing in Publication Data available

ISBN 0 471 91234 4

Printed in Great Britain

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VOLUME 1

Memory in Everyday Life

PREFACE

This volume (together with Volume 1) comprises an edited selection of papers presented at The Second International Conference on Practical Aspects of Memory, held under the auspices of The Welsh Branch of The British Psychological Society in Swansea, from the 2nd-8th August 1987. As with the first Conference on Practical Aspects of Memory (Gruneberg, Morris and Sykes, 1978), the conference sought to examine ways in which our theoretical understanding of memory could be applied to real life memory problems.

Interest in the application of memory research has undoubtedly advanced considerably since the first conference in 1978. Evidence for this is to be seen in the number of papers presented at this conference, approximately twice as many as nine years ago, and the large number of eminent psychologists who are now investigating useful and interesting everyday memory phenomena, and seeking to apply the fruits of their work. Many psychologists are no longer solely concerned with theoretical questions, and insist, as does Dr. Alan Baddeley in the Opening Address, in asking "What the hell is it for?". In the intervening period between the two conferences an academic journal - Applied Cognitive Psychology - has been founded to cater for the burgeoning activity in a field which Professor Neisser (Volume 2) describes as being barely at the margins of respectability only nine years ago.

It would, however, in our view, be mistaken to be complacent about the progress being made. It is important to realise that in many areas we are at the start of the enterprise and that effective application to the real world has still to begin. Again, as Professor Neisser points out, there are large gaps in important areas and the concern of some conference delegates that a gap between underlying theory and application could develop is one which must be taken seriously. Nevertheless it can reasonably be claimed that these are teething troubles in a rapidly developing field.

Because of the large number of papers that are being published, it has been necessary to divide the book into two volumes. Volume I deals with memory in everyday life and covers the following topics: Eyewitnessing, Child Witnesses, Face Recognition, Metamemory, Autobiographical Memory, Ecological Perspectives, Prospective Memory, Maintenance of Knowledge, Action Events, Memory for Broadcast Information, Memory in Everyday Life. Volume 2 deals with clinical and educational implications and covers: Neurological Memory Deficit, Memory and Aging, Drugs and Memory, Stress Illness and Memory, Miscellaneous Clinical Applications, Children's Memory, Reading, Dyslexia, Student Learning, Mnemonic Aids, Motoric Memory, Time of

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Day, General Educational Implications. Papers presented in symposia at the conference have been supplemented by other papers where it seemed appropriate.

As with the last conference, we feel that the importance of these volumes lies as much in terms of the questions posed as of the answers given. For a variety of reasons, a number of the conference presentations could not be included.

We would like to thank the large number of people who contributed so much to the success of the conference. We especially wish to thank the following: Dr. Hugh Foot, Chair, and the committee of The Welsh Branch of The British Psychological Society for their support of the conference; Mrs. Maureen Rogers and Mrs. Jackie Davies, our secretaries, for their highly professional and good humoured labours; the symposium organisers for ensuring that so many eminent psychologists attended; the stewards for their considerable enthusiasm, hard work and courtesy; Dr. Alan Baddeley and Professor Ulric Neisser, not only for their stimulating Opening and Closing Addresses, but for the support they have given over the years to our aim of applying memory research. Finally we should like to thank all the delegates for providing the conference with such stimulating contributions.

Michael M. Gruneberg
Peter E. Morris
Robert N. Sykes

REFERENCE

Gruneberg, M.M., Morris, P.E., and Sykes, R.N. (Eds.) (1978). Practical Aspects of Memory, Academic Press, London.

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OPENING ADDRESS

BUT WHAT THE HELL IS IT FOR?

Alan Baddeley
MRC Applied Psychology Unit, 15 Chaucer Road, Cambridge, England

Without doubt, the psychological study of memory owes a substantial debt to Hermann Ebbinghaus. Single-handedly, he moved memory from the domain of the speculative philosopher to the province of the experimental scientist. He devised methods that are still used today, and mapped out the broad characteristics of human memory along lines that are still valid and important. In order to do so, however, he had to make some important compromises and sacrifices. The first of these was quite intentional; he explicitly accepted the need to control the materials and the experimental situation with great rigidity, in order to obtain consistent and lawful results. His second compromise was intended as a temporary one, namely to stand back from theory in the hope that having collected sufficient data, a theoretical framework would become obvious. Unfortunately, having abandoned theory at the beginning of his research, he never returned to it. I believe that these two compromises, necessary though they were 100 years ago, have continued to dog much of the psychology of memory ever since.

This is not of course by any means a novel claim. Indeed, students of human memory appear to lament the narrowness, lack of relevance and lack of progress of memory research with monotonous regularity (e.g. Tulving & Madigan, 1970; Newell, 1974; Neisser, 1978). So much so that one sometimes wonders why everyone has not simply given up with the study of memory and gone on to something more interesting. My own view has been that the Ebbinghaus tradition, though valuable has indeed been too dominant, but that other traditions such as that embodied in the work of Galton and Bartlett offer a useful counterweight.

The most characteristic descendent of Ebbinghaus was probably the American functionalist tradition, particularly as represented by the S-R Interference Theory approach to memory. Having been dominant in North American psychology since the 1930's, this approach appears to have rolled over and died in the early 1970's, apparently failing to come to terms with the development of the cognitive or information-processing approach to memory. I would like to suggest however that while interference theory may have died - I think prematurely - some of the drearier aspects of the Ebbinghaus tradition, as characterized by the pejorative term **dustbowl empiricism** lived on, reflected in a preoccupation with collecting elegant and orderly results, and a neglect of what such results might mean in a broader context.

My theme then is a very simple one, that collecting replicable results is an important part of creating a psychology of memory, but only if those results are of some more general significance. In short, I am suggesting that whenever we are lucky enough to come across some clear and replicable phenomenon, one of the first questions we should ask is "What the hell does it mean?". We should then put a very high priority on attempting to answer the question of what role that phenomenon might play in normal human activity. If we are consistently unable to come up with a plausible answer, then we should place the phenomenon in the cabinet of psychological curios, and move on.

Judging by the number of such phenomena gathering dust, it would seem that something like this happens anyhow. But does it? I suspect that most phenomena begin with a claim to be pinpointing some crucial component of human cognition. The Peterson task for example was assumed to plot the rate of decay of the short-term memory trace; the Sternberg procedure, the rate of memory scanning; Shepard's work, the rate of mental rotation, not to mention all the 'demonstrations' that learning was all-or-none or continuous, that visual search was a parallel or serial process, or that visual imagery was based on analogical or propositional processes. The vast bulk of research in cognitive psychology was aimed at attempting to answer these 'theoretical' questions, usually via some neat experimental paradigm. Such paradigms appeared to offer ready access to a theoretical game that anyone can play, moving on to the next paradigm when that one is exhausted. The imaginative preoccupation with experimental design and the collection of immaculate data that used to characterize the dustbowl empiricist approach, all too often simply switched its paradigms, and became dustbowl cognitive psychology; yet more experiments about other experiments.

But does it help to ask what the function is of any particular psychological phenomenon we are studying? Surely, sometimes the function is not clear until after we understand it? I would like to suggest that simply being prepared to consider the potential real-world relevance of phenomena will cause us to look at them in different ways, ask different questions, and possibly come up with more productive answers.

I would like to illustrate my case by considering a number of phenomena that have been extensively studied within the cognitive psychology laboratory in recent years, primarily from a theoretical point of view, asking the suggested question "What the hell is it for?". The phenomena I shall discuss include iconic memory, the acoustic similarity effect in STM, the recency effect, and finally I shall say a little about an area that has been neglected until very recently largely because it is hard to capture in a neat experimental paradigm, namely the study of autobiographical memory.

ICONIC MEMORY

One of the earliest and most elegant applications of the information-processing approach to memory is provided by George Sperling's (1960) work on the very brief visual storage system that Neisser subsequently termed **iconic memory**. The initial experiment which now appears in virtually every basic text involves briefly

showing subjects an array of letters, and subsequently cueing them to recall one of three rows of letters after intervals ranging from 0 to 1000 milliseconds. The results showed evidence for the retention of about 9 letters when tested immediately, with the amount retained declining systematically with the rate, depending on whether the background during the intervening interval was bright or dark. This basic effect was investigated in an elegant series of experiments by Sperling and his colleagues, and subsequently gave rise to a large series of later studies, of which the most elegant are probably those of Turvey (1973) who demonstrated the need for assuming at least two visual storage systems, one operating at the level of the retina, and the other at some point beyond the confluence of information from the two eyes.

To the best of my knowledge, this area continues to be active, but its influence appears to have become less and less, certainly on the psychology of memory, and at least according to the one or two colleagues I have asked, on the psychology of perception also.

In the case of iconic memory, people have, from time to time asked what its function might be. The answers have not on the whole been very promising, and might be summed up in the suggestion by Haber, who had previously devoted a great deal of research effort to this field. He suggests that its only function would appear to be that of allowing one to read at night by the lightning flashes of a thunderstorm!

In the process of recently writing a memory text, I returned again to the question of the functional significance of iconic memory. In explaining it to students, I typically suggest that without iconic memory a movie at the cinema would appear as a sequence of stills separated by periods of darkness. However, it hardly seems likely that evolution through the millenia has been carefully shaping the human visual system in readiness for the triumphant arrival of moving pictures in the 20th century A.D. I got as far as wondering whether iconic memory might be designed to allow us to blink; possible, but it would seem to be a very complicated system in order to cope with a very simple mechanical problem.

A more plausible explanation was suggested by my colleague Roger Watt, who points out that given the sphericity of the eye, most of the visual world is likely to be cortically represented in a distorted, non-homologous way. Sorting out this distortion in transmission is relatively easy for a stationary scene, since the distortion from any given part of the retina will always be the same. However, processing such distortions while the eye is rapidly moving, is likely to be computationally very much more difficult and neurally may be much more expensive. One possible solution to such a problem is to attenuate the complex information fed in during movement, assembling the results of successive stationary fixations using a post-retinal buffer store, namely iconic memory.

Whether or not this proves to be a satisfactory interpretation of iconic memory, it does have some interesting implications for the way in which iconic memory is studied. First of all, it suggests that the standard paradigm is somewhat perverse, in that it involves presenting one stimulus for a brief period,

followed by either a blank or a completely different stimulus. Presumably the system is geared to build up a complex scene from a succession of slightly different but **highly correlated** visual inputs, not totally disconnected stimuli. It is of course entirely sensible to investigate a system by studying it under conditions other than those for which it is presumably evolved, but to limit one's study almost entirely to such distortions from the norm is surely somewhat perverse.

A second curiousity about our study of iconic memory is the extent to which it has been dominated by the perception of letters and simple shapes. While reading may be a very important function in Western culture, it seems no more likely that the system has evolved for the processing of letters, than for the delectation of film-goers. Work carried out by a former student of mine, Peter Forster (1982), indicates that the use of real scenes is practicable within an iconic memory paradigm, and furthermore that it appears to yield some interesting effects of non-visual factors such as the emotionality of the scene presented (Forster, unpublished). Why then should studies of iconic memory be so dominated by the perception of letters, when its role in normal reading must be minimal?[1]

Iconic memory is perhaps better considered as part of the psychology of perception rather than the study of memory; that is not the case for the next phenomenon I shall discuss, namely the effect of acoustic or phonological similarity in short-term memory.

The Phonological Similarity Effect in STM

Sperling noticed that his subjects frequently made a particular type of error in reporting letters, namely producing a letter that sounded like the correct item, for example **B** instead of **V** or **F** instead of **S**. Independently, this effect had been noted and explored by Conrad, who found that when subjects were presented visually with sequences of consonants, the intrusion errors were similar in sound to the item they were replacing. Furthermore, Conrad and Hull (1964) showed that a sequence of consonants that sounded alike (e.g. **C G V B T**) tended to be harder to remember correctly than a dissimilar sequence (e.g. **F W K Y R**). On the basis of this he suggested that STM was based on an acoustic code. I myself subsequently showed that the phenomenon was not a general effect of similarity, since similarity of meaning did not impair performance; I also showed that the reverse was true of long-term learning, with meaning being important and sound relatively unimportant (Baddeley, 1966a, b).

Subsequent work allowed this effect to be tied in with a range of other sources of evidence for phonological coding in memory, and to be explained relatively simply in terms of a concept of an articulatory loop (Baddeley & Hitch, 1974; Baddeley, 1986).

The articulatory loop is assumed to comprise a phonological store that holds items in terms of a speech-based code. This code decays over time unless rehearsed. The process of rehearsal is assumed to depend upon subvocal articulation, a process that also enables visually-presented items to be subvocalized and hence represented in a phonological code. This relatively simple model offers an explanation of the effects on STM of phonological

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