

it seems likely that the onset of symptoms is due to a transient failure of the collateral supply rather than that the disease showed itself at that moment.

Now F. Galligioni and his colleagues⁹ have reported a series of four similar cases from Italy, in which there was apparent hypoplasia of the internal carotid artery together with what they term "cerebral pseudoangiomas." These were Europeans, and three of them were adults, though again all four were female. These authors believe that a congenital malformation of the vascular tree is more likely than progressive occlusive disease, and certainly the great majority of cases have shown no clinical progression, though recurrent hemiplegic episodes may be followed by permanent motor deficit and epilepsy.⁶

It is important to be aware of this condition, for it represents one of the rarer findings in cases of acute or recurrent hemiplegia in childhood (and now also in adults), and it is also important that the arteriographic appearances should not mistakenly be interpreted as representing an angioma. Whether these vessels serve a vital function is uncertain, but as they probably represent a collateral supply to a deficient area their presence may be beneficial rather than the potential danger that they might be considered were they part of an angioma.

¹ Kudo, T., *Clinical Neurology*, 1965, 5, 607.

² Kudo, T., *Neurology* (Minneapolis), 1968, 18, 485.

³ Nishimoto, A., and Takeuchi, S., *Journal of Neurosurgery*, 1968, 29, 255.

⁴ Suzuki, J., and Takaku, A., *Archives of Neurology* (Chicago), 1969, 20, 288.

⁵ Simon, J., Sabouraud, O., Guy, G., and Turpin, J., *Revue Neurologique*, 1968, 119, 376.

⁶ Solomon, G. E., Hilal, S. K., Gold, A. P., and Carter, S., *Brain*, 1970, 93, 107.

⁷ Bickerstaff, E. R., in *Handbook of Clinical Neurology*, Vol. 15. Amsterdam, North Holland Publishing Co.

⁸ Taveras, J. M., *American Journal of Roentgenology*, 1969, 106, 235.

⁹ Galligioni, F., Andrioli, G. C., Marin, G., Briani, S., and Iraci, G., *American Journal of Roentgenology*, 1971, 112, 251.

Psychology as Science

Seven years ago the *British Medical Bulletin* recognized the growing importance of psychology among the sciences basic to medicine by publishing a number on experimental psychology.¹ Now the appearance of an issue devoted to cognitive psychology² marks the steady progress which has been achieved with such problems as attention, memory, learning, the use of language, and the acquisition of skills. It is some years since the Todd report on medical education declared that all doctors require a grounding in psychology if they are to understand human behaviour and the effects which disease may have on it. Yet there are still those who doubt the place of psychology in the medical curriculum and others who do not see its relevance outside the field of psychiatry. This volume on the psychology of cognitive processes will help to correct such views by showing some of the solid scientific foundations of modern psychology and their relevance to neurological disorders in adult life and in childhood.

The achievements in cognitive psychology in the last ten years have their origins both in better experimental techniques and in new concepts of brain function. Technical advances include small computers which can control experiments and modify complicated procedures very rapidly, logic units making use of solid-state circuits which can generate complex sequences of stimulation, and synthesizers capable

of producing artificial speech patterns. The new concepts include analogies between the nervous system and a computer with short- and long-term memory stores, the ability to detect and encode information arriving from the senses, and to process it before selecting a motor output. The evidence for these separate processes is growing, and though it is not yet possible to ascribe them to particular areas of the brain the time when this can be done may not be far away.

The subject matter of cognitive psychology makes it particularly relevant to the problems of neurology. The most obvious applications are in the study of dysphasia, failures of skilled performance, and memory disorders produced by brain lesions. Of these the study of memory illustrates most clearly the interrelation between experimental psychology and clinical neurology. On the one hand experimental studies of memory have led to notions about long-term and short-term memory stores and processes of registration, consolidation, and information storage and retrieval, which have proved fruitful in analyzing the disorders of memory met with in clinical practice. On the other hand careful studies of clinical disorders, especially the Korsakoff syndrome, have challenged some of our existing ideas about the psychology of memory. These and other problems are considered in articles by F. I. M. Craik on primary memory, by A. D. Baddeley and Karalyn Patterson on the relation between long-term and short-term memory, and by Elizabeth K. Warrington on neurological disorders of memory.

Other problems which bear directly on clinical neurology include dysphasia, reviewed by Maria Wyke, the related article on linguistics by J. Morton, and differences in psychological processes in the two hemispheres. The latter are described by Brenda Milner with many references to knowledge gained from the study of patients who have undergone brain surgery.

Another approach which draws together clinical and laboratory findings is concerned with the development of cognitive processes. P. E. Bryant discusses recent experiments which have thrown doubt on some of Piaget's ideas about the sequence of cognitive development in young children, while N. O'Connor and B. Hermelin review work on the defects which can be detected in subnormal children and children with infantile autism. Such studies have already led to practical results in improving methods for educating and training children with these handicaps.

To concentrate too much on topics which have direct medical applications would be to distort the view of cognitive psychology as a field of academic study. The editor, Professor A. Summerfield, has wisely included a number of other articles which help to produce a rounded view—problem solving and reasoning, search and selective attention, studies of skilled performance, and an exciting glimpse of the future in the account of machine intelligence. Each provides an authoritative account, and together they succeed in presenting a formidable body of experimental findings in a short space. They should dispel any remaining ideas among doctors that psychology is a "soft" science. There is now a mass of experimental work which can withstand comparison with work in the physiological sciences. We must hope that future doctors will receive sufficient training in psychology to allow them to appreciate these findings and follow the advances which are certain to take place in the years ahead.

¹ *British Medical Bulletin*, 1964, 20, No. 1.

² *British Medical Bulletin*, 1971, 27, No. 3.