tient was taking by far the largest daily dose reported and had been taking it longer, which may have contributed to the severity of his withdrawal. Also, he had been using considerable amounts of alcohol in conjunction with ethchlorvynol.

In the case we have described, the order in which the hallucinations disappeared and occasionally reappeared suggests a progression of severity from tactile to visual to auditory. Auditory hallucinations were first ascribed to external causes and then to internal ones. About 1 month into his withdrawal from the drug, the patient's auditory hallucinations were characteristic of first-rank symptoms of schizophrenia. His range of affective response was greatly lessened in the absence of mood disorder. At that time there were no signs or symptoms that would exclude a diagnosis of schizophrenia, and experienced clinicians who saw the patient questioned whether the drug abuse may have been incidental to a schizophrenic illness. However, that possibility has been effectively excluded by the favorable outcome.

That alcohol could abruptly stop the auditory hallucinations has probable pharmacologic significance. Moreover, the patient's first heavy drinking after withdrawal was followed by a "hangover" that involved the return of severe hallucinations and loss of insight into their cause. Alcohol could have simply reduced anxiety and thus had a nonspecific effect on hallucinations, but the renewed hallucinosis associated with alcohol withdrawal, the rapid progression into addictive alcoholism once heavy drinking began, and the known close pharmacologic relationship between ethchlorvynol and alcohol argue for a closer relationship.

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Idiot Savant with Unusual Mechanical Ability: An Organic Explanation

BY T.L. BRINK, PH.D.

Several isolated cases of mental retardates with amazing mental abilities (i.e., the idiot savant phenomenon) have been reported. These abilities have included calendar calculation (1, 2), artistic expression (3, 4), and mechanical ability (5). The behavioral explanation advanced for these abilities is that they are the result of intense motivation, practice, and appropriate reinforcement (2, 5). No doubt these factors have an impact on many forms of human performance, and perhaps they are necessary for the occurrence of idiot savant phenomena, but very few retardates acquire such abilities, even when they are highly motivated, practice intensely, and receive appropriate reinforcement. Furthermore, if the behavioral factors were a sufficient explanation for the acquisition of mechanical or calculating ability, why could not the same factors produce an intellectual advance beyond retardation altogether?

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An Alternative Explanation

The answer may lie outside of environmental factors, perhaps in the division of functions between the cerebral hemispheres. The left hemisphere governs the use of language, mathematical computation, and other orderly conceptual analysis. A variety of evidence suggests that the right hemisphere is superior in tasks involving visualization and movement (6). The kinds of items on IQ tests emphasize left hemisphere functions. Mental retardation has been traditionally defined as IQ below a certain score, such as 70. Mentally retarded individuals are usually identified by school officials when the student fails to master some language or conceptual skills (left brain functions). Frequently, mental retardation is due to congenital or early childhood organic brain syndrome (e.g., microcephaly, hydrocephaly, cretinism, Down's syndrome) that affects both hemispheres and impairs the development of both kinds of mental abilities. If these organic factors are used as an explanation for the idiot savant phenomenon, then we would infer that organic brain syndrome has affected the left hemisphere but has permitted the development of the right hemisphere.

This organic explanation could be applied to several previously reported cases. The cases of exceptional artistic ability would be the ones most obviously ex-

plained by the different abilities of the cerebral hemispheres, but the same explanation would fit the cases of "calendar calculation" because the mechanism used by the retardates for determining the correct day of the week for a given historical date is not adherence to a conceptual algorithm but eidetic imagery (1). The life history of Mr. A, recently reported by Hoffman and Reeves (5), indicated that he always had difficulty with language skills and even as an adult could not sign his name without a model. Hoffman and Reeves inferred that the cause of retardation must have been congenital. Now an institutionalized adult, Mr. A has developed an amazing capacity to repair and modify mechanical and electrical devices. Mechanical ability is best understood as the capacity to visualize and manipulate spacial relations (7-9). Tests of mechanical ability tend to test right brain functioning, whereas IQ tests have a left brain orientation. The correlation between these two kinds of tests has been, consequently, low (10).

The following case study in many ways parallels that of Mr. A and more clearly supports the inference that organic factors have an important role in the explanation of idiot savant phenomena.

Case Report

Mr. Z was born in rural Mexico, a middle child with eight brothers and sisters. All indications were that he was born physically normal and possessed an intelligence that was at least normal. He began school at age seven and made rapid progress. His father had attained local notoriety (and some envy) for his ingenious design of the family home and his ability to repair almost any kind of device. When Mr. Z was nine years old, robbers assaulted the household, murdered the father, and plundered everything of value. During the gunfire the boy suffered a wound from a small caliber pistol. The bullet entered his left temple at the hairline and exited through the back of the head. For two years Mr. Z was mute, deaf, and paralyzed on the right side. Gradually he regained his hearing and the use of his limbs.

Speech returned somewhat more slowly, and sensorimotor as well as cognitive factors were no doubt responsible. After the father's murder, the family had moved to a different part of Mexico. When Mr. Z regained speech, he had completely shed the dialect of the region of his birth. He had also forgotten how to read, write, or do arithmetic operations. After intense practice, he relearned the alphabet and how to write the letters with his left hand. He could faithfully copy pages of written material, but even after several years of special education remains unable to write complete words or sign his name without a model (as was the case with Mr. A). He responds to questions in a very slow manner, often with long pauses looking for the next word, and is utterly incapable of making or appreciating any abstractions.

Until recently Mr. Z lived with siblings in Mexico and frequently found full-time employment as ranch hand, gardener, or factory worker. He now lives with a sibling in the United States. His right side has less muscular development, coordination, and sensation (sight, smell, touch, and taste) than the left. Nevertheless, in a short time after his arrival in this country he learned how to ride a bicycle and gradually increased his range up to 10 miles. He has never gotten lost, even though he cannot remember the names of streets. His gardening, carpentry, and mechanical talents are outstanding. Without instruction he dismantled, reassembled, and modified several multigear bicycles. He designed a punching bag that would move and simulate the bobbing and weaving action of a live opponent. He was supplied with crayons, paper, and magazines, and although he had never received any artistic instruction, he was able to accurately copy pictures. One of the most amazing things that he does is a series of tricks with strings and small objects. He demonstrates these tricks to others, and although the tricks look simple enough, no one else has been able to do them.

Mr. Z is a man of high motivation and intense practice in everything that he does. He also receives much reinforcement from his family, friends, and teachers. However, despite studying hours a day, he has been unable to learn more than a few phrases in English, read, write without a model, or do arithmetic. His unusual mechanical abilities can perhaps be traced to heredity, an undamaged right hemisphere, and, of course, sufficient motivation, practice, and reinforcement. Whether such abilities were inherited or whether they were due to some form of overcompensation (an injury to the left hemisphere stimulated the increased development of the right hemisphere) cannot be inferred from this case.

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