

**A Further Account of the Idiots Savants,  
Experts with the Calendar**

**BY WILLIAM A. HORWITZ, M.D., W. EDWARDS DEMING, PH.D.,  
AND ROBERT F. WINTER, PH.D.**

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*The authors present a further account of twins, classifiable as idiots savants, whose ability to name the day of the week for a given date in any year, and the converse, has led to conjecture on the mechanism by which they perform the feat. Their method is explained as the ability to subtract multiples of a 400-year calendar cycle from any given year.*

**T**HIS PAPER is a further account of identical twins, George and Charlie, classifiable as idiots savants, whose phenomenal ability to name the day of the week for a given date in any year was the subject of an earlier paper(1), which gave their medical history and psychological character-

istics. The purpose of this paper is to present an explanation, based on tests, of how they arrive so readily and accurately at their answers.

Examples of questions that they answer almost instantly are the following: "What day of the week was the 11th of January, 1862?" "What day will the fourth of September 9637 fall on?" "In what months will Thursday be the third day of the month, beginning with the year 2011?" In a test run, they answered 130 such questions in less than 30 minutes. They do not use paper, pencils, or other instruments.

### George and Charlie

A number of incidental observations seem pertinent to any theory of how they accomplish these mental feats. Both twins are mentally retarded, and both have an exceedingly low level of concentration, except for questions concerning the calen-

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dar. George can do sums and differences. To add 39 and 27, for example, he apparently takes one away from 27 and adds the remainder, 26, to 40 to get 66. He does not write numbers in columns or carry digits. He performs his sums mentally about as well as on paper. It takes him several minutes to do half a dozen sums of two and three digits. He can do arithmetic in the abstract, that is, without "adding oranges to oranges." His speed in arithmetic advances, however, when he deals with dates. He can answer in a flash how many days yet remain this year or how many there were last year beyond the first Monday in October. George's arithmetic ability fits in with our simple theory on how he accomplishes these calculations to be proposed later in this paper. There are considerable differences between the boys. Charlie's arithmetic is by no means the equal of George's.

The ability of the boys to name the day of the week for a given date, and the converse of such questions, resembles memory with random access. Neither boy has any comprehension of the change from the Julian to the Gregorian calendar in the 16th century. However, if allowance is made for the difference of 11 days between the two calendars, George gives correct answers back to the year zero. Neither boy can give an answer to a date in a year prior to the year zero.

Dates for Easter gave them a problem. At his first trial, George was able to name the dates for Easter over a span of close to 30 years, forward and backward from the present, with a number of mistakes. A table in the *Book of Common Prayer* shows Easter to the year 2100. The boys at first disclaimed seeing any such table, or more precisely, evaded the question—mostly, we think, for lack of concentration. This probing went on for several weeks. Eventually they agreed that they had seen such a table at home, undoubtedly in a prayer book authorized by the Roman Catholic Church. We gave George, to carry with him, a piece of paper that showed the dates of Easter to the year 2100. About one week later he did better. Two weeks later, he was able to give some right answers up to the year 2000 and back to 1910. However, he still made errors. As there are only 90

Easters in the interval 1910 to 2000, he may not have worked very hard at it.

### Investigation of Ability

How do they accomplish this? The simplest way to find out, one might suppose, would be to ask them. Their invariable answer: "My mother taught me." This is best explained by a quotation from Horwitz(1, p. 1076):

The development of George's special talent was observed at age six—it had been noted that he would spend hours poring over an almanac which contained a perpetual calendar . . . the father later got a silver perpetual calendar that George played with for hours and hours. . . . The father praised George. . . .

This seems to be the extent of parental help. It may be added that the calendar presented by the father was actually not a perpetual calendar in the usual sense, but a calendar that is reusable indefinitely, with the names of the months and 14 patterns for insert.

As the boys themselves come forth with no helpful explanation, it was necessary to probe, to ask questions about dates in some way that would indicate their method.

An impulse that comes to mind when one first hears of the performance is that the boys depend entirely on a formula for calculation of the day of the week for a given date. No such suggestion is tenable, we believe, in view of the speed of answer and in view of their complete inability to perform the necessary calculations, even with time.

One of the first steps in this inquiry was to investigate the possibility that their facility had gaps, as gaps might lead to a theory on how they do it. Are some spans of years more difficult than others? Do they retain in memory key points on the calendar and reckon backward and forward from these key points?

The main inquiry consisted of a number of interviews with the twins, separately and together, with various types of questions. Dates were selected at random, and the range of dates was altered from interview to interview and from George to Charlie. In

TABLE 1  
Record of Errors in Responses to Questions That Asked  
What Day of the Week Certain Dates Fall On

RANGE OF YEARS (A.D.) (INCLUSIVE TO EXCLUSIVE)	GEORGE		CHARLIE	
	RIGHT	WRONG	RIGHT	WRONG
100 to 1500	12	1	0	6
1600 to 1700	58	1	13	36
1800 to 1900	39	2	25	20
1900 to 2000	13	0	49	2
2000 to 2100	25	0	5	26
2100 to 2200	42	0	2	35
2200 to 2300	29	1	0	10
2300 to 2700	27	3	1	28
2700 to 4100	31	2	2	27
4100 to 40400	16	0	0	4
Totals	292	10	97	194

total, each twin answered around 300 questions. Table 1 summarizes the results.

George's range is apparently unlimited: he is as ready with the day of the week for the 16th October in the year 32011 as in the year 1911. The table suggests the possibility, however, that George is slightly more at home in the 400 years from 1900 to 2300.

Charlie, on the other hand, is about as good as George in the present century but begins to make errors in centuries earlier or later. Charlie's poor record in the table—worse than the expected one in seven that one could achieve with random numbers—arises from the fact that he was at a disadvantage: when he did not know the answer, his standard reply was Sunday, so we loaded his questions against Sunday.

Both boys answer in a flash. When they are together, Charlie usually mimics George within a fraction of a second.

George's error rate (10 in 292) was so low that one might question whether his errors were slips of the tongue or failure to understand the question. His initial failure with years like 32011 disappeared when we wrote the year on a card. His difficulty, as we suspected, was auditory perception.

## Conclusions

It is our conclusion that the twins started by memorizing a conventional calendar.

They noted that one month began where the last one left off, and they tacked months together, then years, etc. George eventually mastered the full range of 400 years. As the 400-year cycle is constant, he can connect any day and date by subtracting multiples of 400; he is aware of the subpatterns within the 400-year cycle. Charlie, on the other hand, has only learned the days and dates of the last 200 years, and he apparently makes no use of the 400-year cycle to help him in centuries past and future.

To be acceptable, a hypothesis must possess two qualifications: it must satisfy the observed data fairly well (we shall not quibble here about statistical inference); and there must be no competing hypothesis. Our hypothesis called for a definite probe into George's ability to subtract multiples of 400 years from any given year, and pointed questioning to learn whether this is really what he does. The conclusion seems justified: George subtracts rapidly multiples of 400—2000, 4000, etc.—to leave a remainder in or near the 400-year cycle that we are in at present. Only the remainder is of interest for the calendar. George was in fact helpless on the question of how many times 400 goes into 3150. Questions, admittedly of a leading nature, brought repeated affirmative answers: Yes, this is the way to do it.

The conclusion offered here is consistent with the observations in table 1, with the boys' abilities to retain other events by photographic memory; and with the prodigious and exclusive effort that they have devoted to the calendar for 15 years. No competing hypothesis, in our judgment, has been suggested.

That the boys could perform these feats of memory may not be astonishing in view of the fact that they have devoted their time to practically nothing else since they were nine years old (born the fourth of December 1939). Their interests were necessarily closely circumscribed, and their whole ambition day after day has been pinpointed toward the calendar. It may be remarked that this feat of memory is not creative, but is rote.

## BRIEF COMMUNICATIONS

### Acknowledgments

We are indebted to Dr. Jack Laderman, who took the trouble to read an earlier manuscript and to assist us in the interpretation of the material in table 1. We are further indebted to Zelda Tannenbaum for tests of the boys and for the discovery that George's ability in arithmetic is sufficient to support the hypothesis proposed in this paper. Jonathan Goldberg, New York,

attorney-at-law, himself an expert with the calendar, has been extremely helpful in the interpretation of tests and interviews with the boys.

### REFERENCE

1. Horwitz, W. A., Kestenbaum, C., Person, E., and Jarvik, L.: Identical Twins—"Idiot Savants"—Calendar Calculators, *Amer. J. Psychiat.* 121:1075-1079, 1965.