The remarkable skills of real-life "Rain Men"

Lorna Selfe and Elizabeth Newsom, could draw brilliantly at age six—in fact, she began drawing at 3-1/2, without ever going through a "scribbling" stage—but her talent faded as her speech, academic and social abilities grew.

Perhaps even more strangely, savant skills have appeared in "normal" people following brain injury or disease. And Rimland and Deborah Fein note that "a number of people at the genius or near-genius level in the 'normal' population have also exhibited some signs of autism. Many of the eccentricities—the 'absent-minded professor' habits—of geniuses such as Newton and Einstein fall into the category of autistic traits . . . The brilliant inventor and entrepreneur Howard Hughes was reported to have kept a ruler near at hand during his last two years to make sure that the chocolate cakes he had delivered to him each day measured exactly 12 inches on each side.

"It is at least possible," they say, "that some autistic individuals are incipient geniuses whose eccentricities are so severe and incapacitating that all but minimal participation in the normal world is precluded."

Researchers also note that many musically gifted non-disabled people are very good at mathematics, indicating that these two talents—common in savants—are somehow linked.

The "triad" of autism, retardation and blindness that is often linked to savant skills is interesting in light of evidence that retrolental fibroplasia—a form of blindness that can occur when infants are given too-concentrated oxygen soon after birth—sometimes causes symptoms similar to autism. In addition to such behaviors as head-banging and rocking, children with retrolental fibroplasia frequently show an unusual interest in music.

—Savant skills studied—

In general, savant abilities seem to involve memory. The most common skills are in the fields of music, art, mathematics, mechanics, directions, calendar calculations, coordination (one infant toddler walked around the rail of his crib) and "pseudo-language"—the ability to produce or reproduce words, by reading and/or writing, with only limited understanding of what the words mean.

The father of one autistic savant daughter reported that "she can type pages, error-free. No typographical errors, no spelling errors." The girl once typed, without error, a page of long and complicated sentences which she had only read once—more than a year earlier.

Some children can measure large objects or areas on sight, and others always know the exact time—even when awakened in the middle of the night. A few parents have even documented strange ESP-like abilities.

Researchers are studying savants in the hope that their unusual skills will teach us more about the workings of both savant and normal brains. Several are focusing on "calendar calculators," people who, given a particular date—say, February 2, 1754—can instantly tell what day of the week that date fell on.

Michael J.A. Howe and Julia Smith recently studied a 14-year-old boy with an IQ of around 50 and autistic characteristics, and compared their findings with those of similar studies. They conclude that:

—Calendar calculators are self-taught, and most (but not all) are fascinated by calendars. The authors note that "a person of normal intelligence would find it extremely difficult, if not impossible, to devote sufficient hours to calendars to acquire the knowledge possessed by the most successful mentally retarded calendar calculators, largely because so many other things are more interesting."

Perhaps the savant can "zero in" on physical details, but cannot "zero out" and deal with general, abstract concepts.

—These savants use techniques different from any available published methods. In some cases, the researchers note, "individuals have been able to succeed at several types of difficult calendar problems that cannot be solved by any readily available algorithm."

—The calendar skills of these savants do not generalize. "There are no records," the researchers say, "of any of these people using, applying or adapting their competence to tasks or problems other than ones that directly involve calendar dates."

—Some (possibly most) calendar calculators use visual imagery, and report "seeing" information when solving calendar questions. However, this is not true of some calendar savants, including a blind girl with no access to braille calendars.

—Calendar calculators know a great deal about days and dates, and the best calculators understand calendar regularities and date sequencing. "The calendar information [the best calculators] possess does not simply involve large numbers of single dates, but is structured and organized in larger units of at least a month," the researchers say. However, calendar savants are unable to articulate any but the simplest calendar rules.

—Most calendar savants are solitary, withdrawn people "capable of ignoring the outside world while they attend to their thoughts." They do, however, appear to like the attention their abilities attract, leading Howe and Smith to speculate that they spend much time doing calendar calculations because "the feats bring social rewards without incurring the usual social costs."

B. Hermelin and N. O'Connor, who studied eight calendar calculators, found that all used at least some strategies based on rules of calendar structure. While all the savants they tested were retarded, the ones with the highest IQs used the most rule-based strategies, indicating that savant skills are not entirely independent of IQ.

They also found that musical savants can improvise, rather than just memorizing pieces, and that they understand musical rules and structures. Savants' memory capacity, they concluded, "(is) not only of an automatic and mechanical kind, but (is) also based on the extraction and subsequent accessing of rules, regularities and structures." Also, they discovered that while artistic savants' ability to match and recognize designs was linked to IQ, copying and reproduction skills depended on artistic ability and were independent of IQ level.

—What causes savant syndrome?—

Why can the savant—particularly the autistic savant—do things we can't?

Dr. Edward Ritvo says that "some of the feats performed by autistic savants only appear to be unusual. It [savant ability] stands out as if it's an area of brilliance, whereas it really isn't. If they put their minds to it, other people can, for instance, learn to do the calendar trick . . . " Ritvo believes that savant skills are attributable not to some special mental ability, but simply to practice. "If you only have one or two notes on a piano, and you keep playing those notes, you get pretty good at those two," he comments.

Rimland contends that practice cannot begin to account for the more remarkable savant skills, nor their early appearance. He suggests that the autistic savant is able to "zero in" on physical details, but not to "zero out" and deal with general, abstract concepts (see page 3). The autistic savant, Rimland suggests, is unable to broaden his focus of attention because of abnormalities in his brain.

Because autistic children have difficulty orienting on different stimuli around them they may exist in a chronic state of "hypodistractibility," causing a lack of drive for novelty that Rimland and Fein say "may allow the opposing behavioral tendency, namely, the drive for repetition and familiarity, to hold sway. This would reinforce the practice of [a] skill at the expense of a more varied and flexible behavioral repertoire."

Rimland and Fein suggest that part of the answer to the savant mystery may lie in the hippocampus—a part of the brain's limbic system, which plays a large part in emotions and memory (see related article on page 4). Citing theories that the hippocampus helps

Continued on page 7