

DIFFERENT STROKES

By BRUCE BOWER

Tiffany Field reaches through the portholes of a hospital incubator and places her warmed palms on the body of the infant inside. There is not much for Field to touch — the baby was born one month prematurely and tips the scales at barely 3 pounds—but she begins to gently stroke the little survivor. For 5 minutes her hands delicately caress his body, from the top of the head to the neck, across the shoulders, up and down the back and along the arms and legs. She then sits him up and carefully moves his limbs in predetermined patterns for the next 5 minutes. Another brief mini-massage follows.

Field, a psychologist at the University of Miami Medical School, is doing more than soothing the infant; she is helping him to gain more weight, become more active, show increased alertness and respond more appropriately to his surroundings than “nonstimulated” babies in the nursery. Premature babies given short sessions of body stroking and limb movement not only reap these benefits but also leave the hospital earlier and rack up markedly lower medical bills than comparison infants, report Field and her colleagues in a study to appear later this year in *PEDIATRICS*.

A potpourri of interventions with premature babies, also called preterms, have been examined in the last two decades. Several studies of both humans and animals suggest that stroking and movement encourage early weight gain, but other than that “very little is known about stimulation effects on preterms,” said Field at the recent American Psychological Association (APA) meeting in Los Angeles. Prior research, she adds, has concentrated on relatively healthy infants.

Field and her co-workers studied 40 premature babies in a transitional care “grower” nursery. The infants were stable enough to be released from the intensive care unit and no longer needed extra oxygen or intravenous feedings. But their medical problems were severe enough to have required an average of 20 days of intensive care, and the heaviest among them was still under 4 pounds. Their average age at birth was 31 weeks.

Half of the group was randomly chosen to receive touch and movement stimulation for three 15-minute periods per day over 10 consecutive weekdays. Treatments took place after morning bottle-feedings. Each “stimulation session” began with 5 minutes of body stroking, followed by 5

The touch of a hand and sway of a bed can have far-reaching effects on premature babies encased in incubators



An investigator begins the delicate task of stroking a premature baby. The infant looks oblivious to the procedure, but its effects are profound.

minutes of limb movement and 5 more minutes of stroking. Stimulation techniques were standardized at 12 strokes per minute and 6 flex/extend movements per minute and performed by the researchers, not nurses.

Although most of each infant's body was stroked, “we don't massage the chest,” notes Field, “because the babies don't like it. It may be a form of negative conditioning from having so many invasive procedures performed in that area.”

Nevertheless, treated infants averaged a 47 percent greater weight gain per day with the same number of feedings and same level of calorie intake as the control babies. The stimulated group also was awake and physically active a greater percentage of the time. This combination of results is surprising, says Field. “Since the experimental kids were more active,” she explains, “their weight gain was not due to greater energy conservation.” The Florida researchers are now preparing a larger study in which they will analyze the physiology of preterms given touch and movement stimulation to see if more active babies metabolize food more efficiently.

Infants in the treatment group also out-distanced controls on a number of behavioral measures. These include the ability to tolerate a stimulus, such as a brief buzzing noise or a rattle, after several exposures; to orient quickly to a new stimulus and to show a healthy range of emotions and behaviors. “The experimental infants

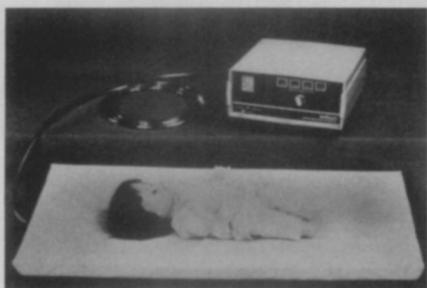
were less likely to cry one minute, then fall asleep the next minute,” says Field. “They were better able to calm and console themselves.”

Consoling to the investigators was the finding that babies in the stimulation group were hospitalized 6 days fewer than controls, with an average hospital cost saving per infant of \$3,000.

An 8-month follow-up shows that preterms given touch and movement sessions are longer, heavier, have larger heads and fewer signs of neurological problems than their counterparts, adds Field.

Although physicians and nurses who treat premature babies are understandably anxious to put promising new treatments to use, “I don't want massage techniques to be adopted too quickly,” she maintains. Further studies are needed to determine whether stimulated infants are consistently active and alert over longer periods of time. Neuroendocrine and metabolic efficiency measures should help to clarify the relationships between stimulation, physical activity, stress reduction and weight gain, says Field.

Another type of movement stimulation with preterms — developed, appropriately, in California — involves gently swaying, miniature waterbeds. Flotation beds appear to reduce irritability and potentially dangerous sleep disturbances, said psychologist and research director Anneliese F. Korner of



Oscillator and waterbed, on which a doll lies, used by Stanford researchers.

Stanford University at the APA meeting.

Studies conducted by Korner and her colleagues in the early 1970s convinced her that healthy full-term infants are "exquisitely sensitive" to movement stimulation throughout early development. Around the same time, William Mason of the University of California at Davis made similar observations with monkeys. As in the famous experiments of University of Wisconsin psychologist Harry F. Harlow, Mason reared infant monkeys in isolation with wire-mesh "surrogate mothers." Harlow produced autistic-like, self-mutilating monkeys who rocked back and forth, but Mason significantly offset these behaviors by using swinging, rather than stationary, surrogates.

These findings prompted Korner to consider the plight of premature infants kept alive in incubators, but deprived of normal movement sensations in the womb and the rocking of a crib or a mother's arms. Waterbeds were "the most gentle way I could think of," she says, to shake up the enclosed environment of preterms. The tiny beds are attached to oscillators that generate a head-to-foot rocking motion of about 2 millimeters, so slight it can barely be seen. Continuous oscillations of between 12 and 14 pulses per minute — within the average range of mothers' respirations during the third month of pregnancy — are used, as well as intermittent

oscillation periods that run for 25 minutes, then stop for 65 minutes. The latter set-up is based on an estimated 90-minute rest-activity cycle for infants.

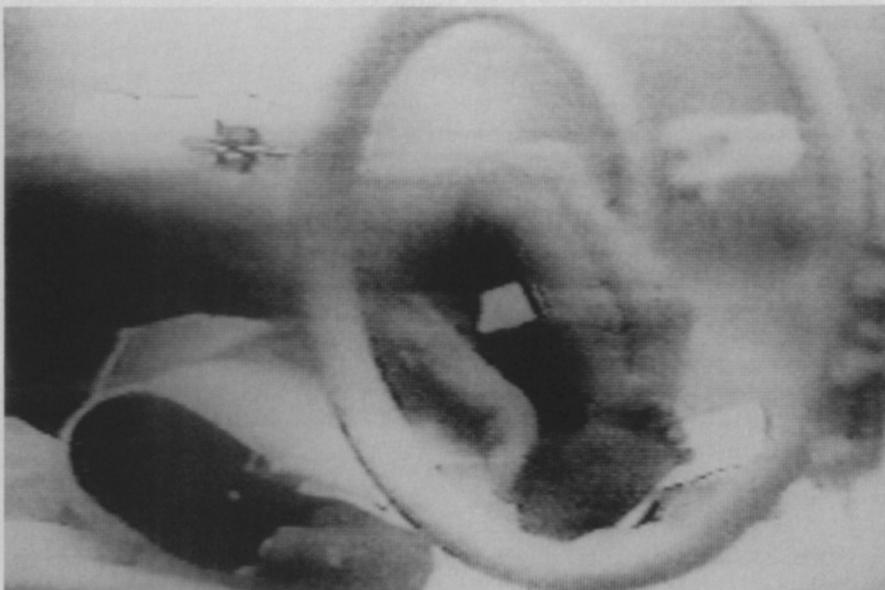
The results of five waterbed studies conducted so far are relatively consistent, says Korner. Better physical coordination, quieter sleep and less irritability characterize small groups of preterms kept on waterbeds. They also have significantly fewer apneas during sleep. These repeated episodes of breathing cessation can, in severe cases, cause brain damage. Together with evidence that preterms raised on waterbeds have rounder, more naturally shaped heads and are more alert and responsive to others, "this may make them more appealing babies for their parents," notes Korner.

Fostering a child's "appeal" is a big step, she explains, since the 7 percent of youngsters born prematurely are disproportionately represented among victims of child abuse, "largely because they tend to be more difficult to raise."

The Stanford scientists have not, however, observed weight gains for waterbed babies when compared with controls. It may take stronger oscillations to provoke changes in metabolism and calorie uptake, says Korner.

Some intensive care units treating premature infants are beginning to use oscillating waterbeds, she points out. But the behavioral and biological consequences of flotation beds, as well as those of mothers' traditional arm and crib rocking, are not clear. In a current study of about 60 relatively healthy preterms, Korner and her colleagues plan to compare the effects of continuous and intermittently vibrating waterbeds with the changes, if any, provoked by waterbeds that do not move.

Whatever the findings, preterm infants are in for some moving — and touching — experiences in the future. □



An incubated infant's tiny legs get a workout with some outside help.

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Cohabiting with Computers — Joseph F. Traub, Ed. Essays by leading experts in high technology, computer science and engineering designed to help the general reader and professional alike to better understand the meaning, promise and challenges of the computerization of human society. W Kaufmann, 1985, 185 p., \$15.

Constructing the Universe — David Layzer. Describes in text and illustrations the two great modern theories of space, time and gravity — Newton's and Einstein's. Goes on to discuss the theories of cosmic structure and evolution that have been built on them. Sci Am Bks (WH Freeman), 1985, 313 p., color/b&w illus., \$27.95.

Decline and Fall: The Ailing Nuclear Power Industry — Peter Stoler. "The condition of the U.S. nuclear power industry is critical," says the author, "but not irreversible." Here he traces the development of the industry, shows what went wrong and what he feels must now be done to correct the situation. Dodd, 1985, 197 p., \$16.95.

Invitation to Archaeology — Philip Rahtz. The aim of the author is to show that archaeology is important to people and to society, that it is stimulating and educational and will enrich the life of anyone who becomes involved in it. Basil Blackwell, 1985, 184 p., illus., \$24.95, paper, \$7.95.

McGraw-Hill Dictionary of Biology — Sybil P. Parker, Editor in Chief. The 15,000 entries were selected from the *McGraw-Hill Dictionary of Scientific and Technical Terms*, 3rd edition. Each definition is identified with the specific area of biology in which the term is used. McGraw, 1985, 384 p., paper, \$15.95.

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McGraw-Hill Dictionary of Physics — Sybil P. Parker, Editor in Chief. Includes some 11,200 definitions for 18 different specialties within physics. Each definition identifies the field of physics in which the term is used. McGraw, 1985, 646 p., paper, \$15.95.

The Space Program Quiz & Fact Book — Timothy B. Benford and Brian Wilkes, introduction by Frank Borman. A fascinating collection of facts, anecdotes and little-known details about the manned space program, presented in a question-and-answer format. Har-Row, 1985, 257 p., illus., \$13.95, paper, \$8.95.