whereby oxidative and photosynthetic energy is transformed into the specific form of chemical energy used by living cells."

• Edward O. Wilson of Harvard University, "for his pioneering work on the organization of insect societies and the evolution of social behavior among insects and other animals."

In the engineering sciences awards went to:

• Morris Cohen of the Massachusetts Institute of Technology, "for original research in metallurgy, leading principally to better understanding of the properties of steel."

• Peter C. Goldmark, formerly of CBS, now with Goldmark Communication Corporation in Connecticut, "for contributions to the development of the communication sciences for education, entertainment, culture and human service." Carter remarked that he was particularly grateful to Goldmark for developing the long-playing record.

• Erwin Mueller (deceased May 17, 1977), "for his invention of the field-emission microscope, the field-ion microscope and the atom-probe microscope, which helped to resolve the atomic structures of solids."

In the mathematical sciences awards went to:

• Kurt O. Friedricks of New York University, "for bringing the power of modern mathematics to bear on problems in physical sciences."

• Hassler Whitney of the Institute for Advanced Studies in Princeton, N.J., "for founding and bringing to maturity the discipline of differential topology."

In the physical sciences awards went to:

• Samuel A. Goudsmit, emeritus deputy chairman from Brookhaven National Laboratory, now at the University of Nevada, "for the major discovery, together with George Uhlenbeck, of the electron spin as the source of a new quantum number."

• Herbert S. Gutowsky of the University of Illinois, Urbana, "in recognition of pioneering studies in the field of nuclear magnetic resonance spectroscopy."

• Frederick D. Rossini of Rice University, "for contributions to basic reference knowledge in chemical thermodynamics."

• Verner E. Suomi of the University of Wisconsin in Madison, "as a distinguished meteorologist, he has provided a new view of the dynamics of our atmosphere."

• Henry Taube of Stanford University, "in recognition of contributions to the understanding of reactivity and reaction mechanisms in inorganic chemistry."

• George E. Uhlenbeck of Rockefeller University, "for the major discovery, together with Goudsmit, of the electron spin as a source of a new quantum number."

At the end of the awards ceremony the president, himself, received a presentation. Medal recipient Goldmark gave Carter the first experimental pressing of a long-playing record. □

Look into my eyes: An infant's view

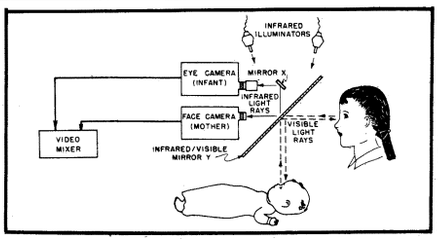
Newborns' visual behavior is both a marvel and a wonder to parents. But how interested are infants in what their parents look like? What elements in faces attract infants the most, and under what conditions?

Because eye movements are among the earliest of social behaviors as well as a crucial factor in the attachment of infant to parent, psychologists have studied them in detail. But past research has had several serious drawbacks. Face photographs, drawings and masks have often been used instead of real faces, and procedures have generally not allowed for precise identification of where on the face infants look. Marshall M. Haith of the University of Denver and Terry Bergman and Michael J. Moore of Harvard University have now explored infant eye movements in more detail. They report in the Nov. 25 SCIENCE that parental faces do not interest infants any more than strangers' faces do. However, the manner in which newborns look at human faces changes as they grow older. Three-to-five-week-olds focus mostly on the edges of faces, whereas 7-week-olds and 9-to-11-week-olds look a lot at the eyes, particularly when the faces are talking.

Twenty-four infants equally divided across three age groups—3 to 5, 7, and 9 to 11 weeks — participated in the study. Each infant lay prone under a mirror tilted to a 45-degree angle. From the position of either the adult or the infant, the other face appeared upright and directly in the line of sight. Behind the mirror were two television cameras mounted horizontally. The lower camera recorded the adult's face through the mirror, and the upper infrared camera recorded the image of the infant's right eye through the mirror by reflection from another small, front surface mirror. Two bulbs, located at either side of the infant's head, provided visual illumination.

The beams of the lights passed through specific points at the plane of the virtual image of the adult's face and converged on the infant's eye. Infrared filters and heat filters in front of the lamps transmitted invisible bands of light; the upper infrared television camera recorded the image of the eye with the reflections of these lights. Because the positions of these lights in the infant's visual field were known, fixation points could later be determined by measuring the distance of one of the lights from the center of the pupil.

Each infant was presented both the mother's and a stranger's face either while still, moving or talking to the infant. For half of the subjects in each age group, the stranger was a male, and for the other half a female. All possible presentation orders of conditions and faces were used within each age group. Each condition lasted 45 seconds. During the experiment, the outputs of two television cameras were alternately switched to a videotape recorder — one-half a second for the infant's eye and one-thirtieth for the adult's face.



Haith et al/Science

The infant's fixations on the adult's face were determined by first recording alternate eye and face frames from the videotape playback. The positions of hairline, eyes, nose, mouth, chin and ears on the adult's face were measured on 10 face frames. For each condition, the facial features were plotted with the sequence of the infant's fixations superimposed. The data were then analyzed.

As for the experimental results, none revealed a visual preference of infants for mother over stranger. The 3-to-5-week-olds spent more time looking at the edges of adults' faces than at their features. In contrast, 7-week-olds and 9-to-11-week-olds focused much more on adults' eyes than on other areas of their faces, especially while the adults were talking to the infants rather than just being still or moving. The researchers had expected just the opposite — that talking would distract the infants from the eyes.

How do these findings relate to early perceptual and social development? The attraction of 3-to-5-week-olds to facial edges supports earlier data showing newborns' attraction to contours, the investigators say. Clearly the previous suggestion that faces are seen as faces by newborns is not supported by these results. One interpretation of the dramatic shift in looking away from the edges of the face and toward the eyes (between 3 and 7 weeks of age) is that the face has changed its status from a mere collection of items to a meaningful entity.

But why do infants eventually zero in on adults' eyes rather than on other features? If the face were seen as a whole, the central location of the eyes as well as their symmetry would make them compelling components, the scientists conjecture. The eyes probably do not attract infant interest because of their movement, color or contrast since the researchers found that, if anything, the increase in lip movement and lip-tooth contrast associated with talking led to increased fixations on the eyes. Why does this happen? The researchers aren't sure.

In any event, they conclude that newborns' increasing interest in adults' faces, and particularly in their eyes, plays a crucial role in bonding between infant and caretaker. □