presumably present in most quasars.

The popular association between redshift and distance derives from an apparent, direct linear correlation, first noted by the American astronomer Edwin P. Hubble in 1929, between the distances of certain celestial objects and the speeds at which they are receding from us (and every other point in the universe for that matter). Using telescopes—in this case optical ones—astronomers can infer a body's recession speed by measuring the amount by which its radiation is shifted toward the red end of the spectrum; the amount is assigned an index value, z.

The two authors, reporting in the July 15 ASTROPHYSICAL JOURNAL, note that the six quasars were selected from a larger assortment recently observed using Cerro Tololo's 1.5- and 4-meter telescopes, outfitted with a special prism spectrometer. The astronomers' goal is to infer the prevalence of high-redshift quasars in the sky from those seen.

The fifth high-redshift quasar (Q1402+044) was identified by David L. Jauncey of the Commonwealth Scientific and Industrial Research Organization in Australia and Phillip Hicks and James J. Condon of Virginia Polytechnic Institute and State University. Their discovery will be announced in a forthcoming issue of ASTRONOMICAL JOURNAL.

Although many quasars of all redshifts surely remain undiscovered, there were 637 in the latest published list of February 1977 (AP. J. SUPPLEMENT, 33:113). □

Language in deaf children: An instinct

The acquisition of language has always been one of the more intriguing aspects of childhood development. "The child of English-speaking parents learns English and not Hopi, while the child of Hopi-speaking learns Hopi, not English," note Susan Goldin-Meadow of the University of Chicago and Heidi Feldman of the University of California at San Diego School of Medicine.

"But what if a child is exposed to no conventional language at all?" the researchers ask in the July 22 SCIENCE. "Surely such a child, lacking a specific model to imitate, could not learn the conventional language of his culture," they say. "But might he elaborate a structured, albeit idiosyncratic, language nevertheless? Must a child experience language in order to learn language?"

In attempting to answer that question, Goldin-Meadow and Feldman videotaped six deaf children in their homes for one to two hour sessions at six- to eight-week intervals. The 17- to 49-month-old children—four boys and two girls of "normal intelligence"—had not been exposed to manual sign language because their parents wanted to expose them to oral education. Yet none at that point had acquired significant knowledge from their oral-education program.

The youngsters were observed and taped during informal interactions with a researcher, their mother and a standard set of toys. The researchers found that the deaf children "developed a structured communication system that incorporates properties found in all child languages. They developed a lexicon of signs to refer to objects, people and actions, and they combined signs into phrases that express semantic relations in an ordered way."

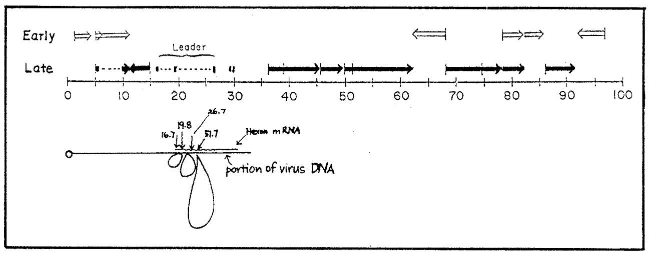
Perhaps most importantly, the experimenters found, through a complex coding system, that it was indeed the children, and not their parents, who actually devised the communication system. Though the mothers did use "some gestures" in their interaction with the youngsters, "a comparison of the mothers' and the children's signs suggests that indeed it was the children who first produced the system," report Goldin-Meadow and Feldman. Only 25 percent of the signs produced were common between mother and children, and there was "no evidence" that the children were imitating their mothers, say the researchers.

The deaf youngsters' systems were composed of:

- Lexicon. Two types of signs were developed to refer to objects and actions. For example, they would point to signify words such as "this" or "there." Or, a closed fist bobbed in and out near the mouth referred to a banana or the act of eating a banana; hands flapped at shoulder height referred to a bird.
- Syntax and Semantics. The children linked their lexicon into multisign phrases that conveyed relations between objects and actions. For instance, one child pointed at a jar and then produced a twisting motion in the air. Another child opened his hand with his palm facing upward and then followed this with a "give" sign with a point toward his chest.

"We have shown that the child can develop a structured communication system in a manual mode without the benefit of an explicit, conventional language model," the researchers conclude. They compare the findings with the "meager linguistic achievements of chimpanzees," where chimps have been shown to develop languagelike communication, but only with training. "Even under difficult circumstances, however, the human child reveals a natural inclination to develop a structured communication system," say Feldman and Goldin-Meadow. □

Animal genes do it differently



DNA loops reveal spliced nature of messenger RNA for an animal virus protein, hexon.

Adapted from Louise T. Chow et al. and Nature

Geneticists were recently amazed, fascinated and bewildered by results relating to how information in DNA is conveyed to the protein factories of the cell. Years of experiments on bacteria and their viruses had produced a clear model: The information carrier, messenger RNA, is copied from a continuous stretch of DNA. The copy begins with a start signal, continues through one or more related genes, and ends at a stop signal. Now it appears that animal genes may issue their directives in a substantially different way.

During a week-long meeting at the Cold Spring Harbor Laboratory in New York early last month, several different laboratories presented independent evidence that messenger RNA of a virus infecting human cells must be synthesized by a novel mechanism. (Investigators expect the genes of a simple animal virus to operate similarly to those of animal genes, since both kinds of DNA can direct protein synthesis in the same type of cells.)

The unexpected result of studies using a variety of techniques is that the messenger RNA copied from at least five different adenovirus-2 genes all begin with the same "leader" stretch of about 150 nucleotides. The pattern for that leader is located in three separate pieces on the viral DNA molecule, a distance from any of the genes (shown by the filled arrows to the right of the leader on the diagram).

All the messenger RNA molecules with the apparently identical leader sequences represent what biologists call late proteins. These proteins are synthesized only during the later phases of cell infection, at the time when DNA is also being made to pack into the new viruses. The leader sequence may play a role in regulating the expression of late protein genes, the researchers propose.

Evidence for the spliced messenger RNA includes direct analysis of the molecules. All the major species of late messenger RNAs appear to begin with an identical (or very similar) 11-nucleotide