PHRASES

From the time Washoe had eight reliable signs in her vocabulary she began to combine them in meaningful phrases such as, GIMME SWEET (when shown a jar of baby food dessert), COME OPEN (after the bathroom door was locked) and MORE TICKLE (after Naomi, a member of Washoe’s foster family, had tickled Washoe). Shortly after the publication of the first twenty-two months of Project Washoe, D.O. Hebb of McGill University sent Allen and Trixie a reprint of Hebb and Thompson's chapter on comparative psychology which appeared in the (1968) *Handbook of social psychology*. Hebb put a bracket around the following passage:

> We propose therefore that the minimal criterion of language, as distinct from other purposive communication, is twofold. First, language combines *two or more* representative gestures or noises purposefully, for a single effect; and second, it uses the *same* gestures in different combinations for different effects, changing readily with circumstances. (p. 739)

In the margin, Hebb wrote "This criterion means Washoe has achieved language." As flattering as is Hebb’s comment, the Gardners resisted all such either-or/yes-no criteria. They reasoned that just as in the speech of human children, the first combinations only mark the beginning of a long process of growth and development in the sign language of cross-fostered chimpanzees (B. T. Gardner & Gardner, 1994). The Gardners found developmental patterns in phrase token (see figure 2), types, and patterns. A phrase
Figure 2. Growth of Phrase Tokens

token in these analyses were defined as an utterance with two or more different signs within two utterance boundaries. An example of utterance boundary would be when Washoe finished signing and her hands dropped out of the signing space (for a detailed description see B. T. Gardner & Gardner, 1994). To measure the variety of phrases, the Gardners grouped all the tokens into types according to the signs that they contained. For this purpose, all phrases that contained the same signs, as CAN'T POTTY, POTTY CAN'T, POTTY CAN'T CAN'T, and CAN'T POTTY CAN'T POTTY CAN'T (recorded for Dar in his 36th month) were counted as different tokens of a single phrase type containing the same two signs CAN'T and POTTY (see figure 3). A phrase pattern is a set of phrase types that are structurally related because they all contain signs that belong to the same semantic categories. Thus, GROOM DAR, YOU TICKLE, and SUSAN CHASE are three distinct phrase types, but each contains one sign that belongs to the category, person, and a second sign that belongs to the category, verb, so all three phrase types belong to the structurally related set for this purpose called person + verb. Similarly, BLACK HAT, GLASS MIRROR, and YOUR SHOE, are three distinct phrase types, but each contain one sign that belongs to the category, object, and a second sign that belong to the category, attribute, so all three of these belong to the structurally related set for this purpose called attribute + object. Developmental pattern were also found with the cross-fosterling for phrase patterns (see figure 4). INFLECTION

Among the languages of the world, English is unusual in its heavy reliance on
Figure 3. Growth of Phrase Types

Figure 4. Growth of Phrase Patterns

word order; most human languages rely more on inflections. ASL is one of the heavily inflected languages of the world (Klima & Bellugi, 1979). Wilber (1980) argued that:

the key to understanding ASL syntax, particularly word order, is the recognition that locations in space are used for inflectional purposes. Within the ‘signing space’ (the allowable area in which signs may be made), signs may be moved from one location to another to indicate differences in subject and object. (p. 19)

We can see this type of inflections with cross-fostered chimpanzees. Videotape records of Dar taken when he was between 40 and 49 months old show that he indicated participants in action with the childish form, touching person, place, or object (Rimpau, Gardner & Gardner, 1989). For example, Dar signed TICKLE (on the side of his head) TICKLE (on the dinosaur toy) ME indicating that Tony was to tickle Dar’s head with the toy.

CULTURAL TRANSMISSION

On March 24, 1979 Washoe adopted a ten-month old male chimpanzee named Loulis. To show that Loulis could learn signs from chimpanzees, human being did not use ASL signs in his presence (with the exception of seven question signs, WHO, WHAT, WHERE, WHICH, WANT, SIGN and NAME). Instead Fouts and his associates (1989) used vocal English and the rich repertoire of human and chimpanzee nonverbal gestures, postures, and calls to interact with Washoe and Loulis.

While humans refrained from signing to Loulis, the chimpanzees were not bound by this rule. In addition to his adoptive mother Washoe, the other cross-fostered
chimpanzees Moja, Tatu, and Dar interacted with Loulis at various stages of the five years. During this five year period Loulis had acquired over 50 signs (Fouts, Fouts & Van Cantfort, 1989). This is the first study to demonstrate the cultural transmissions of ASL signs in chimpanzees.

CONCLUSIONS

The Gardners have always argued that truly discontinuous phenomena must be rare in nature. Historically, the great discontinuities have proved to be conceptual barriers rather than rifts in the fabric of the natural world. It seems unlikely that a phenomenon as rich as language could be based on an isolated, unitary biological trait. It is more reasonable to suppose that language is the result of a complex of interacting traits running through all aspects of human intelligence. Following the same line of reasoning they would argue that, similar to other significant biological phenomena, the general principles that govern human intelligence are related to the general principles that govern the intelligence of all animals. This search for general biological principles of intelligence led them to sign language studies with cross-fostered chimpanzees (R. A. Gardner, Van Cantfort & Gardner, 1992).

I would like to conclude with the opening line of the Van Cantfort and Rimpau’s (1982) paper; "With the beginning of Project Washoe in 1966 a new field of scientific inquiry opened. Sign language studies with chimpanzees provided a new tool for studying linguistic behavior as an expression of intelligence and for understanding the
continuity between human and non-human intelligence" (p. 15). It is to Trixie Gardner and her husband Allen that we attribute the genesis of this pioneering body of research.

References


