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# Propagation of Handclasp Grooming Among Captive Chimpanzees

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A grooming posture previously reported for two wild chimpanzee (*Pan troglodytes*) communities developed spontaneously in a captive group of the same species. This offered a unique opportunity to follow the propagation of a new social custom. The posture consists of two partners grasping hands—either both right hands or both left hands—and raising the arms in an A-frame above their heads while mutually grooming with their free hands. The propagation of this pattern was followed over a 5 year period. In the beginning, handclasps were always initiated by the same adult female. This female initiated the posture mainly with her adult female kin. In subsequent years, these relatives became frequent participants in the posture with each other as well as with nonrelatives. Over the years the posture increased in frequency and duration and spread to the majority of adults and also to a few adolescents and older juveniles. The pattern persisted after removal of the apparent originator. Am. J. Primatol. 43:339–346, 1997. 

**Key words: *Pan troglodytes;* culture; grooming; custom**

## INTRODUCTION

Learning is the most likely mechanism underlying differences in behavior between populations of the same species that live within a distance at which genetic exchange is likely or possible. If these differences are linked to environmental differences, such as the availability of different food types, this learning may be largely individual, but there is increasing evidence for social or cultural learning as well. In 1952, Kinji Imanishi defined culture as "socially transmitted adjustable behavior" [quoted in Nishida, 1987, p. 462]. In this broad sense, cultural learning is widely accepted by students of animal behavior (e.g., Kummer, 1971; Menzel, 1973; Bonner, 1980; Tomasello, 1990; McGrew, 1992; Wrangham et al., 1994; de Waal, 1996).

There are indications in wild chimpanzees (*Pan troglodytes*) of group-specific technologies [reviewed by McGrew, 1992], vocalizations (Mitani et al., 1992), courtship displays [Nishida, 1980], and grooming postures [McGrew & Tutin, 1978]. In captivity, one of the best-documented local traditions is the rhythmic hand- and foot-clapping during grooming in bonobos (*Pan paniscus*) at the San Diego

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Zoo. Over the years, transmission of this pattern took place: these group-specific gestures were adopted by several individuals introduced as juveniles into the San Diego colony [de Waal, 1989, 1994].

Research on captive apes may assist our understanding of the origin of intergroup behavioral diversity. The transmission of novel behavior can be followed in detail and manipulated by moving individuals from one group to another. Sometimes we may witness the gradual establishment of a new tradition. The present report concerns one such opportunity in a well-established chimpanzee colony in which a behavior pattern appeared that was first reported for one community of wild chimpanzees by McGrew and Tutin [1978] and later found in another community in a different part of Africa by Ghiglieri [1984].

The pattern, known as the grooming handclasp, was seen 14 times in K group by McGrew and Tutin [1978] during a visit to the Mahale Mountains field site in Tanzania, whereas the same pattern had (and has) never been reported for the intensely studied Gombe Stream chimpanzees, who live only 170 Km to the north. The authors believe it "unlikely that the two populations had time to differentiate markedly through genetic drift" [McGrew & Tutin, 1978, p. 235]. K group in Mahale is now extinct, but in 1996 handclasp grooming was common in M group at the same research site [McGrew & Marchant, personal communication].

The grooming pattern is described as follows: "Each of the participants simultaneously extends an arm overhead and then either one clasps the other's wrist or hand, or both clasp each other's hand. Meanwhile, the other hand engages in social grooming of the other individual's underarm area revealed by the upraised limb, using typical finger movements. In doing this, the two chimpanzees sit facing each other on the ground in a symmetrical configuration. Either both raise their right arms and groom with their left, or vice versa" [McGrew & Tutin, 1978, p. 238]. The authors went on to note that the pattern was seen only in adults and adolescents, that both sexes took part in the activity, and that it was part of longer grooming bouts in which other postures occurred. The duration of handclasps ranged from 3–60 s, with a median of 15 s.

Ghiglieri (1984) clearly refers to the same posture when he describes a social convention in the Kanyawara community of chimpanzees in Kibale Forest, in Uganda, as follows: "one individual, usually the groomer, grasped the hand of its partner and held it aloft. The groomer then had only one hand available for grooming" [Ghiglieri, 1984, p. 145]. The handclasp was said to result in an A-frame grooming posture, which occurred during 38% of all nonmaternal grooming bouts in the Kanyawara community, whereas the same posture was never seen once in 200 grooming sessions in the Ngogo community [Ghiglieri, 1988]. The two communities were within 2–4 h walking distance of each other. In 1997, the handclasp posture was still common in the Kanyawara community [McGrew & Marchant, personal communication].

## MATERIALS AND METHODS

The present study was conducted on a group of approximately 20 chimpanzees, including one adult male and eight adult females. The adult male was new to the group, introduced a year before the study's onset. Some of the adult females had been together for 15 years prior to his introduction. Two of the partner combinations among the nine adults were maternal relatives (both mother–daughter); the other 34 adult–adult combinations were unrelated. All juveniles and infants in the group had been born to the adult females. Group composition did not change during the study except for the birth of three infants into the colony, several tem-

porary removals for veterinary reasons, and the permanent removal of one adult female by the end of 1993 and another one by the end of 1996.

The colony lived in an outdoor compound of 750 $m^2$ at the Field Station of the Yerkes Regional Primate Research Center, near Lawrenceville, Georgia. The compound was equipped with vertical climbing structures and visual barriers. At night and when the weather was cold, the group could enter a heated indoor area. Observations took place from a tower with an unobstructed view of the entire compound.

Observations were conducted for 5 consecutive years, from January 1, 1992 through December 31, 1996. The number of observation hours per year was 348 in 1992, 306 in 1993, 222 in 1994, 94.5 in 1995, and 96 in 1996. The year of 1996 has been subdivided because a critical individual in this study, named Georgia, was permanently removed for management reasons on September 11, 1996; period 1996a is before and 1996b after this date.

Data collection during 90 min observation sessions included 5 min scan samples of state behavior patterns (e.g., affiliative contact, play) and point events such as mount, mate, kiss, embrace, submissive pant–grunt, intimidation display, hoot, and aggression. Most important for the present study, grooming bouts were recorded with an all-occurrences sampling technique covering groomer, groomee, and bout duration in seconds. Handclasp grooming was recorded whenever it occurred, noting the initiator of the bout (i.e., the first to raise his or her arm), the partner, and the duration of the clasping posture in seconds.

## RESULTS

### First Observations

Handclasp grooming was first noticed in the chimpanzees at the Yerkes Field Station in January, 1992. Over the course of that year, 11 more instances were seen. All 12 instances were initiated by the same female, named Georgia, with four different partners. Georgia was born in the study group in 1980 and had never been removed except for short periods related to routine veterinary care.

The handclasp pattern has never been reported for other captive chimpanzees. Based on thousands of hours of observation, the pattern can be said to be wholly absent in a same-sized group of chimpanzees at the same Field Station [authors, personal observation] as well as in the large Arnhem Zoo colony [de Waal, personal observation].

The grooming pattern in our group was identical to that described by McGrew and Tutin [1978] and Ghiglieri [1984] in that both individuals grasp each other's hand or wrist (either both left hands or both right hands) while mutually grooming with the other hand in the area on the chest and under the armpit of the opposite limb. Rarely, the arms are incompletely extended so that the two partners grasp each other's elbows, but in most cases the arms are fully extended, resulting in the typical A-frame (Fig. 1).

If the apes have overhead objects to hold on to (e.g., chain-link fence or climbing frames), they may make the same upward movement of the arm during grooming but resulting in contact with the object rather than each other's hands. Sometimes the upraised limb posture is adopted by both partners with their hands close to each other. An arm may also be raised by a single individual, usually a juvenile, in a groom present during or just before being groomed by another, usually an adult. These postures suggest that groom presenting and reaching for overhead support may be the origin of the handclasp posture. These possible precursor postures are common in both wild [McGrew & Tutin, 1978] and captive chimpanzee populations [de Waal, personal observation] whether or not they show handclasp grooming.

Fig. 1. Two adult females engage in handclasp grooming at the Yerkes Field Station. The female on the right is Georgia, the presumed originator of the pattern in this colony. Her partner is an older, unrelated female. As typical of the posture, the two partners groom each other mutually.

## Spreading of the Pattern

Figure 2 provides the hourly rate of handclasp grooming over the study period. The period of 1996a includes Georgia, whereas 1996b does not (see Materials and Methods).

As can be seen, a substantial jump in the rate of handclasp grooming occurred from 1993 to 1994, after which the rate stabilized at around 0.16 instances per hour of observation (or about once every 6 h). Because of this dramatic in-

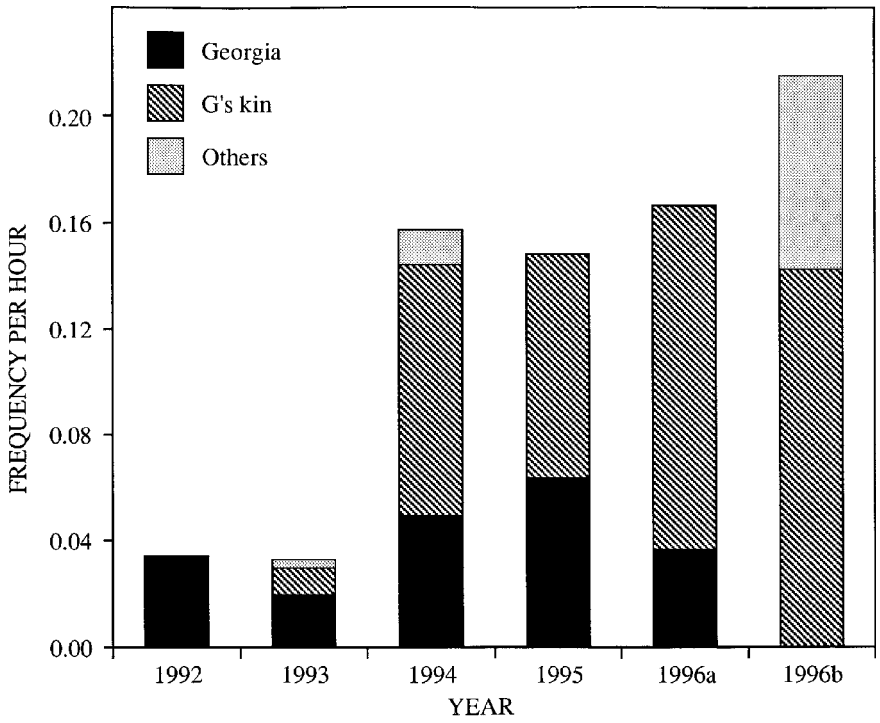


Fig. 2. Frequency per hour of the handclasp grooming posture over 5 years. The final year, 1996, has been divided into the period before Georgia, the presumed originator of the pattern was removed from the colony (a) and the period afterwards (b). The stacked bars show handclasps involving Georgia, those involving not Georgia but at least one of her adult relatives, and those involving no kin of Georgia.

crease in frequency, we distinguished two periods: period I covers 1992 and 1993, and period II covers 1994 through 1996a.

Georgia was involved in 82% of the 22 handclasps observed in period I, initiating all instances in which she was involved. Seven other adults participated in handclasps during this period. Georgia had two adult relatives in the group: her mother and younger sister. The category G's kin includes handclasps between Georgia's two relatives as well as between these relatives and outsiders. Of the handclasps not involving Georgia, most included one or both of her relatives.

In period II, Georgia's participation dropped to 33% of the 58 handclasps observed. Other handclasps during this period occurred between her mother and adult sister (47%), between one of these relatives and a nonrelative (15%), or among nonrelatives of Georgia (5%). The number of different individuals engaging in handclasps remained at eight, including Georgia, although they were not all the same individuals as during period I.

Several adolescents and juveniles over 5 years of age were seen to engage in handclasps but always with an adult. During the 5 year period, 11 individuals engaged at least once in a handclasp, seven of whom were adult (including the adult male) and four immature. This means that most of the nine adults in the group were seen at least once to engage in a handclasp. Data on the second part of 1996 show that Georgia's presence in the group was not required for the pattern to persist (Fig. 2).

Although handclasping requires cooperation, the most critical performers are the initiators. Limiting the analysis to them, Table I shows how the handclasp

**TABLE I. Number of Initiated Handclasp Grooming Bouts Regardless of Grooming Partner***

| Individual | Class | 1992 | 1993 | 1994 | 1995 | 1996a | 1996b | Total |
|---|---|---|---|---|---|---|---|---|
| Georgia | AF | 12 | 6 | 9 | 5 | 1 | Absent | 33 |
| Rita | YAF | 0 | 3 | 11 | 6 | 3 | 4 | 27 |
| Borie | OAF | 0 | 0 | 11 | 3 | 0 | 3 | 17 |
| Reinette | YAF | 0 | 1 | 0 | 0 | 5 | 0 | 6 |
| Peony | OAF | 0 | 0 | 2 | 0 | 0 | 1 | 3 |
| Natasha | YAF | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| Mai | OAF | 0 | 0 | 1 | 0 | 0 | 0 | 1 |

*Initiators during the study were all female: Borie is Georgia's mother, and Rita is Georgia's younger sister. Natasha is Mai's daughter. Age–class codes: OAF, older adult females (25 years or older at the onset of study); AF, adult females (over 9 years of age at the onset of study); YAF, young adult females, all born in 1987, adolescent when the study started, but adult by the end.

custom spread from a single individual in 1992 to eventually six initiators, all of whom were female.

### Duration Increase

Handclasping tended to occur in the middle or towards the end of grooming bouts and never lasted for the entire bout. In period I, handclasping occurred in 0.4% of 5,621 recorded grooming bouts and in period II in 1.3% of 4,350 bouts.

Duration of the handclasp posture correlated positively with the year of study (i.e., it increased with time). Closer examination revealed, however, that this correlation was due to the second half of the final year; no significant correlation with year of study was found if the 1996b data were excluded. The mean duration of handclasping (± standard deviation) almost doubled from 52.2 ± 41.9 s from 1992 through 1996a (N = 75; range 4–198; median 41) to 99.3 ± 66.9 s in 1996b (N = 10; range 26–209; median 92.5). In none of the earlier periods did the mean exceed 60 s. Handclasps lasted significantly longer in 1996b than in all earlier periods combined: *t*-test, t = 3.09, df = 83, $P = 0.0027$ (two-tailed).

Of the three longest handclasps observed during the study (each one sustained for over 180 s), one occurred in 1996a and the other two in 1996b. All three were between Georgia's mother and sister.

## DISCUSSION

All handclasps in the first year in which the behavior was observed and most handclasps in the second year were initiated by Georgia. She initiated the pattern with several partners, mostly immediate adult kin. In later years, these relatives began initiating the pattern at rates similar to or higher than those of Georgia herself (Table I). We believe that Georgia was the originator of this social custom but that she developed it with the help or at least the tolerance of others, since handclasping is cooperative.

The role of cooperation is important because much of the debate about primate cultural transmission revolves around the nature of the learning process [e.g., McGrew, 1992; Tomasello et al., 1993]. Imitational learning is considered a particularly critical issue [Galef, 1992]. In the case of handclasp grooming, however, there seems no need to assume such learning, as the initiator basically shapes her partner's gesture by taking her hand and moving both arms in position. What is required is 1) trustful accommodation by the partner to allow these body adjustments and 2), after having experienced the posture, to initiate simi-

lar movements with others. Accommodation is part of many coordinated activities among chimpanzees; for example, these apes commonly position their grooming partners by means of gentle nudging, pulling, and pushing that turns them around or exposes a new body area for grooming. Transmission of the handclasp may rely on the same tendency to modify the posture of a partner and on the partner's cooperation. After having experienced the posture proprioceptively, the partner then recreates the same experience when initiating the same posture with others. Thus, the learning involved may be partly kinesthetic.

Handclasp grooming in the Yerkes group changed over the 5 year study period: 1) its hourly frequency rose sharply from the second to the third year and then stabilized, 2) the number of initiating individuals grew from one in the first year to eventually six different individuals, all females, 3) most adults but only a few older immatures were seen to engage in the posture, 4) removal of the presumed originator did not extinguish the behavior, and 5) the mean duration of the posture dramatically increased to 99 s in the second half of the fifth year.

This duration increase may still be continuing. Two months after the present study, we observed a handclasp bout that lasted longer than all previous ones: the mother and adult sister of Georgia clasped for 296 s. The reason for the sudden duration increase during the second part of 1996 is unclear. One particularly lengthy bout (198 s) occurred months prior to Georgia's removal; it is well possible, therefore, that the duration increase would have occurred regardless of changes in group composition.

Our group has been the subject of longitudinal research on gestural communication [Tomasello et al., 1994], but the pattern in question was too rare to be part of this project. The pattern occurred only about once every 6 h, which is below the rate of once per 2.4 h reported for K group at Mahale by McGrew and Tutin [1978]. Measured as a percentage of grooming bouts, handclasping in our colony did not even approach the 38% of nonmaternal bouts reported for the Kanyawara community by Ghiglieri [1988]. Compared to the hand-clapping and other rhythmic movements associated with grooming in the San Diego bonobo colony, the rate of handclasping in our colony is even lower: hand-clapping occurred on average once every 26 minutes in the bonobos [de Waal, 1989].

Although chimpanzees under high population densities, such as in captivity, probably spend more time grooming than do wild chimpanzees [Nieuwenhuijsen and de Waal, 1982], and although innovative behavior patterns are expected in captive settings [Kummer & Goodall, 1985], it is evident that handclasp grooming occurs at low rates in our colony. According to Galef [1992], social learning should be a relatively rapid process, but the handclasp custom in our group cannot be considered well established even after 5 years of transmission. We will continue to follow the process.

## CONCLUSIONS

1. A group-specific handclasp grooming custom first observed in two separate wild chimpanzee communities developed spontaneously in one captive group of the same species.

2. The custom seemed to have originated with a single individual but spread to others and increased in both frequency and duration over a 5 year period, although the rate remained relatively low.

3. The pattern persisted after the originator's removal.

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