

SOCIAL CONTACTS BETWEEN INFANTS AND OTHER GROUP MEMBERS IN A WILD *Cebus apella* GROUP AT LA MACARENA, COLOMBIA.

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The genus *Cebus* is part of the Subfamily Cebinae, in which alloparenting has been described as common (Robinson and Janson, 1987). Some studies in captivity have dealt with this aspect in *Cebus apella* (Welker et al., 1987; Fragaszy, 1989) and in other species (Freese and Openheimer, 1969). The present study, a complement to the study on the early development of *Cebus apella* in the wild (Valenzuela, 1992), describes the social relations between new born infants and other group members. It is the first study of this aspect conducted in the wild. A prior study on social relations of three month-old infants was accomplished by Escobar during 1986 (Escobar, 1989a,b) and another on new-born (focussed on the infant's mothers) by Calle during 1987 (Calle, 1990a,b). Those studies took place at the same study site and on the same *Cebus apella* group (MC-1) as the present one.

METHODS:

*Study site*

The study site is located within Tinigua National Park, Department of Meta, Colombia, on the southern bank of the Río Duda. There are two defined seasons throughout the year: a dry season which lasts four months (December to March), and a rainy season, which extends for the rest of the year. The study site is described elsewhere (Izawa, 1980; Izawa and Tokuda, 1988; Izawa and Nishimura, 1988; Yoneda, 1988a,b; anon. 1992). During the study period the maximum and minimum temperatures were 35°C and 17°C (recorded during January and February, respectively) and the rainfall totaled 1728 mm.

*Study group*

Since 1986 the group on which the study was made (MC-1) has been fed at a platform located within the base camp, which the group visits almost daily. Thus, accurate data on the group's social structure are available. Information on the composition of the study group is given in Valenzuela, 1992.

*Methodology*

The study took place from January to July 1989 (dry weather until April, when the rain season starts). The group was followed almost daily from 0600-0800 hs until 1500-1700 hs, depending on weather and visibility conditions. Three infants were observed: Liber and Colon from their day of birth onward, while Dante -who was first seen when he was two weeks old- was systematically observed only from his fourth week on. The data-taking method can be categorized as "Focal individual" (Altmann, 1974).

During our observations the infant was always the subject of attention. The contact partner was the individual with whom the infant or the carrier interact. Therefore, when an interaction took place between the infant and the carrier, the latter was considered the partner. Multiple

partners were groups of several individuals interacting with the infant or the carrier at the same time. New-born infants can be partners with reference to other new-born focal individuals.

There are three possibilities depending on whom is involved in the interactions: the infant, the carrier or both. They can interact at the same time or alternate. Any one of them could be an active or passive actor. When the infant is not being carried, it obviously would be the focal participant in the contact.

Carrying was not considered a social contact, though this consideration is dealt with in the discussion. Those occasions when the infant was being carried but no contact took place are not considered in the analysis.

Three possible directions of contact were considered, with reference to the focal infant (and the carrier, if present): (1) CONTACTS DIRECTED "IN": are those initiated by any individual and directed to the infant, the carrier or both. There is no response from any of them, they are passive actors. (2) CONTACTS DIRECTED "OUT": are those initiated by the infant or the carrier. The contact partner doesn't respond, it is a passive actor. (3) MUTUAL CONTACTS: are those where there is a response to the initiation of the contact. The individuals interact reciprocally, both are active.

The possible responses of the carrier to the contact were: (1) ALLOWING: Carrier doesn't interact and accepts the contacts passively (allowing the partner or infant to act freely). (2) REJECTING: Carrier doesn't interact and it either rejects the contacts by moving away when the contact partner approaches, or threatens the initiator with menacing facial gestures and vocalizations, or pushes it away. (3) INTERACTING: The carrier plays a role in the contact. It can be the initiator of the contact or interact in a mutual contact, thus becoming an active actor.

Every observed interaction between any group member and the new-born individuals (Liber, Colon and Dante) was recorded. The following data were noted: carrier's age, sex and kinship; carrier's activity, carrier's reaction to the contact; contact category (see Table 1); direction of contact and individual involved (infant or carrier). The contact partner, its age, sex and kinship and the response of the infant to the contact, were also recorded. A total of 523 interactions were observed for the three infants. An interruption in the interaction exceeding 4 minutes or an "unclear" contact lasting for more than 2 minutes were used to indicate that the contact bout ended.

## RESULTS:

### *Contact categories*

The frequencies of the contact categories recorded during the whole study period are shown in Table 2, but these frequencies vary according to the kinship of the carrier (Fig. 1). Approach and Touching were the prevailing categories for siblings and non-relative carriers and when the infant was alone. When the mother was the carrier, the predominant contact was Touching, and Approach was the least frequent category. Grooming exceeded Affinitive Sitting when mother was the carrier but was the least frequent type of contact in the other three cases. When the infant was not being carried, Affinitive Sitting was present in less than 10% of the contacts observed.

There are differences also according to whom is the partner involved in the interaction. When the mother was the partner, the most common contact was Approaching. Grooming was next in frequency, followed by Affinitive Sitting. The least frequent categories were Others and Touching. That's not the case with siblings and non-relative partners, where the frequency of all types of contacts was almost equal (Fig. 2).

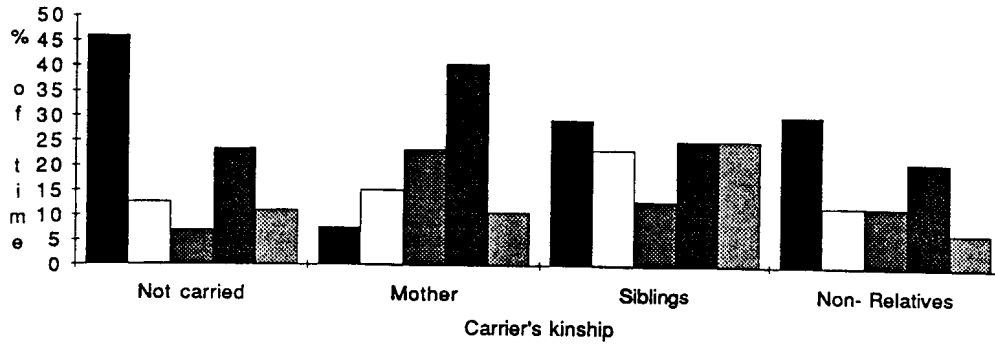


Fig.1. The type of contact most used in social interactions with the new-born is influenced by the carrier's kinship to the infant.

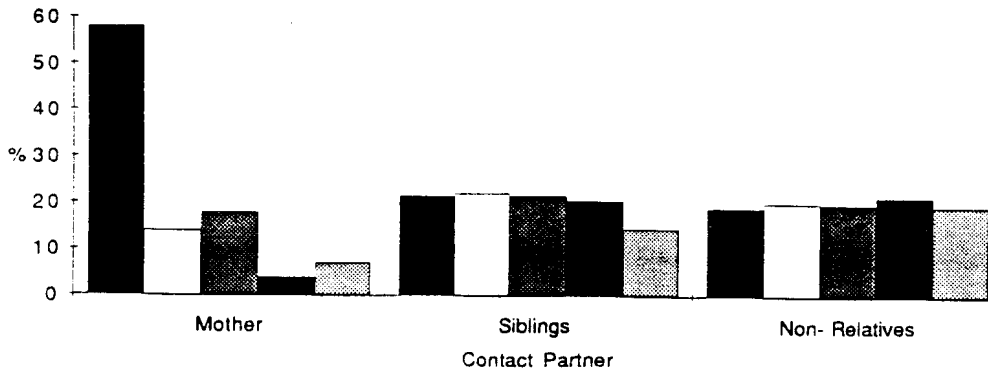
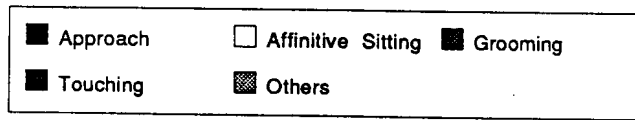


Fig. 2. The frequency of the different contact categories varies according to the kinship of the contact partner.

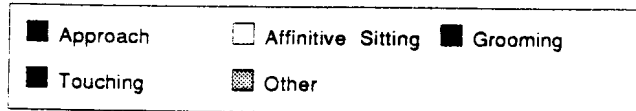


Table 1: Contact categories between newborns and other group members.

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**APPROACH:** An individual moves toward another but doesn't exhibit any other kind of interaction.

**AFFINITIVE SITTING:** An individual sits besides another at a distance varying from body contact to less than 25 cm from it. The animals can rest or feed.

**GROOMING:** An individual inspects and cleans another individual's fur.

**TOUCHING:** An individual has hand or mouth contact with another. Includes lip-smacking and grasping another individual's hair.

**OTHER:** This category comprises the less frequent interactions:

Taking another individual's food: The infant tries to eat from any other animal's food.

Gesticulating: An individual makes an affinitive facial gesture to ward the infant with no physical contact.

Playing: Two individuals chase or pull each other.

Threatening: An individual directs a menacing facial gesture and sound to another. This category does not include the negative responses of the carrier to the contacts.

Facial Contact: Two individuals rub their faces.

Vocalizing: An individual utters sounds while looking at the infant.

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**UNCLEAR:** Any observable contact which could not be categorized because of lack of visibility.

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Table 2: Frequency distribution of the contact categories for the whole study period (% of total number of interactions).

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TOUCHING	27.8 %
APPROACH	22.1 %
AFFINITIVE SITTING	19.5 %
GROOMING	19.2 %
OTHER	11.9 %
Vocalizing	4.3 %
Facial Contact	3.7 %
Threatening	1.9 %
Facial Gesture	0.8 %
Trying to eat	0.8 %
Playing	0.4 %

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When the carrier-infant couple and a partner interacted, the type of contact observed varied according to the carrier's age and sex (Table 3).

Table 3: Frequency of each contact category according to the Partner's age and sex group.

TYPE OF CONTACT	PARTNER'S AGE AND SEX							MG
	Mother	AF	JF	AM	JM	1-yr	Inf	
Approach	58.7	18.6	32.9	9.2	22.2	23.3	0	15.4
Touching	4.4	15.5	16.5	15.8	23.0	34.2	59.3	15.4
Aff. sitting	13.0	23.0	10.1	39.5	23.0	16.4	7.4	30.8
Grooming	17.4	29.8	22.8	25.0	20.6	8.2	11.1	23.1
Other	6.5	13.0	17.7	10.5	11.1	17.8	22.2	15.4

A = adult                      J = juvenile                      1-yr = one year old                      Moth = mother  
 M = male                        F = female                        Inf = infant                        MG = multiple groups

When the infant was being carried, most of the contacts occurred while the carrier was resting, independent of the partner's age, sex or kinship. On the other hand, the contact categories which took place during each carrier's activity (resting, feeding or foraging, and moving) were observed in very dissimilar frequencies, without any discernible pattern.

#### *Contacts' direction*

As a general rule, the most frequent contacts recorded were those directed "in", followed by those directed "out". Mutual contacts were least frequent (Table 4). This pattern can be seen regardless of kinship, age or sex of the carrier or the partner. The only two exceptions were the multiple partners and the infants. In the first case, the mutual contacts were the most frequent (52.9%) interaction. In the other case, when the focal carrier-infant couple made contact with an infant (the partner in this case) the highest frequency was for the "out" directed interactions (40.7%). There was also a high percentage (37.0%) of mutual contacts between the carrier-infant couple and infant partners. Non-relatives were rarely contacted by the carrier or the infant while mother and siblings were contacted often.

Table 4: Frequency distribution of contact directions

CONTACTS	
DIRECTED "IN"	65.0 %
DIRECTED "OUT"	21.9 %
MUTUAL	13.1 %

Percentages are given with respect to the total number of bouts recorded (523) for the three individuals: Liber, Colon and Dante.

### Carriers

The infant's mother was the exclusive carrier before self-mobility was attained (Valenzuela, 1992). From the fourth week of life onward (when the infant was left alone for the first time and allomaternal carrying started), until the fifth week, siblings were the prevailing carrier group, after the infant's mother. During the sixth week, siblings were the predominant carriers. From the seventh week on, the infant was by himself most of the time; when it was being carried, non-relatives were the prevailing carrier group.

### Carriers response to the contact

The carrier interacted in 38.5% of all contacts recorded (523) as an initiator or participant in a mutual contact. Of the remaining 61.5% of the observed contacts, the carrier response was positive ("allowing") in 87% of the cases and negative ("rejecting") in 13%.

With regard to the carriers' and partners' kinship, age or sex, the positive responses surpassed 75% for any of the carriers' groups and 81% for any of the partners' groups.

Almost every interaction initiated by an infant received a positive ("allowing") reaction from the carrier, regardless of its kinship, age or sex. The most extreme example of this was that infant-partners never receive a negative ("rejecting") response from the carrier to contacts initiated by them. There was only an instance in which a carried infant received a negative response to a contact initiated by it. This occurred when an infant tried to eat from the carrier's food and the latter rejected its intent by pulling the infant with the arm and even slapping it. Nonetheless, twice was it observed that the carrier or partner allowed this type of behavior: Lopez (a juvenile male) allowed Liber to eat a larva he was eating, and Duda (an adult female) allowed his son Dante to eat a flower (*Costos* sp.) she was eating.

### Contact partner and individual involved

The frequency of contacts to adult females was the expected; contacts to juvenile females, infants and adult males were less frequent than expected, and contacts to mother, juvenile males and one-year-old individuals were more frequent than expected (Z test,  $\alpha < 0.05$ ).

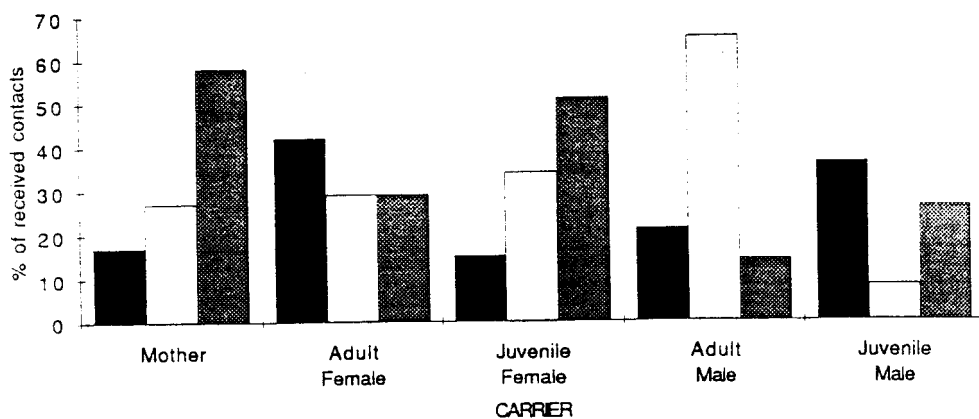
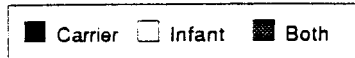


Fig. 3. The most frequent receiver of a contact (Infant and/or Carrier) varies according the carrier's age/sex group.



The highest percentage of contacts involves carrier and infant ("both" category) for any of the carrier's kinship groups; the next frequent type of contact involved just the infant for mother and non-relative carriers and the lowest percentage involved only the carrier as the contact partner. When siblings were carriers, infant and carrier were involved in the contacts with the same frequency.

Regarding the age or sex groups (Fig. 3), when the carriers were juvenile females contacts were preferentially directed to both. With respect to adult male carriers, infants were the age group most frequently involved, the carrier had a lower percentage of involvement and the infant-carrier couple the lowest. The case was different for juvenile and adult female carriers that were the interactor most often involved. The couple was intermediate and the infant was the least often involved in the first case, whilst these two groups had the same frequency in the latter

## DISCUSSION:

### *Contact direction*

The infant-mother couple can be considered as a social unity during the first stages of the infant development, when it is totally dependent on its mother for food and transportation: it is impossible for any group member to interact with the new born without simultaneously contact its mother. When the infant starts to move independently of its mother, it can be contacted individually. But, when it is being carried, it becomes a unity with its carrier. Thus a contact by any member of the group toward the carrier can be an appeasement signal, which enables a contact with the infant. Grooming was described by Oppenheimer (1969) as an appeasing behavior made by juvenile and adult females which intend to have a contact with the infant.

With the birth of an offspring there is a change in quantity and quality of the contacts received by a female (Calle, 1990). It is supposed that this is due to the presence of the new born. Infants have a great curiosity about other infants. The fact that the infant-carrier couple become a source of interest to every member of the group is reflected in the greater amount of contacts directed toward them, when they are just passive, compared to those contacts initiated by them. Mutual contacts also occurred at a high percentage between carrier-infant couple and infant partners, which shows a level of active responsiveness of the infants with respect to each other.

The high percentage of "out" directed contacts when the focal infant-carrier couple interacts with an infant partner is expected since focal infants receive more contacts than they give. That is, infants exert a great attraction on the other group members and motivate them to initiate social contacts.

### *Carriers and their response to contact*

For every carrier group, the distribution of frequencies of contacts is directly related to the frequencies of the carrier groups themselves (Valenzuela, 1992). This shows that the new born motivate the interest of the group independently of the kinship, age or sex of the carrier. If one considers carrying as a social contact and not as an allomaternal-care activity, one sees that, in general, juveniles predominate over adults and that siblings share that role with non-relatives on an almost even basis. This is also true for juvenile males and juvenile females. That is, juveniles have a greater involvement with the new-borns, but there exists a general interest of the whole group, expression of a high level of group cohesion.

The carriers of infants influence the quality and quantity of the contacts that infants receive and initiate: carriers may accept or reject a contact initiated by any group member or by the

infant. Carriers can also be the initiator of contacts, thus allowing or limiting the interactions between the infants and the remaining individuals. Even the infant's mother can be rejected when trying to contact its offspring while it is carried by another individual.

No pattern of distribution of frequencies of the contact categories for each age, sex and kinship group of carriers was found. This was also true for the relationship between carriers and who was interacting in the contact: the infant, the carrier or both. Carriers never rejected a contact initiated by an infant partner. This permissiveness shows the special interest that a new born elicits in the other group members.

#### *Contact partners*

Almost every group member had social contacts with each of the new-borns. Contact partners are more often active initiators than passive recipients of the interactions. The type of contact they can achieve with the infant is determined by the tolerance of the carrier, which is influenced by the social hierarchy within the group. Infants -either carried or alone- never reject a contact, nor are they rejected when they actively contact an individual. The pattern of addition of new social partners described in this study is quite different from the pattern found by Welker et al. (1987): they state that the first two months of life of the *Cebus apella* are characterized by passive contacts with siblings and that males only become interested in the infant from the second month of life on. The author observed non-relatives and juvenile males interacting with the new born from its birth on. They also reported that as passive actors, infants are much more attractive to siblings than to non-relatives considering the whole study period. This is totally opposed to that observed by me: non-relatives were involved in 67% of the contacts. They found that siblings are the only other group members which commonly manipulate, groom and lip-smack the infants, while according to my observations siblings and non-relatives have very similar distributions of the different contact categories. Fragaszy (1990) also reported affiliative contacts from other group members from the day of birth onwards and a gradual active response of the infants to those interactions parallel to its coordination and strength improvement. Robinson reports food sharing and allomaternal nursing for *Cebus olivaceus* and *C. apella*, which is in accordance with the observations made during this study. In *Cebus*, adult females and juveniles of both sexes show a great interest in infants from birth until they are about two months of age and will attempt to touch or pull an infant off its mother's back (Freese and Oppenheimer, 1981). That was also recorded by the author.

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