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“Requests” and “offers” in orangutans and human infants¹

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Abstract

This paper presents two pilot studies of sharing situations in orangutans and human infants. We report on the communicative behaviors that elicit food transfers, the contingencies associated with gesture selection and the (relative) success in obtaining food. We focus on the sequential unfolding of these interactional projects, on the timing between an initial action and the responsive move, and on the semiotic features that allow a participant to recognize a) when a request has been produced, b) when it has been unsuccessful and, c) in the absence of success, when to pursue it further. We claim that the infrastructure for sequentially organized, cooperative social interaction and the capacity to selectively produce communicative actions predates language evolution and is, at least to some degree, shared with other primates.

1. Introduction

What can language do for you? According to Davidson “a creature cannot have a thought unless it has a language” (1982, 322). Proponents of the Sapir-Whorf hypothesis (or linguistic relativity) suggest that it is possible to have thought without language, but language fundamentally affects the way we think and the way we categorize the world (see, e.g., Sapir 1921, Whorf 1956, Gumperz and Levinson 1996, Casasanto 2008). Speech act theorists emphasize how certain speech acts, such as promising, could not exist without language (Austin 1962, Searle 1969). Conversation Analysts emphasize how language is deeply implicated in our ability to produce certain social actions, such as, for example, conveying agreement, telling stories and providing accounts for our behavior (Sacks 1992 [1964-72]). Plainly, human social life would be different in important ways if language had never evolved.

Given the central role that language plays in human social life, a great deal of research has been conducted on its evolutionary roots, although much of it remains speculative. In recent years, a comparative approach has been increasingly adopted in investigating potential precursors of human language in nonhuman primates. A number of scholars have argued that we can use ape gestures to model the evolutionary origins of human language because of a hypothesized similarity between ape gestures and those of our early hominid ancestors (e.g., Corballis 2002, Tomasello 2008). Others have focused principally on the relationship between language and primate vocalizations and the extent to which the latter can be characterized in terms of semantic content and syntactic structures (e.g., Cheney and Seyfarth 2005, Zuberbühler 2005, Fedurek and Slocombe 2011). More recently, an increasing number of studies of primate communication has adopted a multimodal

perspective (see, e.g., Partan and Marler 1999, Leavens, Russell et al. 2010, Taglialatela, Russell et al. 2011, Liebal, Waller et al. 2013). Extending work on the evolution of language to include primate gestures and vocalizations not only broadens the scope of scientific inquiry, it also puts the role language plays in communication and social interaction at the center. Besides helping us to categorize and retrieve information, language facilitates our ability to exchange information and to accomplish coordinated and cooperative social actions. Understanding the relationship between language and social action allows us to shift the focus from how language evolved to what language contributes to human social life. Something we can begin to see by comparing our communicative behavior to that of our closest relatives—the great apes—and those who cannot yet produce language, i.e. human infants.

Focusing specifically on the evolution of human social interaction, Levinson (2006) has claimed that, in the animal kingdom, humans are unique in their predisposition and motivation for social interaction by virtue of what he calls “the interaction engine”. From a psychological perspective, Tomasello (2008) has similarly claimed that human cooperative communication—that he defines as “intentionally informing others of things for cooperative motives”—is species unique. He contends that such cooperative communication “rests crucially on a psychological infrastructure of shared intentionality ... which comprises most importantly: a) socio-cognitive skills for creating with others joint intentions and joint attention ... and (b) pro-social motivations (and even norms) for helping and sharing with others” (pp. 12-13). According to Tomasello and Warneken (2008), the human ways of sharing are unique and distinguishable from those of other primates in their “other-regarding preferences” (see also Fehr, Bernhard et al. 2008). For example, it has been claimed

that nonhuman primates “do not point” for conspecifics, “do not hold objects up to show them to others,” “do not actively offer objects to other individuals by holding them out” (Tomasello 2000, 170) and that, more generally, “do not have the motives to help and to share” (Tomasello 2006, 516).

Recent work on food sharing in primates has shown that about half of all primate species share food from adult individuals to immature ones (Jaeggi and Van Schaik 2011). Thus, food sharing is an ideal domain to investigate primates’ motivation to share. In great apes, food sharing peaks well before weaning and is unrelated to the nutritional quality of the food (Silk 1978, Nishida and Turner 1996, Jaeggi, Van Noordwijk et al. 2008). Sharing between adults exclusively occurs in species that also share with offspring (the claim being that the latter is a precondition for the former, see Jaeggi and Van Schaik, 2011). For the most part, sharing occurs between males and females with males usually in control of the food. The direction of transfer, then, is usually from male to female rather than vice-versa (except in female-dominant species like bonobos, see Fruth and Hohmann 2002).

In multi-male multi-female groups, food sharing seems to arise as a sort of reciprocal exchange (what has been called “meat for sex” see, e.g., Hockings, Humle et al. 2007, Gomes and Boesch 2009, Gomes and Boesch 2011), but it is not clear yet whether food sharing consistently leads to higher mating and therefore greater paternity (see, e.g., Gilby, Emery Thompson et al. 2010). Trading food for mating purposes appears to work in situations where females control future opportunities to mate. This is the case, for example, with orangutans. They live a semi-solitary life, which means that males and females spend a limited amount of time together, and females move on if they find males unsuitable (Rijksen 1978). Van Noordwijk and van Schaik (2009) have claimed that female orangutans even test males in their

willingness to let them take their food and their tolerance in such situations. If a male responds aggressively or resists sharing food, then the female is more likely to move on.

In general, previous research has claimed that the majority of food sharing in non-human primates occurs in the form of “tolerated theft” (Blurton Jones 1984, Blurton Jones 1987) or “relaxed claims” (de Waal 1989). In these kinds of situations, an individual takes the food either from the vicinity or directly from the hands or mouth of the one in control of it, without any opposition. Sequences of more active sharing are rare, mostly arising to end or limit harassment from begging individuals (Stevens and Gilby 2004). “Harassment” is defined as “extending a hand towards an owner, vocalizing, slapping the ground, grabbing at food, or attacking the owner” (Stevens and Gilby 2004: 606). The claim is that such harassing behavior may lead to fights or injuries for the possessor.

Most of the research on food sharing has focused on the amount of sharing and whether it was active or passive; very rarely have studies offered details of the food transferring sequence in terms of how it unfolds, what precedes it, and the timing of the responsive behavior. In addition, while different gestures for requesting or offering food have been observed in orangutans, for example, these gestures have never been systematically investigated in food sharing situations (Liebal, Pika et al. 2006). This paper addresses this gap by providing a more in-depth description of food sharing sequences and the communicative signals used to elicit sharing.

In exploring how orangutans transfer food through request-like or offer-like acts, we engage with Tomasello’s (2008) claim that of three basic motives of human cooperative communication (requesting, informing and sharing emotions and attitudes), the only one we share with great apes is requesting. In outlining the

semiotically recognizable ways in which “requests” and “offers” get done—including some of the contingencies that affect their deployment and success—we show how “offering”, while rare, is another social action that human and great apes share.

Ultimately, the aim is to outline the evolutionary primacy of the interactive machinery (from action formation and recognition to its sequential unfolding) over language evolution and language development. We do so by using a combination of ethology and conversation analysis to show how the behavioral repertoire displayed in orangutan interactions that lead to food transfer is remarkably similar to what is observable in human infants.

Data and Method

We collected video recordings of orangutans (*Pongo abelii*) at the Wolfgang Köhler Research Centre, Leipzig Zoo (Leipzig, Germany) in 2010. To create a situation in which food sharing could take place, we used a procedure similar to what de Waal (1989) had previously done with chimpanzees. We dropped into the orangutans’ enclosure a large paper bag containing fresh bamboo or willow branches with leaves drizzled with honey. The orangutans were therefore placed in a situation of food abundance, where the main bag was easy to monopolize by one individual. On the other hand, the food to which they had access was easy to share and to steal, and the occurrence of sharing or stealing was easy to observe from an analytic point of view because of the size of the branches.

We repeated this procedure on ten different days to observe whether specific sharing patterns or other dynamics might develop within the group. The group consisted of one adult male (Bimbo), three adult females (Pini, Dokana and Padana) and their respective offspring (Batak, Tanah and Suaq, all less than 12 months old), a juvenile female (Raja) and two sisters, Kila and Maia (see Table 1 for more

information about the subjects). After analyzing the data it became apparent that the adult male Bimbo was always the one monopolizing the bag; therefore the majority of food exchanges revolved around him. For this reason, two years later we collected ten additional video recordings of identical situations, with the critical difference that Bimbo was not in the enclosure while the bag was provided to the orangutans (nor were Kila and Maia who had been moved to a different zoo). Since the dominant male was excluded, we observed that the dominant female Pini now monopolized the food. The ten recordings collected in 2010 amounted to a total of 5 hours and 32 minutes, while the ten recordings collected in 2012 amounted to 4 hours and 7 minutes.

Table 1: Subjects Information

Orangutans	Sex	Father-Mother	Recordings 2010	Approx. Age	Recordings 2012	Approx. Age
Bimbo	M	Major-Nony	X	29.5 y		
Pini	F	Coco-Dunja	X	22 y	X	24y
Dokana	F	Djeruk-Djudi	X	21 y	X	23y
Padana	F	Walter-Pini	X	12.5 y	X	14.5y
Kila	F	Tujoh-Dunja	X	10 y		
Raja	F	Walter-Pini	X	6.5 y	X	8.5y
Maia	F	Bimbo-Dunja	X	2.5 y		
Tanah	F	Bimbo-Dokana	X	12 m	X	3y
Suaq	M	Bimbo-Padana	X	12 m	X	3y
Batak	M	Bimbo-Pini	X	8 m	X	3y

To identify the behavioral means through which food transfers were solicited or elicited, we adopted a participant's perspective and relied on the following

procedure: we first observed when an individual that was not in control of the bag obtained food, then identified the behaviors that preceded obtaining the food. Once those behaviors had been identified, we could then track also when an attempt to solicit or elicit a food transfer had occurred but had been unsuccessful.

We identified three main ways of transferring food: (a) taking/stealing (which could be “tolerated thefts” or “relaxed claims”), (b) requesting, and (c) offering (see Table 2 for an overview of the specific distributions). The average number of food transferring attempts (including those that failed) was basically identical between groups of recordings (3 per minute), notwithstanding the absence of the adult male in the recordings of 2012. The difference among the three ways of transferring food concerned whether (a) the beneficiary obtained the food independently and without the help of another participant as a benefactor (taking/stealing), (b) the beneficiary obtained the food thanks to a benefactor who had been asked for it (request), or (c) the beneficiary obtained the food thanks to a benefactor who had not been asked for it (offer) (on beneficiaries, see Clayman & Heritage, this volume).

Table 2: Food transfer attempts by group of recordings

Action Types	Recordings 2010 (with adult male)	Recordings 2012 (without adult male)
Taking/Stealing	91% (902)	98% (752)
Requesting	7% (64)	2% (17)
Offering	2% (23)	0
Total	100% (989)	100% (769)

While taking/stealing was by far the predominant way of obtaining access to food, in the remainder of this chapter we focus on the social actions of requesting and

offering, as they were the ones that were truly interactional and cooperative. Indeed, taking/stealing usually meant that an orangutan would either take some food from the ground near another individual, or directly from the bag or from the hands of another individual. Often this would be done hastily while the individual with the food was distracted. While the individual controlling the food might attempt to prevent the other participants from taking the food, for the successful transfer of food to take place via taking/stealing it was necessary that there was no responsive behavior from the one controlling it (in fact, lack of response is what facilitates taking/stealing). On the other hand, for requests and offers to succeed, one participant had to produce an initiating action and the other had to grant it (for requests) or accept it (for offers). For these two social actions, without the recipient's appropriate responsive behavior, no transfer of food could take place. As Table 2 shows, the actions that were most affected by the presence vs. absence of the adult male in the group were requesting and offering (reduced to less than a third and not occurring at all, respectively), rather than taking/stealing (from 91% to 98%). This is what makes an in-depth investigation of these two social actions particularly desirable.

It should also be noted here that while the number of hours recorded is very small compared to the thousands of hours of focal observation described in prior studies of food sharing in wild orangutans, the number of instances of food transfers observed goes far beyond what has been previously described. Jaeggi et al. (2008) report on 458 food interactions over 1145 hours of focal observation, i.e. one every 2.5 hours, while van Noordwijk and van Schaik (2009) report 76 instances of intersexual food transfers recorded over 2426 hours of focal observation, i.e. one every 31.9 hours. In our data we observed 3 attempted food transfers per minute. Both the setting (the animals that we observed live in captivity as a group) and the

procedure we used appear to have been particularly conducive in eliciting food transfers.

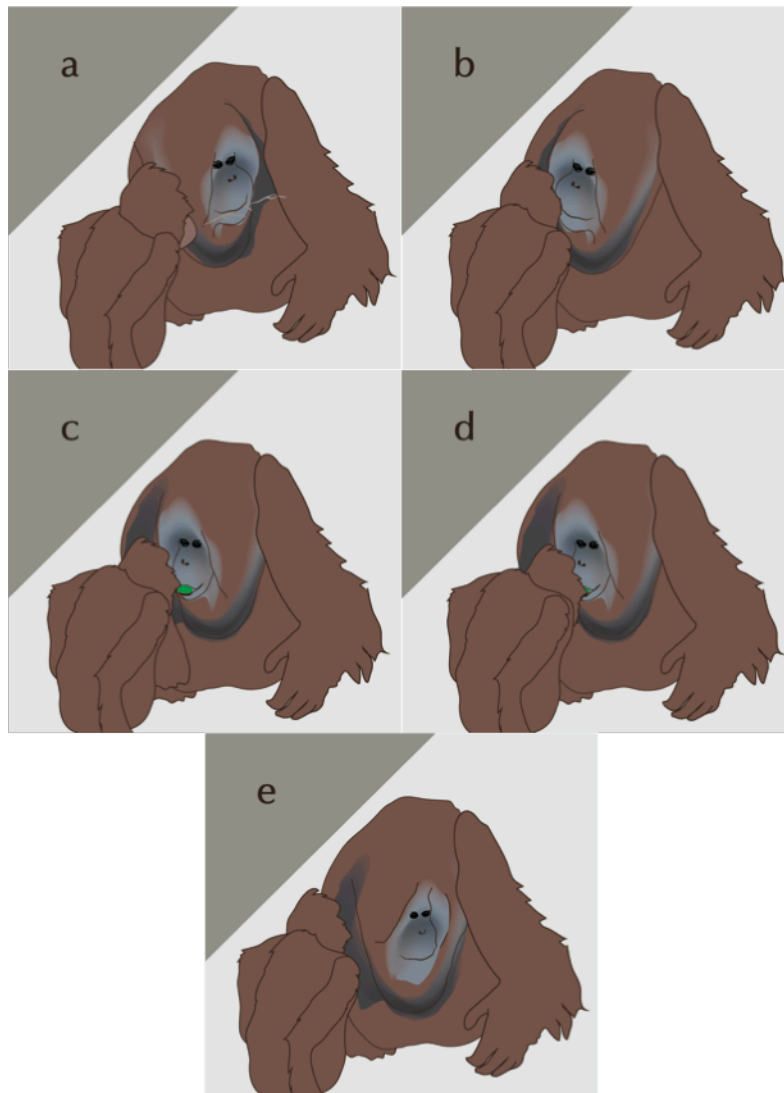
Requests

Within the interactional situations that we identified as requests, we further distinguished three ways in which an orangutan attempted to elicit a food transfer from another:

1. MOUTH-TO-MOUTH: by placing their face and mouth close to the face and mouth of the individual who has the food;
2. BEGGING: by turning their hand palm up, while facing the individual with food;
3. REACH: by extending their arm and hand toward the food, in an apparent attempt to grab it.

Example 1 shows a request sequence in which Raja moves her head and mouth very close to Bimbo's until Bimbo transfers food from his mouth to her mouth.

(1) Request Mouth-to-mouth

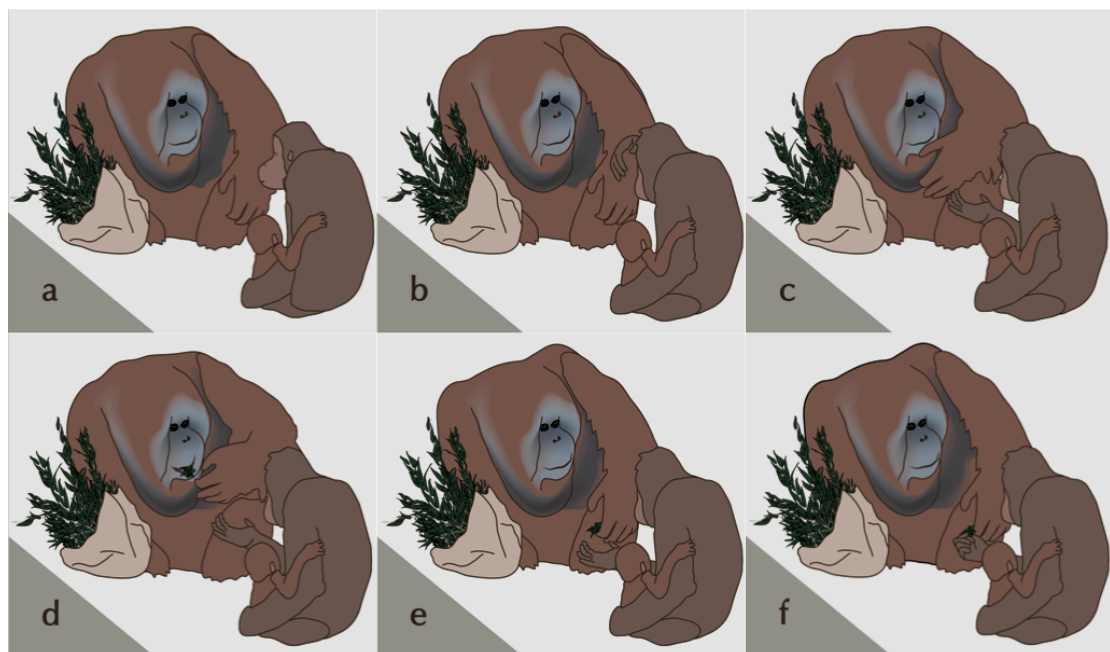


Raja first positions herself in front of Bimbo, in his line of sight, while Bimbo is eating the leaves off a branch (1a). He starts chewing the leaves and turns his head away from Raja (1b). Raja moves slightly to the left, so that she can face Bimbo again and moves her mouth closer to Bimbo's mouth (1c). At this point, with a delay of only 0.1 seconds, Bimbo rolls a ball of chewed leaves on the tip of his tongue, in front of Raja's face. Raja moves closer and takes the ball off his tongue (1d). As soon as the food transfer has taken place, Bimbo turns his head and looks towards his left (i.e. towards the bag containing other branches and leaves) and Raja looks away as well, breaking the F-formation (face-to-face looking at each other, see Kendon 1977) that has made the request sequence possible. In this example, the sequence initiating

action (the request) is implemented by Raja moving her face and mouth close to Bimbo's mouth while he is eating. The responsive action (the granting of the request) is Bimbo's rolling the food on the tip of his tongue and holding it while looking at Raja. Yet notice that to obtain the food, Raja has to make another step, i.e. move even closer to Bimbo and put the food into her mouth by taking it directly from Bimbo's tongue (on division-of-labor in requests and offer sequences, see Couper-Kuhlen & Etelämäki, this volume).

Example 2 shows an instance of the begging gesture. In this sequence, Pini produces a begging gesture while looking at Bimbo, who takes a ball of food out of his mouth and hands it to her.

(2) Request Begging

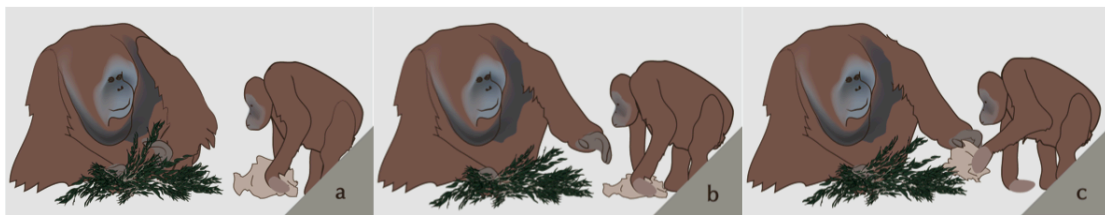


Bimbo is chewing some leaves while holding the bag with food to his right. Pini is sitting in front of him at about 1 meter distance, holding Batak (her son). Initially, Pini is not looking at Bimbo but rather towards her left (2a). Pini then turns her head towards Bimbo and with a wide arm movement she raises her hand up in front of both her face and Bimbo's face (2b) and then reaches the stroke of a begging

gesture: holding the hand palm up at some distance from Bimbo, while looking towards him (2c). Within 0.2 seconds Bimbo begins to move his left arm towards his mouth and takes a ball of leaves out (2d). He then hands it to Pini (2e). Pini takes the ball from Bimbo's hand (2f) and eats it herself. In this case, Pini's request (the first pair part) is implemented through the begging gesture produced while looking towards Bimbo. Bimbo's granting of the request (the second pair part) consists in taking the ball of leaves out of his mouth and handing it to Pini.

Example 3 shows an adjacency pair sequence in which Bimbo stretches his arm towards a piece of paper held by Pini and Pini hands it to him.

(3) Request Reach



Bimbo is eating some leaves from a branch when Pini stops licking part of the paper bag (probably because of the honey) and puts it on the ground (3a). Bimbo then interrupts eating the leaves, drops the branch and stretches his hand and arm towards the paper under Pini's left hand, while looking towards the piece of paper (3b). Pini picks it up and hands it to him (3c) and Bimbo begins licking the piece of paper. In this example, the request is implemented by Bimbo stretching his hand and arm towards the paper while looking towards it. Pini grants the request by picking the paper up and handing it to Bimbo. It is ambiguous to what extent Bimbo's reach for the paper was intended as a request rather than as a real attempt to pick the paper up by himself. The fact that he is not leaning forward while reaching for the paper suggests that it was probably meant to elicit a response from Pini. Independently of

what Bimbo's intentions were, however, Pini responds to Bimbo's gesture by quickly handing the paper to him. In this way Pini has been recruited by Bimbo's gesture (see the editors' introduction on recruitment).

Table 3 shows the distribution of requesting attempts by gesture type in the two groups of recordings. In the recordings with Bimbo, requests implemented through mouth-to-mouth gestures were produced only by Raja and Dokana; begging gestures were produced only by Pini and Dokana; and out of the reaching gestures, two instances were produced by Bimbo towards Dokana and Pini, one by Raja (the juvenile female) towards Bimbo and two by Tanah (the female infant) towards Bimbo. In the recordings without Bimbo, mouth-to-mouth requests were produced by Batak towards his mother Pini and by infant Suaq to Raja); begging gestures were produced by Dokana to Padana, by Batak to Pini and by Tanah to Padana; and finally, the reaching gestures were all produced by infants towards adult females. Overall, it is likely that the reaching gestures here are under-represented, because not all reaching gestures were counted as requests. We considered them requests if the individual producing it could not reach the food by herself/himself. In other words, we consider a reach to be a request if the one producing the gesture would need a responsive action from another individual to obtain the food.

Table 3: Request attempts by group of recordings

Gesture Type	Recordings 2010	Recordings 2012
Mouth-to-Mouth	22% (14)	17.5% (3)
Begging	70% (45)	17.5% (3)
Reach	8% (5)	65% (11)
Total	100% (64)	100% (17)

A few points to note concerning request types and who produces them:

- Bimbo (the alpha male) only produced the reaching gesture and never produced begging gestures nor mouth-to-mouth gestures;
- Nobody requested food from the infants (rather the adults would take food from them);
- The two infants who used a begging gesture once during the recordings of 2012 (Batak and Tanah) are the offspring of the only two females who used the begging gesture towards Bimbo during the recordings of 2010;
- Padana, Kila and Maia never requested food from anybody across all the recordings.

It might be premature to rank the three ways of requesting in terms of how they display entitlement to the food and to which degree they acknowledge the contingencies associated with the granting of the request (see Curl and Drew 2008). Nonetheless, the fact that the adult male only produces reaching gestures suggests that this might be a gesture displaying high entitlement. On the other hand, the begging gesture might display an orientation to the contingencies associated with the granting of the request and similarly produce less pressure in terms of soliciting a response, because it does not amount to physical 'insistence' (as mouth-to-mouth requesting does). Begging gestures are always implemented at a certain distance from the recipient when it is impossible for the requester to obtain the food without the help of the recipient. It is not clear, however, what degree of entitlement a begging gesture displays, given that the individuals implementing it are either adult high-ranking females towards the dominant male or infants towards their own mothers. To understand the contingencies affecting success, we have to consider not just the requests that successfully lead to an active food transfer, but also the ones that fail to do so.

The three examples above show successful request sequences. However, it often happens that a request is not granted. Having identified the behaviors that successfully elicit food transfers, we were also able to identify cases when a request was made but failed to elicit food. Table 4 shows the likelihood of a successful food transfer following a request in relation to gesture types.

Table 4: Successful food transfers following requests by gesture type and set of recordings

Gesture Type	Recordings 2010	Recordings 2012
Mouth-to-Mouth	36% (5/14)	67% (2/3)
Begging	44% (20/45)	67% (2/3)
Reach	60% (3/5)	0% (0/11)
Total	44% (28/64)	24% (4/17)

While it might appear that begging and mouth-to-mouth gestures are generally more likely to succeed if the adult male is not present, caution is necessary given the very limited number of requests in the recordings of 2012. Similarly, it would appear that reach gestures are more likely to succeed if the dominant male is in the group. This is almost certainly caused by the fact that in 2012 all the reaches are produced by infants towards adult females. This already suggests that rather than seeing gesture types as more or less effective or having a normative force, what seems to matter is rather who is requesting and who is expected to grant the request. For example, while requests delivered via begging gestures are granted by Bimbo in 44% of the attempts, he clearly differentiates between who is asking. Dokana got food in 25% of her begging-gesture attempts (4/16), whilst Pini got food in 55% of her begging-gesture attempts (16/29). Pini, the alpha female in the group, was therefore twice as likely than Dokana to get food from the alpha male using the same gesture. It is also clear

that hierarchy in this group plays an important role in terms of accountability of behavior and entitlement to food. In one instance, for example, after Bimbo has offered food to Dokana, Pini – the more dominant female - literally takes it out of Dokana's mouth and eats it herself; Dokana does not fight back or protest in any way. Moreover, a possible sense of entitlement in relation to Bimbo's reaction to attempts to take food appeared to affect the very deployment of specific gesture types. For example, in one recording Dokana first attempts to elicit a food transfer from a distant position using a begging gesture, but when Bimbo does not react, Dokana attempts to take the food directly from the bag close to Bimbo. Bimbo then prevents her from taking the food. She next tries again with a begging gesture, but again Bimbo does not react and when she tries to get the food herself, he again prevents her from accessing it. On the other hand, a few minutes later Pini is now close to Bimbo and takes food directly from the bag or near the bag. The first begging gesture occurs when Bimbo moves the bag away from her and there is no food available on the ground close to her. She could move closer to him and to the bag, but rather she switches to begging. And in the first two instances (separated by 5 minutes) she fails. She then succeeds in eliciting a food transfer in the following 7 instances of begging. Bimbo even offers her food twice, until he rejects the 8th request by pushing her hand away. Two minutes later she resumes begging and although she has to pursue a response a couple of times, she returns to elicit food from Bimbo another 3 times, after which he stops giving. In this session, Pini produces a total of 21 begging gestures, successfully eliciting food in 11 of them. Yet it is not the case that Bimbo alternates between giving and not giving, or that he gives in the beginning and then stops. Rather, having shared food for a while (by allowing Pini to take it or by sharing), he actively prevents further sharing from happening. Considering when begging occurs in relation to

taking, the former occurs when Bimbo either prevents Pini from taking or when he moves the food away from her (making “taking” problematic). So on the same day we see how Dokana starts with begging and then switches to taking (unsuccessfully), while Pini usually takes but then switches to begging when Bimbo prevents taking.

Requests as courses of action

Requests and offers can be considered interactional projects whose successful completion requires a responsive action from the recipient. If an initial request for food is not granted, the individual who made the request can either retract the request (i.e. by interrupting the holding of the gesture stroke and retracting the hand or by moving the mouth away from the other individual) or further pursue it by making another attempt (see, e.g., Example (1)). Hence the occurrence of a sequence-initiating action (e.g. a request) starts a course of action involving a series of actions produced by more than one participant (e.g., Sacks 1992 [1964-72], Schegloff 2007). For the interactional project to be complete, more has to happen. For example, a request can be considered accomplished only if the other participant provides the thing requested. An offer is completed only if it is accepted or rejected and the thing offered is provided to the individual to whom it had been offered. This means that the occurrence of a communicative behavior and the action(s) that this implements opens up the possibility of (and in humans, at times it normatively expects) the occurrence of another set of responsive actions that would allow the interactional project to reach completion. This can be achieved in two moves or may require larger structures, in that an initial move may be repeated if the interactional project remains incomplete. It is useful to consider requests as interactional projects that develop through courses of action rather than as isolated speech acts with felicity conditions (e.g., Austin, 1962,

Searle, 1969), because we thereby take into account the likelihood of orangutans' further pressuring the recipient to share food (possibly through harassment) and on the other hand it shows the contingencies under which a request may be retracted.

The 64 requests recorded in 2010 cluster into 50 courses of action, of which 11 contain at least one pursuit (i.e. a failed attempt that is immediately followed by another attempt). In all cases, the pursuing request consists of the repetition of the same gesture type: a failed begging gesture is followed by another begging gesture to the same individual, a mouth-to-mouth is followed by another mouth-to-mouth. Of the 11 courses of action in which the request was repeated at least once, in 3 cases the request had been initially implemented using a mouth-to-mouth gesture, while in 8 cases the request had been implemented by a begging gesture.

Similarly, the 17 requests from 2012 cluster into 12 courses of action, of which 4 contain at least one pursuit. In all but one of these 4, the gesture used is the same type used in the sequence-initiating action. There is, however, one exception, in which an initial failed reach by Batak towards Pini (his mother) is pursued through a begging gesture. The begging gesture then succeeds in eliciting a food transfer. Out of the remaining courses of action that get pursued, in one an infant uses mouth-to-mouth gestures and in the other two an infant uses reach gestures. Table 5 shows that if an initial request has failed, repeating the request (i.e. pursuing a food transfer from the same individual) pays off, as those courses of action are twice as likely to successfully elicit a food transfer. And in this case who is asking seems to be less relevant in terms of likelihood of success (for the 2010 recordings, Dokana had 2 successful pursuits out of 3 attempts, Pini 4 out of 5, Raja 3 out of 3).

Table 5: Successful food transfer by type of course of action and recordings

Course of Action	Recordings 2010	Recordings 2012
Only 1 request	48% (19/40)	25% (2/8)
At least 1 pursuing request	82% (9/11)	50% (2/4)

However, most of the requests are not pursued, even if the initial request has failed.

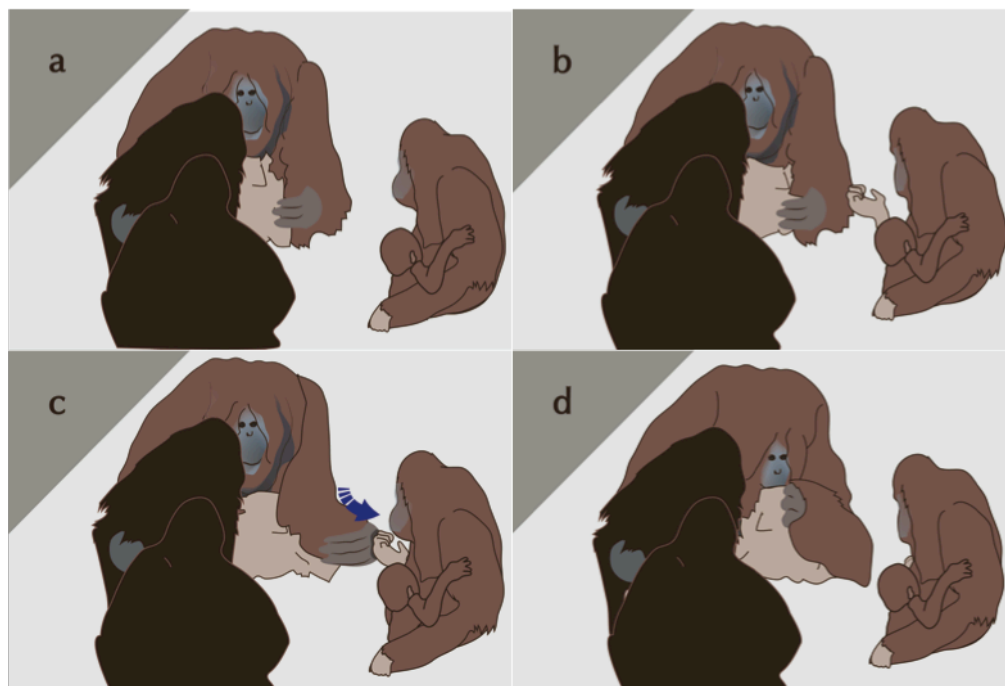
To understand why this might be the case, it is useful to consider when pursuing a response might actually be effective. Repeating a request can work only when both of the following conditions apply:

- a) The recipient has not explicitly denied granting the request; and
- b) The recipient is still capable of granting the request.

Explicit denials occur very rarely (only 3 instances in the recordings of 2010).

Example (4) illustrates how Bimbo can display that he is not going to grant Dokana's request.

(4) Request and rejection



Bimbo is looking at the bag with food and is eating from it while Dokana and her baby are sitting to his left, Pini and her baby are sitting in front of him and Raja is

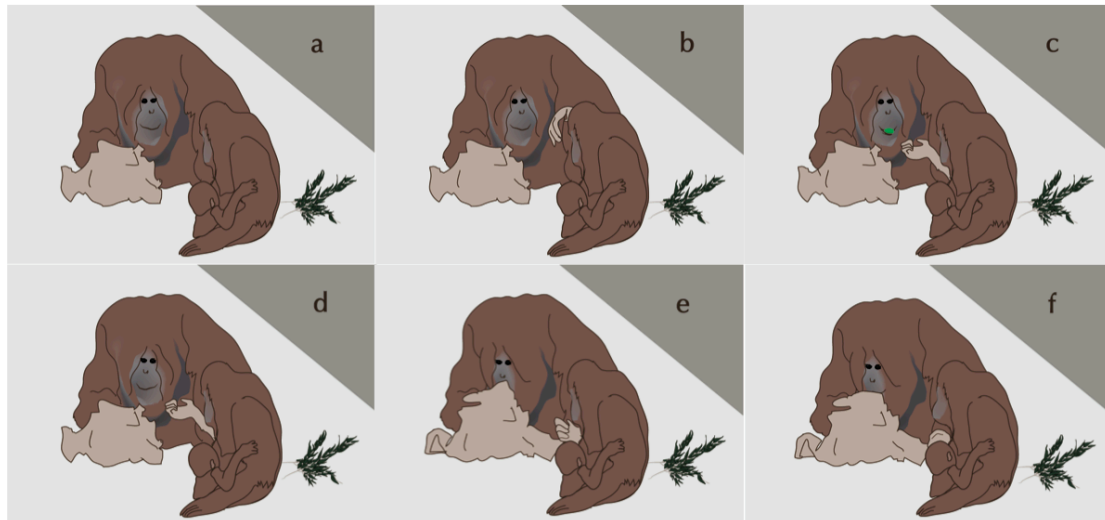
standing on his right. All the females are looking at the bag (4a). Pini then turns towards her left, away from Bimbo, while Dokana produces a begging gesture while looking at him (4b). As soon as the begging gesture reaches its stroke, Bimbo quickly pushes Dokana's hand away (4c). Then Bimbo resumes licking the paper bag and Dokana looks away from him, towards her right.

In this example we can see how Bimbo can reject a request by pushing away the begging hand, leading to the request being abandoned. Dokana does not pursue it any further; by deploying a begging gesture rather than a reach, Dokana is recognizably not attempting to take/steal the food from Bimbo. Pushing Dokana's hand away could imply that he is not willing to share more food with her (Dokana had already requested food from him 5 times before this sequence); indeed she does not request food from him for the rest of this recording. In other words, by pushing the hand away Bimbo is treating the begging hand as a social action with specific implications for him (pressuring for a food transfer).

In most cases, however, after the production of the first pair part, the individual in control of the food (the recipient of the FPP) does not push the begging or reaching hand away or the other individual away. If the recipient is attentive and continues looking towards the individual who produced the request, then it is very likely that the request will be repeated. Sometimes the recipient (e.g. Bimbo) is not looking at the individual issuing the request. Repeating the request with the recipient distracted would be useless and indeed there are no pursuits unless the recipient looks towards the requester. On other occasions, an attentive recipient looks away following the requesting gesture and resumes eating. If the individual was requesting the ball of leaves that the other had in her/his mouth, resuming eating and chewing suggests that

that food is gone (it has been swallowed) and therefore the likelihood of obtaining it is gone. Example (5) shows a case in point.

(5) Failed Request and hand retraction



Pini is sitting in front of Bimbo exactly like in example (3). Pini looks at Bimbo (5a) and ostensibly raises her right arm in front of her face (5b) to produce a begging gesture (5c). By the time the begging gesture reaches its stroke, Bimbo moves the ball of food outside his mouth on the tip of his tongue, exactly as he does in example 3 (see 3d) and as he always does before passing the ball from his mouth to the individual requesting it. However, he then moves it back into his mouth (5d) and resumes chewing the paper bag while looking at it (5e). As soon as he resumes licking and chewing the paper bag, Pini retracts her hand (5e) and then turns her head towards her left, away from Bimbo (5f). In other words, she disengages from the focused interaction that she had established by looking at Bimbo before producing the begging gesture. Note here that Pini does not retract her hand as soon as Bimbo takes the ball of food back into his mouth. Rather, she does so only when he looks away from her and most importantly, when he re-engages chewing the paper bag. By the time he re-engages in a competing course of action (eating), the successful

accomplishment of the previous course of action (obtaining the food from him) becomes unattainable and the gesture can be retracted.

Example (5) then illustrates how an orangutan can recognize whether or not the successful completion of the interactional project is still possible. Example (3) is a sort of template of a basic request sequence: when in response to the first pair part (the begging gesture) nothing happens, after waiting for a bit the request can be repeated and therefore the granting of the request can be pursued. If, on the other hand, an alternative competing behavior occurs (e.g. looking away and resuming eating), then the course of action cannot be completed and the sequence-initiating gesture can be retracted. This is true even if part of the usual responsive behavior is produced (e.g. Bimbo's moving the ball of food outside the mouth and placing it on the tip of his tongue). Indeed, while this might constitute the beginning of the responsive behavior that leads to the granting of the food request, the non-occurrence of the successive step (in this case not taking the ball of food out of his mouth and not handing it to the requester) is problematic.

Another element to consider is the combination of the timing of a delayed response and the possible cause for it. In the 2010 recordings, for example, 89% (17/19) of requests that were granted without any pursuit were granted in less than a second, usually within a few tenths of a second. Similarly, 89% (8/9) of the pursuing requests are granted in less than a second. The 3 deviant cases can be accounted for as follows:

- in one case Bimbo is simultaneously dealing with a request from Raja and a request from Dokana and so the delivery of a branch to Dokana is slightly delayed;

- in the remaining two cases, Bimbo continues to look at Pini and keeps rolling the ball of food in and out of his mouth, before taking it out and handing it to her.

Therefore, in one case the delay is due to dealing with a competing request and in the other two it is clear that Bimbo has not swallowed the food nor disengaged from the F-formation that Pini has established. By not disengaging, he shows that he could potentially still grant the request (which indeed he does after 4 seconds).

In general, it appears that the basic heuristic that the members of this group seem to follow is:

- if following a request nothing happens, wait;
- if the wait is longer than 1 second, and it is unclear why the recipient might be delaying dealing with the request, repeat the request (i.e. pursue it);
- if what the recipient does is in line with the expected course of action (i.e. the food is still available and the recipient has not disengaged from the focused interaction), wait and possibly pursue it further;
- if what happens derails the course of action (i.e. the recipient has rejected the request and/or is engaged in a competing activity unrelated to the request and/or the food is unattainable), retract the requesting gesture and give up for the time being.

Offers

We noted previously Tomasello's (2000) claim that great apes do not offer food and do not show food to others (though he later acknowledged the existence of anecdotal evidence suggesting that offers might occur, see Tomasello 2008). A closer look at Bimbo's behavior during the recordings of 2010, however, shows that he often does

offer food to three females (Pini, Dokana and Raja), but never to his own infants or to other females in the group. It is likely that the food offering is generated by the food abundance and by the fact that Bimbo can easily monopolize a large part of it. Not surprisingly, food offering occurs only between the male and adult females.

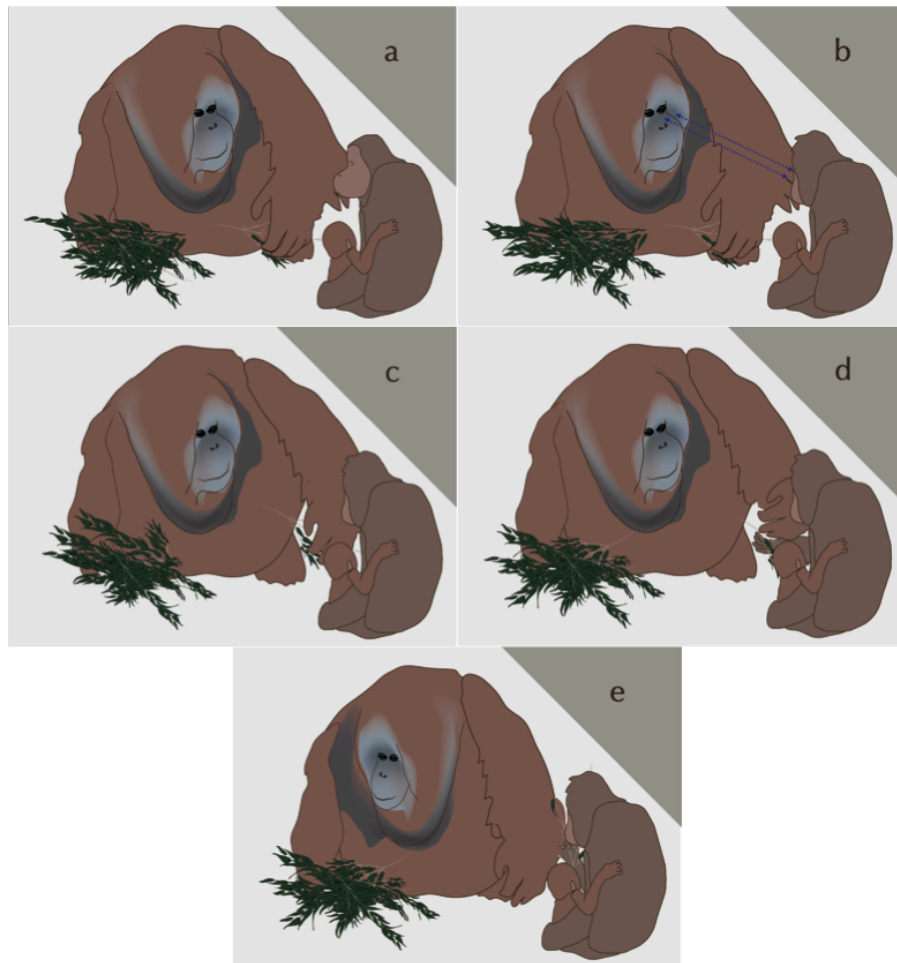
Nonetheless, if the question concerns not what an orangutan regularly does in the wild, but at the very least whether an orangutan might be able/inclined to offer food, our data show a remarkably cooperative and generous adult male.

From the events that we regard as offers, we excluded all those cases in which an individual possessing food dropped food in the space between herself/himself and another individual. This would often lead to the other individual picking up the food and eating it (what we have previously called “taking/stealing”); yet it was not possible to differentiate whether the droppings were intended acts of food offers or if they were accidental and not directed towards the recipient. Among the cases in which behavior is clearly addressed to the recipient (the offerer looks at the addressee), we can identify two main ways of offering food:

- HAND: while looking at the addressee, Bimbo moves the food in his hand closer to the addressee and holds it;
- MOUTH: while looking at the addressee, Bimbo rolls the food on the tip of his tongue outside his mouth and holds it.

Example (6) illustrates an offer implemented using the hand.

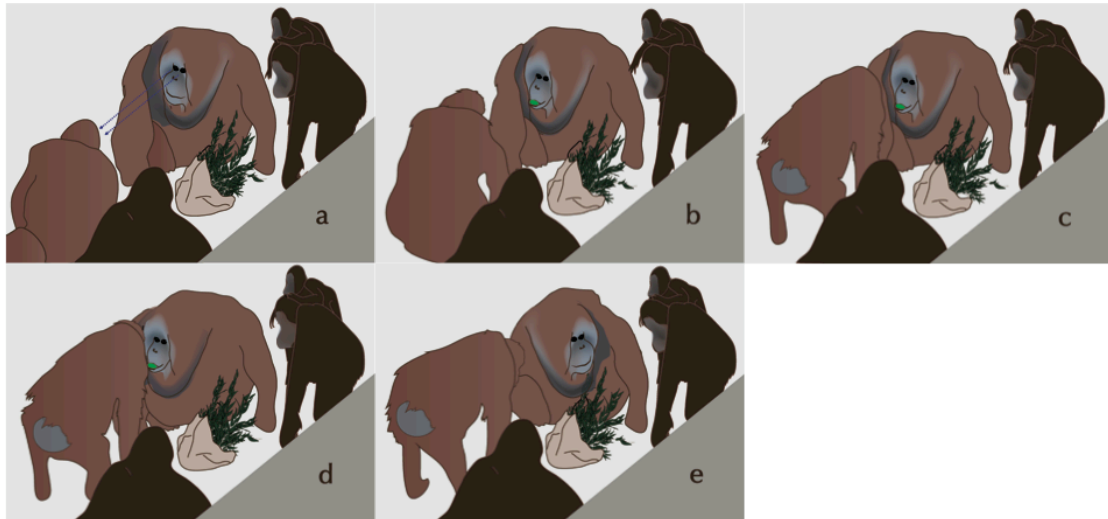
(6) Offer Hand



Having eaten a few leaves off a thin branch, Bimbo looks at Pini while holding in his left hand the branch with a few leaves left. Pini is looking away, towards her left (6a). Pini then turns her head towards Bimbo, who is already looking at her (6b). He moves his hand holding the branch closer to Pini and away from his body, while still looking at her (6c). Pini looks at the hand with the branch and moves her right hand first to touch the branch tentatively and then take it. (6d). Now Pini starts eating it, while Bimbo begins to retract his hand away from her (6e). In this example, Bimbo waits to extend his arm and hand until he has Pini's attention. Once the two of them are looking at each other, he can produce the offer, which is immediately accepted by Pini.

Example (7) illustrates an offer implemented using the mouth.

(7) Offer Mouth



Bimbo is sitting, surrounded by other members of the group. Dokana and her baby are on his left, Pini and her baby are in front of him and Padana is further back. First, Bimbo looks towards Pini, who is looking back at him (7a). Then Bimbo rolls a ball of leaves on the tip of his tongue and holds it outside his mouth while continuing looking at Pini (7b). At this point, Pini moves closer to Bimbo (7c), whereupon Bimbo leans forward and passes the food to Pini, mouth-to-mouth (7d). Having completed the food transfer, the two participants disengage from the mutual visual engagement: Bimbo turns towards his left and Pini looks down at the bag of food in front of him (7e). In this sequence, then, Bimbo offers food first by selecting his addressee and securing her attention, then by showing what he is offering. Pini's move towards Bimbo (7c) shows that she is interested in obtaining the food; he can then provide the food he has offered.

70% (16/23) of Bimbo's offers are hand offers, while 30% (7/23) are mouth offers. Bimbo offered food 11 times to Pini, 10 times to Dokana and twice to Raja. In general, offers are accepted 87% of the time (20/23) and the responsive behavior demonstrating acceptance is initiated very quickly, always in less than a second. The remaining 3 cases in which the offers are not accepted can be accounted for as follows:

- in a first case, Bimbo, producing a mouth offer, turns toward Dokana; but Dokana is looking away and the ball of food drops from his tongue to the ground after he held it for a couple of seconds;
- in a second case, Bimbo offers Dokana a branch with a few leaves right after Dokana had managed to take a better branch from beside the bag; Dokana does not respond to Bimbo's offer;
- in a third case, Bimbo offers Pini a very thin branch, after he has eaten all the leaves from it. Pini looks at the branch but does not reach for it (probably because there is nothing left for her to chew).

21 offers were produced once and either accepted or not responded to (there is no explicit rejection). Only in one case was the offer repeated. This happened in a situation in which Bimbo moved a piece of the paper bag close to Pini but for 0.5 seconds Pini did not move. At that point, Bimbo moved the piece of paper again and placed it even closer to Pini, who then took it.

Request and Offers: a sequential relationship

Conversation analysts have long claimed that in humans, offers are preferred over requests (e.g., Schegloff 1988, Schegloff 2007). This claim has recently been challenged, at least for conversations between adult humans (Curl & Drew 2008). In reviewing this claim Kendrick & Drew (this volume) point to the close relationship between requesting and offering; we can add that a closer look at the behavioral unfolding of requests and offers suggests a very close relationship between the two that is likely lost once these actions are produced verbally (see also the editors' introduction to this volume). From an orangutan point of view, an offer is identical to the second pair part of a request sequence. Let's look, for example, at how Bimbo

responds to a request implemented through a begging gesture (see example (3)): if he is giving a ball of food, he rolls the ball out of his mouth, then takes it with his hands and moves it closer to the requester. If he is offering a branch, he simply moves it closer to the requester. Rolling the ball of food out of his mouth and showing it to the recipient is how he produces offers via the mouth, while moving the branch closer to the recipient is how he implements offers via the hand. From his point of view, the form of an offer corresponds to what he would do following a request, only this time without having observed a request.

This is important because once it is established that orangutans can respond cooperatively to requests, implementing offers does not require any learning or developing of conventions from a behavioral point of view. Rather, it requires the pro-social motivation to give when/although the other has not asked. According to some, this is uniquely human (e.g., Tomasello 2008). Here, we can show the existence of at least one orangutan that actively offers food to females, in the context of eating close to each other in the presence of an abundant and monopolizable food source.

Concerning orangutans' actual pro-social attitude in sharing food, one criticism that can be raised concerns the actual value of the food that they provide in response to requests. For example, if Bimbo offers only food that has little value left for him (e.g. food that he has already chewed and sucked the juice off), is he really being pro-social when he gives it to others?

When an individual is faced with a request, the problem concerns what exactly the other individual is requesting. Recent work has shown how infant bonobos, for example, can develop specific gestures to request being picked up and carried around by their mothers through the process of ontogenetic ritualization (Halina, Rossano et al. 2013, Rossano 2013). In that situation it is possible that one gesture can be used to

request specifically one thing. However, it is by now quite established that orangutans and other great apes often use the same gesture in different contexts (see, e.g., Liebal, Pika et al. 2006, Call and Tomasello 2007). It is likely that some gestures mean something like “give me/can I have/ I want X” and then other features of the gestural form or of the contextual configuration provide helpful information concerning what that X is. For example, if individual A moves very close to individual B and produces a mouth-to-mouth request, it seems rather obvious that what individual A is after is not a fresh branch from the bag but rather the food that individual B has in his mouth. Providing that food means providing exactly the food that has been requested. Similarly, a reaching gesture usually has an indexical component: it works a little like a pointing finger. It therefore facilitates identifying the item that the requester is asking for. It is, on the other hand, much more complicated to infer what the other wants when a begging gesture is produced. The likely heuristic to solve this problem is the following: you want something that I currently have in my control and the context should tell me what you need. A begging gesture, indeed, simply works as a request for something, but does not specify what exactly the requester is asking for. It could be food, it could be a tool. As such, if both participants are in a feeding context, if the individual requesting has no food and the recipient of the request has food, then most likely the request will be about the food. If the recipient has food in his hands (e.g. a branch), then giving that food should satisfy the request. If the recipient has food in his mouth and nothing in his hands, then providing that food should satisfy the request.

The interesting part of this puzzle concerns what happens when the recipient has simultaneously food in his mouth and food in his hands. What does he give? In this situation, Bimbo gives the branch that he has in his hand in 86% of the cases

(12/14). This shows that even when he has a choice, he tends to provide the food item that has most likely generated the request (the food that is visible) and not the least valuable one (the food in his mouth). Similarly, in the 2 cases recorded in 2012 in which a begging gesture is responded to by two adult females that have simultaneously food in their mouth and food in their hands, the food provided is a branch with plenty of leaves and not the food they have in their mouth.

If we then consider offers, in 70% of the cases Bimbo offers what he has in his hands, which means almost always a branch. While it might not be the biggest branch with the largest amount of leaves, it is still a branch with some leaves and not already chewed food. Last but not least, it never happens that a recipient who obtains a ball of food from Bimbo's mouth throws it away or rejects it. Rather, they always eat it. The fact that it might appear of little value from a human perspective does not mean that it has little value from an orangutan perspective.

Requests and Offers in human infants

To investigate whether the behavioral forms observed in orangutans can be compared to ones produced by human infants who do not (yet) speak, we collected some additional human infant data. Middle-class Western human infants are more motivated and interested in toys than in food and in order to collect a larger sample of infants in a comparable situation, we created a semi-experimental situation involving toys. We invited to the child lab 16 infants aged 16 months \pm 2 weeks with their parents. Each infant then played with an experimenter (E) for about 8-10 minutes. They played with some colorful wooden or plastic shapes placed on a table. E produced a series of begging gestures towards the infant, alternating them with

playtime. The begging gestures were produced at times while looking and at times without looking at the infant. The logic behind it was to assess:

- a) whether young infants recognize a begging gesture as a request;
- b) which objects they give to E in response to the begging gesture;
- c) how likely they are to provide an object to an adult stranger (i.e. to grant the request); and
- d) to assess whether they pay attention to the direction of E's eyes or simply look at the begging hand.

The age chosen was related to what has been repeatedly documented about children between 15 and 18 months of age - it is the age when they begin to share more systematically, by showing and giving objects, including giving them in response to begging gestures (see, e.g., Rheingold, Hay et al. 1976). We wanted to test young infants who would be unlikely to speak and indeed very few of them produced a single word during the entire interaction, exceptions being one child who said "Bitte" (please) and three others who produced sounds that were interpretable as "no" and "that". The situation was such that it was possible to observe not just the infants' responses to requests, but also instances of their requests and offers to E. Note that when we use the term "offer" in this context, we really mean "give". Indeed, if in the case of the orangutans giving comes at a cost (the recipient eats the food after receiving it), in these interactions with human infants the objects that were given to E were not lost forever and could be accessed again later in the interaction. Nonetheless, as our interest is primarily in the bodily means through which they communicate to E that they are requesting or giving her something, rather than just showing it, we believe the situations are comparable, at least in terms of the socio-cognitive and semiotic demands on the infants when compared to the orangutans.

A look at the children's responses to E's requests shows that all but one child responded at least once to the begging gesture by placing a wooden shape in E's hand. This suggests that infants clearly recognized the begging gesture as a request for something, more specifically one of the shapes - almost always (97%) the object that they had in their hands. It happened only twice that a child had something in her hands but instead of giving it, looked for another toy and placed that one in E's hand. In other words, infants interpreted the begging gesture as requesting what they had in their physical control at that moment in time, just like the orangutans did.

There was a large variability in terms of the likelihood of E's request being granted. Some children would put the object in E's hand following every begging gesture and others would do so only once or twice out of 6-7 requests. Overall, they gave the colorful objects to E in 58% of begging requests (see Table 6). Given that putting a shape in E's hand did not mean losing access to it forever, but just for a few seconds or minutes, it is remarkable how these "pro-social/altruistic" human infants (especially when compared to other great apes) were not willing to give up what they had in their hands about half of the time. E's looking or not looking at the infant while producing the begging gesture had no effect on the likelihood of success in obtaining the shapes from the infant (with gaze 50%, without gaze 62%, Wilcoxon Signed Rank test $z = 0.912$, $p = 0.362$)

Table 6: Action types and their success rate

Action Type	Successful
E requests	58% (71/123)
E offers	73% (11/15)
Infant requests	75% (21/28)
Infant offers	86% (48/56)

Like the orangutans, in the case of unsuccessful requests, most times the infants simply ignored E's request (at times probably because they did not perceive it/notice it). However, there were also instances in which the infant actively rejected the request by pushing the begging hand away. Example (8) shows how this is done.

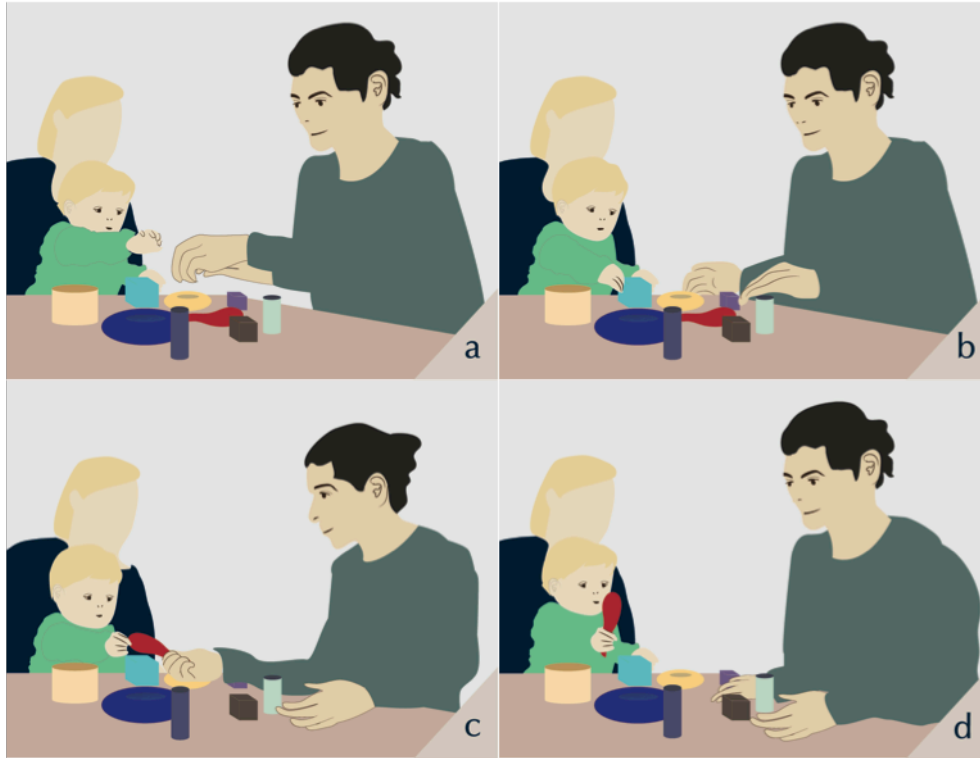
(8) Request rejected



The child (C, a girl) is sitting in front of a table on her father's lap and the experimenter (E) is sitting at a 90-degree angle on her left. C is holding an object in her hand and looking at another object on the table when E produces a begging gesture by placing her hand, open palm, quite close to the child (8a). C drops the cube in her hand and pushes E's hand away while looking at other objects on the table (8b). C then reaches for another object on the table. Here we see how the child refuses to grant the request by pushing the requesting hand away and then proceeds with another course of action.

If we then consider how infants request objects from E, we can see that they almost always implemented reaching gestures (one child once points to an object) and never produced begging gestures. Example (9) shows how infants' requests were usually implemented.

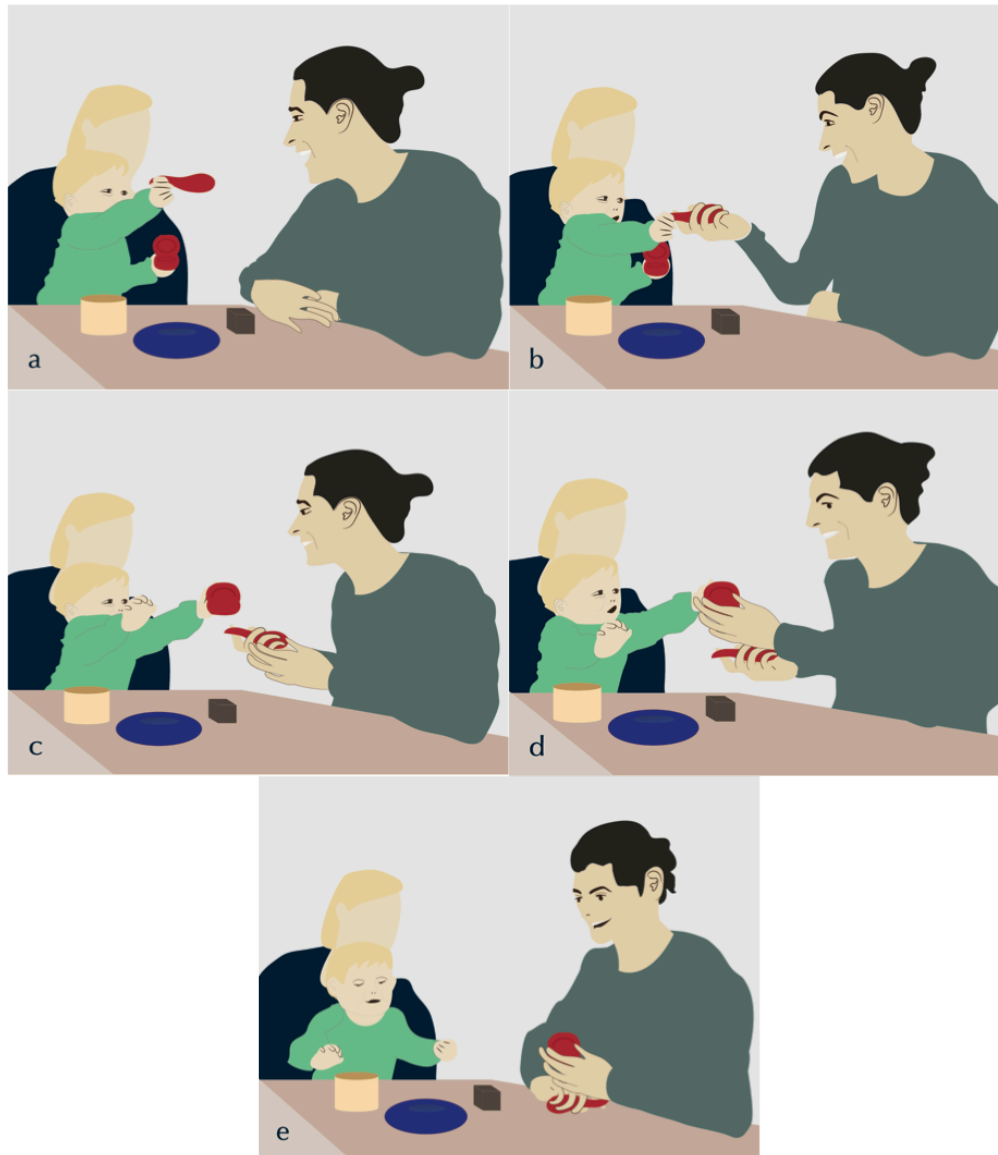
(9) Request Child



C (a boy) and E are sitting in the same positions as in the previous example. E is looking at the objects on the table. C begins looking at one of the objects on the table and he leans forward and stretches his right arm, hand palm down (9a). While stretching his hand, C is simultaneously producing a very brief high pitch vocalization and looking attentively toward the object. C then holds the reaching gesture while E scans the objects on the table, apparently to figure out which object the child might be requesting (9b). After 1.1 seconds from the initial gestural stroke, E picks up the fish toy from the table and hands it to the child (9c). The child begins to look attentively at the fish and E returns to look at the other objects on the table (9d). Note that throughout the whole sequence, the child has never looked at E, while E looks at C while handing him the fish toy (i.e. while granting the request). In our dataset children look at E during a request only when E has not promptly responded to it. This might be due to the child's monitoring what is causing the delay in reacting or it might be done to mobilize a response (Stivers and Rossano 2010) by making more explicit that the gesture is not just an attempt to reach the object but rather an action meant to be

taken as communicative and addressed to E. On the other hand, when a young child wants to give an object to E, she tends to look at E while moving the object closer to the recipient. Example (10) is a case in point.

(10) Offer Child



C and E are in the same spatial configuration as in examples (8) and (9). C, who was looking towards his left while holding a fish toy inside a plastic cup, begins moving the fish towards E. As soon as C begins to move the fish toy, he turns towards E and while stretching his arm and the object towards E, they engage in eye contact (10a). E immediately (0.1 seconds) moves to take the fish from C, therefore accepting

C's offer and says "Danke" (Thank you) (10b). As soon as the fish offer is completed, C also offers E the cup (9c). He does so in the exact same manner as he produced the previous offer: while looking at E he stretches his left arm with the cup toward E. As before, E immediately responds by taking the cup and saying "Danke" (9d). Then E withdraws his gaze from the child and looks at the objects on the table, whereupon C withdraws his gaze from E and looks at the objects on the table. Note here that E's physical and verbal response to C can be used as evidence that C's action was interpretable as an offer. E indeed takes the object in her hands and says thank you to the child. E does not label the object (e.g. by saying "it is a fish") or assess the object (e.g. by saying "it is a beautiful fish"), which would be reasonable responses if E had interpreted C's behavior as showing, rather than giving. Moreover, if C had not meant it as an offer, then he would probably resist E's taking the object and most likely C would not immediately implement a second offer by handing E the other object he has in his hands.

To summarize, requests are produced through reaching gestures while looking at the object, usually associated with a vocalization. While we have no instances of a child requesting an object from E using a begging gesture, they do recognize those gestures as requests as they tend to grant the requests quite reliably. Offers are produced by moving the object in the child's hands closer to the addressee (by stretching the arm) while looking at the addressee.

Discussion

This paper presented two pilot studies aimed at eliciting sharing situations in orangutans and human infants. The goal was to move beyond the general dichotomy of active/passive food sharing in primates, by presenting one way of investigating the

communicative behaviors that often elicit food transfers, and noting the possible contingencies associated with deploying specific gestures and their likelihood of success in obtaining food. Most importantly, we focused on the sequential unfolding of these interactional projects, the timing between an initial action and the responsive move, and the semiotic features that contributed to the recognition of the actions; that is, what allowed a “participant” to recognize when a request versus an offer had been produced, when such “social actions” did not result in a food transfer and when to pursue a food transfer further. In doing so, we have shown the role that body configurations and gaze play in displaying attention and in contributing to a gesture’s possible success. Further, we showed how remarkably fast responsive moves occur when requests are granted (as in humans, within one second). Similar to adult human interactions, delays in the production of responsive actions communicate information—a problem of some kind (in the case of orangutans, such delays communicate the unlikelihood of obtaining food). Given that we found most requests were not rejected but instead ignored, this raises intriguing questions about the nature of accountability in/for human infants and orangutans and the degree to which responses to different actions are (conditionally) relevant (see, e.g., Stivers and Rossano 2010).

In terms of describing some of the semiotic differences between offers and requests from a behavioral perspective, we have shown how the behavioral design of an offer corresponds to the format of an answer to a request. Requests —especially those implemented through begging gestures— are common in primates. This raises the possibility that “requests” may be primordial social actions —relative to offers, at least— such that they appeared earlier in the evolutionary process, whereas offers

may have developed once a motivation to pro-actively share and “other-regarding preferences” kicked in.

Turning to the human infant data, we showed that 15-16-month-old human infants reliably recognize begging gestures as requests and reliably respond to them accordingly. However, the infants observed in this study never used begging gestures to request objects, but instead produced reaching gestures directed toward the object they sought, alongside brief vocalizations while stretching their arms (multimodal signaling). Further, we found that these children usually produced the reaching gesture while looking at the object, as opposed to looking at the addressee, whom they only tended to orient toward in the absence of immediate response. In the case of offers, we found that children move the objects in their hands in close proximity toward and while gazing at the addressee. Finally, we saw that children often ignored requests, as opposed to rejecting them, but when they rejected them, they would push the begging hand away just as we observed with the orangutans.

Morphological similarities in the behavior of orangutans and human infants and comparable patterns in terms of the likelihood of a request being granted do not necessarily imply similar understandings of the social situation and of the social actions implemented through those behaviors. However, we believe that the similarities observed between orangutans and pre-verbal human infants pose a number of intriguing empirical questions for future investigations. In his ethological investigation on the ontogenesis of speech acts, Bruner claimed that “language acquisition must be viewed as a transformation of modes of assuring co-operation that are prior to language, prior both phylogenetically and ontogenetically” (Bruner 1975, 2). In that paper, Bruner investigated only the ontogenetic part of the hypothesis. In this paper we addressed simultaneously both the phylogenetic and the ontogenetic

parts of the hypothesis. The similarities observed here seem to confirm Bruner's claim concerning the existence of communicative modes of assuring cooperation that are prior to language. These modes are very basic and their complexity is minimal. Yet if confirmed, this would suggest that language does indeed build on a pre-existing infrastructure for social action, transforming it and making the range of social actions wider and more complex. In sum, the infrastructure for sequentially organized, cooperative social interaction and the capacity to selectively produce recognizable communicative actions may predate language evolution and be, to some degree, shared with many of our relatives in the animal kingdom.

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