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Evidence-based practice

Duckling-catching by a zoo-housed western lowland gorilla (*Gorilla gorilla gorilla*)

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Abstract

Surveys show that zoo-housed great apes occasionally interact with local wildlife. Bonobos and chimpanzees interact aggressively with and sometimes consume wildlife. Gorillas may also interact with local wildlife, but less often in an aggressive way and consumption is rare. Here we report the case of an adolescent female western lowland gorilla (*Gorilla gorilla gorilla*) in Apenheul Primate Park (Apeldoorn, The Netherlands) that persistently catches and handles ducklings. Prior to observations four possible explanations were proposed, which are not mutually exclusive: play, meat eating, need for abnormal plucking, and allomothering. On eight occasions the female was observed to actually catch ducklings (9 ducklings in total) and the minimum number handled was 19 unique ducklings. She handed ducklings on 10 out of 17 observation days. Ad libitum observations showed that the female spent much time plucking the feathers of the duckling, handling it carefully. In addition, she regularly placed a duckling on her back during locomotion. Eating of a carcass was not observed and playing with a carcass was very rare. Based on these observations, it is proposed that allomothering and abnormal plucking, rather than meat eating or play, may explain this idiosyncratic behaviour. This female probably invented the behaviour herself.

Background

Great apes that are housed in a zoo environment may occasionally interact with local wildlife. Based on a survey among zoos, chimpanzees (*Pan troglodytes*) and bonobos (*Pan paniscus*) seem to interact most often with local wildlife, mainly in an aggressive way (Ross et al. 2009). This complies with reports of hunting on local wildlife by captive (Videan et al. 2007; Llorente et al. 2012) and wild (Boesch and Boesch 1989; Watts and Mitani 2002) chimpanzees, clubbing and catching of local wildlife by captive bonobos (Gold 2002) and hunting by wild bonobos (Hohmann and Fruth 2008; Wakefield et al. 2019). Gorillas, on the other hand, seem to have less aggressive interactions with local wildlife, and the percentage of zoos reporting killing of local wildlife by gorillas is very low compared to that by bonobos and chimpanzees. However,

captive western lowland gorillas (*Gorilla gorilla gorilla*) do interact with local wildlife, and only 11% of the surveyed zoos had never seen their gorillas interact with local wildlife (Ross et al. 2009).

This study reports the case of an adolescent female western lowland gorilla in Apenheul Primate Park (Apeldoorn, The Netherlands) that catches and handles ducklings. According to the gorilla caretakers of Apenheul, this particular female has been catching the ducklings since she was 3 years old. This evidence based paper describes the circumstances and potential explanations of this behaviour. Moreover, the possibility that this is a behavioural innovation is explored (Reader and Laland 2003; Ramsey et al. 2007). Prior to the start of the observation period, four possible explanations for the duckling catching were proposed.

First, catching and handling the ducklings may be a form of play behaviour. If this is indeed the case, one would expect to see a play face and/or displays like chest beats during the handling of the duckling, as these are characteristics of play behaviour in gorillas (e.g. Maestriperi and Ross 2004).

Second, the catching of ducklings may be for foraging (meat eating). However, in contrast to the other great apes (see Suci Utami and van Hooff 1997), there is no direct evidence for consumption of meat by wild gorillas (but see Hofreiter et al. 2010). If meat eating is the main goal of the duckling catching, we would expect the gorilla to kill the ducklings after catching them and to ingest (parts of) their corpses.

Third, duckling catching and handling may provide an opportunity to perform abnormal behaviour, such as hair plucking. The female who caught and handled the ducklings was known to pluck her own hairs. This behaviour is relatively common among captive gorillas, with 15% of captive gorillas performing plucking behaviour (Less et al. 2013). Some of the individuals that show self-plucking also show allo-plucking (gorilla: Less et al. 2013; bonobo: Brand and Marchant 2015, 2018). If allo-hair plucking explains the duckling catching and handling, the female would mainly be expected to pluck the feathers of the caught ducklings.

Fourth, the handling of ducklings may be some sort of allomaternal behaviour that may aid a young female to gain maternal skills (Fairbanks 1990; Schino et al. 2003). If this explains the catching and handling, the female would be expected to carefully handle the ducklings and show maternal behaviours, such as grooming them and carrying them on her back. These four explanations are not mutually exclusive.



Figure 1. Adolescent female M'Fugaji plucking a duckling she caught earlier. Photo courtesy of Judith Algra.

Action

Study situation

Apenheul Primate Park (Apeldoorn, The Netherlands) houses a group of 13 western lowland gorillas. One of the group members, an adolescent female named M'Fugaji (Figure 1), born in the group, has been observed to catch and handle ducklings.

During the observation period, the gorillas were housed in a naturalistic outdoor enclosure (Figure 2) of approximately 1.1 hectares during the daytime. Two times a day (1200 and 1400) the gorillas were part of a feeding presentation for the public. In addition to the feeding presentations, the gorillas were fed multiple times a day. Water was available ad libitum.

The whole outdoor enclosure is surrounded by water. In the spring, the water around the island contains multiple broods of mallards (*Anas platyrhynchos*) and coots (*Fulica atra*) from wild populations that voluntarily choose to brood at this location. Unfortunately, a large part of the island was unobservable (almost full left side of Figure 2). Therefore, it was not possible to observe all the duckling catches and subsequent behaviour.

Ad libitum observations of the duckling catching were made approximately two days a week by TSR. The observations started on 26 April 2017, when the first duck eggs started hatching, and ended on 26 June 2017, because of the very low number of ducklings present. Catching events and the consecutive behaviour of the gorilla subject were recorded when possible on video, using a JVC Everio GZ-R15 camcorder. In addition, notes were made of the behaviour of the subject.



Figure 2. Aerial view of the gorilla outside enclosure (aligned) and the locations of the observed duckling catching events (stars).

The minimum number of ducklings that were handled every observation day was determined, based on the remaining down feather coverage of the caught ducklings and the number of ducklings handled at the same time. This is a conservative estimate, because the gorillas often went out of sight and it was difficult to determine the precise numbers.

In total, there were 17 observation days. On 10 of those days the gorilla female was observed handling ducklings (Figure 3), and on six of these 10 days catching events were observed. In total, eight catches were observed and described, of which three were videotaped. During the study period, the gorilla female handled at least 19 different ducklings. In total, 2 hours of video material were gathered, encompassing both the three catches and the handling of the ducklings afterwards. For some observed behaviours, short selections of video material are provided as examples of the mentioned behaviour types (Supplementary Material).

Consequences

Emergence of behaviour

According to the gorilla caretakers, the female gorilla, M'Fugaji, started catching ducklings when she was around 3 years old and she still showed this behaviour 5 years later (at the time of this study she was 8 years old). The origin of the behaviour was unclear, and it seems very likely that she acquired it herself, because no other group members ever performed this particular behaviour.

Catching of ducklings

In total, eight cases of catching of ducklings, involving the catching of nine ducklings, were observed. All catches took place when the ducklings were either on the gorilla island or located in water vegetation near the gorilla island. In all cases, M'Fugaji came running from a distance to catch the ducklings (Video 1, Supplementary Material). When she was far away, she first approached the duck and ducklings slowly and then accelerated once she was rather close. When close, she ran at high speed and caught one or more ducklings (the observed maximum was two ducklings during the same catching event). She would catch

additional ducklings when already handling one or more. In three of the eight catching events, she was already handling another duckling when she caught a new one.

Main behaviours after catching

M'Fugaji performed a number of behaviours after catching the duckling, ordered from most to least observed. First, all cases (observed on all 10 observation days that involved duckling handling) involved plucking the down feathers of the duckling with either the lips or fingers (Figure 1; Video 2, Supplementary Material). In all observed cases, the duckling was still alive when plucking started after the catch event. Subsequently, the gorilla put the down feathers of the duckling in her mouth, possibly ingesting them. She performed this behaviour very carefully and was not squeezing the ducklings. Moreover, she never ate the meat of the ducklings. All ducklings died at some point after catching, but no sudden behaviour or biting was observed that directly led to the death of a duckling.

Second, M'Fugaji regularly (observed on 5 observation days) placed the caught duckling on her head or back during locomotion (Video 3, Supplementary Material). In some of these cases she let the duckling slide off her back, and then picked it up again. She also used this to transport the duckling.

Third, she used several methods to transport the duckling to a new location. This included, next to carrying on her back (on 5 days), holding the duckling in her mouth (observed on 3 observation days) or putting the duckling between her belly and her thigh. She used this last method also to 'store away' one or more ducklings during feeding or other activities (observed on 10 observation days).

Fourth, a number of rare behaviours were observed, such as one observation of chest beating while holding the duckling clamped under her chin, showing a play face at the same time. This was the only observation of playful behaviour. Also, in two cases, the gorilla seemed to rub with her genitals over the carcass of a duckling and on one of these occasions showed a grin.

Social interactions with other gorillas

Interestingly, M'Fugaji was the only member in the group that engaged in the catching of ducklings. Only one other gorilla showed interest when she caught/handled the ducklings; this was a juvenile female, Tayari. In two cases, she got a close look at M'Fugaji and the duckling directly after catching. However, she did not catch or handle any ducklings herself during the study period. So, the duckling catching behaviour was restricted to only one gorilla of the group.

Discussion

This case study presents observations of duckling catching and handling by an adolescent female western lowland gorilla at Apenheul Primate Park, The Netherlands. The main finding is that she was able to catch live prey on a regular basis. However, she did not kill the ducklings that she caught by biting them, but instead handled them very carefully. In addition, no instance of eating the ducklings was observed. Instead, she spent most time on plucking the duckling and regularly put the duckling on her back. The handling did not seem like a play activity, as she rarely showed play faces and/or displays during handling of the duckling.

Based on these observations, it is highly unlikely that the main reason for the behaviour is either meat eating or play. However, two other explanations remain: allomothering or abnormal plucking behaviour. These explanations are not mutually exclusive. It has been observed that M'Fugaji showed allomaternal behaviours with the youngest male of the group, Jabari, whom she occasionally carried on her back. Allomaternal care would

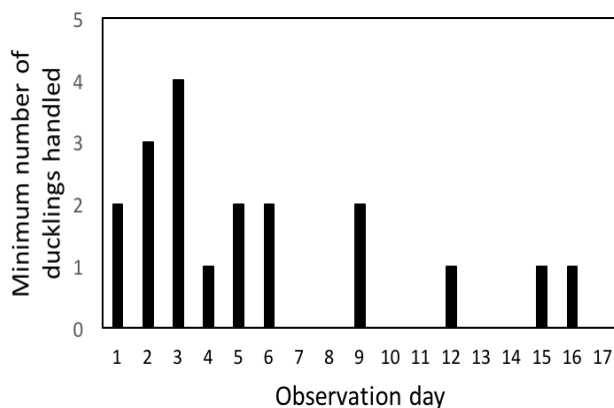


Figure 3. Number of ducklings being handled per observation day.

explain the careful handling of the duckling during plucking, and it would explain why M'Fugaji sometimes placed the ducklings on her back during locomotion. The behaviour is similar to the description of a juvenile wild chimpanzee carrying a duiker on his back, like an infant chimpanzee (Boesch and Boesch 1989, p. 553). It also resembles behaviour of juvenile female Kanyawara chimpanzees that show allo-care to inanimate objects like sticks (Kahlenberg and Wrangham 2010), indicating that objects other than infants can elicit allomothering in great apes. Moreover, these sticks were regularly carried between abdomen and thigh, similar to M'Fugaji's frequent transport method of the ducklings. This suggests that the duckling handling had several elements of allomothering, similar to stick handling in female chimpanzees.

The other possibility is that the duckling catching and, mainly, the subsequent plucking was abnormal plucking behaviour. M'Fugaji has occasionally been observed plucking both herself and, very occasionally, her mother, subsequently ingesting the hairs, just as she did with the ducklings and their down feathers. Since her auto- and allo-plucking were part of her grooming behaviours, this may have formed the starting point of duckling plucking but does not explain the catching behaviour. However, it is important to note that multiple case studies of wild chimpanzees and bonobos also report on the grooming and plucking of caught local wildlife (e.g. Sabater Pi et al. 1993; Hirata et al. 2001; Carvalho et al. 2010; Cibot et al. 2017). So, handling of living animals by great apes may in general be accompanied by grooming and plucking.

This report concerns a case study of one gorilla that catches and handles ducklings. The causation of a behaviour in case studies is always difficult (Whiten and Byrne 1988; Mitchell 1997) and only suggestions can be provided. Two potential explanations are discarded and two suggestions provided, but these do not cover all aspects of the behaviour towards ducklings. Still, case studies can be highly informative, since they show rare (Whiten and Byrne 1988) and innovative behaviours (Reader and Laland 2001). An interesting parallel between the mentioned wild chimpanzee and bonobo case reports (e.g. Sabater Pi et al. 1993; Hirata et al. 2001; Carvalho et al. 2010; Cibot et al. 2017) and this report is that the involved individuals tend to be juvenile or adolescent, which may imply that young individuals more often develop new behaviours. However, a literature analysis of primate behavioural innovation found that adults are generally more innovative (Reader and Laland 2001).

In this case, only M'Fugaji showed duckling catching and it is very likely that she developed it herself. Therefore, it can be considered an innovation (cf. Reader and Laland 2003; Ramsey et al. 2007). Considering why M'Fugaji showed this behaviour, personality may play a role. M'Fugaji can be considered a very explorative individual, as she was among the first and most frequent to climb over the new vegetation-protecting fencing on the island. Also, she was the only individual that dared to touch a turtle that walked on the island. This was especially notable, because the Apenheul gorillas are frightened by the turtles living around the island. In addition, the only group member that showed interest in M'Fugaji's behaviours, Tayari, was a very explorative individual as well. For example, she also participated in climbing the vegetation-protecting fencing. This suggests that explorative individuals may be more likely to invent new behaviours. A similar finding has been reported for chimpanzees, in which explorative individuals were more successful in solving a tool-use task (Massen et al. 2013).

Conclusions

This case study shows that gorillas may have the capacity to catch live prey. However, no meat eating was observed and playing with the caught ducklings was rare. This particular individual, M'Fugaji, may have practiced maternal care (allomothering) by handling the

ducklings. The exhibited feather plucking behaviours may have started with plucking behaviour that was part of her grooming habits. In the group, this unique behaviour is only performed by her, indicating that this immature female invented the behaviours herself.

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