

OBSERVATIONS OF CHIMPANZEE ACCUMULATIVE STONE THROWING IN BOÉ, GUINEA-BISSAU

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ABSTRACT

Certain chimpanzee populations in West-Africa show a particular behavior: they return to a specific tree and throw stones against the base, often leading to an accumulation of stones beside or inside the tree ('chimpanzee accumulative stone throwing', as it was named). We here describe some particular observations of chimpanzee accumulative stone throwing in the Boé sector of Guinea-Bissau, such as stone throwing by an infant; an adult and juvenile throwing stones together, stone throwing at night, and in heavy rain. Other particular behaviors near the focal trees are also described, such as climbing, playing and sitting alone or in a group at the base of the tree. The behaviors were recorded by trap cameras and links to the videos are available as supplementary information. Shared observations may increase knowledge and future research of this particular, rather recent described, behaviour.

INTRODUCTION

Some populations of western chimpanzees (*Pan troglodytes verus*) show a particular behavior: individuals often throw stones against particular trees, generating a loud noise ("bang"), often accompanied by pant-hoot vocalisation (referred to as 'accumulative stone throwing' [1]). The stones often accumulate on site, near or inside the base of the focal tree. The chimpanzees can either 'hurl' the stones against the tree, 'toss' the stones into a hollow tree cavity and/or between its buttress roots, or 'bang' the stones repeatedly while holding the stone in their hands [1]. Occasionally, chimpanzees have been observed drumming the tree with their hands or feet [1-3]. The stones used in Boé (laterite, possibly limonite: a relatively light-weighted, iron-containing mineral) can be as heavy as 3-7 kg (even stones of 17 kg are reported [1]). Most often, it is adult males that throw stones against the trees, but females and juveniles have also been recorded doing so [1,3]. Accumulative stone throwing often involves

a series of behaviors in an almost ritual manner, such as staring at the tree, swaying back and forward, pant-hoot vocalisation (an accelerating and increasingly louder *u:hu:*-sound, until a loud scream [4]; up to and including the throwing of a stone [1-3] (see supplementary video 1). Research on the purpose of this stone throwing behavior has not yet revealed a clear answer: communication, male display and a symbolic function are seen as possible explanations [1-3,5].

This behavior was first described as ‘drumming on trees by chimpanzees’ based on observations by the indigenous population of the Boé sector [6], Guinea-Bissau who describe this behavior as a common phenomenon that already existed in the time of their ancestors (pers. obs.). Moreover, we found focal trees of accumulative stone throwing of chimpanzees within 1 km of a women’s laundry spot, just outside the village Béli [3]. The Boé sector is a remote area of ca. 3,000 km² of forest-savannah mosaic in the south-east of Guinea-Bissau, West Africa. The rainy season starts in May and ends in October (mean annual rainfall: 1,600-2,000 mm) [7,8]. A slash-and-burn practice for agricultures is regularly practiced by the local population. Estimates of chimpanzee populations based on line transect counts carried out for the Chimbo Foundation within the Boé sector range between 1,000 and 1,500 [A. Goedmakers pers. comm., 9], with individual party sizes of up to 17 individuals as seen in one camera trapping event (pers. obs.). The indigenous people in the Boé sector have a strong respect for chimpanzees and will not disturb, nor hunt or harm them, based on cultural taboos (pers. obs., but see also Sousa [10,11] for other regions in Guinea-Bissau). Within the Boé sector, chimpanzees are partially protected within numerous patches of sacred forests [8,12] that possibly create a favourable environment for chimpanzee cultural development (see [13] on this topic), as a consequence of limited human presence.

A site in Boé has been included within the Pan African Programme (PanAf, Max Planck Institute for Evolutionary Anthropology, Leipzig Germany) [14], a project which aims to

enhance our knowledge of evolutionary and ecological characteristics of chimpanzees throughout Africa and to implement this knowledge in future conservation actions [15]. An increase in conservation interventions is urgently needed because in many West African countries, suitable habitat for populations of *Pan troglodytes verus* is disappearing at an alarming rate [16].

We aim to enhance research on chimpanzee accumulative stone throwing by sharing interesting observations recorded by trap cameras in the Boé sector, Guinea-Bissau. Particularities include accumulative stone throwing at night; during the rainy season; by an infant; by an adult and juvenile together, but also of chimpanzees just sitting calmly at the base of the tree in a group, or alone, or climbing it.

RESULTS

1. An infant banging an accumulated stone to a tree

On 2 April 2015 at 08h38, we recorded an infant jumping off the back of an adult that was passing a focal tree with accumulated stones. The infant grabbed a small stone at the base of that tree and banged it to a tree standing next to it. (See supplementary video 2).

2. Juveniles playing, stone throwing and drumming at focal sites

On 17 July 2015 at 07h21, we recorded an adult and a juvenile throwing stones together against a focal tree; first the juvenile throws a stone, then the adult, then they run away (see supplementary video 3). On 28 April 2013 at 15h40, we recorded a juvenile playing alone near the base of a focal tree with accumulated stones (see supplementary video 4). Moreover, we observed a juvenile bringing a stone from elsewhere to a focal tree (on 28 April 2013 at 15h55) (see supplementary video 5) and a juvenile taking away a stone from the main focal

stone throwing spot (on 3 May 2013 at 10h16) (see supplementary video 6). Beside accumulative stone throwing, we recorded a juvenile drumming a focal tree with his feet, on 2 April 2015 (see supplementary video 7).

3. A young female climbing into a focal tree

On 2 July 2015 at 11h32, we recorded a young female, possibly with a disabled hand, climbing into a focal tree before a party of chimpanzees of at least 9 adults passed by, after which she climbs down from the tree to inspect the camera and the accumulated stones, before climbing back into the tree. (See supplementary video 8).

4. An adult female sitting at the root of a focal tree

On 26 May 2015 at 13h15, an adult female was recorded sitting on a buttress root of a focal tree for about two minutes, looking calmly around, without stone throwing or any similar behavior. (See supplementary video 9). The same female was the only individual observed throwing stones at this particular tree during December 2015, on four different occasions: on the 12th at 09h20 and at 17h32; on the 13th at 15h44; and on the 18th at 13h37. In each event, she sat down for several seconds just after stone throwing (see supplementary video 10).

5. Strong adult males

Most often it is adult males that are recorded stone throwing [1-3]. Like the female above, some males may also sit nearby for some time before or after stone throwing (see supplementary videos 11 and 12) (cf. [1]). Strength and effort are used for throwing the stones, and on 12 July 2015 at 7h04 we recorded a stone-throwing behavior that went wrong: the chimpanzee throwing a large stone dropped it on its foot (see supplementary video 13).

Associated behaviors of accumulative stone throwing might be related to male display (cf. [1]), as evidenced on 23 June 2015 at 07h32, when a male is recorded shaking leaves and bushes and banging stones on other trees, as well as on the focal tree of the stone accumulated site (see supplementary video 14). Despite the record where an adult and juvenile are throwing stones together (described above), we observed a juvenile that possibly was chased away from a focal tree by a large male on 24 April 2013 at 16h27 (see supplementary video 15). On 18th of June at 16h31, a bigger male possibly chased away a smaller individual after the latter had thrown a stone at a focal tree, by jumping on the tree, and drumming his feet (see supplementary video 16).

6. Accumulative stone throwing at night

On 20 July 2015, we recorded a young adult male throwing stones at a focal tree, once at 03h46, once at 03h49 and once at 05h20. It is unclear whether some of his behavior recorded during that night, such as scratching and yawning should be regarded as displacement activities or not within this context. After his last stone throw, he begins hanging on the tree (almost ‘hugging’ it), after which he falls asleep in front of it for ten minutes and then leaves the scene. (See supplementary video 17).

7. Accumulative stone throwing during heavy rain

On 23 August 2015 at 18h07, we recorded a chimpanzee throwing a stone against a focal tree while it was raining heavily. (See supplementary video 18).

DISCUSSION

Accumulative stone throwing might be studied at both an individual (e.g., observation 3) and a community (cultural) level (e.g., observation 2); and stone throwing behavior might be altered through characteristics such as function (play, male display, communication), age (e.g., observation 1) and/or sex (e.g., observations 4 and 5).

Ecological context factors such as the location and type of forest (such as observed in [3], but [1]) and tree species used [3,5], time of day or night (e.g., observation 6) and season (e.g., observation 7), might also influence our interpretation of this behavior.

The discussion of potential driving factors behind a newly described behavioral phenomenon is controversial. Further research based on many observations is needed to put them into perspective.

METHODS AND LIMITATIONS

1. Ethic statement

We thank IBAP “Instituto da Biodiversidade e das Áreas Protegidas” and the “Ministry of Agriculture and Rural Development” of Guinea-Bissau for kindly giving us permission to conduct research in the Boé area.

2. Subject and data collection

The study includes four different camera trap sites in Aicum (dry secondary forest), Capebonde (sacred gallery forest), Quebube (savannah edge forest) and Tontege (sacred gallery forest). At each site, one focal tree of chimpanzee accumulative stone throwing was pictured through camera trap, except for Quebube where two different trees were selected by J. van Schijndel in 2012. The camera traps sites of Tontege and Aicum have been selected during the PanAf project [1,14,15]; the

Capebonde site by J. F.C. Wenceslau in 2013 during his MSc thesis [2]. The observations described here were made between December 2014 and July 2015 (so after the PanAf study of [1] and monitored by an independent team of researchers of the Chimbo Foundation [3]), except for those of Capebonde which were made in 2013.

The sensor level of the Bushnell Trophy cameras (NatureView Cam HD Max, type 119439) was set to “High”, the resolution, or video size was 1280 x 720, and video length was 60s. No continuous data is available due to errors in data transfer, data gathering, camera defects and bush fires in the field, making it impossible to compare different trees and locations adequately.

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SUPPLEMENTARY VIDEOS

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3. <https://www.youtube.com/watch?v=ujo9RdafLI4>
4. <https://www.youtube.com/watch?v=33ieaCoVDII&feature=youtu.be>
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6. https://www.youtube.com/watch?v=fYJEM_YXJ7w&feature=youtu.be
7. <https://www.youtube.com/watch?v=tOgvmhZ77A4&feature=youtu.be>
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13. <https://www.youtube.com/watch?v=2xs6LIsbRR8&feature=youtu.be>
14. <https://www.youtube.com/watch?v=WMxN9-vpDbg&feature=youtu.be>
15. <https://www.youtube.com/watch?v=xzKvImQrMJ8&feature=youtu.be>
16. <https://www.youtube.com/watch?v=cjrLC6iR29I&feature=youtu.be>
17. <https://www.youtube.com/watch?v=YG7WUpiTUFY>
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