

Short Communication:

Positional behavior of captive Bornean Orangutan (*Pongo pygmaeus*) at Bukit Merah Orangutan Island, Perak, Malaysia

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Abstract. Kamaluddin SN, Dharmalingam S, Md-Zain BM. 2019. Short Communication: Positional behavior of captive Bornean Orangutan (*Pongo pygmaeus*) at Bukit Merah Orangutan Island, Perak, Malaysia. *Biodiversitas* 20: 425-429. Bukit Merah Orangutan Island (BMOUI) is the only semi-captive orangutan conservation center in the Malay Peninsula. BMOUI promotes orangutan conservation through ex-situ efforts comprising rehabilitation, education, awareness, ecotourism, and research studies. This research aimed to determine the qualitative behavior aspects, especially focusing on the orangutan positional behavior on BMOUI. A focal instantaneous sampling method was carried out for 252 hours from December 2015 to November 2016. The qualitative results showed that the positional behaviors of a Bornean orangutan at BMOUI were divided into nine main categories, as follows: sitting, lying, clinging, forelimb-hindlimb suspension, standing, walking, running, brachiation, and multipositional modes. The most favorable position shown by a captive Bornean orangutan on BMOUI were dominated by sitting and lying postures. The variety of positional modes displayed in a semi-captive condition still maintained Bornean orangutan as the great ape originating from the tropical inhabitants of wooded environments.

Keywords: Bornean orangutan, *Pongo pygmaeus*, positional behavior

INTRODUCTION

The orangutan (*Pongo pygmaeus*) is the only available great ape in Asia in the family Pongidae (Roos et al. 2014). This arboreal and terrestrial primate species mostly inhabit tropical rainforest with restricted distribution on the islands of Sumatra and Borneo (Zhang et al. 2001; Ampeng et al. 2016). To date, three orangutan species have been recorded, namely Bornean orangutan (*Pongo pygmaeus*; Warren et al. 2001; Kamaluddin et al. 2018a), Sumatran orangutan (*Pongo abelii*; Md-Zain et al. 2013), and Tapanuli orangutan (*Pongo tapanuliensis*; Nater et al. 2017). Meanwhile, Bornean orangutan is divided into three subspecies, as follows: *Pongo pygmaeus pygmaeus*, *Pongo pygmaeus morio*, and *Pongo pygmaeus wurmbii* (Warren et al. 2001).

Orangutan allocates time differently to various behaviors depending on the condition of the habitat (Kuncoro 2004). The behavior variation of the orangutan is complemented with distinct positional behavior (Thorpe and Crompton 2005). Primate positional behaviors have been described as having postural and locomotor modes (Thorpe and Crompton 2006). Primate species displayed various positional modes compared to the other mammals based on ecological and morphological features (Manduell et al. 2012). Those various positional and postural modes have been studied in many primate species, such as *Gorilla gorilla gorilla* (Remis 1995), *Pan troglodytes* (Doran 1996), *Symphalangus syndactylus* (Fleagle 1976;

Michilsens et al. 2010), *Macaca fuscata* (Koari 2002), *Macaca fascicularis* (Cant 1988; Md-Zain et al. 2010), *Macaca nemestrina* (Ruslin et al. 2010), *Pygathrix nemaeus* (Workman and Covert 2005), *Trachypithecus delacouri* (Workman and Schmitt 2012), and *Trachypithecus obscurus* (Ch'ng and Md-Zain 2009; Md-Zain and Ch'ng 2011; Ruslin et al. 2019).

Data on orangutan positional behavior in the natural habitat have been documented by several researchers (Isler 2003; Manduell et al. 2012; Putt 2009; Thorpe and Crompton 2006). Orangutan facilitates different postural modes for their terrestrial and arboreal lifestyle due to their special body structure (Delgado and van Schaik 2000). Orangutan has long forelimbs with hook-like hands, short hindlimbs with hand-like feet, and highly flexible hip and shoulder joints (Delgado and van Schaik 2000). In the wild, orangutan dominantly performs suspensory posture and movement (Putt 2009; Thorpe and Crompton 2005). To date, positional behavior has never been investigated for a captive orangutan in Malaysia except in several studies in Indonesia (Manduell et al. 2011; Manduell et al. 2012; Thorpe and Crompton 2006). In addition, most positional studies focus on the wild orangutan and emphasize a few activities, such as resting, feeding, and moving (Descovich et al. 2011). Thus, this study aimed to identify and describe the positional modes of semi-captive orangutan on BMOUI to provide adequate knowledge of the variety of great ape behaviors in a captive environment.

MATERIALS AND METHODS

Study site

Bukit Merah Orangutan Island (BMOUI), Perak (100° 40' 33.9" E, 05° 00' 32.1" N), is located on the Malay Peninsula (Figure 1; Kamaluddin et al. 2018b). Ecotourism is common in the study area in addition to being a captive orangutan conservation center. The island is estimated to be about 35 ha, and it is covered by secondary tropical forest. Five acres were provided to build four enclosures as the orangutan release center. All the enclosures are separated by electronic hot fire fences. Various structures like ropes, feeding devices, and wooden platforms have been set up in the outdoor enclosures, which consist of secondary forest. The orangutan has daily access to the outdoor enclosures from 9:00 am to 5:00 pm. Tourists can observe the orangutan moving freely by walking through the tunnel located in the middle of the enclosures (Md-Zain et al. 2013).

Data collection

The observation was carried out almost over 1 year, from December 2015 to November 2016, as part of behavioral research that also included quantitative data for the daily activity budget. However, in this paper, we only present qualitative data focusing on positional behavior (Md-Zain et al. 2014). The data were collected randomly for 15 individuals of orangutan with different age-sex classes using focal instantaneous sampling. Sampling was conducted from 9:30 am to 5:00 pm in 5-minute intervals for sessions lasting 1 hour (Kamarul et al. 2014; Hambali et al. 2016). Postural behaviors were measured using the standard protocol from Martin and Bateson (1986) and Morrogh Bernard et al. (2002). The description of the positional behavior of the orangutan was recorded following Ampeng and Md-Zain (2012), Ch'ng and Md-Zain (2009), and Hunt et al. (1996).

RESULTS AND DISCUSSION

The postural modes of the orangutan were divided into five main categories, namely sitting, lying, clinging, suspension, and standing. Meanwhile, the locomotor modes were divided into three main categories, which were walking, running, and brachiation. Multipositional modes were also recorded in this study, representing the combination of many postural and locomotor modes at one time.

Postural modes

Sitting

The sitting posture of the orangutan on BMOUI mostly appeared in three categories, which were sit in, sit out, sit in/out, and angled sit. Based on the observation, the dominant sitting posture for the orangutan was the sit-in position.

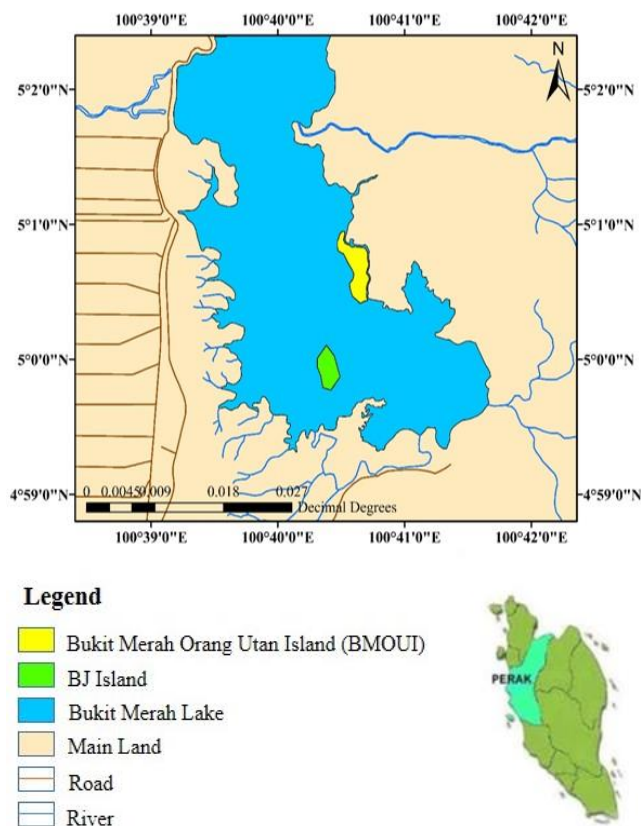


Figure 1. Study site of Bukit Merah Orang Utan Island, Malaysia

Sit in. This position often occurred terrestrially on BMOUI during the resting and feeding period. It is mainly supported by the ischia, which are close to the heels and usually touch the base of the thigh. The knee and hip are tightly bent with the hindlimbs. The body weight of the ischia is roughly held by the feet (Figure 2.A). To support the body weight, the ischia and feet support the stratum horizontally (Putt, 2009; Thorpe & Crompton, 2005, 2006). In the resting period, the forelimbs were often bent on the knee, while the body curved to the front during feeding activity (Hunt et al. 1996).

Sit out. This position involves sitting with the hindlimbs or both feet out (Figure 2.B). The ischia support most of the body weight, while the feet are mostly used for balance (Rose 1977).

Sit in/out. One hindlimb is extended, while the other is flexed (Figure 2.C; Hunt et al. 1996; Thorpe and Crompton 2006).

Angled sit. This position is observed when the hindlimbs are close to the hip and the forelimbs grip the branch (Figure 2.D). The distribution of body weight differs from those on a horizontal substrate (Fleagle 1978). This position was rarely observed in adult orangutans on BMOUI.

Lying

Lateral lie. This mode of position is usually exhibited during the inactive phase and involves the elbows supported by the upper part of the body (Figure 2.E). The substrate is touched by all lateral body segments (Hunt et al. 1996; Philips 2011; Sugardjito and Van Hoof 1986). This position was mostly observed terrestrially during hot weather on BMOUI. It rarely occurred on the tree branches.

Back lie. All body weight rests mostly on the dorsum part (Hunt et al. 1996). This posture was usually displayed by all the orangutans during the resting time (Figure 2.F).

Clinging

This posture is mostly exhibited in two types of modes, which are bimanual clinging and unimanual forelimb clinging (Hunt et al. 1996). A flexed limb posture is most frequent on vertical or subvertical supports (Hunt et al. 1996; Myatt et al. 2011; Putt 2009).

Bimanual clinging (= vertical clinging). Both Bukit Merah orangutan hands grip the substrate with the elbows bent (Figure 2.G). The torso is in orthograde or suborthograde position, while the forelimbs are toward the body. The hindlimbs are bent at the knee and hip. At least half of the body weight is supported by the hindlimbs (Manduell 2008). In all cases, the elbow, knee, and hip are bent (Richard 1985).

Unimanual forelimb clinging (= arm hang). One of the orangutan hands grips the substrate with unusual support from other parts of the body (Figure 2.H). In this posture, more than half the body weight is supported by the forelimbs to grip a substrate above the body (Fleagle 1976; Thorpe and Crompton 2006).



Figure 2. A. Sit-in posture, B. Sit-out posture, C. Sit-in out posture, D. Angled posture, E. Lateral lie posture, F. Back lie posture, G. Bimanual clinging posture, H. Unimanual forelimb clinging posture

Forelimb-hindlimb suspended (= arm-foot hang)

This position involves suspension by a forelimb and a foot with a subhorizontal position (Cant 1987). The limbs are extended (Thorpe and Crompton 2006). This position is different from forelimb suspend, in which the torso position is more pronograde (Thorpe and Crompton 2006).

Ipsilateral forelimb-hindlimb. This position involves suspension of the body using torso pronograde with a forelimb and hindlimb on the same side of the body (Figure 3.A)

Contralateral forelimb-hindlimb. This comprises a suspension of the body using torso pronograde with a forelimb on one side and hindlimb on the other side of the body (Figure 3.B)

Standing

Quadrupedal stand. This position involves four limbs standing horizontally or subhorizontal on the substrate (Figure 3.C). The elbow and knee are enlarged, and the trunk is near horizontal (Putt 2009).

Extended bipedal stand. In this stance, the hip and knee are completely expanded and not supported by the forelimbs (Figure 3.D). The trunk is near orthograde, and this position is described as human-like standing (Myatt 2011; Thorpe et al. 2007).



Figure 3. A. Contralateral forelimb-hindlimb suspend posture, B. Ipsilateral forelimb-hindlimb suspend posture, C. Quadrupedal stand, walk and run posture, D. Bipedal stand, walk and run posture, E. Brachiation posture, F. Multi-positional modes

Locomotor modes

Walking

Symmetrical gait walking (quadrupedal walking). Symmetrical gaits mostly occur in primate walking (Cant 1987; Manduell 2008). Walking is usually a diagonal sequence with extended limbs (Manduell et al. 2011; Myatt and Thorpe 2011). This mode of locomotion supports significant stability (Figure 3.C) of the Bukit Merah orangutan body weight compared with bipedal movement (Gebo-Daniel 1996).

Extended bipedal walking. In this walking, there is support by the hindlimbs via an extended hip and knee (Cant 1987; Putt 2009). This mode of locomotion is comparable to human walking (Figure 3.D; Hunt et al. 1996; Myatt and Thorpe 2011). In the wild, all great apes can perform bipedal walking, and it mostly occurs in the arboreal context (Thorpe and Crompton 2006).

Running

This mode of locomotion is usually observed when the Bukit Merah orangutan is in playing activity or showing fear toward something.

Quadrupedal running. This type of running uses asymmetrical or irregular gaits for fast locomotion (Figure 3.C; Hunt et al. 1996).

Bipedal running. This involves a similar posture to bipedal walking, but with fast movement (Figure 3.D). The most running activity of primates is actually fast walking (Hunt et al. 1996).

Brachiation

This involves orthograde suspensory locomotion by hand-over-hand motion to grip the substrate (Figure 3E; Gebo-Daniel 1996). Half the body weight is supported by the forelimbs, and only some are supported by the hindlimbs (Myatt 2011; Manduell et al. 2012).

Multipositional modes

This positional behavior combines all the modes of posture and movement at one time (Figure 3.F). These modes have usually been observed among sub-adults during playing activity. They include terrestrial and arboreal postures and locomotion, but they are mainly observed on the ground.

In conclusion, Nine types of positional behaviors were exhibited by the Bukit Merah orangutan, namely sitting, lying, clinging, suspend, standing, walking, running, brachiation, and multipositional modes. Sitting comprised many categories, specifically sit in, sit out, sit in/out, and angled sit. Three types of lying positions were identified, namely lateral lying, back lying, and sprawling. The clinging posture was divided into bimanual clinging and unimanual forelimb clinging, while the suspend posture was separated into *ipsilateral forelimb-hindlimb* and *contralateral forelimb-hindlimb*. The standing positional modes involved quadrupedal and extended bipedal standing. Meanwhile, walking exhibited symmetrical gait and extended bipedal walking, while running was divided into quadrupedal and bipedal running. Brachiation displayed only a single type of posture, while the

multipositional modes combined all the types of posture and movement. Positional behavior should be further studied by incorporating habitat utilization on BMOUI. Later, it will indirectly help the Bukit Merah Orangutan Island Foundation to formulate management plans for habitat enrichment and conservation in semi-captive conditions.

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