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Orangutan (*Pongo pygmaeus wurmbii*) human-oriented behavior at the Lamandau Wildlife Reserve, Indonesia

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Abstract. *Amalia N, Fajarallah DP, Atmoko SSU. 2021. Orangutan (*Pongo pygmaeus wurmbii*) human-oriented behavior at the Lamandau Wildlife Reserve, Indonesia. Biodiversitas 23: 396-402.* Unlike other conservation efforts, rehabilitation and reintroduction face different challenges due to humans' role in developing orphaned orangutans. Long-term interactions between orangutans and humans in captivity will gradually encourage orangutans to shape and increase human-oriented behavior (interest in humans). The Lamandau Wildlife Reserve (Lamandau WR) applies the soft-release method for the orangutan release process. Additional feed is provided every day. The correlation between animal-human interactions as part of the conservation efforts evaluation is essential to study. This study aimed to analyze the human-oriented behavior of the orangutan population in the Lamandau WR based on the observation sites (camp, feeding site, and forest) and the age-sex class of orangutans. This study also identified the factors that affected them. The study was conducted for five months (July-November 2019). During the observation, the factor of current age was suspected to affect human-oriented behavior. Human-oriented behavior is divided into three categories based on the orangutans' response: approaching, avoidance, and no response. The highest rates of human-oriented behavior in orangutans were approaching category. The highest promoting behavior was noticed at the camp and feeding site, especially young orangutans and mothers. Interest in humans can be explained by the 'captive effect' phenomenon where captive orangutans are more likely to independently explore the novelty (unfamiliar objects/foods) than their wild counterparts.

Keywords: Camp, feeding site, human-oriented, Lamandau Wildlife Reserve, orangutan, reintroduction

INTRODUCTION

Orangutans are lifelong learners. The most important learning comes from their social experiences, especially in the immature phase when they learn to acquire ecological and social skills (Russon et al. 2016). Developing ecological abilities and knowledge of young wild orangutans in a semi-social environment depends on their mothers, especially for infant orangutans (van Noordwijk et al. 2009).

At the age of 7.6 years, wild orangutan begins to be self-dependent (van Noordwiik et al. 2018). Therefore, the role of the mother becomes essential since the orangutan is born until they become self-dependent. However, the role of mother orangutans living in captivity or the rehabilitation stage is replaced by humans (Russon 2006; Morrogh-Bernard et al. 2009). The longer duration of captivity makes the effect even worse (Russon et al. 2016; Smith 2014; Palmer 2018). Prolonged contact with humans may provide a more extended period for orphaned orangutans to be socially oriented towards humans (Russon 2006; Palmer 2018).

There is a wide variation in the pattern of human-animal interactions in captivity, ranging from operant conditioning training, research procedures, and regular medical treatment. The frequency of interactions that slowly occur between orangutans and humans forms a close relationship eventually (Chelluri et al. 2012; Palmer and Malone 2016). The different experiences of each orangutan with humans cause each orangutan to have different curiosity (Damerius et al. 2017; Damerius et al. 2018).

Captive orangutans that build early learning with human orientation cause orangutans' physical and social development to run abnormally (Russon 2006). These factors may increase the potential for future conflict between orangutans and humans (Russon 2006). Great ape-human conflict is any interaction involving humans and great apes. Subsequent interactions will affect social, economic, cultural, ecological/environmental aspects, and conservation, which tend to be negative (Hockings & Humble 2009). Orangutan conflict with humans is a situation where the interests of humans and orangutans clash since the actions of one species may be detrimental to other species (Smith 2009).

Rehabilitation and reintroduction face different challenges from other conservation efforts as the role of humans are involved in the development of orphaned orangutans (Djufri 2015; Russon et al. 2016). The dependence of orangutans on humans is a significant problem on the success of their rehabilitation and reintroduction (Russon et al. 2016; Palmer 2018). This is associated with the increased predation of orangutans due to reduced nesting ability while in the forest and ineffective

foraging by orangutans (Riedler et al. 2010; Ashbury et al. 2015; Russon et al. 2015).

The long-term relationship or interaction of orangutans with humans in captivity may shape and enhance human-oriented behavior (interest in humans) (Russon et al. 2016). Several factors contribute to human-oriented behavior in orangutans. For example, age is a critical factor for orangutans to initiate interactions with humans (Smith 2009). Likewise, studying animal-human interactions is also essential as it plays a significant role in managing animal welfare in captive settings, such as zoos (Saragih et al. 2010; Pedersen et al. 2019; Webber et al. 2020).

The importance of studies on the correlation between animal-human interactions is part of the conservation efforts evaluation. The results obtained from this research will provide essential information regarding the aspects needed to prevent the dependence of ex-captive animals in the presence of humans in the vicinity. Thus, the goals of rehabilitation and reintroduction can be achieved.

This study aimed to analyze the presence of human-oriented behavior in the orangutan population at Lamandau Wildlife Reserve (Lamandau WR) based on the observation sites (camp, feeding site, and forest) and the age-sex class of orangutans. Besides, this study also identified factors that influence them.

MATERIALS AND METHODS

Time and Locations

This study was conducted in the Lamandau WR, Central Kalimantan, Indonesia, from July-November 2019. Lamandau WR has several Camp releases (Camp), such as Gemini Camp, Siswoyo Camp, JL Camp, Rasak Camp, and Buluh Camp (Figure 1). Feeding sites were built around the release monitoring camp to support the survival of orangutans after being released into the wild. The feeding sites are 4 such as Gemini, JL, Rasak, and Buluh. The vegetation found around the camp area reached 147 species, of which 101 species were the staple food for orangutans (Nawangsari et al. 2016). The Lamandau WR ecosystem area is a lowland forest and swamp forest ecosystem that is affected by tides, periodically submerged. Both of these habitats are orangutan release habitats.

Research subjects

The research subjects observed were ex-captive orangutans released into the Lamandau WR. Nature Conservation Agency, Central Kalimantan, Indonesia**,** and OF-UK have released orangutans since 1999. The total number of individuals which is still under monitoring is 56 orangutans. From 56 individuals, observation of activity patterns in three locations (camp, feeding site, and forest) was carried out on 23 orangutans, where 10 of 23 samples were followed. The observed orangutans were differentiated based on two age classes: adolescent and adult orangutans. They are also differentiated based on sex (Table 1). Individuals in the adolescent age class are newly reproduced individuals from the ex-re rehabilitated individual (Table 2).

Figure 1. The observation sites at: A. Camp release and, B. Feeding site of Lamandau WR, Central Borneo, Indonesia

Sampling methods

Observational data in this study include the response of orangutans to humans involved in their interactions with them, where this response is categorized as human-oriented behavior (Smith 2009). Human-oriented behavior towards orangutans refers to orangutans' interest in humans and/or human activities around the camp, feeding sites, and releasing forests during the observation period.

Based on the orangutan's response, human-oriented behavior is divided into three categories as follows: (i) Approaching, where orangutans tend to approach/initiate interactions with humans, for example, some of them approach camp staff who brings additional feed in a relatively short distance. (ii) Avoidance is described as when orangutans feel threatened/perform activities which tend to avoid interaction with humans, such as hiding when camp staff passes in front of them or making vocalizations as an alarm signal of fear, and (iii) No response, is when orangutan ignores or does not respond at all to humans and chooses to maintain the activity he/she is doing**.** An example of no response, in this case, is that some adult orangutans in the camp were found to be indifferent towards the camp officials working around them (Table 3).

Focal animal sampling was conducted by instantaneous recording every 2 min. Focal animal sampling was conducted by taking instantaneous recording every 2 min. In addition, the depth interview method was performed with informants involved in the interaction with orangutans, such as camp staff, vets, office staff, and visitors. The interview aimed to obtain secondary data in a history of observed orangutan activity.

Observational data on human-oriented behavior is differentiated based on observation sites (camp, feeding site, and forest) and sex-age class. Observation of orangutans at the camp and feeding site would start when orangutans appeared/entered the camp and feeding site. Observations were considered out of sight if the observed orangutan moved outside the specified radius of the camp and feeding sites, 20 m from each side of the camp and feeding site/feeding platform. Observations ended when the orangutans were out of sight or in sleeping nests around the camp either in the feeding site.

Data on observations of orangutans in the forest were obtained by following the orangutans since they appeared/ woke up, then walked from the sleeping nest and ended when the orangutans entered the night nest. Once a follow was initiated, it was continued for three consecutive days.

Table 1. Categories, total observed individuals, total observation days and hours

Categories	(N) Individuals	∑Days			∑Hours		
		Camp	Feeding site	Forest	Camp	Feeding site	Forest
Adult Male (AdM)	2	6	3	3	44	10	30
Adult Female without offspring (AdF)	2	6	3	0	34	6	0
Adolescent Male (AM)	2	7	5	5	36	8	56
Adolescent Female (AF)	6	29	14	11	98	21	120
Mother (Mt)	11	38	21	9	277	26	94

Table 2. Focal individuals, histories, current age, the released/birth year, and the camp near releasing point of each individuals

Focal	Categories	Current age (year)	History	Released/birth	Camps
Yoko*	AdM	23	Ex-rehabilitant	2004	Buluh
Carlos	AdM	?	?	?	Gemini
Ekon*	AM	6	Ebony's offspring[1]	2014	Gemini
Ewet*	AM	15	Ex-rehabilitant	2006	Rasak
Kotim*	AF	10	*Soft-release*[2]	2014	Rasak
Suwita*	AF	11	Sawit's offspring[1]	2009	Rasak
La betti	AF	12	Ladi Di's offspring[1]	2007	Rasak
Sakura*	AF	11	Sela's offspring	2008	Gemini
Pauline	AF	12	Paula's offspring	2007	Gemini
Sugi*	AF	8	*Soft-release*[2]	2016	Buluh
Queen	AdF	23	Ex-rehabilitant	2003	Buluh
Ilik	AdF	20	Translocated	2007	Gemini
Vania	Mt	26	Translocated	2015	Buluh
Morres	Mt	20	Ex-rehabilitant	2003	JL
Dedek	Mt	21	Ex-rehabilitant	2002	JL
Acuy*	Mt	22	Ex-rehabilitant	2006	Rasak
Amina*	Mt	12	Acuy's offspring	2007	Rasak
Sela	Mt	20	Ex-rehabilitant	2004	Gemini
Passion	Mt	20	Ex-rehabilitant	2005	Gemini
Camelia	Mt	19	Ex-rehabilitant	2006	Gemini
Max*	Mt	16	Mantra's offspring	2003	Gemini
Hola honolulu	Mt	15	Huber's offspring	2004	Gemini
Maya	Mt	22	Ex-rehabilitant	2003	Gemini

Note: *) Followed individuals, [1]) The mother orangutan is dead, [2]) Rehabilitation process in Lamandau Wildlife Reserve, Indonesia. ?) Data unknown

Table 3. Orangutan human-oriented categories by (Smith 2009).

Approaching behavior (orient to)				
Visual	**Gestural**	**Locomotor**	**Positional**	**Vocalize**
Glances	Reach out	Approach		
Repeated Glances	Point	Follow		
Visual Tracking	Offer	Up (Better view)		
Avoidance behavior (orient away)				
Look away	Vegetation display	Withdraw	Hide	Kiss squeak Mip-mip Grunt

Data analysis

Observations of orangutan data were analyzed quantitatively for orangutan human-oriented behavior based on different observation sites and age-sex classes. The statistical test using ANOVA and Linear Regression Model. Data analysis was performed using software R.

RESULTS AND DISCUSSION

Orangutans Human-Oriented Rate based on Observation Locations

Overall, the rates of human-oriented behavior of orangutans in the three observation sites (camps, feeding site, and forests) consisted of 73.4% approaching category, 19.5% avoidance category, and 7.2% of the no-response category. The highest approaching category is shown when the orangutans are in the camp and its surroundings. The highest level of the avoidance category is seen when orangutans are in feeding site and forest areas where this behavior only occurred in the AF and Mt groups (this could be due to the limited observation period, so the sample size was low). The highest no response category was shown by the AdM and AdF groups while they were in the forest (Figure 2).

Orangutans human-oriented rate based on age-sex classes

The approaching (66.5%) and avoidance (52.5%) categories were mostly occurred in adolescent orangutan groups, while the no response category mainly occurred in adult orangutan groups (56.8%%). However, several individuals in the mother group (Mt) showed a higher approaching rate than other orangutans. Orangutans belonging to the mother group are Acuy, Amina, Queen, and Max. These individuals were released 15-17 years ago in Lamandau WR.

Identification potential affected factor: current age and duration after release into forest

Age and length of time orangutans in the wild after being released are predictors to determine what factors influence human-oriented behavior in orangutans. This finding is reinforced by the results of Smith's (2009) study, which found that the age factor affected the rate of orangutan human-oriented behavior (P=0.0008b) (R2=0.223 indicating 22.3% of the linear regression model was influenced by current age) (Figures 3). The results showed that the human-oriented behavior of adult orangutans, especially in the approaching and avoidance categories, was lower than adolescent orangutans. Human-oriented (approaching) behavior in adult orangutans will gradually decrease as they age (Smith 2009).

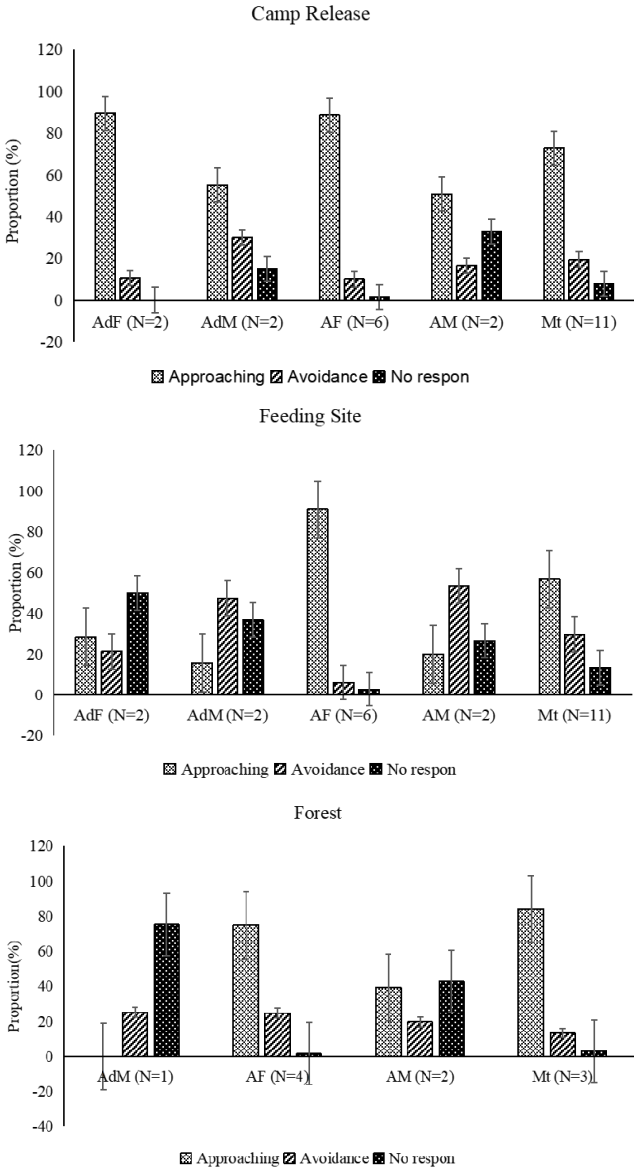

Figure 2. Orangutan human-oriented behavior rates based on observation sites (Camp, Feeding site, and Forest)

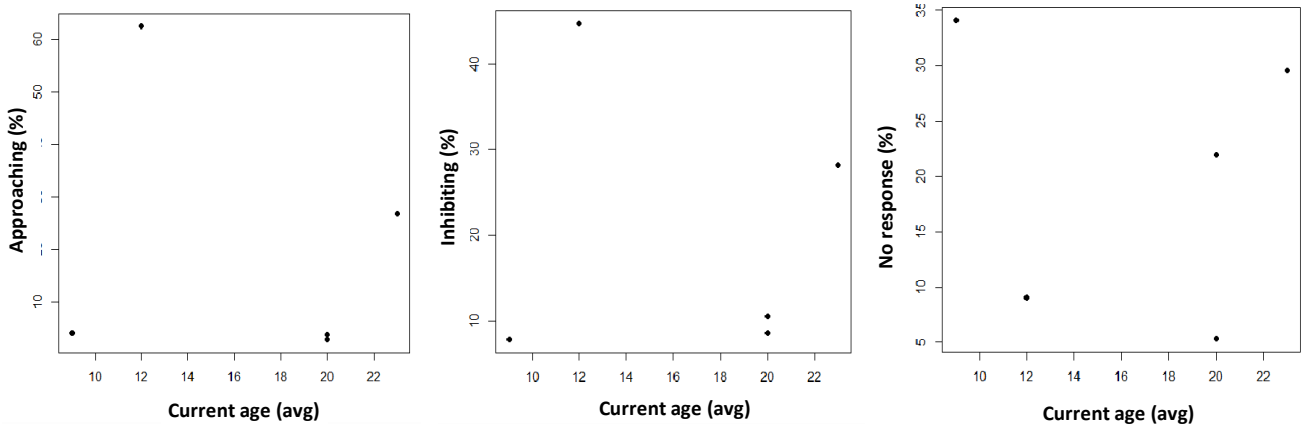

Figure 3. Scatterplot of the relationship between human-oriented behavior (Approaching, Avoidance, and No response) per orangutan group with current age as a predictor (Approaching; $P=0.0008^{b}<0.05$, Avoidance; $P=0.0113^{b}>0.05$, and No response; $P=0.201^{b}>0.05$)

Discussion

Orangutan approaching behavior was mostly noticed through visual orientation to humans around the camp and feeding sites. Visual contact occurs in almost all human activities, such as sweeping floors and washing. Visual contact often occurs by paying attention to humans for more than 60 seconds (Visual Tracking) (Table 3).

The behavior of orangutans shows their interest in humans, even though the activities carried out by humans do not benefit them (Smith 2014). For example, orangutans often approach staff who brings food, such as fruit and human food (coffee or snacks), while at the feeding site or in the forest**.** This response of orangutans was also noticed when they were in the forest by several female adolescents, such as Kotim (10) and Sakura (11) where they often only approached staff who brought food but ignored the staff's presence if they did not.

These results indicate that orangutans tend to be attracted to human food, regardless of their presence in the forest. The study case in Zoo shows that visitors with food could even be a form of orangutan enrichment (Choo et al. 2011). Several factors may influence the rate of human-oriented behavior in apes in a complex way. The results of Smith's (2014) study indicated that the familiarity factor affected the rate of affiliative behavior in gorillas (*Gorilla gorilla gorilla)* and orangutans (*Pongo pygmaeus* and *P. abelii*) in Zoos.

In some conditions, the visual behavior of animals in captivity towards unfamiliar people shows a wary/fearful attitude. This is the same as the level of alertness of orangutans to predators in their natural habitat. However, orangutan alertness/fear can also be associated with curiosity level (Pedersen et al. 2019). Interactions between keepers with gorillas and orangutans in zoos correlated with higher levels of affiliation with humans who were familiar with them (Smith 2014; Pedersen et al. 2019).

The results indicate that the current age factor influences the human-oriented behavior of several individuals in the Lamandau WR orangutan population. Furthermore, the research revealed that the association between age factors that affect human-oriented behavior could be described in the behavior patterns of orangutans in the events/human activities observed below.

A group of volunteers (non-staff) was gathering and eating at one of the camp kitchens. Ekon (AM/6) climbed up the tree to look at the kitchen. Ekon was then followed by Sakura (AF/11) who also climbed up the tree and approached the kitchen to watch the staff eating, while Sela (Mt/20) tended to ignore and continue her activities. In the case of some individuals, orangutans may exhibit high levels of avoidance at a relatively older age. For example, Camelia (Mt/19) and Carlos (AdM) often showed an avoidance attitude when approached by staff, while Morres (Mt/20) often made a mip-mip sound as a fear alarm (Table 3).

This behavior contrasts with the incidence of adolescent orangutans which tend to initiate interaction with humans first, as Kotim case (AF/10) which often initiates and approaches visitors who visit the camp and feeding sites. He showed it through approaching behavior such as stretching the arms/legs towards the human and showing pointing gestures (Table 3).

Different effects may be found in rescued orangutans younger than adults. Conditions when they are captive, such as being tortured or being pampered by humans, can also have different effects on orangutans' social interest in humans (Smith 2009). Interactions between adult orangutans and young orangutans in the wild are often initiated by young orangutans (Galdikas 1984). Preuschoft et al. (2021) found that young rehabilitated orangutans were more likely to initiate human interactions than adult ones.

Human-oriented behavior can be described as orangutan behavior that arises from the 'captive effect' phenomenon because captive orangutans tend to be more independent in exploring new things (unknown objects/food) than wild orangutans. Animals that live in captive environments, such as zoo-dwelling orangutans and rehabilitate orangutans, will perceive humans as no longer a threat (Russon 2006; van Schaik et al. 2016). This habit will reduce the awareness level of crucial things such as predation and inter-species competition. It also triggers

animals to be more interested in exploring new things, such as unfamiliar objects/foods, including those related to humans (van Schaik et al. 2016; Damerius et al. 2017).

Experimental tests on well-habituated wild populations in Suaq Balimbing (Sumatra) and Tuanan (Kalimantan) showed that wild orangutans tended to avoid unfamiliar objects/food placed in non-natural nests (Forss et al. 2015). Furthermore, wild orangutans tend to avoid these objects by maintaining a safe distance for several months and only one adolescent individual is recorded to have had contact with the object.

Contrasting results were shown by orangutans living in zoos based on the same experimental test. Orangutans approach the object for only a short time (Forss et al. 2015). These results indicate that wild orangutans tend to be reluctant to explore the novelty (unfamiliar objects/foods) given the effort/energy expended and the risks that may be obtained, such as the possibility of being injured (poisonous food) (van Schaik et al. 2016).

Human-oriented behavior also occurs in other great ape species such as gorillas (Smith 2014; Pedersen et al. 2019). However, human-oriented behavior between gorillas and orangutans is significantly different. In this regard, orangutans perform more affiliative behavior than gorillas at the Toronto Zoo (Pedersen et al. 2019).

This research focuses on the activities performed by apes on humans before humans try to interact and the ape's response to human activities around them. Current findings highlight the importance of behavior facets beyond daily activities of orangutans that could affect the reintroduction process. In addition, results indicate that the age factor affected human-oriented behavior. Therefore, it is hoped that the overall study findings will serve as basic information in considering recommendations for ape's management and welfare strategies based on the responses and behavior of apes obtained.

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