



Hostile Presenting in Captive Gibbons

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From 1976 to 2005, we observed 100 captive gibbons (Hylobatidae) in all 4 genera at the Gibbon Conservation Center (GCC) and noted a behavior not previously thought to be part of the ethogram of gibbons—hostile presenting—in 25 of 66 individuals of Hylobates. We observed gibbon-to-gibbon hostile presenting, featuring anogenital presenting combined with agonistic behavior, only in parent-reared gibbons. When directed toward humans, the expression of the behavior varied with the displaying gibbon's rearing condition. We here describe the behavioral details of hostile presenting as expressed in captivity.

KEY WORDS: aggression; anogenital; display; hylobatidae; presenting; threat.

INTRODUCTION

In primates, presenting and mounting may have nonreproductive social functions such as conveying reassurance, dominance/submission, or a greeting. They are generally congenial, and can reduce group tension or establish agreement on rank between the presenter and presentee (Chadwick-Jones, 1989; Kuroda, 1980; de Waal, 1995). Whether aggression, copulation, social mounting, or other behaviors follow presenting depends on the

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response of the presentee, the context, and relationships between individuals (Chadwick-Jones, 1989; Smuts, 2002).

The primate literature on nonsexual presenting emphasizes its affiliative role, tension reductions, or an invitation to interact. Females and males display nonsexual presenting, but examples more frequently describe nonsexual male-male interactions (Chadwick-Jones, 1989). For example, Smuts (2002) described in vivid detail the male-male anogenital greeting display of presenting and consequent genital touching in olive baboons (*Papio hamadryas anubis*).

Researchers have observed a nonreproductive genital display interpretable as a threat in marmosets (*Callithrix*; Hershkovitz, 1977; Soini, 1988). Male and female *Callithrix jacchus* present when threatening strangers, i.e., they direct their rumps toward the opponent in the female mating invitation posture. Males enlarge their scrotal sacs for 1 s and raise the tail, directing the posture toward other males, humans, or other species as a form of social dominance display (Hershkovitz, 1977). Another example of male presenting as a threat occurred when dominant male rhesus macaques were separated from their female consorts but could see them copulating with a subordinate male, and in response the dominant males presented to the copulating pair (Rilling *et al.*, 2004). Rilling *et al.* (2004) proposed that the function of the presents is to discourage copulation. In this context the presenting could be interpreted as a threat.

Gibbons (Hylobatidae) belong to 4 genera and 13 species (Mootnick and Groves, 2005; Prouty *et al.*, 1983; Roos and Geissmann, 2001; Mootnick, 2006). They are usually considered to be monogamous, with groups occupying separate territories. Gibbons generally establish long-term pair-bonds, but extrapair copulations may occur (Palombit, 1994; Reichard, 1995), and researchers have observed nonnuclear family groups (Brockelman *et al.*, 1998). Baldwin and Teleki (1976) described gibbon presenting as 3 types that vary in form and function: invitation to groom, invitation to copulate, and appeasement or submission (always directed toward a male). However, because of gibbon social structure, nonsexual presenting as tension reduction, dominance/submission, appeasement, or greeting displays may not be frequent in long-standing, socially isolated mates.

We initiated the study after observing gibbons housed at the Gibbon Conservation Center (GCC) that displayed an anomalous presenting of unknown significance that appeared to combine the normally separate behaviors of presenting with hostility. We refer to the behavior as hostile presenting. We describe gibbon hostile presenting in detail for the first time, propose it as a potential addition to the captive gibbon ethogram, and proffer an explanation of its social significance.

METHODS

Study Site and Subjects

The Gibbon Conservation Center is a behavioral study and conservation facility dedicated to better understanding and propagation of the endangered apes. Since its inception in 1976, 100 gibbons have been housed at GCC, with 10 of the 13 species from all 4 genera maintained and observed at varying times (Table 1). Groups of 1–6 individuals, generally 1 pair and their offspring, are housed in outdoor primary chain link enclosures (3 × 10 × 4 m). Trees, sheet metal roofs, and tarps provide shelter, and branches, platforms, and ropes provide support for resting and locomotion. Between 1976 and 2005 we conducted opportunistic daily observations of the gibbons at GCC, and we conducted 2 formal study periods in February–July 1992 and January–July 1999.

Terminology for Rearing Conditions and Development

Captive-born gibbons reared by 1 or both parents are parent-reared. For simplicity, gibbons removed from captive parental care during infancy or were wild-born, captured, and then reared with peers or humans are human-reared. The latter individuals had varying degrees of human interaction during development. Mootnick and Nadler (1997) provided information on general behavioral differences in gibbons raised in a home vs. institutional environment.

In captivity, gibbons may become sexually mature at 5–7 yr (Geissmann, 1991), but they do not reach a state of independence from parental assistance, or social maturity, until later in their development. Brockelman *et al.* (1998) suggested that free-ranging gibbons did not achieve social maturity until 8–14 yr. Gibbon subjects >10 yr of age are sexually and socially mature adults and gibbons <10 yr of age are socially immature.

Opportunistic Data Recording

The GCC gibbons experienced human interaction whenever caregivers fed them ($\leq 8 \times /d$), changed water, administered medication, and maintained enclosures, which permitted opportunistic behavioral observations of the responses from each gibbon to the arrival of caregivers multiple times daily. The staff record observations of unusual or atypical behaviors in a log that contains descriptions of hostile presenting. By 1992 we showed the display to all caregivers and asked them to record its occurrence, but not its frequency.

Table 1. One hundred gibbons, 1.2 yr–adult, observed for hostile presenting in 1976–2005 at GCC

Species	Hostile presented to gibbons						Hostile presented to humans						Hostile presenting not observed		Total species			
	Mature		Immature		Mature		Immature		Mature		Immature		Mature			Immature		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		Male	Female	
<i>Hylobates hoolock</i> (PR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>H. hoolock</i> (HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	7
<i>Nomascus leucogenys</i> (PR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1 ^a	1	-	4
<i>N. leucogenys</i> (HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	3
<i>N. gabriellae</i> (HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	3
<i>Symphalangus syndactylus</i> (PR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3+1 ^b	2	4+2 ^a	13
<i>S. syndactylus</i> (HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	3
<i>Hylobates moloch</i> (PR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	4+1 ^a	9
<i>H. moloch</i> (HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1 ^b	1	-	3
<i>H. lar</i> (PR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	6
<i>H. lar</i> (HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	11
<i>H. agilis</i> (PR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	11
<i>H. agilis</i> (HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1+3 ^b	-	11
<i>H. pileatus</i> (PR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	7
<i>H. pileatus</i> (HR)	1	2 ^c	1	-	-	-	-	-	-	-	-	-	-	-	2+1 ^a	-	1+1 ^a	10
<i>H. albibarbis</i> (HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	6
<i>H. muelleri</i> (HR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2

Gibbon Hostile Presenting

Total of each sex	1	2	2	2	0	1	12	11	2	8	6	30	48	18	15	12	100
Total of both sexes	1	3	2	2	2	1	12	11	2	8	6	30	48	18	15	12	100
Total presenters and nonpresenters			5				20							75			

Note. Gibbons are listed according to species, sex, rearing condition, and level of social maturity during the time they were housed at GCC. We listed hostile presenting according to the level of maturity during the behavior.

PR, Parent-reared: Captive-born and reared with at least 1 parent.

HR, Human-reared: Captive-born or wild-born, and reared by a human during a portion of its life.

Mature: Socially mature adult males and females, ≥ 10 yr of age.

Immature: Socially immature, < 10 yr of age.

^aFocal individuals in 1999 study.

^bFocal individuals in 1992 study.

^cAt 8 yr female HMO805 hostile presented toward humans when temporarily housed in a smaller enclosure.

^dMale removed at 1.1 yr from his family group so he could receive physical therapy. During the time he was alone he hostile presented to caregivers who approached his enclosure without food. After his recovery he was housed outdoors in an adjoining enclosure to an adult male gibbon. They interacted very well through the dividing wire of their enclosures, but the infant gibbon was frightened of the adult male when in the same enclosure. At 2.3 yr he hostile presented toward the adult male in an adjoining enclosure after an aggressive interaction.

^eFrom 6 to 9 yr female HP103 antagonized neighboring gibbons by hostile presenting daily, whereas from 6 to 7 yr female HP121 directed her hostile presenting toward the antagonistic behavior of a neighboring gibbon. Both females on occasion hostile presented toward humans if they stared at them for a long time. HP121 stopped hostile presenting once she began to carry an infant; HP103 hostile presented less when her infant was dependent on her.

Focal Individual Data Recording

From February to July 1992 and from January to July 1999 we supplemented opportunistic recording of hostile presenting by systematic observations on GCC gibbons for other purposes. The 1992 study consisted of 30 h of observation/subject (60 h/pair) in a study group of 10 focal individuals in 5 enclosures (Table I), with only 2 adults/enclosure. The 1999 study comprised 38 h of observation/subject in a group of 8 focal individuals, including 6 from the previous study period, in 6 enclosures (Table I) that had 2 adults and 1 or 2 offspring/enclosure. We recorded all behaviors for each focal individual during 1-h observation periods.

RESULTS

Of the 100 gibbons at GCC since 1976, 25 (25%) hostile presented, with 10 (40%) of the 25 being socially immature. Two of the 25 gibbons hostile presented only to gibbons, 20 presented to humans, and 3 presented to both humans and gibbons. Four of the 5 that hostile presented to gibbons were parent-reared, and 1 was parent-reared for 1.1 yr, then reared in an adjoining enclosure with an adult male gibbon (foster parent); he showed no interest in humans. Of the 19 females that hostile presented, only 7 were parent-reared.

The 25 individuals that hostile presented belonged to 5 species of *Hylobates* (Table I). There have been 66 gibbons of *Hylobates* at GCC since 1976, of which 37 are males and 6 (16%) of them hostile presented. Of the 29 female *Hylobates*, 19 (66%) hostile presented. The sex difference is significant ($\chi^2 = 6.82$, $df = 1$, $p < 0.01$). Thirty of the 66 were human-reared, and 13 (43%) of them hostile presented (1 male and 12 females). Thirty-six *Hylobates* were parent-reared and 12 (33%) of them hostile presented (5 males and 7 females). The difference between human and parent-reared gibbons is not significant ($\chi^2 = 1.976$, $df = 1$, $p < 0.20$). Human-reared gibbons only hostile presented to humans (Table II). Socially immature gibbons housed in the same enclosure with 1 or both parents did not hostile present toward relatives (Table II). Hostile presenting to humans in close proximity to the enclosure (1 m) was the most frequent circumstance.

Behavioral Components of the Hostile Present

Hostile presenting is an anogenital present toward gibbons or humans, and is accompanied by agonistic behaviors. The hostile present differs from

Gibbon Hostile Presenting

Table II. Twenty-five *Hylobates* spp. that presented to humans or gibbons according to sex, rearing condition, and level of maturity

Maturity	Presented to humans				Presented to gibbons			
	Parent-reared		Human-reared		Parent-reared		Human-reared	
	Male	Female	Male	Female	Male	Female	Male	Female
Mature	–	–	1 ^a	7, 3 ^a	1	1 ^b	–	–
Immature	2	1, 1, ^a 2, ^c 1 ^d	–	2	1, 1 ^e	1 ^f	–	–

^aFocal individuals in 1992 study that hostile presented.

^bFrom 6–9 yr HP103 hostile presented to antagonize gibbons and on occasion toward a caregiver who stared at her for a long time. HP103 hostile presented toward humans from immaturity through maturity.

^cFocal individuals in 1999 study that hostile presented.

^dAt 8 yr hostile presented toward the human caregivers who shifted her into a smaller enclosure.

^eFrom 1.2 yr began hostile presenting to caregivers who approached his enclosure without food, and hostile presented toward an adult gibbon at 2.3 yr.

^fFrom 6 to 7 yr HP121 hostile presenting was directed toward the antagonistic behavior of neighboring gibbon, or on occasion toward a caregiver who stared at her for a long time.

other hylobatid anogenital displays in that it is accompanied by a suite of other behaviors considered agonistic (Baldwin and Teleki, 1976; Carpenter, 1940; Ellefson, 1974; Orgeldinger, 1997). Hostile presenting of adult human-reared gibbons toward humans included ≥ 1 of the following: teeth chomping occasionally producing a loud clicking; audible breathing through the mouth; intense staring with an aggressive facial expression; and agonistic brachiation, jumping, biting, shaking, kicking, or hitting the enclosure or water containers. If a gibbon attempted to grab a human who failed to move away, it reached toward the person, shook its body by jerking its arms against a surface, or hostile presented until the person left the vicinity. In some cases when the human walked away, the gibbon frequently became more agitated, shaking or kicking the walls or objects, and brachiating erratically.

During the hostile present, the gibbon bent over from the waist and elevated its anogenital area while hanging vertically from the enclosure, or while standing (Fig. 1). Generally the knees were flexed, with the posterior directed toward the target's face (Figs. 1 and 2). The gibbon frequently looked around or under its forelimb observing the recipient during the present, or with its hind limbs nearly straight looking between its legs (Figs. 1–3). The hostile present could last from 1 to 60 s. The earliest facial expression during a hostile present toward humans occurred at 48 mo of age. The youngest gibbon to hostile present was a 2.3-yr-old male



Fig. 1. Hostile presenting toward humans or gibbons or both. It may incorporate 1 or 2 hands for balance.

Hylobates agilis that directed the present toward his adult gibbon foster parent in an adjoining enclosure.

Examples of Gibbon to Gibbon Hostile Presenting

Instead of hostile presenting, gibbons in the same enclosure typically use open mouth threats and piloerection in family conflicts. In the 300 h of

Gibbon Hostile Presenting



Fig. 2. A female *Hylobates pileatus* hanging on the side of the enclosure without total visual contact with the gibbon to which she was hostile presenting. Her face is strained, with lips closed. She inflated the vestibule of the oral cavity in front of the maxillary and mandibular anterior dentition.

data collection in 1992, we observed only 1 brief fight and 43 intrafamilial open mouth threats between adult mates.

Subjects directed hostile presenting toward gibbons in other enclosures between 4 and 59 m away, and we easily identified recipients because of the separation between enclosures. Hostile presenting by immature or adult parent-reared male *Hylobates pileatus* (HP118, HP122) directed toward audible ground squirrels or gibbons in the same or other enclosures could include lips pushed forward, expelling flatus in an audible atypical fashion, enclosure shaking or banging while rapidly brachiating in a set pattern after the presentation, intense staring toward the target either

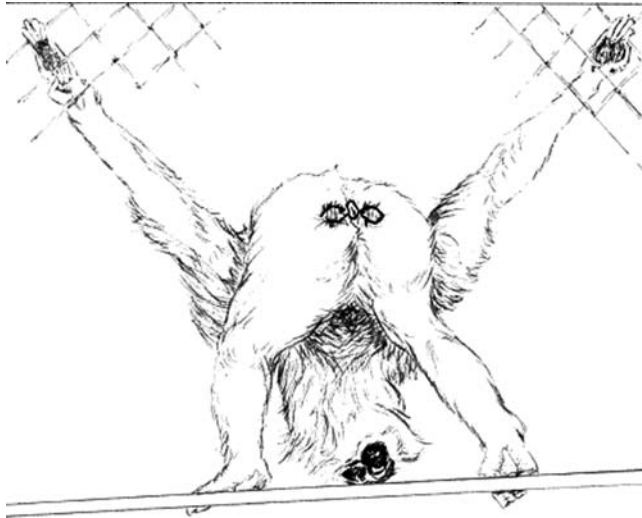


Fig. 3. Hostile presenting by a human-reared gibbon while trying to see the target human.

looking through the legs when completely bent over, or partially bent over and looking off to the side.

When a parent-reared female *Hylobates pileatus* (HP103, HP121) hostile presented toward humans or to gibbons in the same or another enclosure, it included >1 of the following: lips pushed out with a strained face (Fig. 2), vibrating the substrate, shaking a branch or wire mesh while the buttocks are shaking, slight raising and lowering the buttocks, a rigid body, intense staring, and a squeal. When standing or hanging on a wall, its back was bent *ca.* halfway. After a present the gibbon might extend an arm out of the enclosure and wave it back and forth.

Hostile presenting between gibbons housed together occurred only in an incompatible pair of parent-reared *Hylobates pileatus*. If the male (HP122) touched the female (HP103) during the hostile present, she retreated quickly and quietly with her head at shoulder level. HP103 hostile presented toward HP122 ≤ 20 times in 1 h. HP122 occasionally simultaneously hostile presented toward HP103 with his buttocks ≤ 0.5 m of HP103's buttocks.

Hostile presenting to gibbons in other enclosures was triggered when recipients shook enclosure walls or knocked on the roof in response to copulatory behavior (Mootnick, 1997), or teeth grinding on enclosure walls. Hostile presenting ceased once they ceased visual contact. We observed no gibbon response to hostile presenting in a separate enclosure with a hostile present.

Gibbon Hostile Presenting

Examples of Gibbon to Human Hostile Presenting

During data collection in 1992, 2 adult human-reared female *Hylobates agilis* displayed intense hostile presents during 100% of approaches by adult human caregivers, but did not hostile present to prepubertal humans. The more aggressive of the 2 subjects directed hostile presents to human males and females, while the other displayed only to human females. By 1999, the more aggressive of the 2 gibbons confined its responses to particular individuals. During a limited documentation of the behavior, 2 male caregivers elicited a hostile present on 100 of 100 approaches to her enclosure; 31% of them included teeth chomping, 42% enclosure shaking, and 21% biting objects and hitting displays. If the caregivers moved close to the female, she tried to grab them.

A parent-reared female *Hylobates pileatus* (HP199) engaged in occasional hostile presenting toward humans from 29 to 41 mo of age, whereas her older male sibling never hostile presented. Both gibbons were reared in the same manner. Their parents hostile presented toward gibbons. The female stopped hostile presenting toward humans when the male sibling was removed from the enclosure. Hostile presenting in immature gibbons usually disappeared as they matured. A parent-reared female *Hylobates agilis* ceased hostile presenting toward humans at 9 yr, and a male ceased at 7 yr. At 9 yr he hostile presented toward humans in response to human laughter directed toward him. By 9 yr HP103 hostile presented only toward 1 particular caregiver who persisted in offering her food in which she was not interested. When immature male parent-reared gibbons hostile presented toward humans outside the enclosure they shook the substrate on which they were standing, with no change in facial expression. Their eyes had a slight intense look, and they hostile presented and paused to look at the person. When immature gibbons hung from the enclosure mesh and hostile presented to a human inside the enclosure, the back was slightly bent with buttocks directed to the human. They produced a vibrating shake in the beginning and sometimes throughout the hostile present, then looked at the human with no shaking of the substrate. If the gibbons were cautious of a human, they hostile presented only when the person was outside the enclosure.

Effects of Hostile Presenting in Captive Gibbons

Hostile presenting generally became increasingly disruptive to gibbons within visual contact. Within the first 5 d of the hostile presenting by HP103 toward neighboring gibbons, a male *Hylobates agilis* began attacking his

cagemate and her 6-yr-old offspring, which led to its removal, after which he ceased attacking his cagemate. In the latter part of a 16-mo period of hostile presenting by HP103 that was directed toward 3 enclosures, 2 females frequently bit their offspring's hands, and 1 female aborted twice. The abortions were 2 of 5 at GCC since 1979. The biting ceased the day a solid barrier was constructed, and within 1 mo the female that had aborted eventually birthed successfully. Within 5 d of visual barrier construction, neighboring females rarely looked in the direction of HP103, and his presenting decreased. We replaced the solid barrier with shade cloth 8 mo later, which gave HP103 partial visual access to neighboring gibbons. Her hostile presenting increased without appearing to affect neighboring gibbons. At 9 yr, HP103 gave birth and her hostile presenting declined, though she continued to stare daily at neighboring gibbons. Once her offspring was less dependent on her, the hostile presenting increased.

DISCUSSION

When interpreting the presenting as having an agonistic component with hostile intent, we follow the convention of making such attributions based on accompanying agonistic and aggressive behaviors. For example, Baldwin and Teleki (1976) described mouth chomping at unfamiliar observers (rapid jaw movements producing sounds) as agonistic because it was followed by aggressive lunges (Carpenter, 1940; Ellefson, 1974).

A suite of aggressive behavioral displays (Baldwin and Teleki, 1976) accompanied hostile presenting in gibbons. Orgeldinger (1997) described the aggressive biting of objects as a threat in *Symphalangus syndactylus*, possibly derived from displaced aggression. Other explicit forms of aggression included rapid erratic brachiation and shaking displays, which commonly occur in gibbon intergroup conflicts (Baldwin and Teleki, 1976; Berkson *et al.*, 1971; Carpenter, 1940; Ellefson, 1974).

A ventral genital display occurs in dominant interactions by *Saimiri sciureus* (Colgrove *et al.*, 1990), *Cercopithecus aethiops pygerythrus* (Henzi, 1985), and *Saguinus oedipus oedipus* (Hershkovitz, 1977). In contrast, the typically monogamous gibbons and marmosets display dorsal anogenital presents in agonistic interactions. Only 1 polygamous primate, *Lagothrix flavicauda*, dorsally presented antagonistically toward human intruders. The presenting occasionally included urinating, defecating, and shaking branches (Leo Luna, 1980; Ramirez, 1988). Accordingly, a monogamous or pair-bonded social system may facilitate the use of a visual antagonistic display, such as hostile presenting. For the gesture to be functional, the recipient must be within visual range, and therefore close to the presentee.

Gibbon Hostile Presenting

Inducing a potentially aggressive response by hostile presenting would have severe fitness consequences when there are multiple conspecifics that could potentially retaliate, as in primates with larger social units than a monogamous family group.

Similarities in the social organization of gibbons and marmosets allows for comparison between their hostile presenting behaviors. Researchers observed anogenital displays in a free-ranging *Callithrix* toward a subordinate male over an estrous female, toward human observers (Soini, 1988), or unfamiliar groups (Rylands, 1981; Schaffner and French, 1997). Also, unfamiliar captive groups anogenital displayed under conditions of close visual contact (Christen, 1974).

The sexual difference in hostile presenting may reflect that female gibbons sexually present more than males do, so the behavior is more easily triggered in females. That there have been more human-reared females than human-reared males at GCC may also account for the difference. If human-reared gibbons react to humans as they would to gibbons encroaching on their territory, then the human-reared females would display more hostile presenting to humans.

The alterations of presenting with agonistic behaviors could be a sign of conflict in gibbons that have a tendency to react to humans because of prior experience with human-rearing. Banging, shaking enclosures, and redirected biting all reflect the intensity of the arousal. We discerned a pattern relating age to the occurrence of the behavior in that the behavior tended to wane as immature mother-reared gibbons matured socially. However, human-reared gibbons persisted in hostile presenting beyond immaturity. The persistence of the behavior in human-reared gibbons may be a manifestation of aggression toward human, whereas it was observed in only 1 parent-reared gibbon.

Human-rearing creates an affiliative condition in primates that becomes problematic once human interaction discontinues. Many human-reared gibbons at GCC appeared to be imprinted on humans, whereby they seemed unable to detach themselves from their caregivers. There may thus be a direct relationship between the occurrence of hostile presenting toward humans and their rearing by humans. Human-reared gibbons that hostile presented never appeared fearful of humans, and opportunistically would attack them, so we would not interpret hostile presenting toward humans as appeasement or a submissive gesture. The observed bias in hostile presenting toward humans by captive gibbons is most likely attributable to the fact that humans were annoying them.

Hostile presenting among GCC gibbons negatively affected intrafamilial relationships and threatened the integrity of the breeding program by adversely affecting the emotional stability of cagemates. The social

structure within the enclosures is affected by refocused attention and agitation toward the external actor and lowered social interactions (Mootnick, 1997).

Because gibbons at GCC live in close proximity to neighboring gibbons, they need to habituate to auditory and visual contact of other gibbons. One female's agitation over close visual contact appeared to be the catalyst for hostile presenting. At a previous location, she had only auditory contact with gibbons other than her family members. Social situations that cause agitation therefore perpetuate aggressive displays. The level of agitation may vary in time, spacing, or between individuals. A partial visual barrier lowered the amount of time 3 females spent viewing the hostile presenting, which may have lowered the agitation and stress levels enough for 1 to conceive and for other females to stop biting their offsprings' hands.

We observed gibbon-to-gibbon hostile presenting only in *Hylobates pileatus* and *Hylobates agilis*, and only in the genus *Hylobates* at GCC. There are a few reports of hostile presenting between gibbons; 1 in *Hylobates lar* and 1 in the *Symphalangus*, and in gibbon to human hostile presenting in the *Nomascus*. We are unable to determine whether the behavior is limited to the species or simply an outcome of sampling bias.

At the Black Beauty Ranch, Texas a 3-yr-old male human-reared *Symphalangus* hostile presented right after his mother-reared female sibling restrained him. In retaliation, his 6-yr-old sister kicked him during the hostile present (L. Theisen-Watt, pers. comm.). A male *Nomascus leucogenys leucogenys* hostile presented at Budapest Zoo when an observer returned to her study site from a leave of absence (M. Ujhelyi, pers. comm.). Under similar circumstances, we observed an adult, wild-born female *Hoolock hoolock* at GCC turn her back on a familiar caretaker. Benchley (1943) and Hahn (1972) remarked on the behavior that we term hostile presenting but apparently without awareness of its significance as a potential component of the gibbon ethogram.

It is unclear to what extent gibbon hostile presenting is an artifact of captivity. The likelihood of gibbon families being in constant visual contact with other gibbons in the wild is low. Further, factors that produce stress are differentially represented in captive and wild gibbons. Nevertheless, hostile presenting also may occur in wild gibbons, as it does in both captive and wild marmosets. The increased visual contact of captive housing may have increased its expression.

There are several reports of hostile presenting in natural conditions. During a resting period on d 2 in an intergroup conflict at Khao Yai National Park, 2 offspring *Hylobates lar* were the furthest from their parents and closest to a female *H. pileatus* from another territory. One offspring

Gibbon Hostile Presenting

swatted the foot of the *Hylobates pileatus* twice, and she merely pulled her foot back on each occasion. Then the 2 young *Hylobates lar* turned around and hostile presented to the female *H. pileatus*, with no response (L. Theisen-Watt, pers. comm.). In addition, A. B. Chanee (pers. comm.) observed a female *Hylobates albibarbis* that was rehabilitated at Kalaweit and released into the forests in Kalimantan directing a hostile present to a neighboring wild male gibbon occupying a tree too far away to reach. Further, after removal from a deforested area and within 2 d of being housed in captivity at Kalaweit, a female *Hylobates albibarbis* constantly hostile presented once she was in visual contact with conspecifics (A. B. Chanee, pers. comm.).

Territorial encounters might occur in circumstances similar to those at GCC, e.g., 2 family groups might be in visual contact while occupying trees too far apart to allow direct agonistic engagement. However, the chances of hostile presenting occurring in the wild would be less frequent, because gibbons have other options, such as moving away, chasing, or attacking. It is also possible that researchers are not familiar with the behavior and had not recognized it. In captivity the gibbon's confinement removes the options; therefore they use alternative signals of conflict or threat, such as shaking branches or the enclosure, hostile vocalizing, displacing aggression onto family members, or perhaps, hostile presenting. The development of the behavior in captive human-reared gibbons suggests an innate component, because they did not have gibbon parents to imitate.

In summary, field studies could shed light on socioecological factors associated with hostile presenting and define its circumstantial parameters. Hostile presenting among gibbons has discrete agonistic intent and can threaten the integrity of a captive population. Visual barriers prevent hostile presenting from becoming disruptive to a breeding program.

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Gibbon Hostile Presenting

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