

Correspondence

Pan thanatology

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Chimpanzees' immediate responses to the death of a group-member have rarely been described. Exceptions include maternal care towards dead infants, and frenzied excitement and alarm following the sudden, traumatic deaths of older individuals [1–5]. Some wild chimpanzees die in their night nest [6], but the immediate effect this has on others is totally unknown. Here, with supporting video material, we describe the peaceful demise of an elderly female in the midst of her group. Group responses include pre-death care of the female, close inspection and testing for signs of life at the moment of death, male aggression towards the corpse, all-night attendance by the deceased's adult daughter, cleaning the corpse, and later avoidance of the place where death occurred. Without death-related symbols or rituals, chimpanzees show several behaviours that recall human responses to the death of a close relative.

Observations were made on a female chimpanzee, Pansy (estimated age 50+ years) and three other adults: Blossom (female estimated age 50 years), Rosie (Pansy's daughter, 20 years), and Chippie (Blossom's son, 20 years). The group lives on an island in a safari park, but in winter they are moved to heated indoor quarters (see Supplemental Data available on-line with this issue). In November 2008 Pansy became increasingly lethargic. When the group was moved indoors, she immediately lay down on the floor after eating. The others groomed her, and nested near her in the day area instead of on their usual night area platforms. For several days, Pansy received veterinary care alone in the night area, the others being allowed to join her each evening. During this time she rarely left her nest, which had been made by Blossom.

On December 7th, at approximately 15.00h Pansy got up and laboriously moved across to the other platform, where she lay down in Rosie's nest from the previous night. Toward 16.00h she started showing erratic and laboured breathing. Anticipating imminent death, the head keeper (AG)

decided to allow the others to join her and to leave the group undisturbed. Two overhead video cameras recorded the scene until the following morning. Box 1 presents extracts from the video timeline of events around the presumed time of Pansy's death (16:24; see Supplemental Movie S1, and Supplemental Data for the full timeline).

In the 10 minutes preceding death the others groomed or caressed Pansy 11 times, which appeared more frequent than following previous daytime separations (no quantitative data available.) Most notably, none of them groomed her after death; however, Rosie remained near her mother's body almost continuously throughout the night, on a part of the platform where she had never slept during a 29-night study of night-time behaviour 1 year earlier. In that study, Rosie's latest nesting time was 18:15h, but when Pansy died Rosie delayed nesting until 19.47h. Once settled in their nests, each chimpanzee usually made four or five postural changes during the night (range 0–14), but on the night Pansy died Rosie, Chippy and Blossom changed posture 11, 15 and 42 times, respectively. Also that night, Blossom groomed Chippy for 18 minutes, similar to during the entire previous 29-night study. Finally, in that

study the male displayed only three times in 29 nights, without targeting anyone, but on the night Pansy died he performed three displays, each ending with an attack on the corpse (see Supplemental Movie S2).

The next day the three surviving chimpanzees were profoundly subdued. From the day area they watched silently as two keepers lowered Pansy from the platform, carried her into the exit corridor, placed her in a body bag, and loaded her into a vehicle that was then driven away. They remained subdued the following day as the night area was cleaned and disinfected, and new straw provided. When the connecting doors were opened Blossom and Rosie entered hesitantly, but Chippy refused; instead he showed fear grins and made loud alarm calls, causing the two females to quickly return to him. The doors were left open, but the chimpanzees slept in the day area, and Chippy again refused to enter the night area the following day. For five consecutive nights no chimpanzee nested on the platform where Pansy died, yet this platform had been used for nesting on every evening of the 29-night study. Rosie was the first to resume nesting there.

This account differs from two reports of traumatic deaths in wild

Box 1.

Extracts from video timeline of events occurring on platform B, focussing on the presumed moment of death, and an attack on the corpse by the adult male.

- 16:2311 – Rosie moves to Pansy's back, strokes or grooms Pansy's torso. Blossom continues grooming Pansy's arm.
- 16:2404 – Chippy arrives. Rosie is still standing at Pansy's back.
- 16:2408 – Blossom remains oriented away from Pansy. Rosie still stands behind Pansy's back. Chippy stands over Pansy's head, and pulls at her left shoulder and arm.
- 16:2421 – Chippy crouches over Pansy's head then appears to try to open her mouth. Rosie moves toward Pansy's head.
- 16:2425 – Blossom, Chippy and Rosie simultaneously turn toward Pansy's head. Chippy and Rosie are crouched over Pansy's head. Chippy pulls Blossom's face down towards Pansy's.
- 16:2436 – Rosie moves from Pansy's head toward her torso. Blossom moves away from Pansy. Chippy lifts and shakes Pansy's left shoulder and arm.
- 16:2503 – Chippy continues to manipulate Pansy's shoulder/arm. Blossom stands next to Chippy, and also manipulates her left arm. Rosie stands at Pansy's lower torso, not in contact with Pansy.
- 16:2506 – Blossom sits at Pansy's head, stroking Pansy's left hand. Chippy and Rosie leave simultaneously.
- 16:2516 – Blossom stops grooming Pansy's hand but continues to sit next to her.
- 16:2531 – Blossom moves away from Pansy.
- 16:2704 – Pansy moves very slightly: 2 head nods, probably a post-mortem twitch. This elicits no response from the others.
- 16:3609 – Main lighting is switched off.
- 16:3656 – Chippy jumps onto the platform in a charging display. He jumps into the air, brings both hands down and pounds Pansy's torso, then runs across and off the platform.

chimpanzees. At Gombe, when an adult male died after falling from a tree, other chimpanzees present erupted into aggressive displays and alarm calling, with much mutual embracing and touching [5]. They frequently stared at the corpse and some appeared to sniff it, but nobody touched it in the four hours before they left. In the Tai Forest, a fatal leopard attack on an adolescent female also elicited intense mass excitement, but in this case contacts with the corpse were frequent; some displaying males even dragged it over short distances [4]. The corpse was eventually abandoned after 6 hours. In contrast, Pansy's group-members remained generally calm following her death. Several aspects of their behaviour recall those of mothers with dying infants [3], and are strikingly reminiscent of human responses to peaceful death. Below, we summarize key chimpanzee behaviours and indicate in parentheses possible human counterparts.

During Pansy's final days the others were quiet and attentive to her, and they altered their nesting arrangements (respect, care, anticipatory grief). When Pansy died they appeared to test for signs of life by closely inspecting her mouth and manipulating her limbs (test for pulse or breath). Shortly afterwards, the adult male attacked the dead female, possibly attempting to rouse her [7] (attempted resuscitation); attacks may also have expressed anger or frustration (denial, feelings of anger towards the deceased). The adult daughter remained near the mother's corpse throughout the night (night-time vigil), while Blossom groomed Chippy for an extraordinary amount of time (consolation, social support). All three chimpanzees changed posture frequently during the night (disturbed sleep). They removed straw from Pansy's body the next morning (cleaning the body). For weeks post-death, the survivors remained lethargic and quiet, and they ate less than normal (grief, mourning). They avoided sleeping on the deathbed platform for several days (leaving objects or places associated with the deceased untouched).

These behaviours highlight the interest of a comparative evolutionary perspective on death and dying in species without symbolic representations of death or death-related rituals. Chimpanzees show self-awareness [8] empathy [9] and

cultural variations in many behaviours [10]. Are humans uniquely aware of mortality? We propose that chimpanzees' awareness of death has been underestimated, as anticipated some 30 years ago on the basis of self-awareness [8]. Although data are likely to accumulate slowly, a thanatology of *Pan* appears both viable and valuable. Finally, such data may have implications for the end-of-life management of captive elderly chimpanzees, an issue of increasing importance as more great apes are retired from research facilities and zoo populations age. In some cases it might be more humane to allow elderly apes to die naturally in their familiar social setting than to attempt to separate them for treatment or euthanasia.

Supplemental Data

Supplemental data are available at [http://www.cell.com/current-biology/supplemental/S0960-9822\(09\)xxxxx-x](http://www.cell.com/current-biology/supplemental/S0960-9822(09)xxxxx-x)

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