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Orangutan pantomime: elaborating the message

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We present an exploratory study of forest-living orangutan pantomiming, i.e. gesturing in which they act out their meaning, focusing on its occurrence, communicative functions, and complexities. Studies show that captive great apes may elaborate messages if communication fails, and isolated reports suggest that great apes occasionally pantomime. We predicted forest-living orangutans would pantomime spontaneously to communicate, especially to elaborate after communication failures. Mining existing databases on free-ranging rehabilitant orangutans' behaviour identified 18 salient pantomimes. These pantomimes most often functioned as elaborations of failed requests, but also as deceptions and declaratives. Complexities identified include multimodality, re-enactments of past events and several features of language (productivity, compositionality, systematicity). These findings confirm that free-ranging rehabilitant orangutans pantomime and use pantomime to elaborate on their messages. Further, they use pantomime for multiple functions and create complex pantomimes that can express propositionally structured content. Thus, orangutan pantomime serves as a medium for communication, not a particular function. Mining cases of complex great ape communication originally reported in functional terms may then yield more evidence of pantomime.

Keywords: gesture; pantomime; communication; orangutan; great ape; elaboration

1. INTRODUCTION

Studies of great ape gestural communication increasingly find unexpected complexities. Captive orangutans and chimpanzees show intentional gesturing (goal-directed gesturing over which they have significant voluntary control), for instance, by elaborating on gestural messages that fail to elicit desired responses by switching to different gestures or enhancing prior ones [1,2]. These studies show that great apes elaborate but do not focus on *how* they do so, and may have restricted the scope of their elaborations by testing in captive conditions. Other studies have shown great ape use of iconic gestures, gestures that use physical resemblance to their referent to communicate meaning, such as enacting part of a desired

action's form [3]. We suggest that great apes may use a sophisticated form of iconic gesture, pantomime, to elaborate.

Pantomime is gesture in which meaning is acted out; in humans, it can be as simple as twirling a finger to indicate a vortex or as complex as telling the Ramayana. It can be representational, symbolic, narrative in form and fictional [4]. It can communicate meaning with sentential structure, so it is important as a potential evolutionary step towards language as a path to open semantics, narrative, declaratives and syntax [5]. It is a good candidate for *how* individuals elaborate gesturally because it can express the extra information needed to clarify failed communications, especially when standard gestures cannot.

Given pantomime's sophisticated attributes, some consider it to be uniquely human [5,6]. Even great apes' use of iconic gestures remains disputed [7]. However, some spontaneous gestures by captive great apes show pantomime: Koko, a language-trained gorilla, acted as if rolling a ball of clay between her hands to express 'clay' [8], Chantek, a language-trained orangutan, held thumb and index finger together and blew between them to express 'balloon' [9] and Viki, a home-reared chimpanzee, faked being unable to free an imaginary pull-toy from a knob herself and requested aid [10]. Rare reports also exist of pantomime in wild great apes: a chimpanzee mother who noted her daughter's difficulties with stone nut cracking acted out, for her daughter, how best to hold and use the stone [11], and chimpanzees and gorillas enact actions to request them [8,12]. Here, we report an exploratory study assessing whether orangutans living free in native habitat use pantomime spontaneously, especially to elaborate after failed communications.

2. MATERIAL AND METHODS

We identified salient pantomime cases by mining 20 years' data from systematic observational studies on forest-living rehabilitant orangutans in Indonesian Borneo; several focused on social learning but none on communication. We chose these data for their ecological validity and lengthy focal samples, and adopted data mining as fruitful in launching study of rare or unusual phenomena [13]. See the electronic supplementary material for methodological details.

We identified pantomime as gestural communication that involves physically acting out a message and focused on gesturing that achieve its communicative goals non-mechanically and is addressed to a partner and goal-directed [7,14]. In the aims of capturing the actor's initial message, failed communications (messages that did not achieve the actor's goal) and attempts to rectify failed communications, each case included the communicative bout in which pantomime occurred and related bouts preceding or following it (i.e. involved the same actor and the same or similar partners, messages and contexts). We identified failed communication if the actor persisted with or altered earlier message(s) after the partner responded; elaborations were different behaviours pertaining to an earlier message [1,2]. We used only descriptions of behaviour made promptly after its occurrence, by observers experienced with orangutans.

3. RESULTS

We identified 18 cases of salient orangutan pantomime, 14 addressed to humans and four to orangutans (table 1; see the electronic supplementary material for case numbers and full original descriptions). They depicted actions requested (all but no. 11), objects (nos 11, 14), shared events (no. 12), and actors' abilities or intentions (nos 8, 14–18).

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Table 1. Summary of orangutan pantomime cases. Fn (Function): I, imperative; D, declarative; L, lie. Failed (failed communication): Y, yes; P, partial; blank, no. Elab (elaborate): Y, yes; blank, no. Messages, responses: gesturing sketch (pantomimes *italicized*); new line—new message/response. Similar cases: 1, [1]; 2, [10]; 3, [12]; 4, [8,9]; 5, [17]; 6, [11]; 7, [18]; 8, [19].

case no.	Fn	failed	elab	initial message	responses	subsequent messages	similar cases
1	I	P	N	<i>stick scratch body</i> , offer stick	brief stick scratch	<i>stick scratch body</i> (persist)	1
2	I	Y	Y	<i>stick scratch body</i> , offer stick	sand on head ignore ignore	<i>stick scratch body</i> (repeat) make and offer bigger scratcher	1
3	I	Y	Y	offer young stem	ignore	make twig scratcher, <i>scratch partner's head</i> , offer scratcher	
4	I	Y	Y	offer fruit	fingernail open fruit ignore	<i>open stem</i> , offer opened stem offer fruit	
5	I			<i>leaf wipe face</i>	leaf wipe face	<i>fingernail open fruit</i> , offer fruit	
6	I		Y	offer sand	sand put on head	put sand in partner's hand, <i>put partner's hand/sand on head</i>	
7	I	Y	Y	offer termite nest	change subject ignore ignore	<i>bite fruit</i> , offer offer ginger	
8	IL	Y	Y	stare at termite nest	ignore	offer partner termite chunk	
9	I	Y	Y	offer leaf	bang termite bits ignore	<i>bang partner's chunk</i> , offer bits <i>stick open nest—feign fail</i> offer leaf	2
10	I			<i>groom</i> (briefly)	leaf wipe dirty head ignore	<i>leaf wipe dirty head</i>	3
11	I	Y	Y	reach/look at umbrella	groom	<i>make leaf umbrella</i> , attempt trade	1,4
12	D	Y	Y	show injured foot	ignore watch	pick leaf, get partner attention, <i>re-enact leaf treat cut foot</i>	
13	IL			<i>enact hair cut role</i>	cut hair		2
14	IL	Y	Y	give coconut	hold coconut hold coconut	stick probe coconut— <i>feign fail</i> , wait, give coconut <i>stick chop coconut</i>	2,8
15	IL	Y	Y	friendly approach	machete chop coconut fearful withdraw allow approach	approach, ignore, <i>eat—feign no interest</i>	2,5,8
16	IL	Y	Y	friendly approach	fearful withdraw allow approach	approach, <i>eat—feign no interest</i>	5,8
17	IL	Y	Y	friendly approach, <i>eat—feign no interest</i>	allow approach		5,6,8
18	IL	Y	Y	fingers in backpack	rebuff manipulate ants	<i>manipulate ants on backpack—feign interest</i>	7

(a) Functions

Pantomimes expressed imperatives in 17/18 cases. In six imperatives, the initial message identified acted out the response requested: an action (no. 17), a specific action on a specific target (nos 12, 15), or a specific tool–action–target relationship (nos 1, 2, 5). In 11 imperatives, pantomime clarified a previous low information request (e.g. offer item). We identified low information messages as imperatives from the context (e.g. give a food item was a request to ‘open’ it). Specific meanings were thus implied and liable to misunderstanding, but partners were probably familiar with most responses requested (e.g. termite nests are cracked, ginger stems split).

Case no. 12 suggests a declarative function, sharing a mutual memory. Kikan’s initial message (sit near Agnes Ferisa (A.F.), show foot) requested that A.F. watch. When this failed, Kikan pulled A.F.’s hand to get her attention. Once A.F. was watching, Kikan acted out how A.F. had doctored her foot the previous week, when it was cut, and then left.

Seven pantomimes were deceptive: actors variously feigned inability (nos 8, 14), wanting a hair cut (nos 13), and interest in eating or ants (nos 15–18). Respectively, these seemed aimed to elicit help, distract (to enable stealing), express friendly intent and facilitate reconciliation, and did so by acting out expressions of the actor’s internal state (intentions, abilities). Orangutans also acted out events non-communicatively, e.g. one re-enacted her activities with her partner after deliberately turning her back on him, probably to understand them (nos 19 and 20) [15].

(b) Failed communications

Failed communication occurred in 13 cases; in 12/13, pantomime elaborated on the failed message by adding more specific information. We found four patterns (two cases showed two patterns): offer different/better tools for the task requested after previously offered tools were ignored (no. 2), specify the actions, items and/or tools requested after a low-information request was not satisfied (nos 3 and 4, 7–9, 11 and 12, 14; see figure 1), clarify friendly intent after the partner refused non-aggressive overtures (nos 15–17), and feign inability to handle a task after requests for help were ignored (nos 8, 14).

(c) Complexity

Orangutan pantomime complexities included multi-modal acts (e.g. nos 13, 15, vocal and gestural components), re-enacting past events (no. 12), and enacting skills beyond the actor’s repertoire (nos 12, 14). Several cases showed features characteristic of language, including *compositionality* (large meaningful units are composed of smaller meaningful units: nos 2, 6–9, 12–14), *systematicity* (the actions and entities pantomimed are meaningfully rearranged following predictable patterns: nos 2, 7–9, 12, 14) and *productivity* (nos 13 and 14, unique creations of the moment). Thus, orangutans can communicate content with propositional structure and have the



Figure 1. Pantomiming a request. Cecep (juvenile-adolescent male), picking a leaf and a stem. In front of A.R., with eye to eye contact, Cecep wiped dirt off his forehead with the leaf then gave the leaf to A.R. to request that she do the same. (Photo: P. Kuncoro.)

kind of cognitive capacities with constituent structure typically associated with linguistic capacities [16].

4. DISCUSSION

Findings show that forest-living rehabilitant orangutans pantomime spontaneously. They probably pantomime rarely, although probably not as rarely as our sample suggests because it derives from data collected for other purposes. Most rehabilitant orangutan pantomimes addressed humans, probably owing to the rehabilitant situation combined with humans’ limited understanding of orangutan communication and efforts to avoid interaction, but several addressed orangutans. However, like captive orangutans and chimpanzees, these free-ranging rehabilitant orangutans elaborated on failed messages [1,2] and, as predicted, often pantomimed to do so. These orangutan pantomimes also show features like those reported in the pantomimes of other great apes, including depicting objects and actions and feigning one’s internal state (interests, abilities) in order to steal, solicit help, and express benign intentions ([17] and references therein; [18]).

Further, these orangutan pantomimes served other functions (declarative, deceptive) and extended beyond short, simple acts to event re-enactments. Some of their complex pantomimes showed compositionality, systematicity and productivity—all properties of natural language.

Given that pantomime enables actors to fake their own bodily signals, once it is in place it can potentially

serve multiple purposes—communicative and cognitive, honest and deceitful. Complex pantomime may enable in gesture some of the communicative complexities that sentences enable in language, notably expressing content not captured by standardized signs, including novel and propositionally structured content [5]. These orangutan and other great ape pantomime cases indicate that pantomime serves multiple purposes and supports important communicative complexities in living great apes. For great apes, like humans, pantomime is a medium, not a message. Additional evidence of great ape pantomime, then, might be gleaned from cases of complex communication originally reported in functional terms: the cases of teaching and deception discussed here are cases in point.

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