

ELEPHANTS CLASSIFY HUMAN ETHNIC GROUPS BY ODOR & GARMENT COLOR

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Abstract

Animals can benefit from classifying predators or other dangers into categories, tailoring their escape strategies to the type and nature of the risk. In many taxa, reactions to danger are inflexible, but some species can learn the level of threat presented by the local population of a predator or by specific, recognizable individuals. Some species distinguish several species of predator, giving differentiated warning calls and escape reactions; here, we explore an animal's classification of subgroups within a species. We show that elephants distinguish at least two Kenyan ethnic groups and can identify them by olfactory and color cues independently. Elephants (*Loxodonta africana*) showed greater fear when they detected the scent of garments previously worn by Maasai than by Kamba men, and they reacted aggressively to the color associated with Maasai. Elephants are therefore able to classify members of a single species into subgroups that pose different degrees of danger.

Introduction

In general, having the ability to classify all members of a predator species into subgroups and to respond appropriately to the level of threat is beneficial for the survival of that species. It is well known that elephants, unlike most animals, do not have an inflexible reaction to danger as seen through their alarm vocalizations. *Loxodonta africana* encounter several types of people that each present different levels of risk: the Maasai are a pastoral group that are highly protective of their cattle and whose young men spear elephants; in comparison, the Kamba, another nearby group, are agricultural, live in villages, and are of little threat. Additionally, elephants can classify the bones in regards to kinship and have vocal recognition within their complex social hierarchies, but do they have such detailed discriminatory abilities towards different, but proximate, human ethnic groups? This paper seeks to explore three questions: (1) can they classify humans into specific subgroups based on varying levels of danger, (2) can they do so using olfactory or visual cues independently, and (3) do individual or familial histories with spearing affect their reactions when interacting with the Maasai?

Methods

STUDY 1: OLFACTORY

The first study focused on whether an elephant can discriminate two ethnic groups on the basis of olfaction alone. We know that an elephant has scented because it will pause with its head and trunk up and face the direction of where smell originated, as depicted in Figure 1. The elephants will be presented with 3 red clothes, one Kamba-worn, one Maasai-worn, and one unworn. These different stimuli are represented by Fig. 2. We recorded the following: (A) time spent stationary after smelling the shirt, (B) distance moved from cloth (in the first 5 min), (C) travel speed (in the first minute), and (D) time taken to relax.

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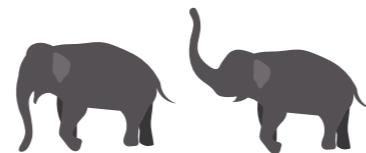


Figure 1
The left indicates no detection; the right shows a scent has been detected.



Figure 2
From the left: unscented shirts, a Maasai warrior, and a Kamba villager.

STUDY 2: VISUAL

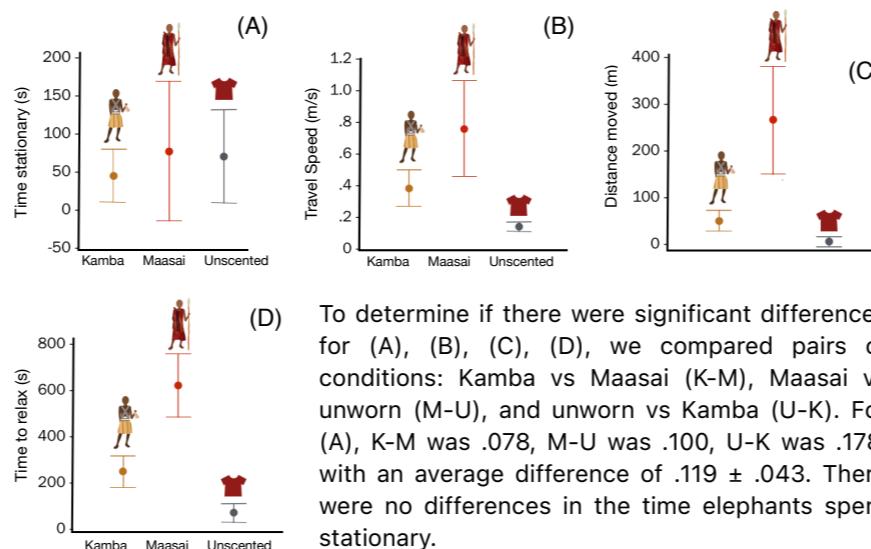
The second study wanted to determine whether elephants could rely solely on visual cues, specifically the garment color, to determine the appropriate response. The Maasai typically wear red whether as the Kamba wear white (Fig 2). So, we compared the reactions, specifically displays of aggression, to a red shirt and a white shirt which were both clean (no scent).

STUDY 3: SPEARING HISTORY

Elephants were divided into three different categories of experience with spearing. We wanted to see how those with differing personal histories of spearing would perform on the previous two studies.

Results

STUDY 1: OLFACTORY



To determine if there were significant differences for (A), (B), (C), (D), we compared pairs of conditions: Kamba vs Maasai (K-M), Maasai vs unworn (M-U), and unworn vs Kamba (U-K). For (A), K-M was .078, M-U was .100, U-K was .178, with an average difference of $.119 \pm .043$. There were no differences in the time elephants spent stationary.

For (B), K-M was .656, M-U was 1.299, U-K was .643, with an average difference of $.866 \pm .306$. There was a significant difference for the distance moved. For (C), K-M was .270, M-U was .645, U-K was .375, with an average difference of $.430 \pm .158$. There was a significant difference for the travel speed. For (D), K-M was .389, M-U was 1.011, U-K was .622, with an average difference of $.674 \pm .257$. There was a significant difference for the time taken to relax. Additionally, it was found that elephants do not just go away (downwind) from the scent of the Maasai but to a particular habitat: tall grass, which is evident through Fig 3.

| | Initial Height | Final Height | Δ |
|--------|----------------|--------------|-------|
| Kamba | 0.20 m | 0.55 m | +0.35 |
| Maasai | 0.35 m | 1.25 m | +0.90 |
| Unworn | 0.30 m | 0.30 m | +0.00 |

Figure 3
Compares the change in the height of habitat elephants seek in regards to smelling each of the three conditions.

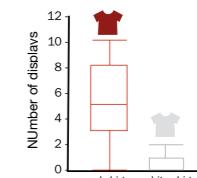


Figure 4
Number of displays of aggression as they relate to seeing a red or white unscented shirt.

STUDY 2: VISUAL

Seen in Fig 4., there are significantly more aggressive displays (threats) directed toward the red cloth than toward the white (Mann-Whitney U test: $U = 4.00, p = 0.012$). This could not have been due to visual salience as red is a dull hue for dichromats like elephants.

STUDY 3: SPEARING HISTORY

Individuals with a history of spearing (to any degree) and those with none performed the same in the previous studies. Spearing history seems to have had no impact on the extent or pattern of the reaction.

Discussion

We can conclude that elephants can in fact classify human ethnic groups. Study 1 showed that elephants have a significant reaction (through distance moved, speed, and time to calm) to the Maasai. However, there may be a number of olfactory cues involved as they could be relying on the lingering smell of cattle or diet. Study 2 showed that they also show a significant reaction to just the visual cues of the colors typically associated with the Maasai. The use of only visual input indicates that they can interpret perceptual cues in the presence of predators—something even monkeys cannot do. Surprisingly, however, for Study 3, all elephants showed a strong reaction to the Maasai regardless of their history with them which means that social learning is effective in transmitting knowledge. A final curious note is that because elephants have such huge olfactory bulbs, when they scent a Maasai, fear prompts an instant response, yet, when just visual cues are used, they can use antipathy (threats).

References

- Evans, C.S. (1997). Referential signals. *Perspectives in Ethology* 12, 99–143.
- McComb, K., Moss, C., Sayialel, S., and Baker, L. (2000). Unusually extensive networks of vocal recognition in African elephants. *Anim. Behav.* 59, 1103–1109.
- Poole, J.H., and Granli P.K. (2003). **Visual and tactile signals of African savanna elephants.** http://www.elephantvoices.org/index.php?topic=what_comm&topic2=what_comm/visual_tactile_signals.html.

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