ELEPHANTS · COMMUNICATION

How Elephants Talk

Rumbles below the range of human hearing, messages through the ground, name-like calls, and a nose that reads the news — the many channels of elephant conversation.

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> An elephant herd that looks silent is often anything but. Much of what elephants say is pitched too low for us to hear, some of it travels through the ground, and a great deal is carried by scent and touch. Here's what research has — and hasn't — shown.

01 Four channels of conversation

SOUND

Rumbles, trumpets & roars

Low rumbles carry most everyday conversation; trumpets and roars are for excitement, alarm and threat.

VIBRATION

Seismic signals

Rumbles and footsteps also send vibrations through the ground that elephants may detect.

SCENT

Chemical messages

Urine, dung and temporal-gland secretions announce identity, breeding condition and musth.

TOUCH

The trunk

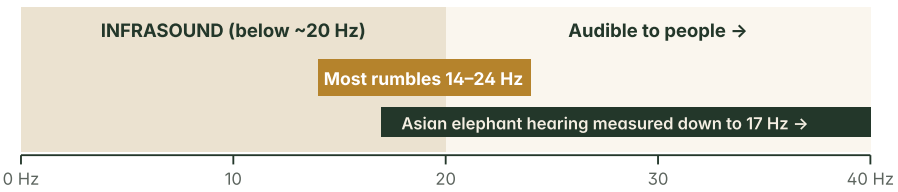
Caressing, guiding, reassuring — and, in a fight, shoving.

02 Infrasound: the voice we can't hear

Infrasound means sound below about **20 Hz**, at the very edge of human hearing. The discovery that elephants use it began with a hunch by biologist **Katy Payne** while visiting the Washington Park Zoo in Portland, Oregon: she felt a thrumming in the air near the elephants — she was *feeling*, rather than hearing, them communicate.

Recordings of captive Asian elephants (Payne, Langbauer & Thomas, 1986) found that **most of these calls ran from 14 to 24 Hz and lasted 10–15 seconds**, reaching 85–90 dB at 5 m. Elephants were the first land mammals reported to produce infrasound. A rumble is rich in harmonics, which is why we often hear part of it as a deep purr even when the lowest part is below our hearing.

THE LOW END OF THE SOUND SCALE



Calls: Payne et al. 1986. Hearing: one young Asian elephant, Heffner & Heffner 1980.

The fundamental of a typical rumble sits around the lower limit of human hearing; its harmonics reach into the range we can hear.

HOW FAR DOES A RUMBLE CARRY?

Low frequencies lose less energy over distance than high ones. The Cornell Elephant Listening Project reports:

~4 km

SAVANNA DETECTION RANGE

Playbacks showed elephants responding over 2 km, with an estimated detection range of about 4 km — enough to reach family members over roughly 50 km².

10×

EVENING BOOST

On calm savanna evenings a temperature inversion bounces sound back to the ground, which may expand the listening area from about 30 km² at midday to about 300 km².

In noisy forest, average detection was only about 800 m. One study in north-western Namibia (Garstang et al., 2014) found collared elephants changed their movements at the end of the dry season when rain was falling more than 100 km away, and suggested that infrasound from distant storms *might* be the trigger — the cue itself is still unproven.

03 A vocabulary of rumbles

Long-term field work by Joyce Poole and colleagues (ElephantVoices) describes many rumble types, each tied to a context and to body language:

CALL	WHEN YOU'LL SEE IT
"Let's go" rumble	An elephant proposes a direction — she stands facing the way she wants to go, flaps her ears and calls, often about once a minute.
Greeting rumble	Family members reunite after time apart: an explosive burst of loud, overlapping rumbles with heads raised, ears lifted, temporal glands streaming and trunks touching.
Musth rumble	A pulsing call from a bull in musth, often with one ear waved at a time.
Oestrous rumble	A series of powerful calls from a female after mating, drawing distant high-ranking males.
Mobbing rumble	Roaring rumbles as the group gangs up to drive off a lion.
Calf calls	Begging and cry-rumbles, escalating to roars, when a calf wants to suckle; mothers and young females answer with soft "cooing" rumbles.
Trumpets & roars	Excitement, alarm, play — and threat, for example towards a lion.

DIFFERENT ALARMS FOR DIFFERENT DANGERS

In Samburu, Kenya, elephants that heard recordings of **Samburu men's voices** became alert, moved away and gave a low rumble. Played back to other elephants, that rumble alone triggered the same reaction. It differed acoustically from the alarm rumble given to **angry bees** — a difference the researchers likened to a vowel change in human speech — and only the bee alarm prompted **head-shaking**, the elephants' way of knocking off bees (Soltis et al., 2014).

04 Knowing who's calling — and calling by name?

Elephants recognise one another by voice. Research in Amboseli, Kenya, indicates that a female typically recognises the contact calls of **about 100 other elephants**. When McComb and colleagues (2001) played contact calls to 21 families, groups led by **older matriarchs** (55 or older) were far better at telling friends from strangers — bunching defensively for strangers' calls — than groups led by matriarchs of 35 or younger. Families with older matriarchs also produced more calves.

NEW RESEARCH · 2024

Pardo and colleagues (*Nature Ecology & Evolution*, 2024) analysed 437 rumbles from 99 wild elephants in Kenya. A computer model could predict which elephant a call was addressed to more often than chance, and when calls were played back, elephants approached and called back more readily to calls originally addressed to *them*. The authors interpret this as **name-like calls** — and, unlike dolphins and parrots, elephants don't imitate the receiver's own call. It is a single study, the "names" haven't yet been pinned down within the rumble, and the researchers themselves list caveats.

05 Listening through the ground

A rumble doesn't only travel through the air — it also sends vibrations through the ground, and seismic energy travels best at roughly **10–40 Hz**, the same range as a rumble's fundamental and second harmonic.

- **Evidence elephants respond:** at Mushara waterhole in Etosha, Namibia, O'Connell-Rodwell and colleagues (2006) played *seismic-only* versions of alarm calls through buried shakers. Herds bunched together, turned to face a common direction and left the waterhole sooner than control herds.
- **How far:** in Samburu, Kenya, Mortimer and colleagues (2018) recorded elephant vibrations with geophones. Modelling suggested rumbles could be detected through the ground up to about 6.4 km, and fast walking up to about 3.6 km, in favourable conditions — estimates, not measured limits.
- **How they might feel it:** the exact mechanism isn't settled. Candidates are pressure-sensitive **Pacinian corpuscles** in the trunk tip and the feet (concentrated at the toes and heel), and **bone conduction** from the feet to the ear through the elephant's massive middle-ear bones.

06 Scent and touch

Elephants have one of the most powerful senses of smell known in mammals. They raise the trunk to sample the air and use its tip to investigate tracks, urine and dung. They can tell individuals apart by scent, and can recognise the dung of relatives they haven't met for years. Females in oestrus give off urinary cues that males detect with great sensitivity, and bulls in musth advertise their status through both urine and **temporal-gland secretions** (see Safari Notes 04).

The trunk tip is packed with touch receptors; studies suggest elephants can feel ridges just fractions of a millimetre high. Mothers touch calves to comfort or steer them, and in tense moments elephants reach out

to companions with their trunks in apparent reassurance.

AT THE SIGHTING — HOW TO SAY IT

"Listen — can you hear that low purr? That's only the top of the rumble. Most of it is below what our ears can pick up, and on a still evening those calls can reach family members kilometres away. Some of that sound even travels through the ground."

IF THE HERD REUNITES

"This is a greeting ceremony — ears up, heads up, all that rumbling and trunk-touching. Researchers in Kenya now think elephants may even call each other by something like a name."

07 Key terms

Infrasound	Sound below about 20 Hz, too low for most people to hear.
Rumble	The elephant's main low-frequency call, with many context-specific types.
Harmonics	Higher frequencies at multiples of a call's fundamental; often the part of a rumble we can hear.
Seismic communication	Signalling through vibrations in the ground.
Pacinian corpuscle	A layered nerve ending that is very sensitive to vibration.
Temperature inversion	A layer of warm air above cool air near the ground, often on calm evenings, that bends sound back downwards.

In summary

- Much elephant talk is **infrasonic** — rumbles of roughly 14–24 Hz that carry for kilometres, especially on calm evenings.
- Rumbles come in many **context-specific types**, and alarm calls can differ by threat (people vs bees).
- Elephants **recognise each other's voices**; a 2024 study suggests they may use **name-like calls**.
- Rumbles and footsteps also travel **through the ground**, and elephants respond to seismic playbacks.
- **Scent and touch** carry identity, breeding status and reassurance.

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