

## Review

## On Cuteness: Unlocking the Parental Brain and Beyond

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**Cuteness in offspring is a potent protective mechanism that ensures survival for otherwise completely dependent infants. Previous research has linked cuteness to early ethological ideas of a ‘Kindchenschema’ (infant schema) where infant facial features serve as ‘innate releasing mechanisms’ for instinctual caregiving behaviours. We propose extending the concept of cuteness beyond visual features to include positive infant sounds and smells. Evidence from behavioural and neuroimaging studies links this extended concept of cuteness to simple ‘instinctual’ behaviours and to caregiving, protection, and complex emotions. We review how cuteness supports key parental capacities by igniting fast privileged neural activity followed by slower processing in large brain networks also involved in play, empathy, and perhaps even higher-order moral emotions.**

### Cuteness for Caregiving, Empathy, and Beyond

What is it about the sight of an infant that makes almost everyone crack a smile? Big eyes, chubby cheeks, and a button nose? An infectious laugh, soft skin, and a captivating smell? These characteristics contribute to ‘cuteness’ and propel our caregiving behaviours, which is vital because infants need our constant attention to survive and thrive. Infants attract us through all our senses, which helps make cuteness one of the most basic and powerful forces shaping our behaviour.

The prevailing view of cuteness came from the founding fathers of ethology, Nobel prizewinners Konrad Lorenz and Niko Tinbergen. They proposed that the cute facial features of infants form a ‘Kindchenschema’ (infant schema), a prime example of an ‘innate releasing mechanism’ that unlocks instinctual behaviours [1]. This hypothesis was part of their larger ethological program to define the biological study of behaviour. The program included at least four goals, namely, to define the physiology, survival value, evolution, and development of behaviour [2,3]. These goals are still relevant, but subsequent research has questioned some of their initial propositions, such as ‘innate releasers’, and the whole idea of ‘instincts’ [4–6]. The tools of modern neuroscience have provided the basis for a broader understanding and precise dissection of brain networks that process survival-related stimuli [7] and have clarified the impact of biologically relevant stimuli on brain networks related to motivation, pleasure, and learning [8].

Here, we propose to extend the concept of cuteness beyond the morphological features of the infant face to include positive auditory and olfactory features that attract parental caregiving. Infant laughs and babbles are examples of what has been called ‘auditory cuteness’ [9], where the infant’s well-stretched vibrating vocal membrane produces mostly high frequency and pure tone-like sounds that attract caregivers across many bird and mammalian species [10]. Most existing neuroscientific research has not defined such auditory features as cute, but here we synthesize the existing research on stimuli belonging to our extended notion of cuteness and

### Trends

The parent–infant relation is fundamental to infant survival and development.

Cuteness has emerged as an important factor for attracting caregiver attention and affection.

Cuteness is not limited to visual infant features, but is also found in positive sounds and smells.

Neuroimaging has started to identify how survival-related infant-positive and negative stimuli elicit core affective brain activity through fast attentional biasing and slow appraisal processes.

Beyond caregiving, cuteness has a key role in facilitating social relations, pleasure, and well-being, as well as increasing empathy and compassion.

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propose that the impact of cuteness on emotions and behavior is broader than suggested by the idea of ‘instincts’. Cuteness is linked to the helplessness of human infants as a key (but not the sole) elicitor of complex parental caregiving [11]. It works on both fast and slow timescales; it elicits core affective brain activity through fast attentional biasing and slow appraisal processes. Our synthesis also indicates that there is a need to rethink the role of cuteness: It is a powerful positive stimulus and even non-infant stimuli can be cute. Beyond caregiving, cuteness appears to have a key role in facilitating social relations, pleasure, and well-being. As such, we speculate that cuteness may even go beyond eliciting caregiving to facilitate complex social relations by triggering empathy and compassion [12].

Here, we first discuss the existing behavioural and neuroimaging evidence for the fast processing of infant and infant-like cute stimuli. We investigate how our extended concept of cuteness helps to unlock complex caregiving even in adults who are not parents. This caregiving cannot be reduced to mere instinctual behaviour, but instead requires ‘expertise’ that takes time to acquire, and this slow acquisition changes the caregiver’s brain. We present evidence suggesting that cuteness can also facilitate slow, complex behaviours that are also involved in caregiving. We discuss the implications of how problems for parents, such as **postnatal (postpartum) depression** (PND; see [Glossary](#)), and for infants, such as cleft-lip, alter the processing of infant stimuli and disrupt natural caregiving. We speculate that the modulatory effect of cuteness on brain networks could be linked to mechanisms for privileged access to consciousness. As such, we suggest that cuteness might usefully be construed as a potential candidate for expanding the ‘**moral circle**’ [99] of entities worthy of moral consideration by increasing empathy and compassion.

### Fast Responses to Infants

Cute infants attract our attention, and they also capture it quickly. Here, we extend the concept of infant cuteness to be a biologically significant, positive multimodal stimulus that, through sight, sound, or smell, elicits fast selective attentional processing that facilitates caregiving and other complex emotional behaviours. Other biologically significant negative stimuli, such as the infant cry, also elicit fast selective attentional processing [13–15]. These abilities enable infants to quickly affect people’s, both parents and nonparents, brains and minds, which opens the possibility for complex caregiving and the promotion of sociality [1, 16]. Cuteness, then, displays both instantaneous impacts and gradual effects that aid infants’ evolutionary aim of survival, perhaps linked to both proximate and ultimate evolutionary functions [17].

Behavioural data demonstrate the salience and attentional prioritisation of infant cues, such as a cute face, on which most research has concentrated. The visual features that make infant faces cute include large, round eyes, a head ‘too large’ for the body, high eyebrows, full cheeks, and a small chin [1, 18] (Figure 1A). Adults prefer to look at cuter infant faces [19–21] and even prefer them to adult faces [14, 22]. The impact of cuteness transcends in-group versus out-group distinctions and cultural familiarity [23]. Infants and children also prefer to look at cuter infant faces [24, 25]. The power of cuteness to capture attention may diminish as a child develops: both adults and children pay more attention to infants’ faces than to older children’s faces [26], suggesting that the power of cuteness in young children’s faces fades as children mature. Crucially, cuteness does not operate alone, and may be influenced by experience. This influence is easily demonstrated in a simple computerised ‘baby social reward task’, where learning about an infant’s easy or difficult temperament shifts subsequent cuteness ratings [27].

Infant cues spur us to action: both men and women will expend extra effort to look longer at cute infant faces [22, 28] (for putative sex differences, see [Box 1](#)). When presented with cute and less-cute infants, adults prefer to give a toy to, or even adopt, the cuter one [29]. Adults who see an infant face before a simple task have faster reaction times and sustain their engagement in the task [30].

### Glossary

**Bifurcation:** an abrupt qualitative change in the dynamics of the system when one or more parameter pass through critical values, for instance the loss of stability and appearance of sustained oscillations.

**Connectome:** the complete description of the structural connections between elements of a nervous system.

**Hopf bifurcation:** in nonlinear dynamics, a Hopf bifurcation is a local bifurcation in which an initially stable fixed point of a dynamical system loses its stability in an oscillatory fashion.

**Global neuronal workspace model:** a model that proposes that conscious access occurs once a stimulus gains access through ignition to a global neuronal workspace, where information is broadly shared and broadcasts it to many other processors.

**Magnetoencephalography (MEG):** a method of measuring brain activity by detecting minute perturbations in the extracranial magnetic field that are generated by the electrical activity of neuronal populations.

**Metastability:** in dynamical systems refers to a state that falls outside the natural equilibrium state of the system but persists for an extended period of time.

**Monotropy:** the concept according to Bowlby that infants have an innate and inborn capacity to attach primarily to a single caregiver.

**Moral circle:** the circle of entities worthy of moral consideration (i.e., the in-group of entities to whom kindness is extended).

**Postnatal (postpartum) depression (PND):** depression after birth associated with impairments in parent–infant interactions, as well as longer-term disruption of emotional and cognitive development of the infant.

**Temporal discounting:** the phenomenon whereby people typically devalue rewards as a function of the delay to their delivery.

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