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Rooting Reflex

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Synonyms

Inborn reflex; Innate reflex; Instinctive reflex; Physiological reaction; Primitive reflex; Reflex action; Unconditioned reflex

Definition

The rooting reflex is the automatic head turning response to the stimulus of face, mouth, or cheek touching.

The rooting reflex is the automatic head turning response to the stimulus of face, mouth, or cheek touching. Infant apes will involuntarily orient their face toward the stimulation, often the mother's nipple, searching for the stimulating object with an open mouth. During development, the rooting reflex appears in utero, is present at birth, and disappears in early development. It is a primitive reflex present in newborn apes to facilitate feeding via maternal milk secretion. The rooting reflex is related to the suckling reflex, the automatic sucking response to any pressure to the newborn mammal's mouth. The rooting reflex has primarily been studied in humans, although it is evident in other apes including chimpanzees (Salloway 2011).

Primitive reflexes in humans include the step reflex, tonic neck, Palmar grasp, Plantar reflex, Babkin reflex, Galant reflex, the suckling reflex, and the rooting reflex. The rooting reflex in humans normally appears around 28 weeks gestation, is fully developed at 34 weeks gestation, becomes less prominent 1 month after birth, and disappears around 4 months after birth (Sosa et al. 2004). Absence of the rooting reflex in newborns indicates brain stem dysfunction, whereas persistence of the rooting reflex beyond early infancy indicates cortical dysfunction (Sosa et al. 2004). Frontal lobe disorders sometimes produce the reappearance of the rooting reflex in humans later in development (Salloway 2011). The rooting reflex coincides with altriciality, or the inability of young to attain food independently via locomotion. Altricial animals require more parental care for survival than do precocial animals. Precocial mammals are able to root and nurse voluntarily at birth and do not require reflexive responses to secure nutrients.

Primates are a relatively altricial mammalian order, with humans representing a highly altricial species, which can be explained by the metabolic limit hypothesis (Dunsworth et al. 2012). According to this hypothesis, labor and delivery occur when the mother can no longer continue to supply the fetus with metabolic and nutritional requirements in utero. The large brain of the fetus becomes too energetically costly for the

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mother to continue to supply nutrients in utero and external feeding is more efficient for the mother, creating a tradeoff between prenatal brain development and maternal energetic expenditure. Birth canal size produces another constraint on gestation duration for a large-brained, metabolically demanding fetus, resulting in earlier labor and delivery than is optimal for brain growth (Ruff 2017). As a result of the increasing metabolic demands of a large-brained fetus, birth occurs when the brain is not fully developed and, therefore, the newborn human is altricial. The rooting reflex, combined with the suckling reflex, solves the adaptive problem of altricial infants having insufficient cerebral capacity to locate and secure nutrients and feed. The rooting reflex is mediated by the brainstem, and as the cerebral cortex develops, the rooting reflex is replaced by voluntary motor functions (Yoo and Mihaila 2020).

Nursing is normally necessary for mammalian infant survival. Maternal milk is dynamic and uniquely suited to the growth and developmental requirements of offspring. Maternal milk contains a high proportion of fats relative to proteins, facilitating newborn brain development (Belfort et al. 2016; Jenness 1979). Operant conditioning facilitates the disappearance of the rooting reflex. Rooting, suckling, and crying serve as infant hunger cues and motivate caregivers to feed newborns. Mothers or caregivers respond to the rooting reflex by nursing, causing the infant to cease display of hunger cues, creating negative reinforcement for the caregiver, and, therefore, motivating feeding as a response to rooting. Nursing in response to the rooting reflex provides positive reinforcement for rooting behavior as an indication of hunger in infants. As infant cerebral cortex development progresses and the rooting reflex disappears, infants continue to root for a period of time as a voluntary indication of hunger (Glodowski et al. 2019).

Cross-References

- ▶ Altricial
- ▶ Feeding
- ▶ Fetus
- ▶ Grasping Reflex
- ▶ Hominid
- ▶ *Homo sapiens*
- ▶ Innate Behaviors
- ▶ Lactation
- ▶ Mammalia
- ▶ Natural Selection
- ▶ Nutrients
- ▶ Operant Conditioning
- ▶ Order
- ▶ Parenting
- ▶ Positive Reinforcement
- ▶ Precocial
- ▶ Reflex
- ▶ Reinforcement
- ▶ Species
- ▶ Suckling/Nursing

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