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# The Neurophysiological Basis of Origin and Evolution of Romantic Kiss in Humans

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## Abstract

Kiss is one of the most ancient and globally practiced behavioral acts in the history of mankind. It is generally regarded as an exhibition of affection. However, despite universal prevalence of its practice, the physiology of its origin remains unsettled. Anthropologists have even failed to arrive at a consensus as to whether kissing is an acquired and learnt behavior or an instinctual or innate one. Kissing is found to trigger a cascade of neural reactions associated with release of several neurochemicals (mainly oxytocin and dopamine) in the brain that contribute to the various emotions associated with it. This brief paper is intended to present neurophysiological basis of its origin and evolution to its present form.

## Introduction

Kiss is defined as an act of touching or caressing with lips in an attempt to exhibit affection or greeting(s) and probably constitutes one of the very old behavioral acts in the history of mankind. However, despite being the simplest act of romance since time immemorial, the physiological basis of its origin remains elusive.

This brief paper attempts to explore the plausible neurophysiological basis of origin and evolution of this apparently simple act of romance that remains yet unexplained. Although undocumented, it is believed that following theories of its origin prevail:

1. Premastication: In ancient times, mother would chew food and pass it directly into the child's mouth; this practice evolved into romantic kissing.
2. It was a belief that the soul resided in the breath of a person and therefore, kiss attempted to bring the souls closer together.
3. Kiss brings the participants closer to obtain each other's scent, a primitive means to gain knowledge and information of one another at subconscious level. Smell is known to alter neurophysiological and neurochemical environment of the brain; even at sub-threshold levels, smells have been found to alter brain waves in studies on human subjects.
4. According to some researchers, kiss maybe an unconscious testing of the genetic fitness of the

partner.

However, there is still failure of arrival at a consensus on any of the prevailing theories.

It is believed that the act of kissing is performed for following reasons:

1. Kiss is believed to be a means for mate assessment by which man assesses fertility status in woman through estrogen levels, while the woman assesses status of immunity in man.
2. Kiss provides pleasure, evokes passion to prepare the partner for bonding and mating for reproduction and eventually species-perpetuation (the most basic purpose of life). There is evidence that saliva contains testosterone and males prefer more open-mouthed kisses, which is viewed as an unconscious attempt to transfer the testosterone to sexually arouse the females.

## Neural correlates of taste

Taste sensation is an inherent and intimate component of kissing; hence, the role of neural pathways and chemical substances associated with taste assumes great importance in the understanding of the neural correlates during kissing. Kiss causes release of several neurochemicals, mainly oxytocin and dopamine, which also contribute to the emotional feelings, associated with this act. Dopamine is known to be involved in pleasure and motivation, while oxytocin [1] has been found to play role in pleasure, pairing and social bonding, and foreplay responsible for the preparation for mating necessary for reproduction.

Taste sensations emanate from taste buds and finally terminate via third order neurons at the post-central gyrus (parietal cortex), with some fibers also passing to the insular region, which is known to be activated by unpleasant tastes [2]. However, gustatory information is also conveyed to hypothalamus and amygdala [3] and this neural circuitry appears to be responsible for the feelings of pleasure and reward associated with gustatory stimulation during the act of kissing.

Taste plays an important role in human behavior also and seemingly occupies a prime locus in the evolutionary history of neural development in humans. This is exemplified by analgesic response to sucrose administration observed only by oral route (oral

ingestion) and not elicited by any other route including intragastric administration [4].

## The Hypothesis

Oral exploration of objects is one of the most primitive behaviors in the evolutionary history of animal life; in fact, it can be viewed as an innate behavioral pattern. In humans also, oral exploration is observed in early childhood and which may persist throughout the life as a dormant feature or may in course of time acquire an inhibited state by the higher degree of encephalization with the purpose of abiding by socially evolved and acceptable behavior.

In Kluver-Bucy syndrome (KBS), which results from removal of both amygdala with bilateral temporal lobectomy, oral exploration or hyperorality is an important clinical feature [5]. This altered behavioral pattern may be viewed as a reversion of the primitive or innate behavioral pattern from its inhibited or dormant state. This may be analogous to the reversion of the primitive dorsi-flexor response (the Babinski's sign present at birth) from its more evolved plantar reflex in upper motor neuron lesions as a result of release of the primitive reflex from the overriding influence of higher centers.

It is human basic nature to seek and derive pleasure and satiety. Kissing involves oral interaction with the partner leading to a state of arousal. Kiss can stimulate wide spread areas of the brain simultaneously owing to large cortical representation of the tongue and lips (the two most sensual parts of the body) and extra-cortical destination of taste sensations (as described earlier); therefore, kiss may have evolved to its present form due to its potential capacity to stimulate wide spread areas of the brain at any given moment and targeted to seek pleasure, arousal and ultimate preparation for pairing and reproduction.

## Conclusion

It is realized that several facts and claims in this brief hypothesis remain unsupported with scientific evidence due to scarcity of available data. Thus, well-designed prospective studies with neuroimaging techniques are justifiably warranted to obtain an insightful exploration of this common but surprisingly unexplained behavioral act.

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## Recent evidence in support of the above hypothesis

In the Introduction section, it has been suggested that during kissing, a male assesses the female's fertility status through estrogen levels, although at instinctual or subconscious level; this is in keeping with the basic purpose of a natural sexual interaction between a male and female being perpetuation of one's species.

Very recently, a revolutionary new ovulation kit (Maybe Baby tester) has been launched in UK (<http://in.news.yahoo.com/ovulation-kit-uses-saliva-determine-womans-fertility-072931398.html>). This kit tests the surge in estrogen and salt levels in the female's saliva at the time of peak fertility and can even indicate the *moment of ovulation*. This kit can also detect the state when the female is not fertile

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