

Haptic perception: an historical approach

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Traditional perceptions of the sense of touch

The idea that perception or sensation may be localised in certain physical organs (e.g., skin) has a long tradition. It pervades many cultures. The system of sensory physiology (of which touch is one important element) is shaped by the influence of both medical thought and the philosophy of nature. Let us turn first to ancient Indian medicine or natural philosophy, as it appears in the Vedas. The Vedas are the most ancient Indian religious texts and consist for the most part of hymns, liturgical chants, sacrificial formulas and magic spells. The Rgveda, the oldest of the vedic texts, has not yet a verb for 'touch' or 'feel' and no expression for the corresponding sensation which – in a later text entitled Atharvaveda – is called *sam-sparsa* (feeling) [1]. In the Ayurveda, which forms an appendix to the Atharvaveda, the primeval matter (*sattva*) acts upon the five senses of knowledge or *buddhindriya* (hearing, touch, sight, taste, smell – Fig. 1). The sense of touch is associated with the wind, one of the five elements in ancient Indian philosophy. The skin, as one of the sense organs, is envisaged simply as the meeting point of the qualities or object assigned to this sense: skin – finger – grasping – feeling.

In ancient China, too, the human organism was perceived as a miniature copy of the universe. The doctrine of the five elements or the five phases of transformation is the basis of the idea that there are many numerical correspondences between nature and the human body (Fig. 2).

The sense of touch thus plays an important role in Chinese pulse diagnostics, e.g., in a clas-

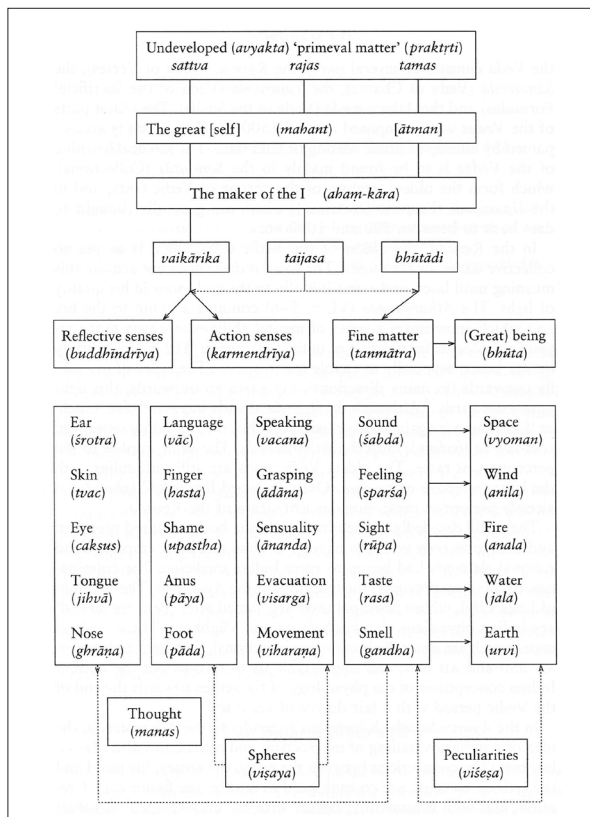


FIGURE 1. THE SYSTEM OF THE FIVES SENSES IN ANCIENT MEDICINE

Source: RFG Müller (1951) Grundsätze altindischer Medizin. Munksgaard, Copenhagen, 83

sical text entitled 'Seven sorts of Pulses which indicate danger of Death' (dating back to the 3rd century AD). The metaphors used in describing these pulses concern tactile perception, for example: "If the Motion of the Pulse resembles the hasty pecking of the Beak of a Bird, there is a failure

Elements <i>hsing</i>	Direction <i>fang</i>	Sense organ <i>kuan</i>	Tastes <i>wei</i>	Smells <i>chou</i>	<i>Yin-yang</i>	Internal organ <i>tsang</i>	Part of body <i>thi</i>
Wood	East	Eye	Sour	Goatish	Yin in yang or lesser yang	Spleen	Muscles
Fire	South	Tongue	Bitter	Burning	Yang or greater yang	Lung	Pulse(blood)
Earth	Centre	Mouth	Sweet	Fragrant	Equal balance	Heart	Flesh
Metal	West	Nose	Acrid	Rank	Yang in yin or lesser yin	Kidneys	Skin and hair
Water	North	Ear	Salt	Rotten	Yin or greater yang	Liver	Bones (marrow)

FIGURE 2. SYMBOLIC CORRELATIONS OF THE SENSE ORGANS IN THE CHINESE TRADITION

Source: J Needham (1978) *The shorter science and civilisation in China*. CUP, Cambridge, Table 9 (selection)

of *Spirits in the Stomach: one may also conclude that the Heart performs its Functions but ill, and that the Blood is in no good condition*" [2]. Other descriptions of dangerous pulses do not refer to a primarily tactile perception, although some figurative comparisons may be explained by a tactile experience of sensing distinctive 'pulses'. According to Elisabeth Hsu these descriptions do not solely express the physicians' tactile experiences but are part and parcel of a more general familiarity with tactile perception.

The Greek philosopher Empedocles uses the word *pagamai* (flat of the hand or gripper) to denote the senses in general [3]. This means that his descriptions of sensory perception in general refer to the sense of touch. In his *Timaeus*, Plato deals systematically with the senses. Unlike the other senses, he does not attach the sense of touch to a specific physical organ. In his opinion sensations of pleasure and pain and other qualities perceptible to the senses, such as warm and cold, feature as "*disturbances that affect the whole body in a common way*" (*Timaeus*, 65c). Aristotle (384–322 BC) not only expanded the hitherto merely inchoate physiology of the senses, but also advanced them to a state of completion that retained its authority well after the Christian Middle Ages [4]. In the Aristotelian view, each function is determined by its object. Applied to the senses, this means that each sense organ is assigned to a specific object of perception. Aristotle's *De anima* deals with the senses one by one in the order of sight, hear, smell, taste and

touch, placing special emphasis on each case on the object of the perception. The organ of the sense of touch is not the skin, but the heart. The corresponding medium (the flesh) is thus in the body itself, and not outside it. Aristotle describes the object of the sense of touch as palpable. The distinction between the palpable and the visible or the resonant lies in the fact that, while the latter are perceived through the agency of the medium, here "*it is as if a man were struck through his shield, where the shock is not first given through the shield and passed onto the man, but the concussion of both is simultaneous.*" (*De anima*, 423b, 15ff). For this reason, Aristotle considers the sense of touch to be more closely related than the other senses to the four elements, since the properties of the elements (e.g., dry and wet) are palpable (Fig. 3).

The Aristotelian doctrine of the fully unified and independent nature of the sense of touch was scarcely ever questioned in the subsequent centuries. The *De anima* of Albertus Magnus (c. 1197–1280) follows him in similarly classifying qualities such as hard and soft and rough and smooth as derivatives of the qualities primarily registered by the sense of touch (e.g., warm or cold) [5]. As we know today, these tactile qualities are, in fact, detected by sensors in the skin that pass on the corresponding stimuli to the brain *via* the peripheral nerves and the spinal cord. But until the 19th century, by which time experimental physiology had made substantial progress, it was impossible to form any definite,