

ARISTOTLE ON TOUCH

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Abstract. According Aristotle's *On the Soul*, the first and most important form of sensation which we human beings share with other animals is a sense of touch. Without touch animals cannot exist. The first part of my article presents Aristotle's teaching about the internal connection between the soul and the sensory powers, especially as regards the sense of touch. The second part consists of a collection of the classical considerations about this subject. The third part then deals with the actuality of some Aristotle's thesis about touch with reference to current research in neurophysiology on kinesthesia and haptic perception.

"The organ of touch is unique among the senses. In the other senses, the material is neutral with respect to the range in question: the eye jelly, for example, is colourless, the air in the ear silent. Touch, in contrast, inevitably possesses some of the qualities along its own range."¹

The principle and the cause of a living body is the soul. All living organisms have a soul: plants a vegetative soul, animals a sensitive one, and human beings a rational one.² The first type soul, is the nutritive soul

¹ V. Caston, "The Spirit and the Letter. Aristotle on Perception," in: R. Salles (ed.), *Metaphysics, Soul, and Ethics in Ancient Thought* (Oxford: Oxford University Press, 2005), p. 285. According to M. Grunwald: "The Aristotelian doctrine of the fully unified and independent nature of the sense of touch was scarcely ever questioned in the subsequent centuries," M. Grunwald (ed), *Human Haptic Perception. Basics and Applications* (Basel, Birkhäuser Verlag, 2008), p. 13.

² Cf. *On the soul*, 424a <<http://classics.mit.edu/Aristotle/soul.html>>, translated by J. A. Smith. The vegetative life of plants as defined by a soul consists in taking in food and growing. The sensitive soul organising the life of animals is responsible for additional abilities (perceiving, desiring, moving). Human beings, due to the rational soul, are capable of theoretical and practical thinking. The vegetative, sensitive and rational souls are not divided from one another in human beings, but they imply each other: the rational soul implies

(424a), possessed by plants. The presented categorization of the souls incorporated the Aristotle's idea that plants are without perception, because perception involves more than affecting the matter. Though a heated iron can indeed affect the plant, but this does not mean that the plant perceives its touch. According to Aristotle plants have no sensation, although they have one part of soul and are in some degree affected by the things themselves which are tangible. The next type of soul is the sensitive soul.

The property of having a sensitive soul defines the animal, and every organism possessing such soul has the sense of touch. Nature equipped all animals with this sense, and hence they survive. Compared with this, such senses as sight or hearing are present only in beings with the ability to move.

Life processes for which the soul is responsible are purposeful ones. Plants are able to nourish themselves, grow and die. Numerous animals can also move, reproduce, and as far as senses are concerned, all of them have at least the sense of touch. Humans are furthermore capable of reasoning, both theoretically and practically. The fact that human beings have a rational soul implies that they also have the lower, i.e. vegetative and sensitive "functions" ("aspects", "abilities", "powers") of the soul, in their complete whole.³

Democritus compiled a list of five senses. The list was taken over by Aristotle, who created a systematic and consequent teaching on the senses, attributing to them, contrary to his predecessors, psychical functions.⁴ Aristotle separates sensual cognition from events in inanimate matter and other psychical functions, claiming that it is not based on a direct contact between the object and the organ of sense, but that it takes place through an agent. Perception, as a psychical "power" of the soul is common to human beings and animals.

The verb "to touch" is usually used in two different ways. I can say that a cup touches the table and it means that the cup is in direct contact with the

vegetative and sensitive soul (cf. *On the soul*, 414b29-34;). Moreover, the vegetative soul is in the same relation to the body of a plant, as the sensitive soul to the body of an animal and rational soul to a human body. The bodiless and rational psyche is responsible not only for perceiving and moving but also for all processes of biological functioning (growth, reproduction, behaviours). The Aristotelian understanding of soul was partly discussed in: J. Bremer, *Osoba – fikcja czy rzeczywistość [A Person – fiction or reality]* (Kraków: Aureus, 2008), pp. 122-129.

³ Cf. E. Sears, "Sensory perception and its Metaphors," in: W.F. Bynum & R. Porter (ed.), *Medicine and the five Senses* (Cambridge: Cambridge University Press, 1993), p. 24-25.

⁴ Cf. E. Scheerer, Die Sinnen, in: Ritter, J., *Historisches Wörterbuch der Philosophie* (Basel: Schwabe & Co. Ag – Verlag, 1995) pp. 824-870.

table. However, when I say that I touch the smoothness of the cup I could mean something different, namely, that I feel or perceive the smoothness of the cup. I touch the cup in this way only when I am using my sense of touch. Similarly, we can say that the touch of your hand is cold. In that case too it is implied that I perceive your hand as cold by my sense of touch. Perhaps it is more usual to use the verb “to feel” rather than the verb “to touch” as a verb of perception. One would say “I feel the smoothness of the cup” rather than “I touch the cup” if I want to say that I perceive the cup rather than that I am simply grasping it with my hand. That is perhaps also, according to T.K. Johansen, why it seems more natural to use the verb “to touch” when the idea is just that there is contact between two things and no perception takes place.⁵

Aristotle was the first to treat the sense of touch (*αφή*) as a uniform sense, thus the teaching on five senses became binding for the next several centuries. In the remainder of this paper we shall first present – on the basis of the sense of touch – the connection of his teaching on the senses with the teaching on the soul, and then we shall discuss more widely the sense of touch as such. We would also like to see to what degree some of the contemporary neurological concepts on this subject correspond to the teaching of Aristotle.

I. THE SOUL

Each faculty of sensory perception is connected with the soul, that is located in the heart (in the centre) of human or animal being. The sense of touch is located near the heart.⁶ The human soul unites in itself the functions of both vegetative and sensitive soul (*τό θρεπτικόν, τό αισθητικόν, τό ορεκτικόν, τό κινητικόν κατά τοπόν*), as well as the functions of thinking (*διάνοια*) and reasoning (*λογισμός*). This means that it is rational i.e. able to engage in scientific and theoretical reasoning (*ἡ διάνοια θεωρητική = τό επιστημικόν*) and in practical deliberation (*διάνοια πρακτική*). All the abilities of the soul except those of the mind (*νοῦς*), cannot be separated from the body and are destructible.

The ability to think in a reflective manner is an exception in the general teaching presented in *On the soul*. “When we consider the mind and its

⁵ Cf. T.K. Johansen, *Aristotle on the Sense-Organs* (Cambridge: Cambridge University Press, 1998/2009), p. 178.

⁶ Cf. Aristotle “On sense” 439a 1: “[...] the soul [is] resident in these parts of the body.” Aristotle, *On the soul*, 420b 28.

theoretical power [thinking] nothing is clear so far; it seems, however, to be a different kind of soul, which is the only one that can exist after the separation as an eternal being from what is perishable” (*On the soul*, 413b 24-27). Aristotle adds at the same time: “As far as other parts of soul are concerned, it is evident [from what we have said] that in spite of certain statements to the contrary, they cannot exist separately” (*ibidem*, 27-29).⁷

For Aristotle, to be a living creature means to be capable of self-nutrition and growth. Thus, all animate things must have a vegetative soul which is the basis of life functions. “This power [of self-nutrition] can be isolated from the other powers but not they from it – in mortal beings” (*On the soul*, 413a 31-32). Nutrition is necessary for maintaining life, thus the necessity of the presence of the sense of touch for finding food and the sense of taste for distinguishing food from other objects. Other senses are not necessary for the survival of the animal; their purpose is to maintain the well-being of the animal.

All other life functions assume a basic power of taking nourishment cannot exist separated from touch. It is the first and the most general power of the soul, since due to it all (that is animate) has life. (i) The organism reproduces itself i.e. creates a different being of a similar nature: an animal creates an animal, a plant creates a plant. Something can be used as food insofar “[...] as a living being is an entity and substance; as it maintains its substance and existence as long as it takes in food” (*On the soul*, 416b 13-15). In the process of nutrition there are three factors engaged: the being which is fed; something it eats; and something which feeds it [actively]. “What does the feeding of these is the first soul” (i.e. the vegetative one, *ibidem*, 20-22). (ii) The sense of touch is unalienable for understanding the real world.

The sensitive soul makes animals capable of moving and feeling pleasure and pain. Some of the animals have all the senses, some only a few. Among the senses, the first one is the sense of touch (*afē*) (together with the sense of taste⁸): i.e. it can exist without other senses but the others

⁷ Cf. *On the soul*, 433b. Any of these powers of soul or its parts is not to be separated with regard to logic or space (with the exception of the intellectual power of soul). Each living being must have a vegetative soul, and this includes also the ability to bring life. Plants have no sensitive soul as they take in food automatically (without sensual impressions).

⁸ “[...] taste also must be a sort of touch” (Aristotle, “On the senses”, 441a 3). Today we know that a large variety of taste impressions are obtained by additional sensations of touch, pain, heat, cold and smell. It has not been scientifically proven where exactly the taste “appears”: is it in the many thousands of taste buds, in afferent nerves, or the in brain as such? (cf. Zahnwissen-Lexikon – <http://www.zahnwissen.de>).

cannot exist without it. Likewise, Aristotle distinguishes between the sense of taste and the sense of touch, and notices that the first is an independent sub-sort (sub-modification) of the sense of touch.⁹

II. SENSORY POWERS

Aristotle's philosophical analyses concerning the subject are based upon his observations of the sense organs' functioning, since they are the basis of sensitive soul's powers: sensory perceptions (*τό αισθητικόν*), desire (*τό πρακτικόν*) and locomotion (*τό κινητικόν*). Senses are the soul's power, depending on properly created and functioning body organs. Damage or overstraining such organs e.g. the eyes, by long looking at the sun, results in the subject's loss of the ability to see.

In Aristotle's works we can distinguish two types of analyses connected with the issues of senses and perception.

(A) Some animals have all the senses, while some have only a few of them. Some have only one sense, "the most necessary one, i.e. touch" (*On the soul*, 414b 3), which is, e.g., necessary to recognise food. Its subject is characterised, as compared to that of other senses, as including a "greater number of differences." Although e.g. colours (as proper objects of sight) also have different variations, as compared to the objects of touch, they do not constitute different genres. Aristotle restricts the number of senses to five. In his opinion, if there were more senses, man would have them (cf. *On the soul*, 424b 21-23).

If we notice something, we notice also that it is we who notice it. We recognise this, not only with the mind alone but also by means of some sense. In order to notice an observation of a sense as our own, we must relate it to ourselves as the basis of this observation; thus, we must perceive ourselves. Today we call this psychological function consciousness.¹⁰ Thus, the act of perceiving is a synthesis in which the subject and the object are reduced to an indivisible synthesis. We cannot perceive in order not to perceive something by this.

(B) It is a consequence of Aristotle's considerations (cf. *On the soul*, 425a-426b), that sensory perception is not only a matter of single sense organs¹¹, but also of a postulated "common sense" (*κοινή αισθησις*, *sensus*

⁹ Aristotle, "On the senses," 438b 30.

¹⁰ Cf. *On the soul*, 425b-427a.

¹¹ "It is impossible that there was a special sense organ for common sensibles, e.g. such as movement, rest, shape, figure, magnitude, which we would perceive only incidentally

communis, 418a17-20), due to which we are aware that we perceive and that the perceptions of particular senses differ from each other. In order to obtain the unity of perceiving, no additional, single organ is needed. Rather it is the common sense which is understood as the whole of the sensual perception and consciousness.¹² Particular single sense organs are as if individual expressions of this sense. What we are aware of in perceiving depends on: (i) which sense organs (interconnected) create a system of perceiving, and (ii) in which way these organs co-operate with one another. For Aristotle the process of perceiving – and thus the soul connected with it – is not a sum of elements, or an unspecified unity, but a complex, whole system. The fact that we perceive in a conscious way is not an effect of the activity of one organ, but of the fact that the parts of the system “human subject” co-operate with one another to constitute the unity of this system. Aristotle explains the phenomenon of intermodal perception with the presence of the “common sense”: common sensibles (i.e. the ones which are attributed to the common sense) are movement, rest, number, figure, magnitude. “[...] these are not peculiar to any one sense, but are common to all.”¹³ Common sense allows the subject to put together the perception of properties of things, such as listed above, in one coordinating centre of perception. Due to the common sense, we are able to distinguish the perceptions of one sense from the perceptions of the other. Sight differentiates the dark from the light, and the taste the bitter from the sweet. But it is the common sense that gives us the ability to tell the dark from the sweet (cf. *On the soul*, 426b 8-29). It is not possible that there is a special sense organ for objects of the common sense. Every particular sense perceives one sort of sensory object (cf. *On the soul*, 425a).

Sensory perception of outer objects causes imaginative pictures, leaving impressions (or pictures) in the soul, which are stored in memory. Representation, feeling, and desire can be attributed to animals’ souls as well, but conscious recollection of something can be attributed to rational souls only. Thus, Aristotle addresses the contemporary issue of consciousness

with each specific sense” (*On the soul*, 425a 26). “Common sensibles are movement, rest, number, figure, magnitude” (418a 20-22).

¹² There is no difference to be seen between the sensual common objects and incidental ones, and the sensual common object is a special type of a sensual incidental object.

¹³ *On the soul*, 418a. Each of the five external senses has objects specific to it. There are, however, also objects of perception which can be perceived with more than one sense. They are perceived not incidentally but rather in their own rights. E.g., shape is perceived through touch and sight. Common objects of perception are not specific objects of the common sense. The common sense is a different ability to perceive, although it is realised through specific senses (*ibidem*, 425a 14-b3).

by speaking of the unity of soul, thanks to which we perceive everything. And it is not an additional centre of the soul which is meant here, but the conceivable unity of sensory activities which are realised in specific functions of single senses. Aristotle attributes this common sense also to animals, and he locates it physiologically in the heart.

Aristotle distinguishes the mind, the main function of which is thinking, from the sensory powers. The functioning of the mind is not connected with the presence of something physical, as in the case of the senses. Thus, Aristotle draws the conclusion that thinking cannot be an activity requiring the presence of some physical organ. On the one hand, this differentiates thinking from sensory impressions, although on the other hand, thinking, like feeling must have some "organ", the so called passive mind (potential), which is not connected with any physical organ of the body.

In the second analysis devoted to the senses, Aristotle deals with the difference between the senses and the mind. Here he concentrates on objects of cognition as providing evidence as to the nature of the mind. A fundamental feature of the mind is the fact that its objects are universal in the sense that there exists nothing that the mind could not think about or (possibly) understand. This kind of phenomenon does not take place with senses, all of which have a limited range of receptiveness. This is the result of the connection of senses with the structure and functioning of the physical organs. Each organ can accept only particular stimuli. Physical structures limit the range of receptiveness of a particular organ. Thus, Aristotle draws the conclusion that unlimited range of receptiveness can appear only when there is no connection with a physical organ.

Senses and mind are similar to one another. As powers they do not have their own nature, except in the sense that they have a specific capacity or ability to apprehend. Moreover, they are possibilities. There is, however, a difference in their possibilities: the senses are something physical; the mind cannot be treated as consisting of flesh and blood. That is why the "table", contrary to the senses, on which the mind records something, must be of a spiritual nature.

III. THE SENSE OF TOUCH

"While in respect of all the other senses we [human beings] fall below many species of animals, in respect of touch we far excel all other species in exactness of discrimination. That is why man is the most intelligent of all animals" (*On the soul*, 421a20-23).

“Without touch there can be no other sense, and the organ of touch cannot consist of earth or of any other single element ... without touch animal cannot exist” (*On the soul*, 435b 3-5,17).¹⁴

The division into the vegetative, sensitive and rational functions of soul Aristotle explains with reference to the sense of touch. Without the vegetative soul there is no sensitive soul, although in plants the vegetative soul is isolated from the sensitive one. Similarly “[...] again without touch there can be no other senses” (*On the soul*, 415a 3-4). The sense of touch can exist separately, without other senses, since many animals have no sight, hearing, or smell. Although, according to Aristotle, touch is the most basic sense, since without it the sensory and rational nature of man is not possible. Touch gives animals the sense of inquisitiveness and builds the foundation of knowing. We are aware of our own being, of our self-knowledge thanks to the sense of touch. “The well-developed sense of touch is the condition of man’s intelligence” (*On the soul*, II: 9, 421a 7ff). On the contrary, we consider sight “above all the other senses” (Aristotle, *Metaphysics*, A 980a 23-25).

Aristotle’s research on the sense of touch concerns as well the role of the body in the hylemorphism that he created. This role can be summarised in a few points:

Aristotle and classical considerations

(1) Touch gives us the impression of directness, and the entity “[...] which is the medium through which the tactual qualities are transmitted must be a body naturally attached to our organism; due to that, a greater number of sensations occur” (*On the soul*, 423a 15-17). In order to function, each sense requires a medium (e.g. light or air). This should also be a requirement for the sense of touch. There have to be immediately affecting junctions between the skin and the contacting surface of the object. The necessity for contact obliged Aristotle to postulate that the skin performs only the function of the medium of touch. The real organs of touch are situated below the surface of the skin. Aristotle had no possibility of seeing these real organs of touch. The visible body is therefore only a medium between the soul and the object of touch. Each medium performs a causal role – light enables the skills of the retina to perceive the objects. Light triggers a potency, to see shapes and colours. Aristotle gives a more detailed analysis of the soul and its powers. He presents each of the senses in turn, noting

¹⁴ Deprivation of the sense of touch causes animals to die.

that all of them operate by means of a special substance (sound, colour, ...) acting directly on a corresponding sensation (sight, hearing, ...). Only touch can sense *any* body. Other senses can perceive only one substance. The senses are only stimulated by matter and its appearance, and cannot sense the essence of an object. Sensation exists by reason of perception, which exists in turn by reason of nutrition and reproduction, which (in turn) exists for the sake of the soul.

(2) When Aristotle writes that “[...] the object of touch has a greater number of differences,” he does not mean that the other senses have no different varieties.¹⁵ The varieties of other species are not different species, but simple oppositions existing inside the species. When one touches with one’s tongue, one part of the body perceives both tactile properties and taste. This is the proof that touch delivers a greater number of sensory impressions than the other senses. Aristotle adds that if the rest of the body could perceive taste, we would have an impression that taste and touch are the same sense. “Taste is a form of touch both in the manner of its operation by direct contact and in having a proper object that is composed of the proper objects of touch.”¹⁶ The research on touch is for Aristotle research into a new degree of complexity of a living organism.

(3) The body is the “mediator” (*medium*) for the sense of touch and not the organ (cf. *On the soul*, 423b 14-15). Aristotle considers the possibility that the sense of touch acts by contact while the other senses act from a distance (Cf. *On the soul*, 423b 1-5), as if sensation of touch were totally unmediated. He rejects this possibility on the grounds that all of our perceptions – including touch – occur through a mediator. The body (flesh) is a mediator itself, and the organ of sense is a kind of “membrane.” Although the body contains the organs of sense of touch, it is not identical with them. The properties characteristic of a body as a body are the subject of touch. However, Aristotle says nothing about the nature of a “body” or “membrane” understood in this way. From the point of view of modern neurology, Aristotle sees no difference between senses transmitting internal information (e.g. taste) and those transmitting external information (i.e. “from the distance” e.g. sight). According to Aristotle, we perceive everything through a “mediator.” However, when he treats the hypothetical membrane as a mediator in case of the sense of touch, we can understand

¹⁵ Cf. *On the soul*, 418a. As refers to the “varieties” of other senses cf. e.g. *ibidem*, 420a.

¹⁶ T.K. Johansen, *Aristotle on the Sense-Organs*, p. 225. The organ of taste, like the organ of touch, is made of flesh.

it as a kind of internal “shape,” in the sense of “sensibilised shape.”¹⁷ According to Aristotle, such a membrane could coalesce with the body, and then the touching impression could be even quicker. The membrane plays the same role in touch as does, e.g., air in seeing.

(4) Aristotle points out two things: (a) that animals must necessarily have senses, and (b) that, if the body has senses, it must be necessarily single or complex (cf. *On the soul*, 434a 27-b 19). A body cannot be single, for in such a case it would not have the sense of touch, which it must necessarily have. Aristotle motivates this thesis in the following way: an animal is a body with soul; all kind of bodies are tangible; what is subject to the sense of touch is tangible. The conclusion is that the body of an animal must also have the sensory power of touch. If an animal that is touched had no sensory impressions, it would not be able to avoid some things and catch others. According to Aristotle, the sense of taste also is a kind of touch, as its subject is food which is a tangible thing.

(5) Differentiating impressions from one another is the essence of the senses. The human sense of touch, when we compare it to the sense of touch of other animals, is the best at differentiating.¹⁸ A person with delicate skin, with a “soft body,” can differentiate better.¹⁹ Touch, as already mentioned, is the most basic sense, and it provides us basic experience of what is substantial, solid and bodily, and the sensual power, whose subject is the tangible thing, is located inside a human being (cf. *On the soul*, 423b 22-23).

(6) Aristotle classifies animals on a *scala naturae* and differentiates perfect and imperfect animals. Imperfect animals lacked one of the five senses. Some of them have only the sense of touch. When they touch an object they shrink or stretch out. But when they have “sensory power they also have imagination” (cf. *On the soul*, 413b 4-23). This imagination is

¹⁷ “If somebody enveloped a body with a kind of membrane, prepared in advance, it would also transmit [sensation] together with touch” (*ibidem*, 423a 3-4). The comparison to paramecium (*paramecium caudatum*) comes to mind here: perception and locomotion are to the same extent mediated by the ectoplasm membrane in this case. A unicellular amoeba (*amoeba*) uses touch, embracing with its body whatever it touches. It is similarly in the case of molluscs (*mollusca*), which by rhythmical movements increase the possibility of coming across food.

¹⁸ “While in respect of all the other senses we [human beings] fall below many species of animals, in respect of touch we far excel all other species in exactness of discrimination” (*On the soul*, 421a 18-20).

¹⁹ Davenport adds that such a person will reach the Aristotelian *theoria*, understood as the ideal of contemplative happiness (cf. Davenport, “Aristotle and Descartes on Touch,” (<<http://hea-www.harvard.edu/SSXG/NAR/Touch.pdf>>, pp. 1-9), pp. 2-3). Touch still plays an important role in some branches of modern medicine, e.g. in diagnosing internal growths or tumours.

undefined (undetermined). Aristotle draws this conclusion on the basis of such animals' movements, which also have an undefined character. Such imagination cannot be separated from the sense of touch. Sensual powers imply the power of imagination. Imagination is different from thinking and sensual feeling, but it does not exist without the latter. It is the basis for beliefs and intellectual operations. One can imagine some object by "the eyes of the soul." Aristotle uses the term *phantasma* when speaking of visualisation or recollection of past feelings. The teachings on the mediating and synthesising power of imagination can be taken together and one can distinguish between the intellectual imagination which is specific to human beings, and the sensual imagination, which is possessed by other animals as well (cf. *On the soul*, 433b 28-30, 434a 5-7). Continuing, Aristotle remarks that it remains an open question whether an "imperfect animal" (i.e. the one that lacks some of the senses "perfect" animals have), having the sense of touch only, can have some fuzzy imagination. He does not take plants into consideration, as they cannot notice things (cf. *On the soul*, 435b 1).

(7) Due to the sense of touch, we have ourselves for ourselves in a bodily way. By virtue of touch, we are potential experiencing and conscious subjects. Without touch, we would be ignorant and incapable of experiencing. We can see and learn about the world around us with our reason because the sense of touch, and thus our body situates us in the time and space. Pleasure and pain are experienced through touch. Desires are caused by pleasure, so each organism that experiences pleasure has to possess desire. For humans, to have pleasure means to be able to act by reason.

Contemporary investigations on Aristotle's themes

(1) A. P. Bos raises the question: What is the subject of the Greek sentence: "ἐι δὲ καὶ συμφυεῖς γένοιτο"? And he answers: "Every modern translator or commentator known to me takes it that Aristotle is still talking about 'the membrane' here."²⁰ His thesis runs that the subject of this sentence is "the instrument for perception" of the sense of touch of the sensitive soul. The instrument of tactile perception must be composed and Aristotle calls it "the ensouled body."²¹ The term "ensouled" can be apply to the

²⁰ A.P. Bos, "The Soul's Instrument for Touching in Aristotle, *On the Soul* II 11, 422b 34–423a 21," *Archiv für Geschichte der Philosophie* 92 (2010), Bd., p. 89–102 [p. 94]. So translated e.g. by J. A. Smith: "If the membrane could be grown on to the flesh ..."

²¹ Cf. A.P. Bos, "The Soul's Instrument for Touching in Aristotle," p. 99.

“instrumental body” with which the soul is inextricably connected. As evidence for his thesis, Bos cites 416b 29: “that is why everything that has soul in it possesses warmth.” This is so because it is this vivacious heat that constitutes the instrument by which the soul produces the visible body. This corresponds to Aristotle’s idea in 415b 18: that “all natural bodies” are “instruments” of the soul. Therefore the medium of the sense of touch is the flesh. In the interpretation represented by Bos, at least one question remains: is there a contrast between “the soul body” and “the visible body”?

(2) In his study on the nature of the human being, J-L. Chrétien remarks that no one in the history of philosophy has ever conducted “a more radical and patient investigation of touch” than Aristotle. A.A. Davenport refers to the work of Chrétien *L’Appel et la réponse*, as well as his numerous works on the understanding of the sense of touch by Aristotle.²² According to Davenport, “if touch deceived us, we would suffer irreparable betrayal before even embarking on our quest. We would lack our very selves and all firm ground upon which to build understanding progressively.”²³ On the one side, the fundamental importance of touch to humans comes from its epistemological assignment – making realisable the consciousness of the self and an awareness of environments. The sense of touch is then a necessary condition for consciousness, feeling, thought and action. On the other side, the sense of touch is the direct form of perception. Many of our activities involve different use of tools, and many others are free of tools and entail direct contact between the skin and the surface of the object. Aristotle treats touch as the determinant for separating living animals from other things. Tangible organisms are potentially destructible. They can be deprived of life, i.e. a close connection with the soul.

(3) Aristotle distinguished five senses. Contemporary neuroscientists, however, speak about the five special senses (balance, hearing, vision, taste and smell), and the four general senses (pain, temperature, touch and pressure). They consider touch (and also pain, pressure, cold and warm) to be discrete modalities. Sensory modality has a number of characteristics: intensity, quality, duration and extension. The modalities of sensation depend upon information that is transmitted in the sensory pathways. The sensory neurons of the mature dorsal root – sensory ganglia²⁴ – are

²² Cf. Davenport, “Aristotle and Descartes on Touch,” p. 1.

²³ Davenport, “Aristotle and Descartes on Touch,” p. 4.

²⁴ Cf. S. Jacobson, E. M. Marcus, *Neuroanatomy for the Neuroscientists* (New York: Springer 2008), p. 5-6. Ganglia host the cell bodies of sensory neurons whose dendrites are placed in the skin, muscles, tendons, joints and other internal organs. These dendrites moni-

heterogeneous population of cells animating such diverse targets as: (i) muscle, viscera, skin; and subserving the discrete modalities as: (ii) pain, temperature, touch, pressure, and proprioception.

(4) The importance of touch in human, nonverbal communication is well known. What about another, lower animals? An earthworm, which Aristotle called “intestines of the Earth,”²⁵ has a well developed a sense of touch. Moreover, it has a sense of smell and of taste. It has no eyes but only light-sensitive spots on different parts of its body. According to a deep-rooted prejudice, earthworms do not show the nature of herd behaviour. A new study demonstrated that earthworms use tactile receptors on the surface body for the thigmotactic responses.²⁶ Earthworms use touch to communicate (they make consensual decisions based only on contact between followers) and influence each other’s behaviour. Thanks the sense of touch, a group of earthworms is able to form herd behaviours: analogical to the behaviours of a flock of birds or a swarm of fish, which have eyes and ears.

IV. CONCLUSION

For Aristotle, the soul is not an independently existing substance. It is directly connected with the body, being the form of the body. The soul is not a different substance inside the body as another substance. Conceived in such a way, the soul has little in common with personal identity and individuality.

According to new empirical investigations, some animals have developed, on the basis of touch, some kind of the communication between members of their kind, and they also show herd behaviour. Because nutrition is necessary for the survival of animals, Aristotle underlines the necessity of touch in order to find food, and the necessity of taste to separate the food from the rest.

The sense of touch is something in between all tangible qualities and the basis of all other senses. Instead of the sense of touch, today we often speak of haptic sensations. Haptic and tactile experiences frequently happen at

tor different kinds of touch, temperature, and pain. Cf. Ch. R. Noback [and others] (eds), *The Human Nervous System* (Totowa/NJ: Humana Press, 2005), pp. 157, 246.

²⁵ Cf. G. Yasmeen, *Urban Agriculture in India* (CFP Report 32, 2001), p. 15.

²⁶ Cf. L. Zirbes [and others], “A New Case of Consensual Decision: Collective Movement in Earthworms,” *Ethology: the International Journal of Behavioural Biology* 116 (2010): 546-553 [p. 551].

the same time but it is possible to distinguish them. When speaking of haptic sensations, we mean something relatively dynamic.²⁷ It comprises sensations of pressure, temperature and force. Examples are: touching, embracing some object, holding it, squeezing.

Active touch, understood in this way, enables us to notice the participation of movement in recognising at least whether the object is solid. Studying the object by touch, we move parts of our body – i.e. the surface of the skin – causing neural impulses to be transmitted to the brain. The example of reading texts written in Braille shows us the importance of the synergy of movement and touch, no matter whether we move our fingers (along a line of text) or keep our hands at the same place and move the text.²⁸ Thus, we can draw the conclusion that at least some aspects of somatosensory perception which constitutes the haptic sense must be based on information from both: from movement and from touching. The haptic sense depends on our ability to integrate these two sources of sensory inputs and it is to be treated as a higher degree of somatosensory modality.

Aristotle speaks of the body – to put aside the exegetical question if “the soul body” and “the visible body” – as a mediator in the sense of touch (and not only of the skin).²⁹ This way of presenting it allows us, from a modern point of view, to take into consideration the basic role of receptors in joints and muscles. From the physiological point of view, it would be hard to speak about a pure stimulation of the skin without the stimulation of muscles and joints. In the tactile examination of some object, there takes place the merger of information from the receptors of the skin, muscles and joints. From this point of view, tactile perception is multimodal in itself. Slightly erroneous direction of some of these informational components can destroy the internal concordance of the haptic-perceptive process. That

²⁷ Cf. U. Neisser, “The Ecological Self and Its Metaphors,” *Philosophical Topics* 26 (1999): 201-215, esp. pp. 205-207: “[...] suggested that haptic perception depends on complementary information from tactual acuity, active movement, and spatial cues” M. Grunwald (ed), *Human Haptic Perception. Basics and Applications* (Basel, Birkhäuser Verlag, 2008), p. 185.

²⁸ Reading the Braille alphabet is an example of our tactile ability to perceive, where the synergy of touch and movement is required. “The tactile display that stimulates skin sensation is a well known technology. It has been applied for communication aids for a blind person as well as master system of teleoperators” M. Grunwald (ed), *Human Haptic Perception. Basics and Applications*, p. 355.

²⁹ A human skin has the area of 1.5 – 1.8 m² and it weights more than 3 kg, being the biggest sense organ. It specialises in the reception of mechanical, thermal and chemical stimuli, providing its owner with a lot of information on the environment. Cf. P. Duus, *Diagnostyka topograficzna w neurologii* [niem. *Neurologisch-topische Diagnostik*, 1983] (Warszawa: PZWL, 1989), pp. 15-16.

is why using the term “the sense of touch” is slightly misleading as it can be understood in a very selective way.

Contrary to modern science, Aristotle does not distinguish senses transmitting internal information from those which transmit external information. Due to the present state of neurological knowledge, it is more adequate to distinguish between somesthesia and kinesthesia. Somesthesia is the ability to perceive one’s own body (senses of the skin, proprioception and internal organs). Somesthesia is not purely passive, and it is not possible to examine its neuronal mechanisms on unaware animals. Kinesthesia is the ability to feel movement, perceive positions of the body (without the use of sight) and tensions in muscles, tendons and joints. Neuronal mechanisms of kinesthesia must be examined during active movement. Haptic perception can be then defined as the merger of somesthesia and kinesthesia not as their ordinary sum, but a kind of an integrating process due to which e.g. internal representation of objects is created. There is a connected question: whether having haptic perception is necessary for having a concept of space and consequently a concept of the world.

Confirmation of the existence of something analogous to an Aristotelian “membrane” can be found in modern neuroanatomy. The “shape” of this membrane would be an anatomic “sum” of the body as it is transmitted to the brain in proprioception and kinesthesia, e.g. by mechanoreceptors (see above). These include, among others, skin receptors, for instance, free nerve endings (located in spaces between the cells of epidermis e.g. Merkel touch bodies) and saccate end organs. These receptors identify velocity, vibration, skin stretch, edge of objects.

All receptors within skin and in deeper tissues are connected with branches of axons (bundles of nervous fibres) and the branches of these axons then converge in the direction of the axon of the sensory neurone. A touch stimulus acting on the skin gets not only to a given type of receptor but also to different receptors. The sum of stimuli in the form of impulses is then transmitted to the complex, perceptual and central haptic system. This system deals with inputs from skin-related as well as from kinesthetic receptors allocated over our body.