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# Sensory perception, body and mind in Indian Buddhist philosophy

# 20

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### Abstract

The Buddha's conception of the nature of sentient beings being without a substantial and lasting core gave rise to interpretations in subsequent Buddhist philosophical traditions that often appear surprisingly modern. In general, his usage of defined abstract notions was prudently limited for the most part, however, to those necessary for presenting soteriological and practical teachings. But this approach proved to be philosophically prolific. Basic concepts and theorems were soon developed into rich scholasticist systems of ontology and psychology, which were followed by a normative epistemology that focussed on the kinds of cognition that can warrant valid knowledge. The relationship between

mind or mental phenomena and the body was elaborately discussed with different proponents of Indian Materialism in order to prove the correctness of the Buddha's analysis of the empirical person. By means of examples this paper will offer a survey of the concept of the senses, their nature and function according to a particular system of mainstream Buddhism, as well as of the ideas about the relationship between mental phenomena and the material body as can be seen in the attempt of the influential philosopher Dharmakīrti to refute the reductionistic explanation of consciousness.

### 1. Introduction

In science, "sensory perception", is now used as a cumulative label to describe the activity of the senses, an activity that consists in the

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transport of information necessary for living beings, from bacteria to human beings, to survive and procreate. This nature of the senses, sensors as transducers, has been examined in great detail by biologists over the last hundred years with regard to their physiological and technical aspects, and an incredibly differentiated wealth of possibilities how stimuli from the outer or inner world of an organism are received and transmitted has been already discovered (see Chapters I, 1–4 and II,6 this book).

I should clarify what you can expect in the following paper. I am neither a scientist nor a philosopher, but as a philologist and historian of ideas, a kind of cultural anthropologist with a focus on Indian and Tibetan thought, in particular Buddhist thought. Yet I am also a living being with an interest in the questions of today. Thus, in conclusion, I will take this occasion to bother you with some personal impressions, probably quite innocent if not even stupid about the so-called problem of consciousness and the manner of some of the discourses about it.

It seems to be my charge to present at the end of this book, as a kind of counterpoint, the example of a pre-modern view of sensory perception, and, moreover, a view that is not only pre-modern, but also extra-European, namely, an Indian view.

As in pre-modern Europe, in India sensory perception was not a topic of the sciences, e. g., of medicine, but of philosophy. Within the various intellectual traditions that I would characterize as “religious” because they offer solutions for the problems of life, the last centuries BCE see the development of a number of philosophical systems in India: comprehensive and structured conceptions and explanations of what there is in the inside and outside worlds. In my opinion, all of these efforts are much influenced by their respective social and religious traditions, Brahmanical, Jinist, Buddhist, or Materialist, much as medieval European or

“Western” philosophies are mostly held together by Christian presuppositions. These Indian systems differ widely in focus and structure. While some are outside nature-oriented, most focus on the inside nature of living beings. Along with the development of such systems, the practice of debate became regulated during this period in order to allow productive or polemic discussions, both within the same traditions but also between competing ones. In the period following this systematization, the background of these systems was contested in an ensuing culture of polemic dispute: proof of the validity of the respective sources of knowledge was sought, including aspects concerning the foundational authority these systems were built upon. Rich developments in epistemology and logic accompanied this trend. While the conceptual context for the various epistemological theories of this period is quite similar, their emphasis on the sources of knowledge differs according to their specific goals. For example, for systems based on metaphysical principles beyond experience, inference is considered more important than perception. If, as in the case of Buddhism, the systems are based on the truth of a particular person’s experience, in this case of course the Buddha, perception is predominant whereas inference receives its validity only indirectly from its connection with the results of perception.

In order to avoid further generalizing statements, I will proceed by presenting two concrete examples in more detail from this rich philosophical development which is quite divergent even within Buddhism. Both examples are extracted from a specific single text and may be relevant in regard to different aspects of the topic of this book. The first example is of a more antiquarian character and is drawn from the “Treasury of Scholasticism” (“Abhidharmakośa”) by Vasubandhu, a famous teacher of the 5<sup>th</sup> century CE. It will demonstrate Vasubandhu’s

conception of the nature and function of the senses as an approach to the topic under medieval Indian intellectual conditions. The second example demonstrates the mind-body question as it is dealt with in the “Commentary on Valid Cognitions” (“Pramāṇa-vārttika”), the first major work of Dharmakīrti, a widely influential epistemologist and logician of the 7<sup>th</sup> century CE. To adequately understand Vasubandhu’s classical presentation of sensory perception we need to briefly look at the Buddhist conceptual background. According to the Buddha, the nature of sentient living beings – humans and animals alike<sup>2</sup> – consists in a collection of five empirically discernible constituents (Fig. 1) that can clearly be distinguished from one another. These constituents he calls “branches” (“skandhāḥ”) (cf. Vetter 2000).

The five branches are “body”, “feeling”, “conceptual awareness or ideation”, “volitional and affective impulses”, and “sensation” (Vetter 2000, p. 69f.). All five constituents are conceived of as continua of distinct factors that are connected only causally. There is nothing in addition to and different from these factors, like, for example, a substantial permanent soul or an observing master-mind. In the later systematic period, the body as matter in general is dualistically opposed to mind, which is accompanied by various emotional and intellectual phenomena. In the light of the Buddhist interest in

the nature of life and its origin, as well as in a method of deliverance from life’s frustrating eternity, the Buddhist point of departure in the examination of sensory perception within this dualistic framework is on the side of perception. This means that sensory perception is not understood as a function of the senses, but a sensation or awareness that comes about under the cooperation of the senses. In the following I extract the most relevant notions regarding the nature of the senses from Vasubandhu’s extremely elaborate system.

## 2. Vasubandhu on senses

Vasubandhu’s list of awareness/consciousness-related factors comprises 18 “components” (“dhātu”), which are listed in Fig. 2.

There are six consciousnesses<sup>2</sup> (“vijñāna”); of these, five are sensory and one is non-sensory. They correspond to six sensory faculties or senses proper, namely, the five human senses (seeing, hearing, smelling, tasting, and feeling/touching), and mind, and refer to six corresponding objects (visible form, sound, smell, taste, tangibles, and knowables). Leaving aside the mind (“manas”)

**Fig.1** The five “branches” (skandhāḥ) according to the Buddha

body (*rūpa*)  
 feeling (*vedanā*)  
 ideation (*sañjñā*)  
 volitional and affective impulses (*saṃskārāḥ*)  
 sensation (*vijñāna*)

<sup>1</sup> In early layers of Buddhism possibly including even plants (cf. Schmithausen 1991)

<sup>2</sup> I here use the term “consciousness” synonymously with “conscious cognition, awareness, sensation”. The single Indian term connotes “discriminating or distinct cognition or knowledge”

consciousnesses	senses	support	object
visual	seeing	eyes	visible form (= colour + shape)
auditory	hearing	ears	sound
olfactory	smelling	nose	smell
gustatory	tasting	tongue	taste
tactile	feeling	body	tangible
mental	mind ("inner sense")	"heart"	knowables

**Fig. 2** The eighteen "components" (dhātavaḥ) of awareness/consciousness following Vasubandhu

and its function as a distinct non-sensory faculty of discrimination, the question pertinent to the topic of the present book is that of the nature of the senses.

First of all, the senses are material in that they consist of the four "great elements" earth, water, fire, and wind. But they represent a subtle kind of matter that is derived ("rūpapasāda") from these four elements (Vetter 2000, 21f.). The elements are the "support" ("āśraya") of all derived matter (Abhidharmakośa "AK" 1.12ab, Pradhan 1967); they are atomically conceived, but are experienced only in terms of their essential characteristics, for instance, earth as "solidity", water as "wetness", fire as "heat", and wind as "motion". Moreover, the elements are composite, that is to say, the element earth for instance contains at least one atom or more of each of the other elements. It is determined as being earth only because the earth atoms predominate (Sphuṭārthā Abhidharmakośavyākhyā by Yaśomitra "AKV", Wogihara 1971, AKV 33,10–15).<sup>3</sup> The same is true for the derived matter in the form of the senses. Depending on which aggregation

predominates in the senses, they are coordinated to the respective object, following the principle "like causes like".

Perhaps intriguing here for biologists is the term "subtle kind of matter" ("rūpapasāda"). This type of matter is said to be derived from the great elements, but it is transparent ("accha") and therefore suprasensible. Like those elements this matter consists of atoms, and, most importantly, is not to be identified with their respective "seats" ("adhiṣṭhāna"). The seats of the senses, the eyes, ears, nose, tongue and body, carry the subtle atomic matter of the senses in different ways (Abhidharmakośabhāṣya of Vasubandhu "AKBh" 33, 17–23, Pradhan 1967).<sup>4</sup> Because of the senses' transparency, the exact place they occupy on their seats can only be inferred. These seats are inferred from medical experience: if medication is applied at this spot, it has an effect on the respective sense.

The sense of vision has its seat on the pupil of the eye in the form of a cumin-flower, and is covered by a transparent skin. Hearing sits inside the ear on a cartilage that

<sup>3</sup> On the notion of "predominance" ("bhūyastva"), cf. Preisendanz (1994, 724ff.).

<sup>4</sup> Cf. Preisendanz (1994, p 445).

has a colour like that of a birch-leaf. Smell is placed in the two nostrils in the form of arrow heads. Taste sits on the tongue like a half moon. In the middle of the tongue there is a spot the size of the tip of a hair that is not pervaded by the atoms of this sense. The sense of feeling follows the body in its arrangement.

Although the systematic explanations are different, all of this, and there is not much more to be found on the physiology of the senses, is also more or less commonly accepted in the brahmanical traditions, especially those with a focus on the philosophy of nature. There is only one point where they diverge. In general, the brahmanical schools upheld the requirement that for perception to occur there must be physical contact between a sense and its object. Buddhist scholasticists, however, accepted the necessity of contact only for the senses of smell, taste, and feeling, as long as their objects were of comparable size to the sense organs. But in the case of seeing and hearing they denied the necessity of physical contact (AK 1.43cd, Pradhan 1967).

Their main argument concerns the sense of vision: although we see objects that are distant from the seat of vision, we do not see the eye lashes in its nearest proximity. The requirement of contact and the debate with the Buddhists generated rich developments in optical theories in the brahmanical schools. These culminated in a theory of eye-rays, for which the Nyāya-Vaiśeṣika school was mainly responsible.<sup>5</sup> The reason the Buddhists denied the necessity of physical contact in the cases of seeing and hearing is, however, not based on the discovery of specific facts, but

is clearly dogmatic. In the Buddhist tradition it is said that advanced virtuosi of meditation have special capacities; they are able to acquire “divine”, suprasensitive sight (“divyacakṣuḥ”) by means of which they see not only far in terms of space and time but also through walls and mountains, as well as “divine”, suprasensitive hearing (“divyaśrotra”), through which they hear sounds over great distances, even sounds created in other world systems. Such capacities would not be possible if physical contact were required.<sup>6</sup>

If then for Vasubandhu there is no contact between the senses of seeing and hearing and their objects, how does he explain the arising of the respective cognitions? According to an older authority,<sup>7</sup> the sense of vision perceives something, i.e. “attains” something in that it arises in a “state of non-separation” (“nirantaratva”) with an object (AKBh 32,10f, Pradhan 1967), by reason of light. When a visible form is too close to the sense of vision, the form impedes the function of light and thus, the sense of vision does not see. When an object is distant, light is not impeded, and the sense of vision sees. The sense of hearing perceives by reason of space (“ākāśa”). When a sound is close to the sense of hearing, it does not oppose the function of space, which is to impede matter, and thus, the sense of hearing hears.

But as said above, these quite artificial constructions are only due to dogmatic considerations. I believe, however, that in order to get a clear view of the conceptions of the senses in this system, all considerations which only accommodate the tradition can be disregarded here. I would instead like to examine in more detail the model of the

<sup>5</sup> For an extensive treatment of these ideas cf. Preisendanz (1989 and 1994, pp 446–449). Cf. also Mookerjee (1935) and Tillemans (1990).

<sup>6</sup> AKBh 32,2f: *satī ca prāptaviṣayātve divyaṃ cakṣuḥśrotram iha dhyāyināṃ nopajāyeta* (Pradhan 1967). Cf. AKV 83,26–84,2 (Wogihara 1971).

<sup>7</sup> *Vibhāṣā* 13,7 as quoted in *L’Abhidharmakośa de Vasubandhu “AKBhV”* I. 87, note 1 (La Vallée Poussin, 1971).

three other senses, those that actually “attain” their objects, namely, smell, taste and feeling. When, in the case of these three senses, the sense-atoms “attain” roughly the same number of object-atoms, consciousness is produced (AKBh 33, 11, Pradhan 1967). But atoms, as the smallest entity of matter, do not “touch” one another because they are the smallest entity and thus have no parts (AKBh 32,13, Pradhan 1967), or because they would collapse into a single atom, if they did touch (AKBh 32, 12, Pradhan 1967). But they do touch, in the sense of non-separation, understood as a “juxtaposition without anything in the interval” when they are “agglomerated” (“saṅghāta”) and thus have parts (AKBh 32,17f, Pradhan 1967). Such “agglomerates” are either dissolved or held together by the element wind, i. e. by “motion” (AKBh 32,14–16, Pradhan 1967). While it is fine that “motion” keeps atoms together without their collapsing because they have resistance (“sapatigha”), “agglomerates” are still atoms (AKBh 33,4f, Pradhan 1967), and using such terms as “touching” or “attaining” can only be considered metaphorical without reference to reality (AKBh 33,2f, Pradhan 1967).

In another context, the five elementary sense-objects are also said to be “resistant” (“sapatigha”) in the sense of being impenetrable, as when a hand strikes a rock, it is repelled (AKBh 19,7f,18, Pradhan 1967). But the senses are also “resistant” in the sense of “encountering one another” or of “coming together” (“nipāta”), which in this context is explained as “an activity with regard to its specific object” (“svaviṣaye pravṛttiḥ”, AKBh 19,18, Pradhan 1967). What is meant here is not that the senses act on their objects, but that they are “active in mutual assistance” (“sabhāga”). On one hand “mutual assistance” means “mutual service” (“anyonyabhajana”), in which the senses, objects serve one another as the support and object of consciousness, and, and in which con-

sciousnesses relies on the senses (AKBh 28,20, Pradhan 1967; AKV 76,27–34, Wogihara 1971); on the other hand, it means “possession of an activity” (“kāritrabhajana”), namely, the acts of seeing, of being an object of consciousness or being seen, or of discerning the object (AKBh 28,20, Pradhan 1967; AKV 76,34–77,2, Wogihara 1971). This is also expressed in a more meaningful way as “having the same contact as (their) effect” (“sparśasamānakāryatva”) (AKBh 28,20, Pradhan 1967; AKV 77,5–9, Wogihara 1971).

Also “contact” (“sparśa”) does not mean the same thing here as it does in the brahmanical schools. In the given context it means a “coming together, becoming near to one another” (“sannipāta”) of the three: the sensory faculty, an object and consciousness (AKBh 132,8, Pradhan 1967; AKV 77,8f, Wogihara 1971). Moreover, it is not a physical contact that is meant, but only a conceptual or metaphorical contact. Yaśomitra, a ninth century commentator on Vasubandhu’s treatise, expresses this in a manner that helps to get a clearer picture: “These, sense, object and cognition, have the same effect. When cognizing the [sense of the] eye and the object, visual cognition arises.” (AKV 77,7, Wogihara 1971)

As a historian of philosophy I am compelled to reveal at this point that Vasubandhu’s summary of Buddhist scholasticism is comprised of several layers of consistent theories that are historically and systematically intermingled with a great number of individual opinions on specific points and problems. His own views can often be seen as more down-to-earth alternatives, clearer and more compact, when compared to the traditions he endeavoured to summarize. And at the end of his career, he abandoned his earlier ontological position of naïve realism altogether and proposed an idealistic ontology – with a considerable number of similarities to modern constructivist ideas. Only his proof of the impossibility of a reality that is external to

consciousness may be mentioned as being of interest to our topic. For this proof is basically a refutation of the conception of atomic reality: atoms are impossible.<sup>8</sup>

The critical realism, already seen in Vasubandhu’s work that served to reduce the conceptual extremes of scholasticist causal theories, was subsequently fully developed by Dharmakīrti in his conceptions of causality and of the momentariness of anything caused. Here, the scholasticist’s complicated structure of six types of causes and five types of effect is replaced by a theory based on one major cause and a group of auxiliary causes that are, in principle, representative for an unlimited number of auxiliary causes. These causes produce only one kind of effect, while at the same time they contribute to the properties of this effect.

In the spirit of Yaśomitra’s succinct remark quoted above,<sup>9</sup> I would now like to briefly sketch Dharmakīrti’s theorem (Fig.3) (Steinkellner 1967, pp 44–55). According to his conception one has as a starting point

phases of different causes that are in proximity to one another, thereby forming a causal complex (“hetusāmagrī”). In principle, the proximity of these causes is the effect of a “history” of previous causes that have no beginning in time, and the causes belonging to such complexes are unlimited in the space of each time-phase as well. Nevertheless, the main causes are easily discernible: a main cause is distinguished as having a preceding causal phase that is of the same type as the effect (“samanantara-pratyaya”); auxiliary causes (“sahakārin”) are not of the same type, but they need to be present to allow the causal complex to be also sufficient to produce its effect. In the case of sensory perception, the main cause is sensation, mind, or consciousness, and the auxiliary causes are the sensory faculties, objects, light, etc. What is gained by the cooperation of the auxiliary causes with the main cause is that they have a causal influence on the properties of their common effect (Fig. 4).

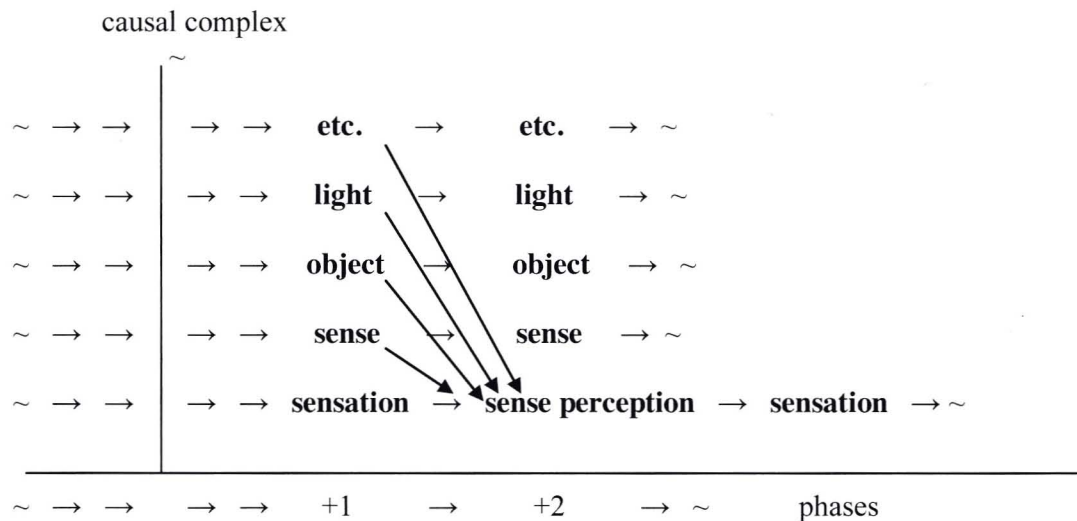
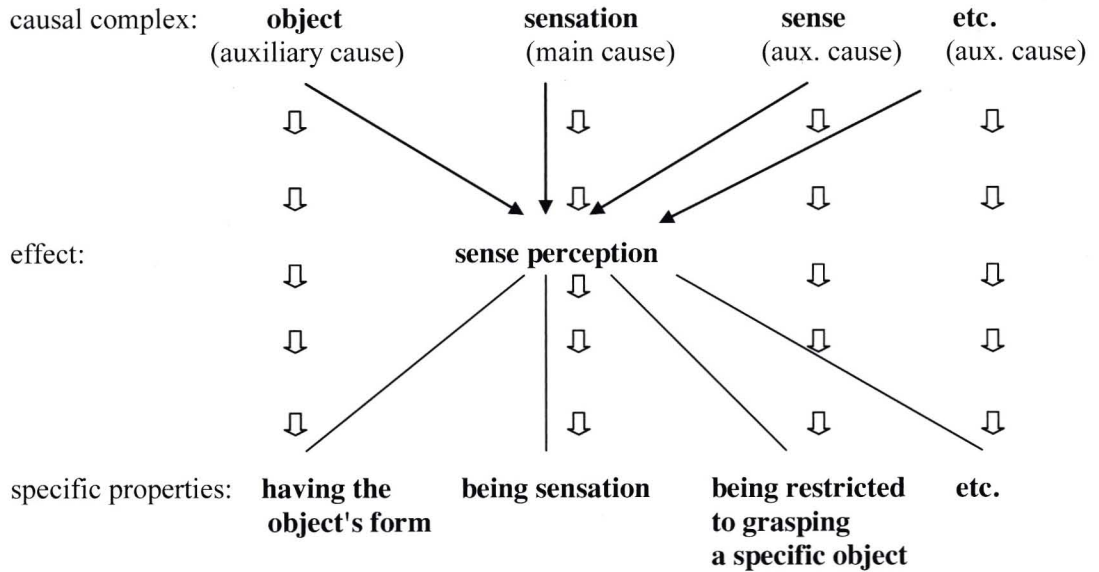


Fig. 3 Dharmakīrti’s theorem (Steinkellner 1967, p 137)

<sup>8</sup> Vimśatikā 11–15 (Frauwallner 1994).

<sup>9</sup> I understand this remark as summarizing the earlier interpretation of the process of sensory perception already under the influence of Dharmakīrti’s theory.



**Fig. 4** The empty arrows indicate a causal relationship, the lines the effect's properties, and the filled arrows their relationship to the respective causes in the complex (Steinkellner 1967, p 127)

To sum up: What these Buddhist philosophers thought they were able to explain on the level of material reality as governed by causal regularity, is the possibility of an event of consciousness that refers to or represents reality “as it is” (“yathābhūta”). In Dharmakīrti’s definition of perception as being “non-erroneous” and “free of conception” (Dharmakīrti’s *Pramāṇaviniścaya* “PVin” 1.4ab’, Steinkellner 2007 and Vetter 1966, p 41) this is spelled out at the end of a long development in both a pragmatic and a Buddhist manner. Since sensory perception is only one type of cognition defined in this manner aside of other events of cognition like the self-consciousness of cognitions as objects, even conceptual ones, or the peak-experience of a meditator, it can be said that these characteristics of perceptions are better appreciated through what amounts to their psychological equivalent, namely the subjective feeling

of “immediacy” or “clearness” (“sākṣatva”), a quality that is exemplarily experienced in sensory perception.

### 3. Dharmakīrti on body and mind

The second topic I consider to be of interest here is the Buddhist position on the relationship between body and mind. Again I can use Dharmakīrti as my source. In the second chapter of his “Commentary on Valid Cognitions” (“*Pramāṇavārttika*”), Dharmakīrti deals at length with views from traditions of Indian materialism and medicine (*Pramāṇavārttika* “PV” 2. 34–119, Franco 1997)<sup>10</sup>. His motivation is obvious: the affirmation of the Buddhist belief of a re-embodiment of the

<sup>10</sup> Cf. its review by Taber J (2003) Dharmakīrti against Physicalism. *Journal of Indian Philosophy* 31: 479–502, from which I benefitted substantially for this lecture.



continuum of sensation in beginning- and endless existences full of suffering, as well as the possibility to release oneself from this eternal circle through the development of moral and intellectual capacities to ultimate perfection.

As said at the beginning, the Buddha considers a living being to consist of five ultimately different constituents, the body, feeling, ideation, impulses and sensation, which can be contracted for our purposes to "body and mind". They are distinct continua of existent factors that are connected only causally, but they cooperate in forming an empirical personality, an ego. There is nothing substantial and eternal, such as a soul, in addition to these constituents.

Now, whereas all bodies are visibly impermanent because the elements rearrange themselves, this is not the case with the mental constituents. Their continua generate their respective subsequent phases, and, after the death of the body, impelled by the heritage of previous activities, namely, by the karma, attach themselves to new bodies. It is this conception which makes the belief in the development of mental capacities possible beyond specific single life periods in the direction of final release. This is the basis of Buddhism as religion. The belief that mind is different from body is for Dharmakīrti, therefore, a necessary presupposition to be able to accept the authority of the Buddha in all the goals of his striving. At the same time it is ascertained thereby that all experiences, deposited in the continuum of sensation like seeds, will bear their fruits in the present or a future life, so that in general moral norms can be accepted as meaningful. The existence of mind beyond the death of the body is thus crucial.

However, the intention of Dharmakīrti is not to definitively prove the difference of mind and body, for he sees no purpose in

convincing his own group of this. He intends, just as true philosophical questions are dealt with, to render his ideas acceptable to all fellow rational beings. His aims are more modest, and thus I believe of interest even for modern discussions of this question: he shows that the assumption of a mind as independent of the body, and thus the assumption of re-embodiment, or afterlife, is *not impossible*. He does this by supporting, through his arguments, the doubts regarding the thesis that consciousness *necessarily originates* in bodily matter.

For the basic counter position he opposes, is that of a reductive physicalistic materialism, classically expressed in the ancient metaphor: "Consciousness arises from the elements just as the power of intoxication from molasses and other substances when a fermenting substance is added."<sup>11</sup>

Traditionally the Buddhists refute a number of positions held in the Indian context by means of aporetic proofs to demonstrate that the phenomenon of consciousness in newborns cannot be caused by something that is not of the same type, i. e., it must stem from a previous phase of consciousness. To mention only the most common of these other positions proposed, these are the theses (1) that consciousness is newly created by an eternal creator, (2) that consciousness arises from the consciousness-continuum of the parents, (3) that consciousness springs from the mixture of semen and menstrual blood, i. e., the elements, and (4) that consciousness arises spontaneously, i. e., without a cause.

Dharmakīrti examines only the third, the materialistic thesis that consciousness springs from the elements. He begins with the question what causes cognition, a mental event. I can only briefly summarize. According to him only like causes like. Matter such as clay causes pots, not conscious cognitions. If this

<sup>11</sup> Brhaspatisūtra, cf. A3–A5 in Namai (1976).

principle were invalid, anything could come from anything.

Also different combinations of matter, particularly organic and living matter, are incapable of giving rise to cognitions, for it otherwise would be inexplicable why not every combination would be capable in that respect. There would have to be a surplus to be responsible for this difference in causal capacities.

The senses, too, are no option, since although they are needed for the arising of sensory perceptions, they are not necessary for mental cognitions such as thoughts, memories and the internal states of pleasure and pain. In short, even if the body or the senses can support the arising of cognition as auxiliary causes this does not mean that the body is the main cause of cognition.

But most remarkable in Dharmakīrti's examination is his repeated reference to the methodical principle known as Occam's razor, according to which the simpler explanation is the better. Since no one can prove that the body generates consciousness, why postulate this when the immediately preceding and, moreover, like phase of consciousness is a sufficiently suitable candidate for this task? With regard to modern discussions about consciousness it can be asked, however, what exactly Dharmakīrti means by "like causes like"? He certainly knows that the type or substantial form of "clay" does not remain when a pot or a house is produced, or that effects often have properties surprisingly different from their causes, such as ashes from burning wood. He does not deny that material causes are capable of producing something that is more complex or differently structured than them. He only insists on the dualistic position that something physical cannot cause something non-physical.

In this sense, Dharmakīrti is on the side of all those modern philosophers who hold

that consciousness cannot be traced to matter as its source. No ever-so-detailed description of the micro-physical states of an organism can show with certainty that the micro-physical or macro-physical area can have some kind of conscious experience. Even today's knowledge of the nervous micro-cosmos of the brain and the hypothesis that this, as a "complex system", is simply capable of a "more" than its components or their sum cannot, as far as I see, answer the question why such "complex systems" lead to certain conscious experiences. Since, in my simplistic opinion, it is not, or at least not yet possible to explain *how they do it*, we also cannot know *that they do it*.

Dharmakīrti's point is to demonstrate that a regular causal relationship between material states and consciousness cannot be established. Certainly, his knowledge about the physiology of living beings has been long since outdistanced. Nevertheless, his discussion of the problem underlines the fact that although biology of today can explain the conditioning framework for the presence of consciousness, the existence of regular relations between physical and non-physical phenomena, or the assumption of the non-existence of non-physical phenomena, must still be treated like a matter of belief in the sense of a non-established conviction.

Of course, Dharmakīrti, too, did not offer a solution to the question of the presence of consciousness that one could accept today. He thought he had successfully attained his aim by showing that the materialist is not able to convincingly establish that consciousness as existing independently of the body is ultimately impossible. Nevertheless, I believe we can draw a lesson from Dharmakīrti's exercise and in this way also make use of our reading of a pre-modern Indian philosopher for some present-day problems of discourse.

#### 4. **Afterthoughts**

If, in conclusion, the science's state of the art on this issue can still be said to be, provisionally, a matter of belief or non-established conviction, this field of discourse might also be considered a neutral and open space for a conventional approach.

If a mono-causal explanation of the two, body and mind, cannot yet be proven, the same holds true for a dualistic explanation as well, because a causal or non-causal existence of mind as an "inner sense" or of a soul has also not yet been proven. While scientists are certain that the latter can never be proven, for the time being they still can only be hopeful that the former might be.

Then, even if we accept this scientific expectation as the only reasonable one, and even if most of us believe that a comprehensive mono-causal explanation will be found in a not-too-distant future, this is – so it seems to me at least – not a reasonable basis for the often polemic opposition against the dualistic model.

After all, both camps must acknowledge the fact that cognition or consciousness exists. What we know about cognition and how it works, as well as its effects and consequences in our lives, does not depend on our knowledge of how it comes about, what causes it, and how its variations and processes are conditioned. Yet, on the other hand, this life of the mind has long been studied, will continue to be studied, and will always be of interest, irrespective of the final answers to the question of the causes of its existence.

What I would like to propose, therefore, is, at least provisionally with the purpose of allowing the functions of mind to be observed as such, that it would be best if scientists did not brush aside the notion that the mind is a reality of its own. Even if the mind

is only accepted as a hypothetical entity, a kind of second-order reality, because of its usefulness in practical life, the mind's functions, when seen as the result of evolutionary developments, still merit the same attention they have received throughout the history of humankind.

There is, then, also no need to vote for one of the opposing positions recently debated with much heat of either "physicalism" or "evolution" versus "intelligent design". We have to admit, I think, that both nature and living, sentient beings, *look* very much as if they had been designed. Yet "design" can be understood as the result of an intelligent directing cause, a creational result, or as the result of undirected, incidental evolution.

However, we have to be aware of the fact that "design" is only in the eye of the beholder. It is based on a conceptual judgement that refers to our outer and inner worlds of experience. We judge these worlds as "designed". And we actually need the conception of the world as "designed", because for our activities and for finding a way through the impediments and dangers present "out there" we have to rely on some guide that helps us to direct our next moves. Whether the judgement of the world as "designed" is further considered to have either evolutionary or creational grounds is therefore quite irrelevant for our survival. Even if we consider the scientifically most likely option as having the flavour of truth, namely that it is nothing but the incidentalistic "policy" of evolution which happened to provide us with the capacity of conceiving the world as "designed", this will not be much of an advantage, for we already know that we have this capacity and that we can rely on it.

In this sense it will always be useful and necessary to differentiate between the study of the physiological nature of the mind and the study of the social and epistemological nature of the mind and its functions useful

to the species. If the former study explains the mind's nature, the latter deals with the mind's function. Such a distinction, if considered as conventional practice, would neither discredit the progress of science in its efforts for a natural explanation of the mind, nor would it discredit ordinary human practice, which relies on the mind's functions as providing one of the best tools in the strivings for survival.

## References

- Franco E (1997) Dharmakīrti on compassion and rebirth. Verlag Österr Akad Wiss, Wien
- Frauwallner E (1994) Die Philosophie des Buddhismus. Akademie Verlag, Berlin
- La Vallée Poussin L (1971) L'Abhidharmakośa de Vasubandhu. Traduction et annotations. Nouvelle édition anastatique présentée par Étienne Lamotte, Institut Belge des Hautes Études Chinoises, Bruxelles
- Mookerjee S (1935) The Buddhist philosophy of universal flux. Motilal Banarsidass Publishers, Delhi 1993, pp 300–310
- Namai M (1976) A survey of Bārhaspatya philosophy. Indological Review 2, pp 29–74
- Pradhan KP (1967) Abhidharmakośabhāṣya of Vasubandhu. Jayaswal Research Institute, Patna
- Preisendanz K (1989) On *ātmendriyamanorthasannikarṣa* and the Nyāya-Vaiśeṣika theory of vision. Berliner Indologische Studien 4/5, pp 141–213
- Preisendanz K (1994) Studien zu Nyāyasūtra III, 1 mit dem Nyāyatattvāloka Vācaspatimīśras II. Alt- und Neu-Indische Studien 46/2. Franz Steiner Verlag, Stuttgart
- Schmithausen L (1991) The problem of the sentience of plants in earliest Buddhism. Studia Philologica Buddhica, Monograph Series, VI. The International Institute for Buddhist Studies, Tokyo
- Steinkellner E (1967) Dharmakīrti's Hetubinduḥ. Teil II. Übersetzung und Anmerkungen. Hermann Böhlau Nachf, Wien
- Steinkellner E (2007) Dharmakīrti's Pramāṇaviniścaya. Chapters 1 and 2, Critically edited. China Tibetology Publishing House – Verlag Österr Akad Wiss, Beijing
- Taber J (2003) Dharmakīrti against Physicalism. J Indian Philos 31, pp 479–502
- Tillemans TJF (1990) Materials for the study of Āryadeva, Dharmapāla and Candrakīrti, Vol. I. Arbeitskreis für Tibetische und Buddhistische Studien Universität Wien, Wien, pp 156–159
- Vetter T (2000) The 'Khanda Passages' in the Vinayaṭīka and the four main Nikāyas. Verlag Österr Akad Wiss, Wien
- Wogihara U (1971) Sphuṭārthā Abhidharmakośavyākhyā by Yaśomitra #2<sup>nd</sup> edn. Sankibo Buddhist Book Store, Tokyo

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# Sensory Perception

Mind and Matter

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