

MIND, AWARENESS AND BEHAVIOR

The Relationship between Sensory Consciousness and Mind Consciousness.

Geshe Nyima Tashi

In Buddhism there is an emphasis on the existence of the sixth sense—mind consciousness—and its functions regarding how the subject (the perceiver) engages the object (of perception). The perception of the five senses—sight, sound, smell, taste, and touch—all function through this mind consciousness, and without mind consciousness there would be no perception. My talk will explore Buddhist explanations of direct perception and the different kinds of perception. Some of these are seemingly incompatible with modern neuroscience. I will try to share my understanding of mind and mental factors and make some comparisons with some of the big ideas in neuroscience.

Geshe Nyima Tashi: First, I would like to thank you for not only giving me this opportunity but also for providing some of the monastics the opportunity to study science for more than a decade.

Before I proceed with my talk, I just want to share with you the challenge of definitions that is inherent in these exchanges. To me, one of the biggest problems in participating in these dialogues, as

Geshe Lobsang pointed out earlier, is the difficulty of terminology. For example, when we use the term “consciousness” in English, and she-pa in Tibetan, they often do not seem to carry the same meaning but they are used as exact translations. There are often times in English when we might say “unconscious,” but in these cases, the Tibetan notion of she-pa is still there, still relevant. We use different terms because it is difficult to find exact terms that map onto the definition of the other. In addition, we often interchange the terms “secondary mind” and “subtle mind” to imply the same meaning. This is a bit sloppy as they have distinct meanings in Tibetan.

When I was asked to give this presentation, I accepted immediately without asking what topic I should talk about. This is not because I think that I have a lot of information to share, but by being here I hope to encourage other monastics to participate in similar dialogues. Some of the other monks and myself have been active since joining the first science workshops, and we have tried to be trailblazers. It’s about giving you monastics an example, so that you too can be active in this role.

Today I will be talking about the sense organs, sensory perception, and the sixth sense, or mental perception. I am interested in understanding the sense organs, which are described in Buddhist texts, and finding out if there is common ground with modern science. I’m going to be speaking on the biological and Buddhist concepts of sense organs. Buddhist texts describe three conditions that are necessary for sensory perception, and I will describe these three conditions for each type of sensory experience. I’m not trying to create a consensus, but I am trying to find out if there are points of overlap—common ground where the different interpretations converge. I’ll talk about sense consciousness and the thalamus, which, from the neuroscientific point of view, plays a very important role in sensory perception. Then I will briefly speak on the object and subject, and finally on the existence of a sixth sense and some of the properties of the sixth sense.

In Buddhism we identify six senses. In general, I think all schools

of thought agree that there are five senses, but there may be some disagreement as to the existence of a sixth sense. When we talk about a sense, we often first investigate the sense organ itself. Scientists mainly speak about a receptor, not an organ. In Buddhism, we talk about the sense organs, but what is a sense organ? According to the Abhidharma, a sense organ is a very clear physical phenomenon that sensory consciousness is dependent upon. The Abhidharma addresses the sense organs of the eye, ear, nose, tongue, and body.

First, I will talk about the eye. There are very complicated structures in the eye, but I will mainly focus on the retina. In the retina there are many cells, such as photoreceptors, bipolar cells, and ganglia cells, etc. Light hits the eye, passes through the pupil, travels to the photoreceptors in the retina, then a chemical signal is sent back to the bipolar cells, which in turn sends the signal to the ganglia cells. The ganglia cells send the information to the optic nerves, and the optic nerves take the information to the lateral geniculate nucleus, and then to the visual cortex. From the visual cortex, information is sent to the different areas of the brain, the higher brain, or wherever the information needs to go because, according to Buddhism, it is a hidden phenomenon.

There is a subtle distinction I would like to make here. When Buddhist texts talk about the body organ or body sense organ, they are referring to the entire body. But from a neuroscientific understanding, even though our whole body is covered by sensory receptors, the body itself is not a sensory receptor. In Buddhist texts, the sense organs are described as hidden phenomena. We cannot see the rod or cone receptor with the naked eye, but scientists see it by magnifying it thousands of times. This is one reason why our monastic friends often have a problem accepting the rod and cone as an eye sense organ.

I would like to talk about the three conditions necessary to experience any of the five sensory consciousnesses: (1) the objective condition, (2) the dominant condition, and (3) the immediately preceding condition.

We move to the objective condition, the one that produces, or generates into, the aspect of its own object. If you are looking at a flower, the flower is the objective condition: any external phenomenon that you are looking at is considered the objective condition. If you are hearing something, the particular sound that you are hearing is the objective condition, and so on. If we take as an example the eye perception, which perceives blue, maybe we can say that the eye organ—the dominant condition—that perceives blue is one that produces or generates into the aspect of blueness. I have a very interesting piece of information for my Buddhist colleagues that I learned during our science workshops. If you write a big letter “A”, when you look at that letter the active neurons in your visual cortex respond in a very similar shape as that letter. This was very interesting because the objective condition should be like the perception that sees the objects and generates into the aspect of that object. The question then arises as to which part of the brain is consciousness dependent upon? The retina, the LGN inside the thalamus, and the visual cortex all have this information, but which one is most appropriate to designate as the dominant condition? I want you to decide which would be the most appropriate.

Now let’s talk about the immediately preceding condition. The immediately preceding condition is what produces the experience part of any sensory perception. Maybe we can take an example from this flower. When we look at this flower, we can perceive, or we can recognize, that it is a flower. But if somebody asks me, “What kind of flower is this?” I might not be able to answer. I might not know what kind of flower it is or what it’s called. We need another condition to recognize that flower. If there is someone who knows botany, they may know the name of the flower. Here, I think we can understand that the immediate preceding condition is needed to recognize the flower, to know the flower.

Let’s take another example. When we look at the night sky we see a bunch of stars, but we might not have the condition in our mental field to distinguish them, to say, “this is a star,” or “this is a

planet.” It’s a practical experience. When we were at a workshop in Bir we went outside to look at the stars one night with Professor Chris Impey. He brought the Galileo telescope and we looked through the telescope. Of course, when we looked into the sky, we saw a bunch of white dots, but we didn’t know which were which. Professor Impey told us, “this is Jupiter,” “that is Mars,” and then he pointed out the star constellations as well. Without the immediately preceding condition, even when two people are looking at the same place, and both individual’s retinas are functioning normally, some can perceive which star this is, which planet this is, but some cannot. The two people are receiving the same information, but while one can make a distinction, another cannot. I think this indicates why the immediate preceding condition is very important. It is not just what we see, but what we hear, what we smell, where we touch, and all of these types of perception. When the perception arises—any perception, mental or sensory—the immediate preceding condition should be there. The immediate preceding condition is a common property of mental phenomena; it is not necessary for physical phenomena where you don’t need this immediate preceding condition.

If eye consciousness needs an immediately preceding condition, and because the immediately preceding condition is a mental phenomenon, Buddhist logic of cause and effect dictates that it needs another immediately preceding condition, and so on. At one of the Mind and Life conferences, His Holiness said that if we investigate closely the immediately preceding condition, then we may finally touch on the Buddhist idea of the subtle mind, which is common to all the Buddhist schools. I think this could even be a very good approach for studying life after death and the continuation of the consciousness, because in finding this immediately preceding condition we might not need to go very deep down, we might not need to look to past or future lives to understand how the immediately preceding condition functions in this lifetime. Perhaps we can do an experiment to try to understand. Scientists have been trying to measure what the speed of light would be between here and there, say ten meters, but it is

very difficult, perhaps impossible to measure over short distances. They will not try to do it. They will try to find out over a much larger distance, and then apply this knowledge to the phenomena that occur over shorter distances. In the same way, with the immediate preceding condition, perhaps in this lifetime, in maybe 10 years, 20 years, 50 years, maybe we can apply these insights to other phenomena like the consciousness of a new born baby, or the consciousness of a deceased person.

There are some interesting overlaps between descriptions of the sense organs found in Buddhist text and the findings of modern science. I've already mentioned some for the eye organ, now to sound. Inside the cochlea, scientist have found a lot of hair cells which are very, very small, where the vibrations hit and send the information to the nerves. The Abhidharma text describe many tiny nail like structures inside the ear organ, and these descriptions seem to be very similar to the scientific descriptions of the hair cells that identify a small stone at the end of each hair cell. For the smell organ, Buddhist texts talk about something like a copper needle, which is very, very thin. Likewise, from the scientific perspective, within the olfactory epithelium there are very tiny cilia that respond to contact with molecules in the air, and then send information back to the olfactory bulb. Next is the taste organ, the tongue. From the Buddhist text, the tongue organ is like a crescent moon, and perhaps this parallels the scientific finding that the taste receptors are not distributed evenly across the tongue; there is significantly greater density along the edges of the tongue. Now to touch. Scientists differentiate many types of touch, and there are receptors for experiences like pressure, soft touch, heat, and coolness. Each type of touch has different receptors. Once a fellow monk asked a scientist if we have touch receptors even on the tongue: "Does the taste receptor detect touch? Do we have touch sensory receptors on the tongue?" The scientist responded that on the tongue there are also touch receptors, but the taste receptors do not detect touch, and touch receptors do not detect taste. That one receptor will not detect two different sense objects is very clear to the monks. According to

Buddhist texts, one sense organ cannot detect the sense object of another: the tongue cannot see, the ear cannot smell, etc.

Most of the sensory information goes through the region of the brain known as the thalamus. But why does olfactory information not go through the thalamus? That's one question. Is there an evolutionary explanation? The thalamus is associated with learning and memory. We have found many regions associated with memory inside the thalamus. In the thalamus, there's one center, which they call the house nuclei, that seems to be important in controlling consciousness. What do we mean when we say it controls consciousness? In the thalamus, many mental activities like learning and planning are involved. Many of these associated regions of the brain, like the visual association area and the auditory association area, interact with the thalamus in creating and recalling memories. Of course, in Buddhism, memory is a very important mental factor, which is included in the category of determining mental factors.

Is this area, the brain area, responsible for memory? Or maybe it's not really memory, but related to memory, and perhaps some other factors related to memory? Many questions arise. This is just an overall picture of the pathway to and from the thalamus. The questions are: Why do all of the sensory signals travel through the thalamus except for the olfactory? What is the mental state when the signal arrives at the thalamus? Does the visual cortex have the capacity to recognize or describe the object, and do the auditory cortex and somatic sensory cortex, likewise, have the capacity to recognize their objects of perception?

We now move to the discussion of object and subject. From the Buddhist perspective, all phenomena can be included in the object, which we call *yul*, the perceivable. However, within perceivable phenomena there are conscious phenomena (subjective) and non-conscious phenomena (objective). Buddhist texts distinguish different categories, like the object of apprehension, appearing object, referring object, the conceptual object, and the determined object. For

example, every level of consciousness has an appearing object. The conceptual object is not a direct perception. In Buddhism this means that the object is only that which the conceptual level can perceive. Compared to Western convention, there seems to be a different usage of terminology of object and subject, objective and subjective.

What does direct perception and conceptual perception mean? Direct perception is an awareness that is non-mistaken, free from concepts, and produced from its own uncommon dominant condition, which is physical. It is mainly for sensory direct perception, not the sixth sense. Direct perception leads to the affirming perception, which validates the perception. In one of our science workshops, we learnt that when we look around our eyes receive a lot of information, but only 5% of this information makes it to the mental level. We don't really know what happens to the rest of it. For example, when I look out at the audience all of the information, all of the photons entering my eye make contact with my retina, but only information about one or two people in the audience can be sent to my mental state at any one time, that is very obvious. Even Buddhism says direct perception always focuses on the object;—the object is not separated from the perception of that object. We call that which engages its object, that which differentiates it into its separate parts, a limited engager or subjective consciousness. This is one aspect. Additionally, in looking at a flower, your direct perception can be looking directly, but thought is coming through your consciousness, or perhaps, informally, we can say through your imagination.

Neuroscientists have demonstrated that when you're looking at the object, the neurons in the upper part of the frontal lobe and the visual cortex are active. There is activity of neurons in these regions when you are looking at something, and when you are not looking at it but are thinking about the object after you have looked at it. But there are different parts of these two regions that are more or less active when you are looking at it and when you are thinking about it. Here, we don't see too much difference in the frontal lobe, but you can see a very clear difference in the visual cortex. When you are looking at

something, many places are activated, but when you are thinking, very few places are activated.

In Buddhism, we talk about many mental factors. I will not talk about all the mental factors, but the selective mental factors that are most important to perception. If we were to try to find each mental factor in the texts, they would be countless. Hence, Buddhist scholars categorize mental factors that have completely separate functions. According to one Buddhist text, the *Abhidharma Samuchaya*, there are 5 omnipresent mental factors, 5 determining factors, 11 virtuous mental factors, 6 root afflictions, 20 secondary afflictions, and 4 changeable mental factors. So all together, in this text, there are 52 mental factors. But in another text, the *Abhidharmakosh*, there are 46 mental factors. Also, there are some texts that divide the mental factors into 72 factors. The categories are similar between the texts and conceptually there are no real differences, but when they are counted, there are differences. When you go into them deeper, you don't see much contradiction. Mainly, we will focus on the five omnipresent mental factors. First is *tsorwa* or "feeling." In Tibetan, *tsorwa* often takes on a different meaning than its English equivalent. In the Tibetan language, *tsorwa* is a body and mental sensory experience, so it is not how we feel about food or someone who tried to cheat us. If a mental state arises in your brain or your mind, there is a feeling, or *tsorwa*, which we divide into three types: pleasant, unpleasant, or neutral. The second omnipresent mental factor, *dhushe*, is translated as "recognition" and sometimes as "perception." Yesterday's presentation by Geshe Lobsang considered the differences between the mind and the mental factors. Recognition is like a mental factor that separates things, such as "this is white" and "this is blue." The third factor, *sempa*, is a mental impulse that pushes your primary mind closer to the object. Fourth is *rekpa*, translated as "contact," which means to contact and analyze: it is the coming together of the organ and consciousness. Fifth is *yilajepa*, translated as "attention." These five factors accompany any type of mental state; that is why they are called omnipresent.

For ordinary beings, mental direct perception is an extremely

hidden phenomenon, therefore the three conditions are also considered extremely hidden phenomena, even the dominant condition. Many of my fellow monks have a difficult time accepting the rod and cones as the dominant condition of the eye organ, because in the Buddhist text the dominant condition is considered an extremely hidden phenomenon. For me there is no contradiction that we can see the sense organs through a microscope that is magnifying hundreds and hundreds of times.

As to the sixth sense, the question arises: Is there a sixth sense? If so, how do we define it? When we are sleeping, sensory consciousness doesn't function. At that point, only the sixth sense is functioning. In Buddhism, there are two things that know a visual image: one is eye consciousness, and the other is mental consciousness. Buddhist texts also consider non-Buddhist philosophers who contend: If there is a sixth sense, what is the object of this sixth sense? Is the object similar to that of the five senses already perceived? Or is it different? If the object perceived is different then, according to the debate, the blind should see visual things, even in the waking state. The great Indian philosopher, Chandikirti, said that in sleep there cannot be eye consciousness, only mental consciousness. And the Buddha said the eye perceives blue, but cannot see blue as blue, but the mind or mental consciousness can both perceive blue and perceive blue as blue. According to Buddhist philosophy, the sixth sense must also satisfy the three conditions: an objective condition, a dominant condition, and an immediately preceding condition. For example, if you're dreaming of a flower, the image of the flower is the objective condition. The dominant condition is a little confusing, because for the five sensory experiences the dominant condition is the sense organ, but here, for the sixth sense, the dominant condition is mental, which is said to be the last state of mind related to perception. The immediately preceding condition is the consciousness that leads to the experience of the perception of the flower within the dream.

According to several Buddhist texts, phenomena are categorized into mental phenomenon and non-mental phenomenon. The

consciousness that perceives one's own mental phenomenon is called rangrik in Tibetan, which means seeing your own mind. In addition to the mental phenomena of mind, there are sensory perceptions, and also mental perceptions, and then something we call yogic perception, or the mental state that arises from and is dependent upon the meditation stabilized union of vipassana and shamatha. According to all of these views, consciousness or mental development is infinite.

How does the sixth sense arise? There are three different ways of explaining the arising of the sixth sense: (1) alternating production, (2) production of three steps, and (3) production of the end of the continuum. However, it is rather complicated and there is disagreement among the philosophers. For example, the first Dalai Lama opposed the production of three steps; he didn't accept it. His way of thinking was that the production of the end of the continuum, when we continuously see something, refreshes in our mind moment to moment.

Buddhism describes seven types of mental states which roughly translate as: (1) direct perception, (2) inferential understanding, (3) subsequent cognition, (4) inattentive perception, (5) presumption, (6) indecisive mind or doubting mind, and (7) distorted awareness. The first three are the valid conscious level, and the last four occur at an unconscious level and are considered invalid. To understand reality, the subjective is very important, as many scientists believe. They take illusion, especially visual illusion, very seriously. Since the ancient Greeks, Leonardo, Galileo, and Einstein have all taken illusions, and the way in which they may disturb our understanding of reality, very seriously. Indeed, they have found that reality does not exist as you see it. What then is reality?

Thank you.