The Buddha Sees the Neuronal Synaptic Gap in His Mindscope

Suwanda H J Sugunasiri
BA (London), MA (Pennsylvania), MEd, MA, PhD (Toronto)

Author of
Dhamma Aboard Evolution:
a Canonical Study of Aggañña Sutta in Relation to Science (2014),
and
Triune Mind, Triune Brain:
Map of the Mind through the Eyes of Buddhianscience and Westernscience (2015),
and
Editor Emeritus,
Canadian Journal of Buddhist Studies
ABSTRACT

A neuron is a physical structure in the brain (and other parts of the body) comprised of a cell, with dendrites leading to it, an a single axon extending from it. Serving as the medium of communication, it carries electric messages within the mind-body in the form of neurotransmitters. Travelling along the Axon and arriving at the Axon Terminal, they connect with other dendrites adjacent to it. But this happens by jumping across a synapse, namely a gap.

A neuron being no thicker than a sixth of a hair strand, you can imagine how small the synaptic gap must be. While our knowledge of the neuron is relatively new, in this paper, I seek to show how, 2500 years ago, the Buddha saw this miniscule gap in his mind’s eye, through his mindscope, as I call it along the lines of telescope or stethoscope.

For this reason, I claim that the Buddha is a Scientist in the best possible sense of the word, and the body of knowledge he has left for us I call ‘Buddhianscience’, as contrasted with Westernscience. This claim is not based just in this study, but on the basis of my other studies as well (see Bibliography).

The paper is intended for the non-specialist, both in relation to Buddhism and / or Westernscience, and geared towards unimpeded reading. Footnotes are added for the inquisitive, along with Pali terms, references and other relevant comments. They’re kept on the same page to make for easy reference, but these may be totally ignored without losing the thrust of the paper.

What I am clearly presenting in my paper is only an arguable possibility and not a demonstrated certainty, to use the words of a peer reviewer of this paper. A shortcoming in the paper is my reliance on the internet for info on Westernscience, which I find sufficient for my task. But for readers for whom the very rudimentary level info is not sufficient, I would respectfully invite them to check for oneself the original sources, and pursue their interest.

If the paper is more to satisfy my own curiosity, it is also to pique the interest of the readers to discover for themselves the Buddha’s Teaching that are said to be ‘Timeless’, as may be justifiable by the fact that no Teaching of the Buddha that has been put to the test has been found to be wanting. If anything, the Buddha can be said to be ahead of Westernscience, as e.g., when he considers both humans and animals under the same phylogenetic rubric termed satto.
Neuronal Synaptic Gap

We begin by seeking to understand a ‘Neuronal Synaptic Gap’ that the Buddha sees?

To begin with, ‘Synaptic Gap’ is simply an elaboration of ‘synapse’, which itself means ‘gap’. A Gap, i.e., emptiness, entails ‘unemptiness’, i.e., banks or boundaries if you like, on either side or all around, which are, by definition, solid. So what are the solids that mark boundaries of the gap? In neuroscientific terms, it is two neurons.

So what’s a neuron? It is a physical structure in the brain (and other parts of the body) that carries messages, i.e., serves as the medium of communication. In thickness, it’s no more than about a sixth of a strand of your hair! Lengthwise, it could be from a few micrometers, i.e., millionth of a metre (less than an inch) to several feet, going from the brain to the end of the spinal column. But most of them are of the micro type. So the synapse is the gap between two such micros.

To get a rough understanding of this, let’s think of yourself going down a footpath in the bush. But, uh oh, there’s a stream, basically a gap, between you and the other bank. Now I hope you have an understanding of what a ‘Neuronal Synaptic Gap’ is – basically, a gap between two neurons.

But can you imagine how miniscule such a synaptic gap would be? Just as much as the neuron itself is not visible to the naked eye, a synaptic gap can hardly be seen other than through, not even a regular microscope, but an electron microscope! What I seek to show in this piece, then, is that the Buddha sees this miniscule gap in his mind’s eye, or what I will call the ‘mindscope’

The Four Great Essentials

We said that a neuron is a physical structure. That is to say that it is made up of matter. So what’s the matter? Oh you mean ‘What’s matter?’! Easy. In the understanding of Western science today, oh, never mind, it is made up of solid, liquid, gas and plasma.

---

1 Using the term Western science here instead of Science probably calls for an explanation. It is simply to remind ourselves that Science has a venerable history in other cultures such as, e.g., India and China. As for India, here’s what the Syrian Astronomer-monk Severus Sebokht [also spelt ‘Sebokht’] (writing in 662 CE) has to say:
This, of course, please mind, is a modification of an earlier earth, water, air and fire, reflecting classical Greek thought dating back to around 450 BC.

In Buddhianscience, too, earth, water, air and fire are called the mahābhūta ‘great essentials’ (or ‘great elements’) making up matter. But not only. Says the Buddha, “The four great elements and the material form derived from the four great elements - these are called materiality” (ital. added). But if that is in relation to matter per se, ‘dead’ matter, if you like, say like wood, the Buddha communicates the idea with a more visual imagery in relation to the human body:

And again, monks, a monk reflects on this body according to how it is placed or disposed in respect of the elements, thinking: 'In this body there is the element of extension (solidity), the element of cohesion, the element of heat, the element of motion.' Monks, even as a skilled cattle-butcher, or his apprentice, having slaughtered a cow, might sit displaying its carcass at a cross-roads, even so, monks, does a monk reflect on this body itself according to how it is placed or disposed in respect of the elements, thinking: 'In this body there is the element of extension, the element of cohesion, the element of heat, the element of motion'.

---

"I shall not speak of the knowledge of the Hindus... of their subtle discoveries in the sciences of astronomy – discoveries even more ingenious than those of the Greeks and Babylonians – of their rational system of mathematics, or of their method of calculation which no words can praise strongly enough – I mean the system using nine symbols. If these things were known by the people who think that they alone have mastered the sciences because they speak Greek, they would perhaps be convinced, though a little late in the day, that other folk, ... men of a different tongue, know something as well as they." (quoted in Basham 1954, p. vi. See also <http://www.downtoearth.org.in/content/science-common-people>.

As for China, consider in particular the health sciences, as e.g., TCM (Traditional Chinese Medicine), dating back to the early 3rd c. BCE (Aung, 2000, p. 2).

Let us see what Arthur C Clarke sees in Sri Lanka: "Two thousand years ago, Sri Lanka must have been one of the most technologically advanced countries of the world. The vast network of irrigation canals and artificial lakes, and the awe-inspiring ruins of ancient cities, point to engineering and construction skills of the highest order" (Clarke, 1985: 87-88). (See also Selin, Helaine (Ed.), 1997, re Science and Technology in Non-Western Cultures). Our attention here, of course, is to Science in the West with great advances since the time of the Greeks.

1 http://www.hometrainingtools.com/a/four-elements.
2 In Pali, pathavi, apa, tejo, vayo.
3 By Buddhianscience is meant here the Buddha’s analysis of reality, this in contrast to ‘Buddhism’ entailing a sociological and ethnocultural dimension.
4 Majjhima Nikāya (MN hereafter), Nāṇamoli & Bodhi tr.,2001, 141. Unless otherwise noted, the references are to the English translations in the Wisdom Books series, since they are readily available.
5 "... a Bhikkhu possessing psychic potency who has attained mastery of mind might focus on a block of wood as earth ...[as water... as fire ... as air...] because the earth [water, fire, air] element exists in that block of wood..." (Anguttara Nikāya (AN hereafter), Bodhi tr., 2012, 904-5).
6 The Pali term is bhikkhu (feminine: bhikkhuni) literally ‘the begging one’, since they live on food offered by the community, they themselves having no personal worldly possessions.
7 The section ends with “Thus he fares along contemplating the body in the body internally...”.
Though bhūta in mahābhūta is translated as ‘essentials’ or ‘elements’, it is of importance to note that literally it means ‘a come-to-be’. So mahābhūta may be translated as the ‘Great Come-to-be’, or in somewhat odd English, ‘Great Having-comes-together’. What the Buddhian term seems to capture then is that the four elements, individually and collectively, need to be understood as a process, i.e., subject to constant change (anicca, literally ‘impermanence’) rather than as a constant. Hence it may be more appropriate to take earth, water, air and fire as ‘extension’, ‘cohesion’, ‘motion’ and ‘heat’.

Two More Essentials

In the context of a mindbody, namely a human being, two more elements are added by the Buddha: ākāsa ‘space’ and viññāṇa ‘consciousness’, the latter referring to the non-form dimension. But setting this latter dimension aside for now with this cursory look (see more of it later), let us now take up ākāsa, entailing ‘emptiness’, i.e., space.

Akāsa

“What’s the space element?”, asks the Buddha of the Bhikkhus. It is “either internal or external”. Now before we proceed further, let us note that elsewhere, the Buddha

---

9 It is the past participial form of the root bhū- ‘to become’. Bhūta (in mahābhūta < bhū + ta) then literally means ‘a come-to-be’, ‘a become’.
10 I use the term Buddhian to mean ‘that of the Buddha’ to distinguish it from ‘Buddhist’ which covers a cultural universe and to that extent not all true to Buddhianism!
11 This is one of the three characteristics (lakkhana) of reality, the other two being dukkha and anatta.
12 If you need some experiential evidence, if still at a distance, that the mindbody is indeed made up of the Four Great Essentials, all you have to do, if you can manage the experience, and have the opportunity, is to watch a dead body in decay. (You could envision it, too.) Keep your hand at the nostrils of the dead person, and you’ll feel no air! By keeping your hand at your own nostril and feeling the warm air coming through it, you’ll know that the dead body has no air left in it. Now touch the body in a few hours, and you will feel the coldness, showing that the heat is gone. Watch it the next few days to see liquids oozing out of the nostrils, mouth, ear and other orifices. And after a few days, you can see cracks appearing in the skin showing that the final amounts of liquids are gone. Give a few months, you’ll see the bones appearing, eventually only the skeleton left, showing the earth element. Give it time, and the body, losing its water, will break up and end up as dust. Perhaps an impossible personal experience today, but not in the Buddha’s time when all you needed was a visit to a cemetery. But you can perhaps get an approximation of it through a ‘death meditation’ (maranānussati), as a daily practice, visualizing your own death, visualizing the above in relation to oneself. A beneficial by-product of such a practice may be that you’ll be all ready when the moment of truth arrives, leaving you breathless, that is, literally!
13 What I have translated as ‘mindbody’ is nāmarūpa, literally, name-form, or in more common parlance, mindbody.
14 Although the reference here is to a human being, the Buddha’s technical term sattā includes all ‘sentient beings’, meaning ‘ones with (the six) senses’, this including both humans and animals.
15 For a detailed study, see Bodhi (Gen Ed.), 1999.
16 For a popular rendition, see Sugunasiri, 2001.
17 Nāṇamoli & Bodhi (Tr.), 2001, 1089-1091.
uses two other terms to mean space: *ajatākāsa* ‘tangle-free space’ and *antalikkha* ‘a space between sky and earth, and in between Devolution and Evolution’\(^{18}\). They clearly refer to ‘external’ space\(^{19}\).

But our attention, by contrast, is the ‘internal’ space, i.e., within the mindbody - yours, mine and every other sentient being’s. So, shall we then explore this internal space? Good!

“What is the internal space element? Whatever internally, belonging to oneself, is space, spatial ... that is, the holes of the ears, the nostrils, the door of the mouth, and that [aperture] whereby what is eaten, drunk, consumed, and tasted gets swallowed ... is excreted from below, or *whatever else internally*, belonging to oneself..... is called the internal space element (bold and italics added).

Do you note the words ‘*whatever else internally*’\(^{20}\)? Mark it in bold, and you’ll get a treat!

So what does the Buddha mean by ‘whatever else’? Of course, it could have been a reference to pores in the skin. But that would have been easy to be named, like the rest, since perspiration through the skin pores would have been a personal experience of his audience who would have understood. But could it be to some other space, not named or identified since it is not within the experience of the worldling\(^{21}\) listener\(^{22}\)? We get some help here from the Abhidhamma\(^{23}\), i.e., Metaphysics.

Talking of the ‘space element’ (*ākāsadhātu*) in the context of the mindbody, the Abhidhamma\(^{24}\) characterizes it as a ‘delimiting form’ (*paricchedarūpa*) in his ‘Guide’ to the term, Ven. Bodhi writes:

---

\(^{18}\) See Sugunasiri, 2014 (a), 47-48 for a discussion.

\(^{19}\) The Abhidhamma also talks of a ‘space concept’ (*ākāsapaññatti*) (see Bodhi, Gen Ed, 1999, 326-327), giving ‘wells’, ‘caves’ and the like as examples. But we may merely take note of it, as being not pertinent to our exploration.

\(^{20}\) In Pali, *yam vā pana api aññaṃ kiṃ ci ajjhattam*.

\(^{21}\) By ‘worldling’ (*puthujjana*) is meant you and me, and everyone else who has not reached the higher spiritual levels, from ‘streamwinner’ (*sotāpanna*) to ‘Arahant’ (Worthy One), the Buddha being the first Arahant.

\(^{22}\) The intrepid communicator that the Buddha is, the Discourses show how he matches the content and the language to the level of the audience. An example would be the Agganna Sutta in which he speaks of the unfolding of the universe only to two sophisticated young men who had come to him. To others, he had thrown a bit here, bit there about the topic, but only enough to meet the communicative needs of the occasion. See Sugunasiri, 2014 (a), ch. 12.

\(^{23}\) *Abhidhamma*, literally ‘higher Dhamma [=Teaching]’, it is commonly understood as ‘metaphysics’. It is one set of the Tricompendium (*tipiṭaka*) which contains the Buddha’s Teachings, the other two being *Vinaya* ‘Discipline’ [for the ordained] and *Sutta* ‘Discourses’.

\(^{24}\) The reference here is to the *Abhidhammatthasangaha* by Acariya Anuruddha, and translated by Ven. Bodhi (Bodhi (Gen. Ed.), 1999, 241).
Space, as understood in the Abhidhamma, is not bare geometric extension but the void region that *delimits* and *separates* objects and groups of *material phenomena*, enabling them to be perceived as distinct. The space element has the characteristic of *delimiting* matter. Its function is to *display the boundaries of matter*. It is manifested as the confines of matter, or as the state of *gaps* and *apertures*” (italics added) 25.

We have seen above the Buddha explaining ‘apertures’, namely, the holes in our body: nostrils, ear hole, anus, etc., explaining ‘whatever else internally’ in the Sutta account. Nostrils, skin pores and the like can, of course, be seen as ‘delimiting form’ since there is muscle and tissue around them. However, they also open up to the outside of the body, not ‘delimiting’ externally. So is there any other space in the body, then, internally that is *totally* circumscribed? Since ‘internally’ is already mentioned earlier, too, in relation to the holes of the ears, etc., is the Buddha hinting at something else?

This brings us back to ākāsa, to continue to now use the Pali original as a technical term26, listed following the Four Great Essentials, the materiality domain, but prior to Viññāna, the psychological domain (as above). So should we take ākāsa as relating to the material side or the psychological side? In the Abhidhamma analysis, it is taken as being ‘non-concretely produced’ in contrast with the earlier Four Great Essentials which are ‘concretely produced’27. If that puts space in the domain of non-matter, and non-physical, its positioning shows that it is also not unrelated to the psychological element Viññāna. So we may say that ākāsa is in essence non-matter. This then allows us to see the synaptic gap fitting the description. A synapse is non-matter since it doesn’t belong to either of the neurons on either side. That is to say that were there to be no two neurons on either side, there would be no synapse either.

Another justification for taking ākāsa as referring to the synaptic gap is the characterization given to it by the Buddha – *paricchedākāsa*, ‘delimiting space’, or literally

---

25 While there are other distinct terms in Pali for each of gap and aperture, a term common to both is *vivara* (see Buddhadatta, EPD, 1979, under each term).

26 I use the original Pali term without translation in the expectation that over the long term, such Pali terms will find traction in the western scientific literature and discourse, the same way terms like photon’ ‘neuron’, etc., drawn from Greek, have come to be, indeed becoming part of the English vocabulary.

27 Aniphanna and nipphanna respectively. See Bodhi (Gen. Ed.), 1999, 235.
‘cut-all-around space\textsuperscript{28,29}. We may understand this in relation to the empty space between chapters of a book, indeed \textit{pariccheda}, literally ‘division’\textsuperscript{30} used, as e.g., in that sense in Sinhala, the oldest living language most closely associated with the Buddha’s Teachings\textsuperscript{31,32}. Similarly can we see the synaptic gap as circumscribed by two neurons.

\textbf{Viññāṇa}

To understand this fringe of matter called ākāsa (but remembering that it, as with all the elements, is a process), let us, ironically, explore Viññāṇa (taking it, too, as a technical term), i.e., consciousness, the psychological element of the mindbody. It is one of three terms used by the Buddha to mean ‘mind’, and characterized as ‘Lord Mayor’\textsuperscript{33}. On this basis, I have labeled Viññāṇa the \textit{E-mind}, meaning ‘Executive mind’, the CEO – Chief Executive Officer of the city of the mindbody. The other two terms used by the Buddha for mind are \textit{Citta} (\textit{J-mind}, short for ‘Judging-mind’) and \textit{Mano} (\textit{R-mind}, i.e., Receiving-mind), giving us the Triune Mind\textsuperscript{34}.

\textsuperscript{28} < \textit{pari} ‘all around’, (as e.g., in \textit{paridhwati} ‘wash all around’ (PED)) + < \textit{chid} ‘to cut’, and more idiomatically, ‘circumscription’ (as also in PED = Pali-English Dictionary, Davids & Stede, 1979).

\textsuperscript{29} The last page of a chapter may be practically full or contain only a word or two, allowing barely a line or a whole page of space before Ch. 2 begins. So while the extent of the space may vary as between any two chapters, the common feature is that it is delimited by the two adjacent chapters. This, of course, would as in the case of a synapse, too.

A more \textit{co-dependent} relationship may be seen when it comes to any two of the Four Great Essentials. And the shape could be a narrow long strip evenly spaced along the entire stretch or bulging in the middle or in places or a wide one narrow in places, giving us a series of hour-glasses. Or it could be a circular bubble. However, the space would be smooth, and not rough edges, a neat dovetailing of one element into the other.

\textsuperscript{30} PED meaning 4.

\textsuperscript{31} Sinhala, the language of the majority people in Sri Lanka, and its literature as well as its culture, grew in the womb of Buddhism, since its introduction to the island by Arahant Mahinda. (See Sugunasiri, 2012 for an extensive study of Arahant Mahinda.) It was also by Sinhala monks in Sri Lanka that the Tipitaka was first committed to writing in Pali in the 1st c BCE. An inscription of the 2nd c. BCE. refers to the gift of a cave ‘to the Sangha of the 13th c. works of Sinhala literature are Butsaraṇa (Refuge in the Buddha) and Pūjāvaliya ‘Garland of Offerings’ (see Reynolds (Ed.), 1970, for translation of excerpts). The 16th c. work Lovaeḍasangarāva ‘A Treatise on the Ameliorization of the World’, \textit{pariccheda}, literally ‘division’ (as e.g., in \textit{paridhwati} ‘wash all around’ (PED)) + < \textit{chid} ‘to cut’, and more idiomatically, ‘circumscription’ (as also in PED = Pali-English Dictionary, Davids & Stede, 1979).

\textsuperscript{32} The last page of a chapter may be practically full or contain only a word or two, allowing barely a line or a whole page of space before Ch. 2 begins. So while the extent of the space may vary as between any two chapters, the common feature is that it is delimited by the two adjacent chapters. This, of course, would as in the case of a synapse, too.

A more \textit{co-dependent} relationship may be seen when it comes to any two of the Four Great Essentials. And the shape could be a narrow long strip evenly spaced along the entire stretch or bulging in the middle or in places or a wide one narrow in places, giving us a series of hour-glasses. Or it could be a circular bubble. However, the space would be smooth, and not rough edges, a neat dovetailing of one element into the other.

\textsuperscript{33} This is my idiomatic take on \textit{nagarassāmi}, literally ‘Lord of the City’ (\textit{Samyutta Nikāya}, SN hereafter) 35.195).

\textsuperscript{34} The Buddha says each of us has what I have come to call the \textit{E} Triune Mind (Sug 2014), made up of Viññāṇa, Mano and Citta. But there is some confusion in the minds of scholars as to what they actually mean. It is thus I have translated and characterized Viññāṇa as E-mind, Mano as R-mind and Citta as J-mind. I call Viññāṇa the E-mind, since as in the
CEO Viññana, of course, would be a lame duck without the cooperation and the active participation of the J-Mind and the R-mind. This clearly entails communication. But it is not just a matter of going from point A to B to C, or linking three points. Each of the three minds is to be understood as having its own intrinsic, and wide, network. Mano earns its designation for its function of receiving stimuli inputs through the six sense doors – eye, ear, nose, tongue, body and mind itself. Citta likewise with its own function, is responsible for intent and judging. Viññana as noted has the function of being responsible for, among others the Autonomic Nervous System\(^{35}\) which runs through the entire mindbody, head to toe. This then means that the communication is system-wide, covering the entire gamut of the mindbody\(^{36}\).

So how does Viññana maintain this extensive communications network?

**Viññana and the Neuron**

Fortunately, we can turn to Western science, thank you, and its rich research findings. Here the mind, seen to be in the brain (called the neocortex)\(^{37}\), communicates both within itself as well as with the rest of the mindbody via neurotransmission. This is done through a series of neurotransmitters constituted of chemical processes called peptides. The physical medium through which communication takes place is the neuron, explaining the term neurotransmission and neurotransmitters. So what, then, is a neuron? Here is a visual image of it:

---

\(^{35}\) Just as a reminder, as noted elsewhere, another is the Autonomic Spiritual System (Sugunasiri, 2014), on the argument that every sentient being has a spiritual dimension.

\(^{36}\) For this very reason, this view of consciousness of the Buddha as being in the whole body (Sugunasiri, 1995) we have called the Pancorporeal Theory of Consciousness. Just bringing this to your attention.

\(^{37}\) This view of the mind being in the brain I have called the Encephalic Theory of Consciousness (Sugunasiri, 2014).
Can you see the antlers-like branching to the left? Just to the right of them is the cell, with its nucleus in the middle. Then we have a series of ‘beads’ (called Schwann cells), making up the axon, which terminate at the axon terminal, now branching out. They are called dendrites.

If the neuron I have presented you with is an ‘eyeful’, so to speak, I am sorry to remind you that it’s a mere 6th of the thickness of a strand of your hair! In other words, a neuron is not something we can see through the naked eye. Small enough? So any surprise that they number in the billions if not trillions within the brain itself, calculated to be 10^{12}.

So what does communication mean in tangible, real world terms? Let’s see if we can explain it.

You are now reading these words. But what does ‘reading’ mean? In Buddhianscientific terms, it calls for four ingredients:

a. a stimulus (words on this page),
b. falling on the retina (i.e., eyes have to be open),
c. in the presence of light (without it, you can’t see), and
d. with attention (your eyes have to be on the page).

---

38 And a note of appreciation to Western science for its years of research on the topic of the brain, and to the Abhidhamma which has been able to see the process of neurotransmission, though not using the same terminology.
So where do the neurons fit in here? When the stimulus falls on the eye, i.e., through the eye door, a single neuron comes to be vibrated. And then, the words of the page, letter by letter and/or sound by sound (i.e., phoneme by phoneme, if you want to be technical) and word by word, if you’re saying them out loud, come to be converted into energy with a chemical structure. This then constitutes the ‘peptides, i.e., units of the message. It is along a neuron that the message travels (thus called a ‘motor neuron’), and hence ‘neurotransmission’, and the chemical units called neuropeptides. At the end of the process, you have figured out the letters, words, phrases, sentences, paragraphs, etc. I don’t have to tell you how fast all this happens. It happens as you read!

To return to the neuron, the stimulus, impacting up on one of the dendrites (at left of the neuron figure) travels, i.e., gets neurotransmitted, to the cell. Next, the cell making some decisions, the stimulus continues to travel along the axon (to the right of the cell), continuing along the Axon Terminal of Choice, conditioned by a multiplicity of factors, both internal and external.

Fine, but then what happens? Upon arriving at the end of the axon terminal, you’ll notice that there is no more track to travel along! Well, what do you think happens when the chemicals (neuropeptides) come to the end of the Neuron? Does it simply vanish into the thin air, bringing the transmission to an end? If that were the case, then there would be no communication, would there be, within the Autonomic Nervous System. That surely is nothing but death! Period, no ifs or buts.

**Synaptic Gap in Neurotransmission**

But let’s see if we can get out of the impasse. Here then is another Diagram:

![Fig. 2: Two Neurons Linked by a Synaptic Gap](image)

39 For the curious, please see Bodhi (Gen E.), 1999 for a detailed analysis of the 17 mindmoment process.
Aha! We can now explain what happens to the neurotransmission that reaches the end of the Terminal of Choice, at the right extreme in Neuron 1 in the above Figure. And happily, waiting to its right is a kindred spirit, namely the Dendrites of Neuron 2, waiting to welcome the neuropeptides of Neuron 1. Does each of them look like a handy branch to hang on to? Neuropeptides, the happy trooper leaving Neuron 1 now swiftly, and efficiently, jump across the gap, on to the waiting lap of a single beginning dendrite, yes, only one, of Neuron 2. Both the welcoming dendrite and the jumping neuropeptides making the necessary neurochemical adjustments in relation to each other, the process is characterized as a key fitting into a lock. Mission accomplished, the neurotransmission continues along Neuron 2, traveling along many more neurons and finally the Optic Nerve. This results in ‘reading’ my words on the page, receiving its latest nutrition for its continuation and survival.

But, dear reader, have we left something behind unexplained? Yes, we have. We said that the neuropeptides ‘jump across’. But what does ‘jumping across’ suggest? Exactly. A gap! Indeed a gap alright, as in the Figure. What we have are two independent-minded neurons, on either side of a chasm, namely the synapse, or the synaptic gap. These “junctions play an important role in the regulation of neuronal metabolism and homeostasis by serving as connections that enable small molecules to pass between cells and synchronize activity between cells”.

Now what would you say, dear reader. Is the gap empty or is the gap empty? Yes, thank you. Empty. By definition.

Looking at both neurons starkly in their face, so to speak, and standing boldly and holding its ground between them, the synapse may however be seen to be marking the boundaries of, and for, each of them, as if to say, ‘Hey, buddies, let’s keep to our boundaries, shall we!’ Can we call this ‘delimiting’?

Now to check your memory, how was ākāsa characterized in the Abhdhamma? Exactly. As ‘delimiting space’. Good memory. So the ‘synaptic space’, okay, synaptic gap,

---

40 The term synapse itself is “coined from the Greek syn- (‘together’) and haptein (‘to clasp’)” <http://en.wikipedia.org/wiki/Chemical_synapse>.

41 The Buddha points out how nutrition is a key factor to the survival of a sentient being, and any given dimension of it, identifying four types: solid/liquid food (kabālinkāhāra), contact food (phassāhāra), consciousness-food (viññāṇāhāra) and mind-volition food (manosāncetansāhāra) (ref). You can figure out which of these types the eye would be getting.

in Western science is 'delimiting space' in Buddhian science. So what we have, then, is ākāsa! Unlike the other two types of space, out there, ājātākāsa and antalikkha as above, it is not 'infinite' because it is bounded by the two Neurons.

But there is yet another exciting characterization we get from the meaning of ākāsa, which literary means 'shining forth', i.e., the illuminated space' (PED). Now in addition to the more common chemical synapses, there are also electrical ones:

An electrical synapse is a mechanical and electrically conductive link between two abutting neurons that is formed at a narrow gap between the pre- and postsynaptic neurons known as a gap junction. At gap junctions, such cells approach within about 3.5 nm [nanometer] of each other, a much shorter distance than the 20-to 40-nanometer distance that separates cells at chemical synapse. In many animals, electrical synapse-based systems co-exist with chemical synapses.43

While not all synapses are electrical, there are enough of them within the neuronal system that cannot fail to provide an investigator of the calibre of the Buddha to pick on the feature and render it generic to include all synapses. This then may explain the term ākāsa used by the Buddha, with the meaning of 'shining forth'. It may be construed that what happens at the synaptic gap is that the information of Neuron 1 jumps across, i.e., go forth, to Neuron 2, with a shine! Here is how it happens:

The release of a neurotransmitter is triggered by the arrival of a nerve impulse (or action potential) and occurs through an unusually rapid process of cellular secretion (exocytosis). Within the presynaptic nerve terminal, vesicles containing neurotransmitter are localized near the synaptic membrane. The arriving action potential produces an influx of calcium ions through voltage-dependent, calcium-selective ion channels at the down stroke of the action potential (tail current).44

We may note 'voltage-dependent' ions', an ion being "an atom or molecule in which the total number of electrons is not equal to the total number of protons, giving the atom or molecule a net positive or negative electrical charge".45 Do the above characterizations relating to the synapse speak to a 'shining forth' ākāsa?

Synaptic Gap in the Abhidhamma

We now revisit the Abhidhamma analysis of matter in a mindbody:

\[
\text{water, fire, wind, earth} + \text{ākāsa} + \text{Viññāṇa}
\]

BODY BOTH / NEITHER MIND
BODY AND MIND

Fig. 3: Dimensions of Mindbody, showing Space as body-mind gap

What Fig. 3 shows are the constituent elements of the mindbody at the most simple level. What makes up mind and body are clear. As noted, the mind is made up of Viññāṇa and the body, of earth, water, fire and wind. The Diagram shows the third constituent, ākāsa, infixed as it is between matter and Viññāṇa, shown as ‘both and neither body and mind’, in typical Buddhianscientific logic. It is ‘body’ (rūpa) since it is demarcated by the Essentials, and since there is no ‘presence’ of it other than in relation to them. Yet it is ‘not-body’ (arūpa) since it is constituted of no materiality, being ‘non-concretely produced’. However, its presence is marked only by the absence of anything material, and anything visual, and the presence of energy (electrical and chemical). To that extent it is ‘mind’ in the context of the mindbody.

Ākāsa, as noted, has no visual presence. Yet, for all its ‘absence’, the Buddha names it! Akāsa. To name, of course, is to see, a unicorn notwithstanding. What can we then say that the Buddha has indeed seen? The end boundary of Neuron 1 and the beginning boundary of Neuron 2, to draw upon our figure. He also would have seen the Neuron 1 chemicals (neuropeptides) in flight, across the synapse, in fractions of a second, in a flash of a mindmoment, reaching out to the Dendrite of Choice in Neuron 2. So it is that we can hypothesize that the Buddha has seen the neuronal synapse, infinitesimal as it may be, and invisible to the naked eye, along with the other elements, and the workings of the neuron in its 17 mindmoment process.
While we have noted the presence of absence (space), so to speak, as between form (Four Great Essentials) and non-form (Consciousness) and between form and form (Neuron 1 and Neuron 2), there is something else the Buddha would have seen. And that is, speculating here and with no scientific evidence, the ākāsa between and among any two or more of the Four Great Essentials. The boundaries of this naturally ever changing four essentials - any two or more (as are everything else in nature) can said to be likely never perfect, and so what can be expected is a 'space' in between.

In fact, it should be surprising if the Buddha did not see the synapses, given that “the adult human brain is estimated to contain from 1014 to 5 × 1014 (100–500 trillion) synapses”\(^{46}\). And we may want to see the power of the Buddha’s vision when “Synapses are generally too small to be recognizable using a light microscope except as points where the membranes of two cells appear to touch, but their cellular elements can be visualized clearly using an electron microscope”.

**The Buddha Seeing Synaptic Gap: Jhāna States as Supportive Evidence**

But I can see a smirk appearing, now don’t try to hide it, on your skeptic face. So you think this is a Buddhist flight of fancy, hunh! Alright, but, watch out. You’ll be surprised! Don’t say I said so. Take a credit for yourself that it was your discovery.

OK, let’s begin.

Quick. What’s a *jhāna*? Exactly. It is a stepwise series of states of mind experienced by a diligent meditator\(^{47}\). They are of four stages:

1. Sense-sphere;
2. Material-sphere;
3. Non-material-sphere and
4. Supramundane\(^{48}\).

---

\(^{46}\) [http://en.wikipedia.org/wiki/Chemical_synapse].

\(^{47}\) It may be incidentally noted that while the jhanas bring benefit to the life of a Buddhist, the Buddha, in fact, says that he makes jhana his home. Let it also be noted that attaining jhanas is not a requirement for Nibbāna (Gunaratana, 2009, 19).

\(^{48}\) In Pali, kāmāvacara, rūpāvacara, arūpāvacaral and lokuttara respectively (Bodhi, Gen Ed., 1999, 27). See Gunaratana (2009) for a lucid treatment. Incidentally, while rūpa (in rūpāvacara) has been rendered 'Fine material.'; it seems better for it to be translated as Envisioned-Material-form-sphere, given that it is kāya and not rūpa that is used in the Canon to mean physical body. See e.g., kāyānupassanā (following through the body) in the Satipaṭṭhāna meditation.
Leaving behind Sense-sphere (1) and Supramundane (4) as being of no relevance to our discussion\(^{49}\), we look at 2 and 3 - Material-sphere and Non-material-sphere experiences. Each being a progression of levels, we could say that it is by going past the Material-sphere experience that the meditator arrives at the Non-material-sphere, which itself is made up of four stages:

1. base of space (ākāśānācāyatana);
2. base of consciousness (viññānañcāyatana);
3. base of nothingness (ākiñcaññāyatana);
4. base of neither-perception-nor-nonperception (nevasaññānāsaññāyatana).

It is then of interest here that, coming after Material-sphere (2), ākāsa ‘space’ comes as the first stage of the Non-material-sphere (3.1), and is followed by the ‘base’ related to Consciousness (3.2), that is to say, between matterliness and nonmateriality. We may remember in this context that in Fig. 3, too, ākāsa comes after the ‘Four Great Essentials’ (earth, water, fire and wind), i.e., matter, and is postceded, to coin a term here\(^{50}\), by Consciousness in the psychological domain. This, then, is a first basis that argues for the position that the reference of ‘base of space’ is to ‘delimiting space’ that we have associated with the synapse.

Secondly, the reference cannot surely be to the apertures like the nostrils and the mouth given as examples by the Buddha (see above). One surely needs no meditation, never mind the magisterial level of jhāna, i.e., a strict mind-discipline, to see them! This again takes us to the ‘whatever else internally’ category in the Buddha’s characterization.

That ākāsañcāyatana (3.1) relates to paricchedakāsa (i.e., delimiting space), and not space in general (as also noted above), seems confirmed thirdly by the jhāna level of ‘base of nothingness…’ (3.3). Of course, ‘nothingness’ can also be understood as suggesting an absence, and semantically close to emptiness. However, appearing after the ‘base of consciousness’ (3.2), it could hardly refer to ‘delimiting space’ between matter and non-matter. If ‘space’ (3.1) and ‘nothingness’ (3.3) were indeed one and the

\(^{49}\) The curious may benefit from Ven Bodhi, Gen Ed, 1999, 27-75.
\(^{50}\) The term ‘postceded’ is coined here as a parallel to ‘preceded’ along the lines of ‘predated’ and ‘postdated’ (as e.g., in Webster’s).
same, why is the distinction made? Also, by this stage, the meditator has well gone past materiality. So 'base of nothingness' has to be seen as referring to something other than 'internal space'. This obviously takes us to 'external space' as in the Buddha’s characterization, such as the sky, but on a vaster scale.

A literal characterization of the term ākincaññāyatana allows us another insight. Classically, ākincañña- in ākincaññāyatana (ā + kiñcañña + āyatana) is explained as the abstract of a + kiñcana ‘not anything’, kiñcana < kiṃ + cana itself being the adjectival form of the indefinite pronoun kiṃ + ci (PED). But it may be taken more literally as follows:

\[
\text{ā + kiṃ + ca + añña + āyatana, ‘not + what + indeed /also + [not] any other} \\
\text{+ āyatana.}
\]

The initial ā in ākinca again is the abstract form (as above). Kiṃ (NT of rel pron. ka. .. ‘what’ (PED)), it may be noted, comes to be used ‘in composition’51, often implying doubt, uncertainty’ (PED)52, as if asking ‘what is it?’. This doubt can be seen to be carried into añña as well, with the initial a- being equally applicable, as in a compound, and thus an abstract form53. In ca + añña, the non-elision of the final –a in ca preceding the initial vowel, is as in a sandhi elsewhere54. So, in this literal interpretation, then, ‘not what... indeed not any other-āyatana’ seems to suggest a state that cannot be described. Thus, it is NOT nothingness, comparable to ākāsa, as in ‘base of space’ (ākāsānaṇcāyatana), which, to repeat incidentally, is a material-related state prior to consciousness, ākincaññāyatana being post-consciousness, and thus not material related.

So this differentiation between ‘base of space’ and ‘base of nothingness...’ again seems to confirm that it is the ākāsa, i.e., the synapse, between neurons that the Buddha can be said to see at the contemplative stage of ‘base of space’ (3.1)55.

---

51 This is as e.g., in kinnukho (kiṃ + nu + kho) ‘what is it then’, kiṃ kāhasi ‘what will you do’, kiñcāpi ‘whatever’, ‘however much’; kiña ‘none’, yad atthi kiñcā ‘whatever there is’, etc.,’
52 Another interesting example here is kinnara (kiṃ + nara) ‘a kind of man but not sure about it; half man’ (PED).
53 If ā in the traditional interpretation is conditioned by a change of kiñcana to kiñcañña, we take its retention in the context of anñña as also an abstraction.
54 It may be noted that in the context of a sandhi, while the final schwa followed by an initial a- is sometimes lengthened, as e.g., in kiñcāpi (< kiñca + api) ‘whatever’, it comes to be deleted as well, as e.g., in puna čaparam’ and again something else. See also c’eva, ito c’ito ‘here and there’, etc., as with other vowels.
55 Of course, it is granted that the Buddha’s teachers had also attained these two levels of jhāna. But it is that no such distinction was made by them, ‘naming’ them, by the Buddha, meaning cognizing them analytically.
If our creative literalizing has any merit to it, what it does show is that the state of ākincaññāyatana is distinct from ākāsānaṇcāyatana, as accurately placed (as 3 and 1) in the classical analytical schema.

Discovering Synaptic Gap Through Meditation

Addressing the monks the Buddha, putting the words in the mouth of a Bhikkhu, says that “the six elements are rightly proclaimed by the Blessed One who knows and sees”\(^{56}\). We may note the words "knows and sees"\(^{57}\). So under what conditions can the Buddha be said to have ‘known and seen’ the synaptic gap? Was it when he was going on his alms round begging for food, or when sleeping or when with his disciples? None of the above. No Sirree, it is in meditation that he could be said to have seen the synapse, as also of course, made all his other discoveries, on the night of Enlightenment (see Sugunasiri, 2010) and ongoing thereafter.

So what is entailed in Meditation? One is stilling the mind (samatha) through attention (manasikāra) to whatever that may impinge upon the mind at the given moment in time, through the six senses, but not going after any. Gradually, the calming and relaxation (passaddhi) serves as a condition for increasing concentration (samādhi) to the point of one-pointedness (ekaggatā)\(^{58}\). This, then, is the mindfulness (satimā) dimension of meditation, as in the satipaṭṭhāna bhāvanā\(^{59}\).

Then there is, as in the same Foundations of Mindfulness (satipaṭṭhāna) practice, the diligence (ātāpi) called for. The Buddha should know! His digging in his heels lasted six years – no kidding! The skills initially honed in under two renowned meditation masters of the time\(^{60}\), he then goes solitaire, trying this, that and the other, when eventually he comes by his discoveries of the Four Noble Truths, the Noble Eightfold Path and the Conditioned Co-origination sitting under a tree on that historic day when he attained Enlightenment, earning the epithet the ‘Awakened One’, this being the meaning of ‘Buddha’\(^{62}\).

\(^{56}\) Ēṇaponika & Bodhi (Tr.), 2001, 905.
\(^{57}\) Jānatā passatā, in the instrumental, agreeing with Bhagavatā ‘by the Blessed One’.
\(^{58}\) While vipassanā‘insight’ is part of the process, it is left out here as not being relevant.
\(^{59}\) Satipaṭṭhāna Sutta, DN Sutta 10.
\(^{60}\) They were Ālara Kālāma and Uddaka Rāmaputra.
\(^{61}\) See Rahula, 1959, for an initial but lucid characterization of these concepts.
\(^{62}\) See also Sugunasiri, 2010.
In addition to mindfulness and diligence, a built-in critical third dimension of the Buddhist method of meditation is worth noting. And this is engaging in meditation 'with emergent knowing'\textsuperscript{63}. 'Emergent' here may be understood as relating to both knowledge and the knower. As re the former, it is the process of emerging of new information regarding reality. As re the latter, it is 'ongoing knowing' (\textit{sampajāna}) that appears on the mind screen of the meditator\textsuperscript{64}. Now it was noted that in relation to the six elements, including ākāsa, the Buddha is said to 'know and see'. It is then of more than passing interest that the Pali present participial term for 'known' is \textit{jānatā} (known) (instrumental))\textsuperscript{65}, which is the identical term \textit{jāna} we find in the feature of \textit{sampajāna}. This seems to then clearly tell us that ākāsa, identified as the synaptic gap above, was discovered by the Buddha, obviously in meditation, in what could be called the mindscope. So 'knowing' and 'seeing' the synaptic gap by the Buddha can be understood as an outcome of being sensitive to, i.e., being 'with', the 'emergent knowing' of reality in relation to oneself at a given moment in time, and repeatedly seen thereafter\textsuperscript{66}.

But since the intended supreme goal of meditation is attaining Nibbāna, there is an additional factor in meditation, conditioning the others or conditioned by them, that can be said to have facilitated the Buddha knowing and seeing reality. And this is getting rid of the debris of the mind. Just as a gold digger takes out the dirt from the mine as he looks for gold, so can the meditator be said to empty the mind of whatever taints of the Triple Thirsts ('Sense thirst', 'Thirst-to-be' and 'Thirst-to-be-not')\textsuperscript{67}, and the Triple Blemish Roots (Passion, Hatred, Ignorance) to find the gold of emergent and advancing knowledge. So “how does a venerable one know, ... see these six elements?”. It is “from

\textsuperscript{63} My translation here, 'with emergent knowing', is of the Pali term \textit{sampajāna}, literally 'with [going]-forward knowing' (<\textit{sam} 'together [with]' + \textit{pa} from Sanskrit \textit{pra} 'forward') + \textit{jāna} (from \textit{ñā} 'to know') 'knowing'.

\textsuperscript{64} It is as if to capture the ideas of 'ongoing' in relation to both knowledge and the knower that the Buddha seem to have opted to use \textit{jāna} 'knowing' as distinct from, say, \textit{jānana} 'knowledge' 'Clearly knowing' is a more common translation of \textit{sampajāna}. But we give a literal translation. This meaning seems clear from a reference in the Digha Nikaya (III 103 and 231) where the term is explained as "consciously experiencing one's own life as an embryo in the womb, including the event of being born". This suggests that what the meditator is encouraged to do is to consciously experience any new knowledge that emerges, progressively, i.e., going forward (\textit{pra}), adding the new knowledge to the repertoire that already exists, as one's meditation continues, and advances.

\textsuperscript{65} This is made up of \textit{jāna} 'knowing' + \textit{ṭā} 'past participial instrumental, agreeing, as noted, with Bhagavatā 'by the Blessed One'.

\textsuperscript{66} This 'knowing and seeing' could be seen as incremental, the experience serving as a condition for wisdom (\textit{paññā}) relating to reality in relation to oneself 'internally'. It may begin with the basics such as posture ('I'm now sitting in meditation') to activity of the body ('I'm watching my breath') to a state of discomfort ('my knee hurts') to a state of the mind ('I feel agitated / calm / relaxed') to realizing the reality of fundamentals (e.g., impermanence, as one notes each and every breath as beginning, middle and ending), or in time, seeing the innards such as the elements when in deeper meditation.

\textsuperscript{67} 'Thirst' is \textit{pañhā} - \textit{kāma pañhā, bhava pañhā} and \textit{vibhava pañhā}.  

\begin{figure}[h] 
\centering 
\includegraphics[width=\textwidth]{figure1.png} 
\caption{Diagram of the three dimensions of meditation.} 
\end{figure} 

\begin{figure}[h] 
\centering 
\includegraphics[width=\textwidth]{figure2.png} 
\caption{Diagram of the relation between meditation and knowledge.} 
\end{figure} 

\begin{figure}[h] 
\centering 
\includegraphics[width=\textwidth]{figure3.png} 
\caption{Diagram of the role of the knower in meditation.} 
\end{figure}
the mind being liberated from the taints\textsuperscript{68}. The Buddha, as an Arahant, is one who has, by definition, jettisoned them all\textsuperscript{69}, practicing meditation with mindfulness, diligence and with emergent knowing.

If jettisoning the taints entails the affective dimension associated with the right brain hemisphere, continuous watching of the mind for any new knowledge entails the cognitive domain associated with the left hemisphere. So what we see in the Buddha is a total double-hemispheric and full mindbody involvement, putting all the tools in his kit – affective and cognitive, to use. And this can be seen as providing a further supportive condition for the Buddha to dig out the gold of the synaptic gaps of the total mindbody under the auspices of meditation.

Incidentally, we may say that it is not only by the Buddha, however, that the synaptic gap is seen and known. By his disciples, too. So any and every disciple? No! Only by ones “with taints destroyed”.

**Set a Gap to catch a Gap!**

Now we can see how ākāsa is, as in the case of Western science, no mere theoretical construct of the Buddha but an experiential discovery. Indeed he can then be said to have *seen* the presence of the absent ākāsa, in three contexts as above – between form (Four Great Essentials) and non-form (Consciousness, i.e., Viññāṇa) (as in Fig. 2), between two forms (neuron 1 and neuron 2) and as between and among the Four Great Essentials.

So it is in the mind’s eye that the Buddha sees ‘space’ (synaptic gap or other) in the context of the mindbody. It can then be said that the ākāsa space was seen by making a space of the mind. Oh, so now we have an adage - ‘set a space to catch a space’! Or set a gap to catch a gap!

So Dear Reader, is the wording of the title – ‘The Buddha sees the neuronal synaptic gap in his Mindscope’ now clear?

\textsuperscript{68} āsavehi cittaṃ vimuttaṃ.

\textsuperscript{69} Becoming Buddha means both discovering the reality of the Four Noble Truths, Noble Eightfold Path and Conditioned Co-origination (= Enlightenment) but also jettisoning the taints, becoming an Arahant ‘worthy one’, too (see Sugunasiri, 2010).
The title of this paper reads ‘The Buddha sees the Neuronal Synaptic Gap in his Mindscope’. But what’s a mindscope? Linguistically, it is made up of mind + scope. And ‘scope’ as a verb means ‘to peer, look carefully’ (Webster’s). As a noun, it means ‘the area that the mind can cover’ or ‘the extent of perception’. In combination, as in microscope and telescope, it means ‘an instrument for seeing or observing’. Clearly, it is in peering through the mindbody, and looking carefully (i.e., ‘scoping’) that the Buddha can be said to have seen the synaptic gaps. So, on the analogy of ‘telescope’, meaning ‘an instrument for peering far outward’, we could say the Buddha was using his ‘introscope’, this to capture that the peering was not outward but inward. But if we were to now take the telescope as an instrument with which the peering is done, then we could say that the Buddha was using his ‘mindscope’, taking mind to be an instrument. But, of course, mind is not a ‘thing’; it is rather a process. So mindscope can also be understood to refer to the process of his explorations, of which the scope, as in the second meaning of Noun above, is deep.

What the Buddha can then be said to be doing is ‘scoping’, that is ‘peering’, through the mind in his mind. It is thus that we say that he is using his mindscope to dig deep within his own mind. Can we say then that he is mindscoping?

So what’s a mindscope? You don’t know? What a surprise! OK, ‘Scope’ literally means, as noted, ‘peer’, ‘look’, etc.. This is clearly seen in the context of a microscope. But what’s a microscope? It is an instrument that facilitates the eye to take a close look at micro elements in nature, such as e.g., amoeba or virus, the example closer to us in this paper being a neuron. Here we have the term ‘scope’ in its original sense of looking, as also in telescope – an instrument that facilitates the eye to take a close look at distances and distant objects like stars. But it may well be to remember that it is not the facilitating instrument – microscope or telescope, that is doing the looking, and seeing, but the eye. In these instances, then, we can see the eye-sense put to use. So each of the microscope and the telescope could be justifiably called an ‘eyescope’. But we can already see that in each of these eyescopes, there is another dimension at work, not

---

70 Sugunasiri, 2014 (b).
implicit in the term ‘scope’. And it is that it relates to *manipulating the view* of the object being looked at - as e.g., *enlarging or bringing closer*.

If in the context of the microscope and the telescope, it is the eye-sense that is entailed, we find a twist in the use of the term ‘scope’ when it comes to the stethoscope. First, the semantic association is with the *ear sense* and not the eye. So there is really no ‘eyescope’. How about ‘earscope’? Second, while the label ‘microscope’ or ‘telescope’ speaks to the *act* engaged in using them, when it comes to the stethoscope, it is *not* even the act (listening/hearing) after which the equipment is labeled. The primary semantic reference of the term is to the *location* where it is placed - the chest or the breast, by the physician who is using it. And appropriately so. *Stethos* in Greek means ‘chest or breast’ (Webster’s). In this clever word play, then, we find two mechanisms at work. One is that the meaning of the term ‘scope’ comes to be generalized, and expanded from the narrow confines of a given single sense (eye / ear) to a generic one. Now it means ‘perceived’ in the senses, bringing both seeing and hearing under the same rubric. But again, it needs to be noted that it is not the technical gadget that is hearing but the human being using them. Thirdly, however, it may be noted that there is, in using the stethoscope, no manipulation of the perception of object being examined.

If ‘stethoscope’ then is a good example of how language grows conditioned by the demands of use, *mindscope* can be said to fit the bill. First, it is closer to the meaning of the term ‘scope’. What the Buddha, and the meditator, does is ‘seeing’\(^1\). However, true to both dimensions of the term scope, and more general than in relation to either of microscope or stethoscope, the term mindscape has a perceiving dimension, namely the sensory act (of minding); and then there is an object (stimulus) which is also the sensory locale, namely the ‘mind’. So ‘mindscape’ can be seen as a semantic improvement on both ‘stethoscope’ and ‘microscope’.

We seek to capture our discussion thus far in the following Figure:

---

\(^{1}\) *Cakkhum udapādī, vijjā udapādī*: eye was born, knowledge was born'; In an extension of the meaning of the term scope, ‘knowing’ can be said to be a ‘cognitive seeing’.
So from a logical point of view, using the mind (mind-) to see through (-scope), is functionally no different from seeing through the eye or hearing through the ear. Only there is no technology involved! Furthermore, it is still a human being that perceives - through the eye, ear or mind. And indeed, as noted, it is through the mind one even sees, hears, tastes, and minds, given the primacy of the mindsense\textsuperscript{72}.

Further, from the perspective of a Buddhianscientific analysis, what is entailed in all three cases is the same 17 mindmoment process as in the Abhidhamma. A stimulus enters through the door (eye, ear or mind), the ongoing life (i.e., of the experimenter or scientist), feels a vibration at which point it is welcomed by mano (R-mind as above), then subjected to a quality control by Citta (J-mind) and packed off for a ‘swift run’ (to use Ven. bodhi’s translation of javana) following which it is ‘registered’\textsuperscript{73}. Whether the stimulus is encountered through the medium of a piece of equipment (microscope or stethoscope) or whether the function is seeing, hearing or ‘minding’ (=sensing) has no bearing on the process. So we could be frivolous and even call the Mindscope as simply an ‘As-Is-Scope!"

The Figure shows further linguistic-semantic and epistemological growth in relation to the mindscope. As can be seen in Col. III, for the mind to see the synaptic gap, there is no need for any technological mediation. What the ‘open door’ meditating investigator sees is the mind in real time, with no need for an external mediation. And within a

---

\textsuperscript{72} Dhhammapada verse 1.

\textsuperscript{73} See Sugunasiri, 2014, for a detailed treatment showing how all three dimensions of the Triune Mind – Viññāṇa, Mano and Citta, kicks into action, taking responsibility for the different mindmoment stages in the process.
mindmoment, one sees reality, technically ‘mind’, internally ‘as it has come to be’ (yathābhūta). This would be just as the gold doesn’t need any mediation to be discovered.

Another feature of the Mindscope is that the ‘emergent knowing’ results from no active search on the part of the meditator. We may understand with an example from everyday living. Let’s say you’re with a colleague and having an intellectual exchange. At one point, your colleague says, “Bismarck, I believe, is ….”, to which you respond, “I see”, or “I see your point…”. Now here, while it may have been an ongoing conversation, it could well have been a thought that your colleague is sharing with you, not because you had asked his opinion about Bismarck but because it had just come to him and so he shared it with you. So here, the information just comes to you, not because you asked, but by simply having provided a context, the first being that you are colleagues. A proximate condition is that you’re meeting face to face, and talking. These were then the conditions that prompted a comment from your colleague. So it could be seen as a case of receiving without specifically asking for a particular something. How lucky! It would be the same process in meditation. Here the conditions present could be one or more of ‘mindfulness’, ‘exploring reality’, ‘effort’, ‘happiness’, ‘being relaxed’ and ‘concentration’, with assistance from ‘one-pointedness’, ‘diligence’, and ‘neutrality’. This is not to say that your mind has not been ‘programmed’ onto an ‘investigation of reality’, but that it was not seeking any particular information or knowledge, not looking for anything in particular but keeping the mind open to whatever information comes by relating to reality, relating to oneself. So it is simply by allowing the free flow of information in relation to the dynamic of the mind at a given point in time, then, that ‘emergent knowing’ takes place, just as when your colleague talks about Bismarck, when you’d never asked her about it.

This also takes us back to ‘seeing’ without eyes and with no physical stimulus. Here ‘see’ has the exact meaning of ‘know and see’, as by the Buddha, i.e., reality, in his mindscope, and not with the eye sense but with the mindsense.

So we can see that mindscoping, then is what we all do every moment of not only our waking lives but every 1/17 mindmoment, 24/7/365, conception to death. But only that the mediators are the masters at it, with golden fruits!

---

74 Upekkhā is ata [also translated as] ‘equanimity’ (i.e., literally ‘equal-mindedness’).
75 ‘Investigation of reality’ (dhammavicaya).
Retaining its authenticity, then, renders mindscoping qualitatively higher than microscoping or stethoscoping.

Hm! Interesting... isn't it? The internal stimuli are the thoughts or, as in this case, 'knowledge of reality as it has come to be'\textsuperscript{76}. So let's say the meditator in jhāna sees one of the Four Great Essentials, say hardness (earth) in the muscles, or the liquidity (water) in blood or phlegm. That seeing gives the meditator a first insight of something in one's own mindbody, this not learnt in medical books or the internet, but in one's very own mind, i.e., experience. Right then and there arises knowledge of a reality as it has come to be, for one is seeing it after the fact – 'has come to be'. So this is 'emergent knowing' (pajāna), the third quality in mindful meditation, and it is also exquisitely objective. So a meditator ends up 'seeing (= gaining) knowledge of 'reality as it has come to be'\textsuperscript{77}, and continues to be 'with emergent knowing'.

But there is more. What we have here sure enough is reflecting, but without a 'reflector' i.e., a doer, behind it, confirming the Buddhianscientific teaching of asouility (anattā)\textsuperscript{78} and non-duality. The case of the microscope or stethoscope gives the impression of there being a doer behind the looking – i.e., an action and an actor. But from a Buddhianscientific point of view, this is pure distortion\textsuperscript{79}!

"Whaddaya mean?", you ask. Isn't there surely the doctor listening to the heart? True, but it is a natural process within the stethoscoper or the microscoper that brings in the information. In hearing, the stimulus, in the form of chemicals, travels along the different parts of the ear (outer, middle and inner) before making the final journey along the auditory nerve to become the latest news, so to speak, for the ongoing mindbody. In seeing, likewise, the stimulus (e.g., the image of the virus) makes the final travel along the optic nerve. But in neither case is there a doer outside of the process. This is the Buddhianscientific principle of asouility. The human being merely provides a 'housing' for the process to be effective and functional. This indeed is what is established in the case of the mindscope where there is no 'scoper' but only the process. The stimulus is the new information of the presence of a delimiting space ākāsa, which travels along a 'mind

\textsuperscript{76} Yathābhūtañāṇa, from नाण- 'knowledge (of)' + yathā 'reality' (as in nature) + bhūta 'has come to be'.

\textsuperscript{77} 'Seeing (= gaining) knowledge of reality as it has come to be' (Yathābhūtañāṇadassana).

\textsuperscript{78} Sugunasiri, 2011.

\textsuperscript{79} Distortion (vipallāsa).
canal’ and becomes part of the ongoing mindbody. A process indeed that generates results without labels!

Now the purist conventionalist, or the diehard physicist, in you will protest that while micro-, tele- and stetho- ‘scopes’ are solid, physical objects, your so-called mindscope is no comparison, especially since we don’t even know what a ‘mind’ is. In answer, we may say that as for the latter, the Buddha has spoken much\(^{80}\). A first point is that the mind, like any other part of the mindbody, is made up the Four Great Essentials\(^ {81}\). Is that different from the Westernscientific point of the triple scopes? In the final analysis, both mind and the microscope are nothing but zillions of particles and atoms coming together, subject to change. This is what would be called the ‘ultimate truth’ (*paramattha sacca*) in Buddhianscience. Sure, the microscope has earth as the overwhelming element, whereas the mind is less matter and more non-matter. But that is only to speak to a difference in proportional representation as in an electorate. Furthermore, the microscope or the stethoscope is a mere label, a conventional truth (*sammuti sacca*), merely for the purpose of communicative efficacy. And, would you believe, so is the mindscope. Thus we see that the physical instrument that helps looks at phenomena closely (micro-) or at a distance (tele-) is on a par with the mindscope, both sharing the two truths - conventional and absolute.

To explore a bit further, what is a mindscope in Abhidhammic terms? it is the ‘avenue of the mind-door’ (*manodvāravīthi*). *Dvāra* is ‘door’, of which there are, in Buddhianscience, six: the five physical senses (eye, ear, nose, tongue and body) plus the ‘mind sense’, this being Buddhianscientific term for what in Westernscience is called ‘esp’ (extra-sensory perception). So *manodvāra* is ‘mind-door’. *Vīthi* is ‘avenue’. So what do we do on an ‘avenue’ (road, street, lane, footpath)? Travel along, of course, on foot, vehicle, horseback, etc. right? Likewise. When a stimulus enters the ‘avenue of the mind’, it travels along it, the Abhidhamma showing it, as noted, in terms of a 17 mindmoment process.

---

\(^{80}\) See also Sugunasiri, 2014.

\(^{81}\) This I grant is a controversial claim on my part, given that the mind is the opposite of body. But, I like to think that there is indeed a ‘mindorgan’ (as I hope to show in a future research) (Sugunasiri, forthcoming, *Triune Mind Triune Brain*). Stay tuned!
The Buddha the Scientist: Concluding Remarks

We now summarize the basic points in this short essay, as drawn upon the Suttas and the Abhidhamma on the one hand, and Western science on the other:

1. The mindbody is made up of the Four Great Essentials (earth, water, fire, air) plus Viññāṇa ‘consciousness’, with Ākāsa in between.
2. Ākāsa is characterized as ‘apertures’ such as nostrils, mouth and anus, but also ‘whatever else internally’.
3. While allowing any possible gaps between and among any two or more Great Essentials under ‘whatever else internally’, it is claimed that the reference of ākāsa is also to the ‘synapses’, or ‘synaptic gap’ between neurons.
4. Three main arguments have been advanced in support of this:
   i. the characterization of ākāsa in the Abhidhamma as ‘delimiting phenomenon’;
   ii. occurrence of ‘Base of space’ as a jhanic state under the grouping of ‘non-material sphere’; and
   iii. the literal meaning of ākāsa as ‘shining forth’ (PED) fitting well with ‘electrical synapses’ as in neuroscience.
5. The Buddha is said to ‘know’ and ‘see’ the synaptic gaps in meditation, stemming from emergent knowing’, and
6. It is in his mindscape that the Buddha knows and sees the synaptic gap.

So the Buddha can be said to have seen the synaptic gap between matter and matter, having earlier seen the Four Great Essentials individually and collectively. But why then did he not say so? The answer is that the consummate communicator that he is, he orchestrates his words and content to suit the audience. Body apertures are, of course, no mystery to his listeners, and so he identifies them readily. But to talk about a neuronic gap would have only resulted in raised eyebrows! So he covers the ground with ‘whatever else’. Waiting for the right ears to get his message across is not unknown with the Buddha. He unfolds the nature of the universe, e.g., only to two Brahmin youth.....

---

82 See Sugunasiri, 2014 (a), ch. 7 for details.
Now we double-dip the question: Does the Buddha qualify as a Scientist or Does the Buddha qualify as a Scientist? We would like to answer it in the affirmative. To begin with, the very fact of the Buddha knowing and seeing the synapse renders him first an observer, and a sharp one at that. Since the synaptic gap is a phenomenon discovered in meditation, it is empirical. But one may wonder whether the ordering of the two terms ‘knowing’ and ‘seeing’ suggests not an empiricism but speculation. Think up something as reality and then creatively visualize it? Hardly. Seeing, of course, is through the eyes. However, from the Buddhian point of view, behind the seeing, as well as in hearing, tasting, etc., is the mind-sense, as in the Dhammapada line, ‘Mind is forerunner...’. So, ‘knowing’ in the context of seeing needs to be understood as ‘visual knowing’. So why then add ‘seeing’? Precisely because without the addition, knowing will be understood as being speculative. Additionally, ‘seeing’ also tells us through which physical sense the object came to be known – mind’s eye. Hence we have the sequence, ‘know and see’, establishing the empirical base.

Since the ākāsa phenomenon can be seen through meditation by the same person (the Buddha or any other with the same level of mind purity), again and again, speaks to both repeatability and internal consistency. Says the Buddha that a Bhikkhu who has jettisoned the taints could also see what he has known and seen. This speaks to a cross-validity as well.

And of course, the Buddha’s is no ordinary scoping as by a philosopher or a scientist observing a phenomenon, intellectually or with the help of an instrument, as e.g., microscope or telescope or stethoscope. As for the quality of observation, from a Buddhian point of view, the mind of a ‘worldling’ is coloured by the taints of the Triple Thirsts and the Triple Blemishes (see above). This means minimally that the philosopher or the scientist comes with biases – worldviews, hypotheses, likes and dislikes, etc. rendering them worldlings. This means that although the level of ‘objectivity’ of the philosopher and the scientist would undoubtedly be by far superior to that of the untrained and the average person, sorry to say that their worldling status has already doomed their objectivity! Their observations can be said to come packed in their prejudices based in their Triple Thirsts and Triple Blemishes.

Not so in the case of the Buddha, and his ‘noble disciples’ (Arahants). Drained of thirsts, blemishes jettisoned, they by definition come to their observations, ‘clinging on
to nothing’ (as in the Satipaṭṭhāna bhāvanā). And as the Buddha says, it is only by the wise (viññū) that reality can be seen. This, of course, is no different from saying that, in the world of Science, it is only a scientist (say a physicist) that can see the intricacies of the physical phenomena, or a psychologist of the psychological phenomena. We may wonder here, then, by way of closure, whether looking for reality ‘as it has come to be’ with an untainted mind renders Buddhismscience even more scientific than Westernscience!

---

83 Veditabbo viññūhīti... Indeed the Buddha says how a Bhikkhu who "has no knowledge of form", among other things, is “incapable of growth, increase and fulfillment of in [the] Dhamma and Discipline” (Naanmoli & Bodhi (Tr.), 2001, 313).
84 I thank Dr Bryan Levman for his comments on the paper.
BIBLIOGRAPHY

Anguttara Nikāya, Pali Text Society.
Aung, Dr Steven K H, Traditional Secrets of Wellness, 2000, College of Integrated Medicine, Edmonton, Alberta, Canada.
Dhammapada.
Dīgha Nikāya, Pali Text Society.
Gunaratana, Bhante Henepola, 2009, Beyond Mindfulness Meditation in Plain English – an introductory guide to Deeper States of Meditation, Wisdom.
http://www.downtoearth.org.in/content/science-common-people.
Majjhima Nikāya. Pali Text Society.
Samyutta Nikāya, Pali Text Society.
Sugunasiri, Suwanda H J, 2010, Rebirth as Empirical Basis for the Buddha’s Four Noble Truths, Sumeru.
Sugunasiri, Suwanda H J, 2015, *Triune Mind, Triune Brain; Map of the Mind Through the Eyes of Buddhist Science and Western Science*, LAP.
Webster’s New World Dictionary.

**Suggested Reference Resources on Buddhism and Western Science**

Dalai Lama, 2006, *The Universe in a Single Atom: The Convergence of Science and Spirituality*
Wallace, B. Alan (Editor) 2005 (2d Edition), *Buddhism and Science*

**Relevant Institutes**