Chapter 4.1

Integration of senses

Synaesthesia and multisensory integration · Emotions as senses · Channels of information : Human Bottleneck, Sensory Fish · The cycle of sense-meaning-response · Attention · Intuition

When I am among the trees,
especially the willows and the honey locust,
equally the beech, the oaks and the pines,
they give off such hints of gladness.
I would almost say that they save me, and daily.
I am so distant from the hope of myself,
in which I have goodness, and discernment,
and never hurry through the world
but walk slowly, and bow often.
Around me the trees stir in their leaves
and call out, "Stay awhile."
The light flows from their branches.
And they call again, "It's simple," they say,
"and you too have come
into the world to do this, to go easy, to be filled
with light, and to shine."
– Mary Oliver

"Prior to Descartes's time, mind and world had been understood as entangled, interpenetrating, open to each other.

But in the inexorable march of the physical sciences and the mechanistic explanation of the world during the scientific revolution, mind (and soul) were morally threatened. This led Descartes to split the mind off from the world (and the body that was unarguably part of the world) in order to save it from reduction to physical mechanism. All experience, meaning, and purpose--once of mind and world both--were withdrawn from the world and put solely into Descartes's new 'mind-substance', something that had not existed before."

-- James Barnes[1]

Synaesthesia and multisensory integration

In real life situations, the senses are hardly ever used singly. The simple act of walking requires a combination of many senses – proprioception, equilibrioception, visual senses (e.g. motion tracking, peripheral vision, distance judging), and more. But the senses themselves (or perhaps we would be better talking about "channels of perception") are often already integrated before they hit our awareness. Some of the 20 or more senses listed above (such as verticality or equilibrioception) are wholly integrative from many different places and individual senses in the body. And other senses are selectively integrative of several senses – for instance, the sense of hearing usually integrates sounds from both the ears and lateral line pressure sensors, depending on the particular frequency range or type of noise that is of interest. Not only that, if one sense is lacking information, the other senses will activate themselves. For instance, if the sense of touch is waiting for information, the eyes will attempt to fill the sensory gap scan by saccading[2] – in fact all senses are joined together in terms of spacial awareness, because "where?" is as important a question as "what?". Sound (internal self-talk), sight (images), emotion, and movement (proprioception) are senses that are used for internal quasi-synaesthetic representations of other senses, and for imagination – self-storytelling of past, present and possible future events.

This integration and pre-processing is necessarily non-conscious because of the relative slowness of conscious thought. This interpretative and integrative sensory capacity is learned "automatically" (whatever that means) by the infant brain at the very earliest stages of development. And then integrated senses simply appear to our waking consciousness as information in a particular form. The mode of presentation is not necessarily directly related to the sensory organ from which it came. My experience of consciously applying the senses is that – when they are called on to perform outside their normal range or to detect something that is so subtle that it is on the limit of sensory

experience – there is some crossover of sensory channels.

So another requirement of sensing with any kind of reliability and depth (in addition to trust / belief / openness) is that the information is *received* rather than forcibly grasped. The trust / lack of questioning approach to senses creates a focus on *what is being perceived*, and making sense of that, or comparing it to memories or finding a particular word that describes the experience. The effort is taken up largely by exploring the "What?" question, and there is very little effort put into the "How am I going to sense this?" You don't have to think "how am I going to smell his rose?" Rather, you focus on the smell itself, and the nasal sinuses and turbinates automatically re-shape themselves to redirect air laden with the molecules of rose-scent more strongly to the first cranial nerve. It's exactly like using your hand to pick up a cup. Unconsciously, the movement is easy and fluid. As soon as conscious control is taken, the movement is less fluid, less certain, and the "How?" occupies most of the capacity for conscious attention. If we moved like that (consciously directing every muscle) all the time, life would grind to a halt.

Similarly, as soon as effort is placed on operating the senses to grab information, they actually become less reliable (because of expectation of what might or might not be sensed) and less open to new information (because the information may not come to us in the manner we expect), and less sensitive (because too much attention is being placed on the "How?" aspect of sensing). I compare it to looking down a telescope. Or even looking down the wrong end of a telescope. What *should* happen is a light and effortless curiosity about something – and then the senses organise themselves and deliver he information in a way that we are most able to receive it. When first accessing unused senses this requires a certain zen-like state of not-knowing, because there literally is a not-knowing how or in what form the information will rise up and meet and interact with conscious awareness. In other words, the sensory system adapts so that the information is passed on in a manner that can be most easily accessed. And this is one of the ways that we experience the world and ourselves individually – and sometimes very differently – from other people around us.

One aspect of this perceptual variation from one individual to another is already widely acknowledged in education. Each person has specific sensory preferences, which for 99.9% of people rotate around the primary senses of sight ("*Visual*" or V), sound ("*Auditory*" or A) and touch/interoception ("*Kinaesthetic*" or K). There is also a very small minority of people whose main sensory preoccupation is (rather like that of a dog) focussed on the senses of taste and smell[3] ("*Gustatory*" or G). In fact the experience of taste is multisensory/ synaesthetic for almost everyone, and provides a good experiential understanding of how all the other senses are linked together in their own particular ways.

It is well known by professional chefs such as Heston Blumenthal that perception of taste is dependent on all of the external senses – sight, touch, smell, hearing – and even internal senses such as nocioception/pain. This "crossmodal" and flexible use of senses in everyday movement and perception has received remarkably little attention until very recently, with senses being looked at singly according to the conventional rules of reductionist scientific investigation. The heavy (popularised) scientific leaning toward senses as being single and unintegrated has led to a general widespread belief that they are – to the extent that everyday experience is ignored or even ridiculed. All of this is changing, partly due to celebrity chefs making people far more aware that taste is so contextual. A small but significant set of research into real, complex, adaptive human cross-modal integration of senses has carried out in the past few decades – e.g. by Professor Charles Spence in the department of Experimental Psychology unit at Oxford University[4]. To give just a few examples[5], it has been found that sweet flavours are made even sweeter and enjoyable by the colour red (which also suppresses bitter tastes), and round-shaped plates. And sweetness is automatically expected when the food has a silkily soft texture. Particularly when flavours are complex, a low intensity, low frequency background noise (such as muted conversation in a room) increases the taste of sweetness. There are many other associations. For instance, if someone holds sandpaper they tend to taste saltiness (even to the extent that they will taste salt when none has been added). Whereas jagged sharp edges will tend to induce an enhanced awareness of bitter flavours[6] – interesting in that the iron in blood gives it a characteristically bitter flavour, so maybe we taste more bitterness in the presence of jagged edges because there is some inbuilt expectation of blood

During a talk on consciousness given by David Bohm[7] he talked about the subtlety of the senses, and how the need for sensitiv***ity*** to the environment drives the way that any organism optimises its available senses. And that sensitivity is damaged by a retreat from the senses causes by repeated violence of one form or another. The experience of violence makes any organism less interested in nuance, and far more over-focussed on the (usually) more external senses that might give some warning of further impending violence. Along with this goes a reduced capacity to engage certain senses, not because they are physically (potentially) less acute or that the nerves are somehow damaged, but that the organic sensory organisation assigns them far less priority – to the point of temporarily masking them out or filtering them so that they are less conscious or less high on the stack of possible things we might be aware of.

Caught up in a mass of abstractions, our attention hypnotized by a host of human-made technologies that only reflect us back to ourselves, it is all too easy for us to forget our carnal inherence in a more-than-human matrix of sensations and sensibilities. Our bodies have formed themselves in delicate reciprocity with the manifold textures, sounds, and shapes of an animate earth – our eyes have evolved in subtle interaction with other eyes, as our ears are attuned by their very structure to the howling of wolves and the honking of geese. To shut ourselves off from these other voices, to continue by our lifestyles to condemn these other sensibilities to the oblivion of extinction, is to rob our own senses of their integrity, and to rob our minds of their coherence. We are human only in contact, and conviviality, with what is not human."

-- David Abram, from The Spell of the Sensuous

It would be easy to dismiss individual sensory preferences by saying that most of us smell, hear, see and feel. However, the point is that individual perception can be (and often is) heavily biased round one or two senses to the point that the way of experiencing the world is strongly affected. Given your own particular sensory preferences, sensory skills, aversions and blind spots, it may then be almost impossible to imagine the life experience and mind of another person who lives inside a different set of sensory filters.

Taking people in the VKA range, a small minority of people are equally receptive to information through all or any of those channels. But most of us are either strongly focussed on one particular channel of information (V or A or K), or are less interested in one of these three channels – and work with a combination of the other two. So then there are combination preferences VA, VK and KA, Av, Ka, etc. This has been integrated into education, and most people will have completed a "Learning Styles" questionnaire at some point. However, it gets a little more complex, because the sensory preference may change according to the context of the situation (e.g. is this a social situation or one in which I am relying on myself?) and on stress level. So a stressful memory ("when I felt threatened I ran across the street" is a very Kinaesthetic description) may be different from the same person describing a non-stressful memory more visually ("When I went to Greece, I loved the amazingly blue-green sea and cloudless blue skies").

In this way, information from one sensory capacity is often routed through another preferred sense... If a visual person says "I see that" after hearing a description – it is because they have played out the information in their "minds eye", and the hearing sense *also* automatically relays through the inner visual sense. Many of the internal/interoceptive (I) senses above may (or may not) play out through whatever sense or sense combination the person naturally orients towards. This is particularly true when senses are being used at their limit. The tiniest difference in shade of green to a strongly Kinaesthetic (i.e. non-visual) person may be detected more viscerally because it "feels"

different. At this level of perception it becomes harder and harder to communicate individual experience (and its reliability!) unless speaking with a person who processes sensory information in very similar ways. A strongly Visual person might experience running in their minds eye, as an internal image of their legs moving. As strongly Kinaesthetic person would be more likely to be aware of visceral, emotional and other somatic responses to anything they hear or see – making the reading of a book something of a physical journey. A strongly Auditory person might not be so in touch (relative to a K person) with sensations of having a full bladder, and would more "tell themselves" that they need to go to the toilet.

There are even deeper versions of sensory crossover, which are so extreme that they were once considered to be neurological curiosities, and Richard Cytowic's book[8] "*The man who tasted shapes*" is a wonderful way to dip into unfamiliar kinds of sensory experience. In Synaesthesia[9], there is an *enhanced* crossover of senses. All the sensory crossovers described so far are of relatively small shifts in sensory processing, and are to some degree re-trainable. Someone who processes in a truly Synaesthetic manner has a far greater crossover which is hardwired into their connection between the conscious mind and the areas of the brain that collect, pre-process and interpret sensory information *of one specific sense*. So in the case of the book's title, a particular chef excelled at reproducing flavours because his sense of smell/taste was hardwired directly into his kinaesthetic and visual senses (Gustatory → Kinaesthetic synaesthesia). He did not smell, so much as perceive shapes and textures. The taste of a specific recipe for chicken broth might appear to him as a knobbly ball with a slightly furry and spongy surface texture. Minor variations in the recipe would result in a change of surface texture or the shape of the ball. Another person with Auditory → Visual Synaesthesia would experience a particular persons voice as having a specific shade of green with small grey and purple dots. What should be understood clearly from the extreme case of hardwired Synaesthesia – is that these sensory crossovers are a *normal* way in which the senses operate. It's just that each of us performs them differently and to different degrees. And the unforced use of the senses described above taps into this fundamental capacity for synaesthetic processing. A personal investigation into subtle internal nuances would in many people identify vague and hard to define sensory "flavours" – or more often, somatic responses, that accompany memories or words. As noted above, even the slightest hint of an additional and perhaps unexpected sense participating in an experience gives the opportunity for that awareness to be trained so that the enhanced and broader sensory perception is made more available.

True (overt) synaesthesia is often a gift.

Richard Feynman, one of the great Physicists of the 20th Century saw equations as colours. Nicola Tesla, the inventor of many aspects of electrical technology, had a photographic memory and was able to construct his machines and theories in his head down to the tiniest detail without needing to commit them to paper – and was synaesthetic. The likelihood is that we all have these crossovers to some extent, but they are more pronounced in someone who is (definitively) synaesthetic. Vladimir Nabokov beautifully described synaesthetic experience in his autobiography "*Speak, memory*":

> *I present a fine case of coloured hearing. Perhaps 'hearing' is not quite accurate, since the colour sensation seems to be produced by the very act of my orally forming a given letter while I imagine the outline. The long a of the English alphabet (and it is this alphabet I have in mind unless otherwise stated) has for me the tint of weathered wood, but a French a evoked polished ebony. This black group also includes hard g (vulcanised rubber) and r (a sooty rag being ripped). Oatmeal n, noodle-limp l, and the ivory-backed hand mirror of o take care of the whites.*

Given all these senses and the capacity to integrate them – one might ask *what they can be used for?* The answer is – anything you wish. Anything that sustains life or makes it more meaningful. All animals are fundamentally curious when healthy, and exploration – the movement into new territory – is an activity that demands all of our senses to be fully functional. The Polynesians used to navigate the Pacific well before the invention of sextants or GPS by sensing the long rhythmic swells that occur as interference patterns due to large ocean currents flowing past islands and sea mounts. Somehow they charted these interference patterns and passed them on in an oral tradition – so that their ships could navigate the vast and featureless Pacific ocean. How did they sense these slow movements of the sea through the noise of the waves? A navigator would stand at the front of the canoe, naked, and would be aware of the movement of his testicles. Although in some ways it's an amusing story, I think it underlines how un-curious we have become as a society in the capacity of our senses, as more and more we have relied on technology to provide the answers.

A blessing for the Senses

May your body be blessed.
May you realise that your body is a faithful
and beautiful friend of your soul.
And may you be peaceful and joyful and
recognise that your senses are sacred
thresholds.
May you realise that holiness is mindful gazing,
feeling, hearing and touching.
May your senses gather you and bring you home.
May your senses always enable you to celebrate
the universe and the mystery and possibilities
in your presence here
May the Eros of the Earth bless you.

John O'Donohue[10]

The Emotions as Senses

Candace Pert's book[11] "Molecules of Emotion" is now over 20 years old, and has significantly influenced how we think of the ways that the body processes symbolic information. Before the ubiquitous role and many production sites and receptor sites of peptides were discovered, the brain was considered to be the beginning and end of everything to do with consciousness. Pearts' research showed this to be a fallacy, and that the body has more than one communication medium. Even more importantly, that the presence of peptides and neurotransmitters in the bloodstream (and in other bodily fluids and organs) provides some temporal continuity to our lives over periods of minutes to hours. Furthermore, the discovery of the relationship of these chemicals (which clearly had effects on – and were affected by – the experience of emotion) to the functioning of the digestive system, immune system and the brain itself – provided the insight for the formation of the new science of Psycho-neuro-immunology (PNI).

Subsequent writings along these lines (e.g. investigating the "Second brain" of the gut plexi[12,13]) have further confirmed that the brain and consciousness and awareness are as dependent on the body as the body is dependent on the brain. This mutuality of

cognition and biology has also been systematically explored in detail by Francisco Varela and his students[14] from the perspective of the nervous system. The total picture is one in which we inhabit a completely integrated biological organism which has different levels of organic "intelligence", each level having some means of communication and influence on other levels, but nevertheless maintaining some separateness of function.

The three germ layers of the embryo constitute three major functional divisions in the adult human :

1. ectoderm = brain/nervous system
2. endoderm = gut/vagal complex
3. mesoderm = musculoskeletal system

Although this system collapses when cell division and movements during gestation are viewed in detail, the more general (archetypal and gestural) relationships it presents are impossible to ignore. The gut produces and stores 90% of the serotonin in the body – an important neurotransmitter affecting emotions (the midbrain). A deficiency of serotonin is strongly correlated to depression – and thus the gut (and the ecological balance of intestinal bacteria) has a powerful effect on consciousness and on emotional state.

Emotions are oddities in that we can have an emotional reaction to an emotion (e.g. distress about feeling distress, or anxiety about the dizziness that sometimes comes with fear). Almost as if we can think about a thought that we have had; and then think about the thought that was about a thought... Emotions are potentially iterative, and are capable of dropping us into a reactive cascade or loop unless we cognitively choose to interrupt them through conscious selection of where attention is directed. It is vital that the possibility of implosive and self-destructive emotional looping is recognised. So far as we know, we are the only animal that is capable of this self-referential feedback, and it would seem that one responsibility of the conscious mind is to NOT enter such a loop – i.e. the conscious mind has a responsibility to intelligently manage the mental-emotional emotional world, rather than creating problems by mis-management. Emotions are a form of information and are also a means by which that information is processed. Becoming emotional about emotions is to treat them as things in their own right (as opposed to information) – rather like looking at the headlines of a newspaper reporting war, and thinking that the newspaper itself is the war! And this kind of reactivity to emotions interrupts and stalls the self-healing and self-regulating processes that they are expressing. For the body, information always leads to reassessment which leads to re-organisation and remobilisation and redirection of energy, so there is no static state in a truly free somatic world. This mobility of physical movement and emotive expression can be readily

observed in animals, and it is the thinking storytelling human brain that creates problems by interrupting it. Stories have huge power both to heal and to prevent healing.

The emotions, like various parts of the nervous system, are also subject to sensitisation (becoming more sensitive than normal in certain circumstances). For example, one particularly visceral emotion is disgust. The disgust reflex is designed to make sure that we do not eat rotten or putrid food and that we stay well away from anyone who might infect us with an illness. So if you are *already* feeling queasy for any reason, the disgust reflex becomes temporarily hyper-sensitised and the slightest whiff of a smell of anything that has even the slightest unpleasantness may be enough to make us vomit. Morning sickness (during pregnancy) is a hyper-aroused disgust reflex and/or immune reflex in the stomach. These two are essentially the same, although the *emotion* of disgust may be de-coupled from the *experience* of nausea. This is a useful hint that emotions play out in several layers... They may be almost cerebral, or be highly emot-ive, or may be very visceral. Or any combination of these.

Most emotions are not quite so visceral in their nature or in their propensity to generate a reaction. However, disgust is a useful example, because it demonstrates that an emotion has a distinct biological *purpose*. This purpose may not be particularly clear if we are socially disgusted with somebody's behaviour or find the colour of a particular wallpaper particularly unpleasant. In these circumstances, the same reflex (disgust) is being activated, but its strength is (usually) not enough to induce projectile vomiting! Nevertheless, its message is more or less the same – that we want nothing to do with the particular thing and that we would prefer that it was not in our immediate environment. So we will as far as possible, remove ourselves from its presence. Thus, this emotion/reflex generates a particular action, which (as has already been said) has a particular biological function. The question I have is – *do all emotions have a similar functionality*? Fortunately, in investigating this question we don't need to analyse and derive meaning from the chemical message of an emotion, because we can *feel* what effect it has on us and what our response to it might be.

Messages in the blood

The senses are very much concerned with information, and emotions have been given a special place in our ways of perceiving the *experience* of information. They definitely have special characteristics that separate them from thought, and from interoception. A brief look at the generic chemical aspect of emotions is one useful starting point. As each part of the body capable of producing neurotransmitters/ peptides “identifies” a situation in which it should increase or decrease its production, then it will do so. These signalling

chemicals are released into the blood stream and then cause both local and global responses as they are taken up at receptor sites. Blood flow in an adult is typically an average of between one and six total volume circulations per minute, increasing with exercise, and so any chemical released will exert a global influence for at least 1 minute when more or less at rest and about 10 seconds when engaged in strenuous exercise. The liver is central to the usefulness of these signalling molecules, in that it breaks them down into basic building blocks (e.g. cholesterol) ready for the next round of signalling. The signalling chemicals are quite complex in their effect, being capable of not only signalling positively in their own right, but also increasing or decreasing the relative extent to which *other* chemical signals are released and/or accepted. This complex cocktail of information in the form of peptides, hormones, neurotransmitters and primary building blocks is constantly being generated, used and reabsorbed.

From the above description, several important features emerge :

a) Chemical signals affect the body for a far longer period (of the order of 1 minute) than a nerve impulse (about 0.1 seconds) : a 500-fold timescale. Nerve impulses are immediate, changeable, and on the timescale necessary to generate a muscle reaction with speed to an external event. On the other hand, chemical signals are far more durable, and produce a sustained response over a period of time sufficiently long so that the attention can be brought to a situation and that situation may then be assessed. In other words, for an organism as large as a human being, chemical signalling brings the body into a decision-making timeframe rather than a purely reactive timeframe.

b) On a local level, chemicals diffuse even faster than nerve impulses (!) because of the very short distances involved, and so chemicals provide an extension of the nervous system into cells and connective tissue – down below the physical dimensions (and physical reach) of nerve fibres.

c) As each local site adds chemicals to the soup that is travelling round the body, it subtly modulates the total message. Then, as the liver reabsorbs and breaks down these signals, the message changes according to the state that the body is on now (rather than what it was in some seconds ago). Thus, emotions are supposed to arise and then pass again.

d) The neurotransmitters and peptides are not only produced in the brain, but also in the whole of the rest of the body – particularly the Gut. So it is reasonable to state that the particular cocktail at any one moment is an integration over both time and different parts of the organism of the assessment of its *current status relative to both the internal and external environment.*

Now, this kind of moving status report is of no use unless it is put to some use, and I would like to propose that :

i. it is meant to be put to use

ii. it somehow has to convey *meaning* to the every organising level – from cognitive mind to cells and connective tissue. Being in touch with the body means that we are supposed to be able to sense this balance more or less continuously – and particularly when its message is particularly urgent

iii. we experience particular combinations of signalling cocktail as emotions, and **each emotion is directing our response to "an integration over both time and different parts of the organism of the assessment of its current status relative to both the internal and external environment".**

As such, emotions are another form of information[15] that precipitates internal non-conscious responses; and may be part of cognitive awareness, in which case it may be used as a basis for response to the world; and usually even contains a response inside itself – provided that the emotion is allowed to led directly to action (e.g. anger). In fact, in emotions we see an integration of conscious and non-conscious processes , along with an integration of the fundamental biological chain of *sense-meaning-movement*. Considering that single cells use almost as many neurotransmitters and a complex organism (like a human), it would seem that emotions are an ancient means for any organism – from single cells upwards – to be aroused into a single, whole-organism response to events that a large fraction of their parts considers to be significant. Emotions induced through the combination of neurotransmitters and peptides (and maybe other signalling chemicals, such as steroids, hormones) are a democratic process – if a sufficiently large volume of particularly important parts of our biology ask for attention, then our attention is grabbed.

Each language has a label for specific combination of somatic sensations and mental states – that we call "emotions" – which is usually taught to us by our parents. And this label (a "Higher level description") is so familiar to most people that when they say "I am feeling angry" (or any other emotion) they are cognitively unaware of the somatic textures that they have fleetingly been aware of and interpreted. This labelling gives a rapid shorthand access to what can be a complex set of sensations, body postures, mental states. If fluent we can even distinguish subtle flavours of mild emotions or distinguish several different (perhaps conflicting) emotions in a single feeling. Almost like having a sense of smell! There overriding aroma of lamb has a flavour of mint and something warm and spicy in the background – Cinnamon? Nutmeg? If a child is not taught this linguistic identification chart (often because the parents themselves were uncomfortable with some emotions), then emotions become a difficult-to-interpret mess of contradictory messages – because most human emotions are nuanced and complex.

If one chunks back to the original set of somatic sensations that relate to the activity of the emotion *in the body*, then it becomes possible to perceive the experience in several different ways...

- There is a mental storyline that says why we are feeling what we are feeling – which presupposes a known causative chain of events.
- there is the *meaning* of the emotion – which is partly the emotion itself (because emotions inherently carry meaning – "I am angry"), and partly the physical movement/response that we are stirred to by the emotion.
- there is the set of physical somatic textures and sensations (and movements) that can be observed simply as textures and sensations with meaning stripped away.
- there is the awareness of the current situation – which may provide a cognitive reality check – "Yes – this emotion is congruent with my current circumstances", or "This emotion is incongruent with (or out of proportion to) what is happening around me".
- There may be visceral and biologically important layers of experience that are far less easy to be so objective about ... such as the need to urinate or vomit.

Thus, we return once more to the important and fundamental issue of awareness and presence. If one is aware of each moment and able to let go of the previous moment, then emotions are largely a stream of information that comes, has its time, and then goes. We are not un-feeling in this moment-to-moment awareness. On the other hand the emotion is in proportion to the world, and is only ever as big as it really is in that moment; not being fuelled by anything else. Simply put, we are not driven by the emotion, but just experience it at the strength that it truly is for as long as it truly exists. However, once the emotion is attached to a story line which we in turn become attached to, then it continues to play out like a stuck record. With each playing the grooves become deeper. We remember the story; we then feel the emotion; then the story is confirmed by our experience; and so we go on; and on.

Emotions as biological responses

Stripped of the cultural meaning, and placed in a more somatic and evolutionary framework, emotions[16] are ways that the body conveys important qualitative information to the collective consciousness that runs it. An emotion is experienced by humans as a change in the degree to which particular parts of the body and qualitative mental states of be-ing are present (or not) in consciousness, and specific qualities of sensation that arise with that awareness. These were recently mapped out in the brain[17] and in the body with

regard to intensity and "geography" of physical sensation[18]. But these mappings miss out a lot of qualitative information – the "what" that is being felt in that particular part of the body : the qualitative experience. The qualities of rested-ness, satiety and wellness already mentioned are also emotions in the way that they are experienced... it's just that they are not usually considered to be an emotion in this particular culture. In early life we are supposed to be told by our parents when we (and they) are feeling, so that it is possible to attach a linguistic label to what is a very complex pattern of experience. The linguistic label for simple emotions ("anger", "sadness", etc) then allows us to distinguish and discriminate several emotions when we experience more than one emotion at once. Without this linguistic clarification, complex emotions are a big mess, and can – especially when conflicted – cause confusion. The cultural problem with linguistic labels for emotions is that many people learn to sense an emotion so quickly that they bypass their body and simply "know"(!) that they are feeling an emotion because their mind tells them so. Even when they say "I feel rested" or "I feel angry", the experience is (or at least appears to be) largely mental.

It is worth thinking about how *animals* express emotion when reading these notes, and consider that our emotional brain is the mammalian midbrain, not the cortex. Qualitatively and experientially, emotions are different from other sensory information in at least a couple of ways. Firstly, they are complex – we assign a label to a whole-body set of changes in sensation and other sensible factors such as mental state, alertness, externally directed vs internally directed attention, etc. Secondly, they are almost always likely to precipitate a physical response to the world in the pulsatile manner described by Stanley Keleman. We are moved to push out or reach out, or withdraw. Of course, other kinds of sensory information may also have that effect – but usually there is a distinct sequence of events – we sense, then we derive meaning, then if an emotion arises, there is a corresponding *E-Motion, a physical response*. As a source of information their influence bridges the whole of the sense-meaning-response cascade. Thirdly, as a direct result of their interpretative quality, emotions stand out as being far more about relationship – to ourselves, to the environment, to the landscape, and to other living organisms.

Wild Geese[19]

You do not have to be good.
You do not have to walk on your knees
for a hundred miles through the desert, repenting.
You only have to let the soft animal of your body
love what it loves.

Tell me about despair, yours, and I will tell you mine.
Meanwhile the world goes on.
Meanwhile the sun and the clear pebbles of the rain
are moving across the landscapes,
over the prairies and the deep trees,
the mountains and the rivers.
Meanwhile the wild geese, high in the clean blue air,
are heading home again,

Whoever you are, no matter how lonely,
the world offers itself to your imagination.
calls to you like the wild geese, harsh and exciting-
over and over announcing your place
in the family of things.
-- Mary Oliver

The meaningful awareness of emotion can be instinctive – i.e. there is an E-Motion, but it is largely unconscious, and passes from hindbrain/physiology to action with little chance of modulation or inhibition. Provided that our emotional senses are well calibrated to the reality of our environment, there is little wrong with this instinctive reactivity except that there is no opportunity to exercise choice. The exercise of choice requires that it is possible to inhibit this emotion → motion cascade by being a conscious observer of the process. There are several ducks that have to fall in line to achieve this important act of discrimination – particularly important in that if the emotional senses are *not* well calibrated to the present reality, then the reactivity is problematic – be it the anger-violence of fight-flight or the submissive collapse of freeze states. So, for the kind of more conscious response that will allow the emotional senses to be re-calibrated and/or choice to be exercised :

1. We must be *capable* of feeling that emotion (i.e. not dissociated from it)
2. There must be a mental *open-ness* to feeling it – e.g. social or personal mores as to the acceptability of that particular emotion do not detract from us being able to sense and affirm its presence,
3. There must be sufficient curiosity and somatic engagement to identify it
4. It requires a fluency of emotion, enough to be able to identify its components – something that is largely dependent on language
5. There is sufficient awareness of context to be able to put the strength and attributed meaning to the test, so that there is a recognised congruence and proportionality (or not).
6. We are not over-invested in that particular emotion or the meaning we attribute to it as a sign or expression of identity
7. The feeling is bearable, so we don't go into denial or overwhelm
8. There is sufficient sense of immediate safety and/or internal resilience for all of the above to be possible.

With all of these in place, the emotion has meaning and we have a choice to inhibit it, to act on it, to calibrate it (it's not proportionate), and to allow it to course its way through our body-mind uninterrupted and so to evolve and leave us energised and ready for the next experience. Given enough internal resources (see Chapter 9.1) even overwhelming emotions can be safe enough (and so evolve and move through) if we initially feel safe enough in ourselves, or have other (let's say Spiritual) resources that can be called upon. Which always brings me back to extremes like the way that Viktor Frankl identified whet drove his internal sense of meaning during his time in Auschwitz; or to the Dresden firestorm survivors who went through overwhelming fear into an experience of existential and transcendent awe.

The following is a very tentative description of a few selected emotions as primitive biological messages...

Anger – the gathering of resources

Anger is the easiest of emotions for which we might identify a biological use. The experience of anger is a gathering of energy, an increase in attention on the muscular potential of the shoulders, neck, jaw, face and hands (fists, claws). If we were a four-limbed animal like a dog, all our resources would be concentrated at the pointy end, which in turn would be pointed at the source of danger/threat/rivalry. So the emotion of anger does not only gather energy ready to use – *it also externally displays our readiness to use that energy*. Blood pressure increases, heart rate increases, cortisol levels increase so that our immune system is geared to dealing with bite wounds (rather than primarily infections through food, water and air). This is preparation for physical defence and repulsion of an invader of our territory – the attention is drawn to the front of the body and particularly to the parts of the body that are needed in a fight – the teeth(/head/neck/shoulders) and forelimbs. Anger is externally directed. When in an angry state, it is remarkably difficult to remain internally aware. We are focussed on the external world, and particularly on the threat a short distance in front of us – so the eye focus tends to be close rather than far away[20]. And if we bring our attention internally, the anger tends to subside. There is a focus on physical muscles, and if allowed to run its course or observed without getting fixated by anger, then it transforms into a sense of physical and personal empowerment and response-ability.

Just like all the other emotions, anger may arise from an external event – in which case we may have a storyline about why we are feeling anger. Alternatively, we may have gathered ourselves for conflict, and then the physical response will be the same. So then we might think that we are feeling anger, but will actually be sitting in the innate chicken and egg nature of emotions. If we feel our body in a specific state, we can choose to interpret that as anger, but actually, it may not be real anger. Instead, it may simply be a very well resourced defence reaction that – if we had not fallen into the storyline of "X and therefore Y and therefore anger"- we would simply have been left feeling physically empowered and externally focussed.

Depression – an ancient form of anger/aggression

This is very much based on my historical experience of depression and also on my experience of dissecting it in a guided therapy session using somatic experiencing tools. The heaviness of depression is often restricted to the frontal bone, and it is as if a solid dense and heavy bone (rather like the visor on a suit of armour) is coming down over the eyes. The exact form of this was only something of a curiosity to me until I really started to think about EvoDevo; and then I realised that much of our internal architecture started off in the bony fish of the Cambrian oceans. Why would fish have an armoured, bony head? Clearly, this was a tool to use in a fight. So – what happens when you gear up to fight using your head as a club or intend to use the armour on it to resist the bite of something bigger than yourself? Focussing on the heaviness produces more heaviness. Being curious about "where do I not feel that?" is a really useful approach. At first it feels as if the heaviness is everywhere, but for the vast majority of people there is always somewhere that feels light. Re-focussing onto this lightness, its qualitative texture and its geography (deep, shallow, thickness, volume, shape, etc.) – instead of being pulled in by the biggest somatic noise – has some interesting effects on way the rest of the body (and mind) feels. Deeper forms of depression may also contain an element of overwhelm and immobilisation, which will be covered in more detail in Chapters 5 and 6.

Contentment – something to smile about

Porges (Chapter 5) has noted that smiling alters the pressure between the jaw joint (TMJ) and the middle and inner ear, and makes it far less easy to hear low frequency sounds of the type that might come from a big predator. So, if I smile, the converse is true – there is both an externalised and internalised demonstration that there is no need to check for danger. I am giving myself and the people around me a sign that I feel safe in this environment. The interesting thing about a true smile (as opposed to a grimace) is that the motion of the facial muscles makes it almost impossible to open the mouth – so although the teeth may be showing (which is used to say "keep away" in primates and other mammals) they cannot be engaged in any form of aggressive manner whilst the "real" smile continues. So the total message from a smile is – "I'm safe, you're safe, we're safe".

Anxiety – where can I go?

Anxiety is about halfway along the spectrum of fear and is essentially a feeling of disturbance – something is not right – I have to move, check, look, get somewhere else. The constant twitchy lack of stillness in a mouse is essentially a state of constant anxiety – and we see mice perpetually looking over their food to check out "is it safe?" Wild animals that have been disturbed prefer to leave the place they were feeding and find another one. It is a feeling that may persist[21], and it persists if there is insufficient sense of safety and containment in the environment. If the anxiety is preceded by a general state of contentment, then endorphin production is high (in this case dynorphin) and the anxiety goes again. Anxiety is to some degree a "false" emotion in that we only feel it for any prolonged period of time because the movement that it wishes to generate (usually flight) has been suppressed or inhibited through social convention. It is common for humans to feel anxiety. An animal would only feel anxiety if it was aware of danger but physical response was not possible – such as in the situation where the exact location of danger was not known, so random flight might deliver it into the danger it was fleeing. *(This is a good example of the importance of "where-ness" in addition to "what-ness" in our sensory attention to the meaning of the world.)* Or maybe if there was no safe escape exit. So anxiety as a(n apparently) relatively innocuous emotion is – so far as the less cognitive survival-oriented parts of the brain are concerned - only a short distance from biological overwhelm.

Milder versions of anxiety – trepidation, nervousness, anticipation – are interesting in that they feel almost exactly like excitement. But there is a subtle difference in that the mental-physical gesture underlying them is withdrawal and uncertainty rather than expansion and curiosity. In Daoist philosophy, the "lower" emotions may all transform into higher emotions if we allow them to move through the body. Whereas getting caught up in a storyline creates a feedback loop that prevents this evolution from taking place. These transformations are worth considering. The five emotions are :

- Sadness/Grief *transforms into* Compassion (including self-compassion!)
- Anger/Rage *transforms into* a sense of being physically and mentally Empowered
- Worry *transforms into* a desire for the very best for everyone.
- Fear *transforms into* Awe
- Hysteria *transforms into* Gratitude

The transformation of one emotion into another is essentially a freedom of movement (motion) between different mental and embodied states. Sometimes this motion is so rapid that one has to be quite subtle to perceive the "higher" form before another, different state arises as part of the froth of daily existence. The above list is in a specific "elemental" order (Metal-Wood-Earth-Water-Fire)[22], and the progression of mental-emotional states tends to follow the natural progression of these archetypal elements.

Sadness and Grief – hiding, coming back together

> No one ever told me that grief felt so like fear
>
> – C.S. Lewis

Sadness has a couple of features that relate to possible evolutionary origins. Firstly, it is about loss, and if we are considering a colony of cells, the loss would be part of that colony. There seem to be two major thing that have to be addressed. One is the issue of how that loss has occurred, and for a colony of cells that could be a predatory animal – so we stop doing our normal feeding and sensing into the environment, we stop moving and we retreat inwards. Small, silent, still and with a slightly suppressed breath and heart rate, we are (hopefully) not so easily seen. Secondly, we have to reform and reorganise to adjust around this loss. I first really "got" the biological meaning and "use" of sadness when I read a description of a sponge. Sponges are ordered, structured colonies of millions of simple single celled animals. If a sponge is put through a mincer, the colony has been disintegrated, but many of the single cells are still alive. If this soup of sponge cells is now poured into sea water, the small fragments will recognise each other and will do their best to swim through the water to re-join. Maybe the feeling of reconnection is more a kind of nostalgia, or **longing** – which inherently ask "*How can I return?*" or "*How can we be together again*". Whereas sadness and grief ask a question more like "*what do we do now?*".

Paralytic Fear

There comes a point in the spectrum of fear where we become paralysed – unable to move in escape, and the jaw starts to tremble uncontrollably, but nevertheless quite quickly, rhythmically and lightly. Here we have a very clear vagal response – the sympathetic system is shut down and movement of most of the muscles of the body is not possible. Curiously, my personal (fortunately extremely brief) experience of these states was that the body did not want to curl up, but was elongated. Given the pulsatility of life, there is also a curled up version of fear, still holding on. When I have revisited these states, one interesting aspect is that its memory just does not kick in with any strength at all unless I have entered (embodied) the specific physical gesture[23]. If the total pattern is considered from an evolutionary perspective – where did jaw muscles (and the jaw) originate? – what stage of evolution was so strongly vagal? – then we can appreciate that there is some regression of the jaw to gill-like behaviour. I am reminded of (literally) a fish out of water trying to breathe.

Love – the experience of connection

> A home is not simply a building; it is the shelter around the intimacy of a life. Coming in from the outside world and its rasp of force and usage, you relax and allow yourself to be who you are. The inner walls of a home are threaded with the textures of one's soul, a subtle weave of presences. If you could see your home through the lens of the soul, you would be surprised at the beauty concealed in the memory your home holds. When you enter some homes, you sense how the memories have seeped to the surface, infusing the aura of the place and deepening the tone of its presence. Where love has lived, a house still holds the warmth. Even the poorest home feels like a nest if love and tenderness dwell there.
>
> – John O'Donohue[24]

In the illusion of separateness that we live in, Love has taken up an almost mystical quality, something extraordinary and special that transcends the mundane. It may also be slightly confusing, because there are many different kinds of love, which – if conflated and not carefully discriminated – make Love itself confusing, intangible,

even unfamiliar; when it should in reality be the most present, real and everyday experience of all.

The Ancient Greeks listed at least seven different kinds of love:

Eros: physical or sexual love. (Eros was the Greek God of sexual desire)

Philia: the Love found in friendship, an affectionate regard, or the understanding and bond between equals

Ludus: Playful love.

Pragma: Longstanding love

Agape: Love of the soul : the love of God for man, and of man for (a good) God. Thomas Aquinas described it as "to will the good of another" - leading to Xenia or hospitality

Philautia: Love of the self

Storge: Love or affection (e.g. of parents for children)

but all of these really are about connection. To understand the simplicity of Love, all one has to do is have a pet dog. Whilst most pet dogs are deliberately infantalised so that they remain to a certain degree in a puppy state (rather than growing up into wolves), and some of a dogs love is very similar to the love expressed by small children, there is also a lot more depth to it.

Everyone who has experienced a feeling of Love will recognise the innner "glow" that defines it, and the simultaneously soft and shiny sensation round the eyes. If you recall the times when you experienced Love, you will on reflection, recognise that these were times when you felt deeply connected to someone or something. The Love that comes with connection is not a single emotion, but more of a spectrum, that includes Appreciation, Gratitude, Compassion; and even Awe, as described by St Theresa of Avila and many other Christian mystics.

Channels of information

The senses can (and do) provide information that is used purely subconsciously – such as the way our feet move along the ground when we are preoccupied with something else. However, our main focus here is ultimately consciousness, conscious sensory awareness and embodiment. It is obvious that nobody reading this will have *simultaneous* access to all the senses above.

So how exactly does the conscious mind interact with the senses?

The answer to this question in part comes down to how quickly we can think and process information. If you consider your experience of being in a body-mind, it becomes clear that the conscious mind cannot usually process many things at once. There are extraordinary altered states in which far more information is present in consciousness, but most of us can only do one thing at a time. This is normal everyday experience. If I think, then I am far less able to be very sharply aware of what is on front of my eyes (or sounds coming to my ears). It's not that I cannot see or hear – but those senses go slightly to the background and are less distinct. If I add a strong emotional load to the thinking, then the visual details recede even further and become an unfocussed blur. Similarly, most people find that a curiously engaged focus on body sensation tends to calm the thoughts – it becomes much more difficult for random thoughts to enter the mind – instead one has to deliberately choose to think.

It has been known for a long time that there are a maximum of about four or maybe five channels of information that can be consciously present in awareness at any one moment. Thoughts can occupy one of those channels, as can moderate to strong emotions. The way it works is something like having a sea with lots of fish. As one of them rises to the surface, the others sink deeper into the water. So there can only ever be one or two fish visible of the surface (or leaping out of the water), plus a few swimming close enough to the surface so that one is aware of their presence. The rest are deep in the ocean, below the reach of daylight. Focussing the eyes on an object sends sounds slightly into the background... You can investigate for yourself by simply shifting your main sensory or perceptual focus and noticing what happens to your other senses and to non-central objects in your awareness. If I focus on somebody's voice, I can still see their face, but not with the same clarity. If that focus of very strong I may have completely (temporarily) lost connection with an awareness of the room or of noises of birds and traffic coming through the window, or even a sense of the presence of my own body. If I shift attention to their face, I can still hear their voice, but it takes a substantial effort to

remain conscious of the content and meaning of the words. If I think, then it is generally harder to feel – because thoughts also take up room on this limited platform, and displace other forms of information and activity that might present itself to consciousness.

All of this experiential ground is quite consistent with a "bottleneck" of information processing. Research by Richard Epworth suggests that we can only take new information into memory at about 10 bits per second[25]. Clearly if one considers the entire sensory system, this is wrong. However, the bottleneck principle demonstrates the amount of effort that has to go into processing sensory information so that it has *meaning*. So maybe we are only able to process about 10 different pieces of *meaning* per second? There are several ways that this sensory information bottleneck can be put to good use. One is to realise that over-intense focus on any sense will inevitably prevent other senses being available, and will also lock down the ability to think round the information – the level of intensity can increase so much that the whole conscious mind suffers a kind of attentional *rigor-mortis* that also leads to physical immobility. So it is possible to choose to go in the opposite direction, in what the Hawaiian culture calls "*Hakalau*". This is a practised and cultivated quality of unfocussed sensory presence, allowing the user to (potentially) be freely aware of all of their senses at once, and their conscious attention to be equally freely mobile. It is familiar to martial artists as the zen-like unfocussed state in which the edges between observer and observed may begin to blur, and a qualitative awareness of the full 360 degree space may also be available. There is a tendency to think of de-focussing as being part of a dulled state of awareness. But that dullness only arises when the de-focussed attention does not include the somatic senses. For – if they are allowed to do so – the external senses can play out in and through the internal senses.

The deliberate choice of *sensory* channels in the practice of *Hakalau* creates a quiet mind (because there is no space for mental activity when all the available channels are being used in awareness). And this is a general rule – as the sensory engagement increases, the level of mental chatter decreases. And *vice versa* – as the level of mental chatter and disturbance and intensity increases, the degree of awareness of the environment and the body decreases. It raises a question as to whether there is an ideal locus towards which the attention should be trained to naturally gravitate. Firstly, it must be realised that we are supposed to have this wide range of possible attention, because all of it is "good" if it is appropriate to the current situation. Beyond that, there is a lot to be said for being in the present moment. And there is no doubt that an awareness of the senses – particularly the somatic, interoceptive senses – brings the mind and attention into the present moment[26]. There are further advantages to the body being a habitual place to rest at least a part of waking attention, which we will look at in later chapters.

What is most important about all of this – is that we always have a choice that can be exercised as soon as that availability of choice becomes conscious – because the sensory system obeys the tiniest redirection of focus and will. If the choice of sensory focus is not conscious because we allow our attention to be pulled by the biggest sensory "noise", then we are no longer in charge. It is particularly useful to train oneself to manage the senses by deliberately shifting between different senses. If this is just done as an exercise, it is meaningless and rather futile. If it is carried out with genuine curiosity, then the degree of control of the sensory system increases, which will be put to use in some of the embodiment exercises at the end of this book.

There is an additional limitation to perception that comes with the thought/emotion sensory channels – in that it is only possible to be aware of one strand at any one time. So a thought may be busy and confused, but at any one time it is only one thought. Similarly, when we place attention on one emotion, the others are not present. That is not to say that emotions are simple, because an emotion may be a complex mixture of apparently contradictory nuances – and as an emotion, it always carries the potential to shift and evolve. But if our body is simultaneously expressing two emotional states from two distinct places, it is only possible to be aware of the contents of one of these at a time. Another analogy might be to think of your capacity for awareness (be that of internal and external sensory information, thoughts or emotions) as something like a torch being used to look round a junk shop that is otherwise pitch black. You shine your torch to the ceiling, and most of what you see is ceiling, but the reflection creates a peripheral awareness of some elements of the rest of the room... you swing your torch towards one of those, and that in turn reduces the light falling on the ceiling. The more focussed your attention (the narrower the torch beam), the less you are aware of anything not directly lit. Very focussed mental attention is exclusive. Someone can lose themselves in thoughts or memories in the words of a book, and be totally unaware of their external environment. A practiced meditator can be so absorbed by the motion and rhythm of breath that their awareness is wholly on that and might not even be aware of aching knees or other people moving around. And of course, the sensory system also feeds back into this concentration of focus, so exceedingly bright lights or pain or very loud noises can intrude into every corner of our being. Nevertheless, the same rules apply... Wherever the focus of attention rests – whether it is placed there by choice, or is dragged there by the intensity of the experience – will dominate awareness and damp down or even exclude everything else. Areas of sensory (or other) experience that we usually go to become easier and easier to access. And ones that we rarely (if ever) go to remain potentially available, but less and less easily accessible.

Choice of focus (of attention)

The topmost information channel is always the one that we are focussing on. The language of (external) vision is used extensively when talking about perception and attention, to the point that it can become easy to think that focus of the eyes and focus of attention are synonymous. But the real process can be discerned with a little reflection on the visual sense – and this clarifies the generic process that works for all senses and trains of thought-emotion-experience. There is an internal *choice* to look at a particular object at a particular focal distance – and then the eyes (senses) accommodate that decision. The process of accommodation is complex, and its specifics vary form sense to sense, and also for the subject of focus. So focussing on water – choosing to see what is beneath the water, or the shape of the ripples, or the reflections – takes an effort to shift the perceptual focus. In a very similar way, the question of whether to see the pale cube edges as being on top or below the cubes – and to switch between these – takes an effort of re-focus. The same process and the same qualitative use of choice (will) applies to all kinds of perception and all channels of information. If we do not exercise choice, then it is always the loudest sensory noise, the most intrusive or disturbing experience, or the perception that we are most habitually used to making – that takes centre stage.

> *The appearance of things changes according to the emotions; and thus we see magic and beauty in them, while the magic and beauty are really in ourselves.*
>
> *Kahlil Gibran*

The cycle of sense-meaning-response

> *I give the name of cosmic sense to the more or less confused affinity that binds us psychologically to the All which envelops us. The existence of this feeling is indubitable, and apparently as old as the beginning of thought... The cosmic sense must have been born as soon as man found himself facing the forest, the sea and the stars.*
>
> *Pierre Teilhard de Chardin*

I would like to look a little closer at just one of those textbook definitions of biological life – **response**. The idea of responsiveness of an organism is non-trivial. The ability to respond (response-ability) is itself a package of different capacities, which include :

- sensing the internal and external environments,
- deriving some kind of "meaning" from that sensory information, and
- using that information to respond in a meaning-full way, externally through movement, and/or internally through shifts in one or more of Homeostatic balance, Metabolism, Adaptation and Organisation (or even Reproduction and Growth[27]).

The senses have been largely discussed so far outside the sense-meaning-response feedback loop in which they naturally exist in a living creature. There is – on close inspection – a continuous feedback of information through the senses that then modulates not only our actions, but also how the senses are then used. I saw Evelyn Glennie perform in St Andrews Hall in Norwich about 15 years ago. Glennie is an internationally acclaimed concert percussionist, despite being profoundly deaf, and so has a very well developed and experiential understanding of how her senses work. In a 2007 TED talk[28] she gives a beautiful description of the way in which senses and movement and emotional presence are fine-tuned to each other. If a drumstick – or a sense - is grasped too hard, then the natural relationship between sense and movement and response is lost, and there is less information, less beauty, less coordination, less grace, more strain. If they are trusted, played with, danced with, set free almost like birds from a cage - then they begin to sing - and this is the process of expression that she embodies and a master musician. This is not only about being a concert percussionist, but is a wonderful about how the senses, the body, and the attention are meant to be used optimally. As a Craniosacral Therapist I can fully appreciate her description, since that is also my practical experience in my daily job. If I trust the subtleties of my body-mind's ability to sense and respond, then there is much less effort, and the range of sensory perception hugely expands. In fact, my experience is that the challenge is always to expand that trust and

letting go of control *enough*. When the cognitive mind has fully let go, then the body and its sensory capacity and the associated feedback loops are able to work at their best. A good analogy is to think of an olympic level horse rider and her horse. If the rider tries to over-control the horse or holds the reins too hard, then she becomes less aware of the horse, the horse becomes less able to use its senses, and the quality of responsive communication between them reduces. Really, I am talking about Love. Glennie's TED talk also describes how the imaginal world – the ability to create something in the imagination – can also become a part of this delicate and creative feedback loop between movement, emotion, and senses. It is one form of the exertion of will, but instead of demanding a specific outcome, the imaginal will provides space for qualitative emergence.

Usually the idea of "meaning" is briskly skated over, but it deserves a lot more attention. If the external sensory organs are viewed as transducers (such as is used in an industrial process line or laboratory), they can not determine meaning. In one way the biological senses do automatically detect meaning, simply because the senses are all attuned to *relative* rather than absolute information – so we don't detect temperature as being 20 or 40 degrees Centigrade, but rather note that it feels pleasantly warm or excessively hot when compared to our ambient internal body temperature. However, meaning goes deeper than that. A water bear[29] has to be able to distinguish food from non-food, or the presence of bigger (predator) tardigrades.

Although this possibly goes without saying, there are also many senses that are not necessarily conscious, whose function is more related to control of internal physiological adaptive processes and homeostasis. And some of those senses inhabit the territory between conscious and non-conscious. For instance, the upper respiratory tract is rich in sensory fibers that help regulate breathing and muscular activity in the Larynx during both normal and abnormal conditions, and which help defend this particularly survival-critical and vulnerable area. These include[30] :

- collapse of upper respiratory structures on exhalation (so that inhalation can be initiated)
- temperature (cooling tends to inhibit depth of breathing)
- irritants (chemical or mechanical) inside the upper respiratory tract – coughing, retching, sneezing
- changes in osmolality and ionic composition of the mucosal surface liquid – compensatory mechanisms

The trachea and throat being a transition zone between external and internal worlds,

some of these senses are similarly oriented in both directions. The response to these effects may be reflexive, or physiological, and some may be modulated consciously (or any combination of these), and control may come from local reflexes through to the hindbrain through to the cortex. To my mind, this one example (of maybe a million possible examples) gives a nice feel for the way in which the body-mind is a whole organism, integrated at all levels, all of the time.

So it is clear that the **sense-meaning-response** cycle is also continuous between conscious and deeply physiological or cellular processes. So whilst it has been postulated that the entire evolution, structure , embryological and infant development of the brain if focussed on movement[31,32] – in fact every organism is filled with processes that are based on the same interdependency of sense-capacity, interpretation-capacity and response-ability. It is curiously circular in that the capacity to sense information is utterly useless – unless there is also some means to interpret that information ("meaning"), and also some way of responding. Which implies that both the capacity to interpret meaning and the capacity to move are inherently tied into the capacity to develop sensory apparatus, and at the very least they have a propensity to follow each other. The capacity to respond (move) is dependent on the capacity to sense something that has meaning. And the *control of movement* is also dependent on the internal capacity to sense what that movement is doing both internally and externally (i.e. the proprioceptive ability to gauge self-motion and self-position). Which in turn requires that there is some inherent sense of self-identity and of relationship to the external environment[33]. There is no specific point in this loop at which one can definitively say "it starts here", and one suspects that this apparent ambivalence of mechanistic causality has been there right from the very beginning. Interestingly, if one adopts a more Lamarkian stance – that the need for adaptation feeds back directly into the organism and can (e.g.) affect DNA expression and/or RNA transfer from food or viruses – then the randomness of evolution is as much about availability of building blocks as it is about random mutations, and "where does it start?" is no longer a relevant question.

> *The world is full of magic things patiently waiting for our senses to grow sharper.*
>
> *– W.B.Yeats*

All this is (at least apparently) somewhat prosaic for adult human beings. Historically, a philosophical difficulty with empathy in Western culture resulted in a belief that only humans (with a specifically adult human brain) can possibly be conscious. Human babies do not have a nervous system wired like an adult, and so for about 50 years in some medical and philosophical circles they were considered to be non-conscious automatons,

whose screaming was a meaningless reflex reaction. This mistaken understanding of human babies came out of an anthropocentric, patriarchal and brain-centred arrogance that still persists in many mouldy old corners of Western science and philosophy. Its legacy is not only a continuing issue in ethics, spirituality and health care, but extends into legal and cultural definitions of humanity, and of life itself. It is at the heart of the debate about animal intelligence, sentience and welfare (when that debate is not just quietly ignored for the purpose of economics and convenience). It was one of the foundations of several generations of advice to "let the baby cry itself to sleep, because (a) the crying is meaningless, and (b) it's good for its character / it won't be 'spoilt' ". Anyone who has carefully observed babies and really "listened" to them will tell you – right from the time of birth they exhibit both consciousness and intelligence, and only lack in the means to communicate using a spoken language. In fact, they have heard spoken language during the entire gestation period, and already possess a rudimentary linguistic understanding at birth. So if one speaks simply to a baby and then pauses (allowing their relatively unconnected brain to calculate what it has experienced) they very often demonstrate comprehension and respond in context. And a baby can learn, understand – and use! – a couple of hundred sign language gestures at just a few months old when their brain is definitely not wired like an adult. So – at what level does intelligence arise? And by what medium is it propagated and acted upon?

Having lived with a dog for 10 years, I can confidently state that dogs are intelligent and conscious/sentient, in all meanings of the words. In particular, spacial/geographic and social memory is very difficult to reconcile with a view of animals being pseudo-aware automatons. The more that animal behaviour is studied further convinces us that many animals are intelligent – and conscious. Corvids (the crow family) are well known for their intelligence[34]. They are one of many non-human species (including elephants, apes and octopus) that can make and use tools. This tool-using and tool-making capacity requires that the "mind" (whatever that is[35]) processes a model of the world based on analogies. Which is in turn a necessary prerequisite of a structured language. Parrots (particularly Grey parrots) are even capable of learning up to a few hundred words of human language and then using them to tell contextually accurate jokes, indicating a level of understanding that cannot be explained away by "instinct". Dolphins (and all cetaceans) exhibit substantial intelligence and a capacity for playful socialisation and bonding – two other behavioural traits (creative/recreational play and complex social grouping) that we tend to associate with consciousness and emotional intelligence.

To what shall I liken the world?
Moonlight, reflected
In dewdrops, Shaken from a crane's bill.

– Dogen

And it's not just warm blooded creatures. Fish and other sea creatures exhibit complex behavioural patterns that cannot possibly be "programmed", such as the mating and reproductive behaviours of seahorses, zebra fish and lamphreys[36] and the profound intelligence of octopuses[37] (working with "only" half a million nerve cells, half of which are distributed in their arms). And termites exhibit communal intelligence as they construct homes that might extend down to 100 metres to intersect a desert water table – and which rely on a sophisticated passive solar ventilation system. As we gradually go to more and more (so-called) primitive life forms, we continue find behaviours that are almost impossible to account for without some nod towards consciousness[38]. Meanwhile, research continues to be carried out that assumes "it's all neurology" – such as the paper reporting that the complex behaviour of a snail is controlled by two neurons[39]. This, by the way is an animal that can find its way back "home" when moved up to 10 metres, and maybe even up to 30 metres[40]. But when one starts to consider single celled organisms, or acellular organisms with no neural structure such as slime moulds being able to navigate their environment, it becomes necessary to ask questions. In the early soup from which life emerged[41], who knows how the smallest of lifeforms detected the state of their environment – how they *perceived* the world through which they moved.

> *THE VALLEY WAS in the shadow, and the setting sun touched the faraway mountain tops; their evening glow seemed to come from within. To the north of the long road, the mountains were bare and barren, exposed by the fire; to the south, the hills were green and heavy with bushes and trees. The road ran straight, dividing the long and graceful valley. The mountains on this particular evening seemed so close, so unreal, so light and tender. Heavy birds were circling effortlessly high in the heavens. Ground squirrels were lazily crossing the road, and there was the hum of a distant airplane. On both sides of the road were orange orchards, well ordered and well kept. After the hot day the smell of purple sage was very strong, and so was the smell of sunburnt earth and hay. The orange trees were dark, with their bright fruit. The quail were calling, and a road-runner disappeared into the bush. A long snake-lizard, disturbed by the dog, wriggled off into the dry weeds. The evening stillness was creeping over the land.*[42]

Attention

Attention is one of the main ways in which the sensory system – and therefore more non-conscious parts of the body-mind complex - can be accessed and altered by conscious intention. Its importance therefore cannot be over-stated.

Attention is more of less defined by – on what part of the total information available to us do we place our mind.

Intuition

The word "intuition" is used as if the process of intuition is mysterious and “irrational”, with the general 20th century attitude being that men are rational whereas women are irrational (and use their intuition). The whole attitude is yet another aspect of the patriarchal tendencies in Western society, the way that this society has distanced itself from the body, the way we have placed a neo-Aristotlean objectivity atop of a rarefied pedestal, and stopped observing internal (somatic) and even cognitive processes in any kind of subjective detail.

Subjectively (and surely careful and orderly subjective observation is the only way to assess internal processes?) - intuition is a lot of very different things that are bundled carelessly, perhaps fearfully together into a single package. Firstly, the very foundation of intuition is that it is inherently bound to the sensory system, is (possibly among other things) an integrative sense. It comes from somewhere quiet and non-cognitive, and so occurs very much “out of the corner of the eye”, and usually disappears like morning mist when subject to the full light of critical rational attention. We have already looked at these issues when discussing synaesthesia and attention, and just like extreme peripheral vision, intuition arises from some place or places where subtle sensory information is collated and integrated and a meaning “more than the sum of the parts” arises.

There are several quite distinct kinds of intuition which nevertheless may be overlaid on each other and rise into consciousness in similar ways. Intuition exists at the shoreline where mental processes and thoughts, feelings (as in emotions), somatic information (internal/interoceptive body sensations) and even external senses mingle together, and as such its position in conscious awareness is no different from conscious presence.

Just like survival issues, intuition may be a knowing something useful, or may be a foreboding, and its general emotive/interoceptive ground reflects those. So beneficial intuition tends to have a mild accompanying feeling somewhere within the colour palette of joy, expectation, engagement, brightness, expansiveness, energisation, pleasure,

peacefulness – the sum total of which may also include a "knowing" either without knowing how one knows, or with an increasingly clear awareness of which (known) senses are providing the information. As a long-term user of intuition, I can also say that usually there is a clear distinction between this "knowing" and wishful thinking, but that the process is so subtle and ephemeral that the slightest doubt and analysis can completely lose it or distort it. Either one believes the internal information, or not. Noticing, recognising and logging intuitive information as being of importance is a state of mind that can either be cultivated or rejected. Recognising the information as it arises (and discriminating it from wishfulness) is a skill that can be developed with use.

Most people are more familiar with the "danger" kind of intuition – a sense of apparently irrational fear or anxiety. Perhaps the hairs on the back of the neck stand up. There may be an onset of unease, wariness, apprehension or dread that has no discernable boundary in the spectrum of mental state that includes paranoia. There may also be a discomforting feeling of *not* knowing something of importance, or of something being missing. I remember waking up with such a feeling many years ago. After standing at the bedroom window looking out into the night for some very tense minutes, I realised that the "wrongness" I felt was actually unaccustomed silence in the railway sidings behind my house – silence because the continuous clanking and banging that had become a normalised part of the sounds around the house were absent because of a rail workers strike.

Common traits of intuition include :

- "knowing", which *may* also include some degree of inner vision or "seeing" in the mind's eye. This doesn't have to be a bright technicolour full HD immersive experience, and is usually more of a quick image that comes and goes. Once one has learned to trust these brief images, some discrimination also becomes possible that
- a sense of rightness (or wrongness)
- a non-cognitive self-movement. These can be very fast because they do not have to go through the cortex, and martial arts training includes development of automatic "instinctive" movements
- a "pull" to go in a certain direction, or a sense of the direction from which danger is coming

It's fitting that intuition/instinct is the last topic covered by this review of the sensory system, because of its inherently integrative nature. In the end we don't really need to

know how we know, or which sense is telling us something – we just need to have some trust in the sensory system and a familiarity with how it conveys useful information to us... Hence the VKA system, which points out that – regardless of which senses the information is arriving in, we all have internal preferences for how we best receive that information. Any careful analysis of everyday sensory experiences reveals that multiple senses are operating all the time, and most experiences are multisensory, even if we don;t recognise them as such because of the lackadaisical way the senses are usually engaged with.

Most importantly for the purposes of this book, I urge you to reflect on the fact that almost every sensory experience – whether it is external or internal – has a "where" as well as a "what", also includes a qualitative ground of mental-physical "presence" upon which the "signal" is overlain; and every conscious sensory experience (i.e. things we pay attention to) invokes a consequential interoceptive response.

Notes : Chapter 4.1

1 James Barnes (21 February 2023) The space between us | In order to understand and heal mental distress, we must see our minds as existing in relationships, not inside our heads https://aeon.co/essays/how-the-interpersonal-model-explains-and-heals-mental-pain

2 Badde, S., Myers, C.F., Yuval-Greenberg, S. et al. (2020) Oculomotor freezing reflects tactile temporal expectation and aids tactile perception. Nat Commun 11, 3341. https://doi.org/10.1038/s41467-020-17160-1 and at https://neurosciencenews.com/eyes-touch-16611/amp/

3 Patrick Süskind (2010) Perfume: The Story of a Murderer (Penguin Essentials) Paperback. 272 pp ISBN-13: 978-0141041155

4 https://www.psy.ox.ac.uk/research/crossmodal-research-laboratory

5 Spence, C (2015) Multisensory flavor perception. Cell 161 (March), pp24-35 doi:10.1016/j.cell.2015.03.007

6 Ruby Deevoy (2018) Feed your senses, in Breathe Magazine, issue 13 pp38-39. ISSN 2397-9747

7 The Bohm–Krishnamurti Project: Exploring the Legacy of the David Bohm and Jiddu Krishnamurti Relationship. A series of 10 seminars at Oak Grove School, Ojai, California. http://bohmkrishnamurti.com/bohm-consciousness-seminars/

8 Richard E. Cytowic (2003) The Man Who Tasted Shapes (A Bradford Book) Paperback, 296 pp ISBN-13: 978-0262532556

9 John Harrison (2001) Synaesthesia: The Strangest Thing. Publ. OUP Oxford ISBN-13 : 978-0192632456

10 John O'Donohue (1997) Anam Cara. Publ. Bantam. 281pp hardback ISBN: 0593-042018 (poem from page 105)

11 Pert, Candace B (1997) Molecules of Emotion: Why You Feel the Way You Feel. Publ. Scribner. ISBN: 0684831872

12 Think Twice: How the Gut's "Second Brain" Influences Mood and Well-Being : The emerging and surprising view of how the enteric nervous system in our bellies goes far beyond just processing the food we eat. By Adam Hadhazy Scientific American, February 12, 2010. Available online at http://www.scientificamerican.com/article.cfm?id=gut-second-brain

13 Michael Gershon (1998) The Second Brain : The Scientific Basis of Gut Instinct and a Groundbreaking New Understanding of Nervous Disorders of the Stomach and Intestines. ISBN: 0060182520

14 Michel Le Van Quyen (2003) Disentangling the dynamic core: a research program for a neurodynamics at the large-scale. Biological Research 36, pp67-88, Available online at http://www.scielo.cl/pdf/bres/v36n1/art06.pdf

15 Konstantin Lidin (2021) Emotions as experiences of information flow. Academia | Letters April Article 651. https://doi.org/10.20935/AL651

16 http://atlasofemotions.org/

17 Kragel PA, Knodt AR, Hariri AR, LaBar KS (2016) Decoding Spontaneous Emotional States in the Human Brain. PLoS Biol 14(9): e2000106. https://doi.org/10.1371/journal.pbio.2000106

18 Lauri Nummenmaa, Riitta Hari, Jari K. Hietanen & Enrico Glerean (2018) Maps of subjective feelings. Proceedings of the National Academy of Sciences Sep, 115(37) pp9198-9203; DOI: 10.1073/pnas.1807390115 https://www.pnas.org/content/pnas/115/37/9198.full.pdf

19 Mary Oliver (2004) Wild Geese – selected poems. Bloodaxe World Poets Series, No. 2 ISBN-13: 9781852246280 ... and to hear

Notes : Chapter 4.1

Mary Oliver reading this poem see https://www.youtube.com/watch?v=lv_4xmh_WtE

20 This close visual focus ready for combat seems to be very hardwired into the capacity to feel and express the emotion of anger. It is very difficult to remain truly angry if the focus of the eyes is directed to a distant object, or the eyes are de-focussed.

21 When Anxiety Won't Go Away (Science Daily) http://www.sciencedaily.com/releases/2012/07/120706105430.htm : a summary of Andras Bilkei-Gorzo, Susanne Erk, Britta Schürmann, Daniela Mauer, Kerstin Michel, Henning Boecker, Lukas Scheef, Henrik Walter, and Andreas Zimmer. Dynorphins Regulate Fear Memory: from Mice to Men. The Journal of Neuroscience, 4 July 2012, 32(27):9335-9343; doi: 10.1523/jneurosci.1034-12.2012

22 The Chinese "**Five** Elements" of Metal, Wood, Earth, Water and Fire are a description of a cycle of **processes** (rather like the hydrologic cycle – evaporation, dispersion, condensation, rain, flow in rivers, settling in the sea/lakes). In contrast, the system of *four* elements (or humours) more familiar in Western culture is a set of ingredients that combine together in different proportions, rather like the way that the basic ingredients sugar, flour, eggs and fat can be combined in a myriad of different ways to produce scones, angel cake, sourdough bread, puff pastry, pancakes, waffles, and many other traditional foods. The Five Elements are given a (necessarily very brief) consideration in the Appendix, because they crop up experientially during interoception; and can be a useful tool to navigate and understand some somatic experiences.

23 I deliberately did not use "... acted the gesture ...", because when the memory activates fully there is non sense at all of anything being "acted" (as in "made-up"). The gesture may be *approached* through mimicry, but at a certain point "something" takes over.

24 Where Love has Lived, from John O'Donohue (2004) Divine Beauty: The Invisible Embrace. Publ. Bantam ISBN-13: 978-0553813098 https://johnodonohue.com/store

25 Richard Epworth (2013) Bottleneck – Our human interface with reality: The disturbing and exciting implications of its true nature. Kindle Edition. 414pp Publ. Goforich Publications. ASIN: B00H2RE7I0 Also available in paperback http://www.humanbottleneck.com/

26 Eckhart Tolle (2001) The Power of Now: A Guide to Spiritual Enlightenment. Publ. Yellow Kite 192pp ISBN-13: 978-0340733509

27 For instance, it has recently been found that the gestation period of many insect-eating birds lengthens and shortens according to decreasing or increasing ambient temperature. The key is that the chicks must hatch at the correct time so that there is maximum food availability, and insect development is affected directly by temperature (possibly itself being driven by temperature-related changes in plant growth). One example of this is in Cresswell, W. and Mccleery, R. (2003), How great tits maintain synchronization of their hatch date with food supply in response to long-term variability in temperature. Journal of Animal Ecology, 72: 356-366. doi:10.1046/j.1365-2656.2003.00701.x

28 Evelyn Glennie (May 14, 2007) How to truly listen | TED https://www.youtube.com/watch?v=IU3V6zNER4g&feature=share

29 Tardigrades (or water bears) are about half a millimetre long, and are amongst the hardiest living organisms known, being able to withstand compete dehydration, and even some minutes exposure to the deep vacuum and high ultraviolet levels of outer space. They eat bacteria and other smaller tardigrades, and are important pioneer species in water habitats.

30 Giuseppe Sant'Ambrogioa, Hirokazu Tsubone & Franca B.Sant'Ambrogioa (1995) Sensory information from the upper airway: Role in the control of breathing. Respiration Physiology (Fronteirs Review) 102(1) October, pp1-16 https://doi.org/10.1016/0034-

5687(95)00048-I

31 Schwartz, A. B. (2016). Movement: How the Brain Communicates with the World. Cell, 164(6), 1122–1135. http://doi.org/10.1016/j.cell.2016.02.038

32 Hermundur Sigmundsson, Leif Trana, Remco Polman & Monika Haga (2017) What is Trained Develops! Theoretical Perspective on Skill Learning. Sports 5(2), PP38-49; https://doi.org/10.3390/sports5020038

33 In which case one has to question whether the individual senses – sight, temperature, etc – have any meaning outside the capacity do derive meaning, and it is the higher interpretative levels (such as a sense of safety) that are our true senses.

34 Esther Woolfson (2009) Corvus: A Life With Birds. Publ. Granta Books, Paperback, 352pp ISBN-13: 978-1847080806

35 When considering that other creatures may have a conscious "mind", care must be taken to not assume this is how your mind works. There are vast differences between humans who use different language structures, so to imagine the processes of an animal that has a different physical form is pretty well impossible. Experiencing that may not be impossible ...

36 One of the most primitive of vertebrates, sea lamphreys swim up to a hundred miles inland up freshwater rivers to lay their eggs. Two males accompany a female. When they reach a suitable site, they will dig a hole about two feet in diameter and up to one foot deep – if any stone is too big for one of them to move alone, they will cooperate to move it. Once the eggs are laid, all the material is replaced, and the adults swim back to the sea.

37 http://www.bbc.com/earth/story/20160527-eight-reasons-why-octopuses-are-the-geniuses-of-the-ocean

38 I have observed a family of house spiders for about 10 years, and despite them occasionally eating each other when food is scarce, they show distinct social behaviour. The matriarch gave birth again recently. For almost two months she held a ball of web-silk containing several dozen babies smaller than the eye can distinguish lightly in her jaws. Once they reached sufficient size – about a millimetre across their leg span – the babies swarmed out onto a specially constructed nursery web, so they they rested eqidistant from each other and all within about an inch of the mother. During this period, the previous generation of youngsters made regular trips to visit, each then returning to their particular corner of the room.

39 Snails use 'two brain cells' to make decisions, Sussex University discovers – BBC news story http://www.bbc.co.uk/news/uk-england-sussex-36443264 and the original paper is Crossley M, Staras K & Kemenes G (2016) Nature Communications 7, Article number: 11793 doi:10.1038/ncomms11793

40 http://www.bbc.co.uk/radio4/features/so-you-want-to-be-a-scientist/experiments/homing-snails/results/

41 In the Hoyle–Wickramasinghe model of **panspermia**, life began in interstellar space. Microbes were found in the almost non-existent atmosphere 41 kilometers above the surface of the Earth in two sampling experiments carried out in 2001 and 2005, including three species that had never been seen before. However this still left the unanswered question as to whether these had come up from the Earth or had fallen from space. We already know that the building blocks of life exist almost everywhere in outer space. And there are identifiable simple/bacterial life forms (*extremophiles*) that can survive in a full vacuum, temperatures as low as 1ºKelvin (-272ºC), and the destructive forces of ultraviolet radiation. Bacterial spores 40 million years old have been found to be "viable" (i.e. they come to life in the presence of water and food). There are even complex life forms (*tardigrades* or "*water bears*", a creature up to 0.5mm long genetically related to Arthropods and Nematodes) that can survive these extremes for minutes

or days. Their extreme hardiness means that *extremophiles* and *tardigrades* are pioneers, entering new environments, altering them and creating a proto-ecology.

42 Krishnamurti (1956) Commentaries On Living Series I Chapter 12 'Experiencing' : found online (with all of Krishnamurti's texts) at http://www.jiddu-krishnamurti.net/en/commentaries_on_living_series_1/1956-00-00_commentaries_on_living_series_i_chapter_12_%27experiencing%27.html