Prologue

This is the fourth of four linked articles that deal with various aspects of human health and Well-Being in the context of Autogenic Training. We all experience various ups and downs in life, and one of the purposes of meditative approaches such as Autogenic Training is for us to develop skills to deal with these.

The four linked articles are:

I. B21: Stressors and the Stress Response – background reflections. This paper deals with the dynamics of the Stress Response and updates some of the concepts discussed previously [Ross 2010 E2].

II. B22: A playfully sympathetic approach to the Polyvagal Theory: An introduction to Flourishing Autogenically. This is a brief introduction to the Polyvagal Theory that links our Social Engagement system with nurturing, CARE, PLAY and Well-Being. This forms a prelude to B23.

III. B23: Flourishing Autogenically – Pathways to Well-Being and Feeling Safe Whatever our Background – and embracing some PTSD dynamics.
   o This article goes into the Polyvagal Theory more deeply than B22, and includes quite extensive discussions regarding the dynamics and some treatment options in Post-Traumatic Stress Disorder.

IV. B24: Autogenic Switches and Well-Being. This, the present article, deals with some of the underlying dynamics that can facilitate balance and harmony in those regularly practising mindful / meditative approaches such as Autogenic Training.
   o The paper brings together some fundamental concepts of Autogenic Training based on the work of Schultz, Luthe, Luis de Rivera and Micah Sadigh.

Contents /

Thanks to Michael Ross and Annie Sturgeon for their most helpful proof-reading, comments, and suggestions; and to my wife Bernie for all her support, friendship, and being.
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Notation:

As with other articles in this web series, terms included in the glossary are notated (when first introduced in the text) thus.
1. Introduction

We can look at the fundamental changes that can come about through Autogenic Training in terms of three crucial switches within our neuro-physiology and body-mind continuum that facilitate Well-Being. These are all in line with the work of Richard Davidson and what he sees as four central themes in Modern Neuroscience relevant to Well-Being [Davidson 2012; 2018; and the web article F3-A: Some underlying neuro-physiological principles of change].

Schultz, in his original work in developing Autogenic Training (AT), indicated that the profound changes that can come about with the regular practice of the Standard Autogenic Exercises are as a result of a psycho-physiological shift – Umschaltung – [Luthe & Schultz 1969 p 1], which he named “the autogenic switch” [de Rivera 2018 p 60, and now known as the First Autogenic Switch].

Subsequently, Luthe proposed a further significant neuro-physiological change in terms of the two cerebral hemispheres. Often, in the modern world, communication between them is not good (hemispheric discordance), and AT can bring about increased cerebral hemisphere concordance (coherence) – resulting in improved and wholesome communication between the left and right hemisphere. Luis de Rivera calls this the Second Autogenic Switch [de Rivera op cit. p 60].

In this article, we will be examining the underlying neuro-physicsology of these two switches, and, in Section 8, suggesting a Third Autogenic Switch, that arises as a result of regular Autogenic Training / meditative approaches. This is essentially a switching on of nine basic Pre-Frontal Cortex functions [Siegel 2007] that are crucial for the well-being of ourselves and others. The rationale for this third switch is based on a number of studies supporting this thesis, and some of these are discussed in Section 8.1 to 8.5 of Section 8 – and these are of a somewhat technical nature. The essence of this third Autogenic Switch can, however, be found, by directly moving on to Section 8.6. I swithered as to whether or not to keep 8.1 to 8.5 in, and then decided that as it gives a significant research basis for the proposal of a third switch, it does form an integral part of this article.

Taken together, these three switches facilitate positive social engagement and the qualities of Jen and Ubuntu.

2. A brief resume of the Stress Response (for a more detailed summary, please see companion article B 21).

Stressor: the physical (e.g. heat; cold), chemical (e.g. ether / poison), or psychological (e.g. ruminating on an unresolved problem / previous trauma) that sets in motion the Stress Response.

Stress Response: the physiological changes that are activated by the stressor. This involves:

I. the Type I Response involving the activation of the Sympathetic Nervous System (SNS) with the release of adrenaline (catecholamines) from the Adrenal Medulla, and

II. the Type II Response¹ involving the pathway that results in the secretion of cortisol from the Adrenal Cortex. In technical terms this is the Hypothalamic Pituitary Adrenal Cortex Cortisol (Hy-PACC) pathway.

¹ The notation of Type I and Type II Stress Response comes from Ross 2010.
It is particularly the persistent activation of this Type II Cortisol pathway that causes damage, ill health and disease [Henry 1987; Sapolsky 2007].

**Homeostasis**: the inbuilt dynamics of living organisms to return to a stable state following a significant stressor (e.g. being chased by a bear and getting away!). It is helpful to distinguish this from Allostasis.

**Allostasis**: An overlapping concept is that of Allostasis, which is discussed in companion article B 21, as is Allostatic State and Allostatic Load. When stressors persist, Allostasis (a balanced system) moves into the un-balanced **Allostatic Load**, which overlaps with the Chronic Stress Response (see below) and dis-ease ending up as pathology – i.e. disease [Ross 2010 pp 43-96].

➢ Some authorities now prefer the term Allostasis to Homeostasis.

**Historical Note:**

Hans Selye identified the Type II response [Ross 2010] during the 1930s, and his research indicated that a recurrent Stress Response would produce disease. He saw the Stress Response as an adaptive response to the stressor, and so protective to the animal / person. He surmised that damage occurred when the secretion of stress hormones became exhausted and ceased.

➢ Later research indicated that this was not exactly correct. In chronic stress, the cortisol levels become permanently elevated, and in this situation the cortisol itself becomes toxic to the body.

➢ “The poison is in the dose” – (Paracelsus 1493 –1541).

See also Ross 2010 p 55

### 3. The Stress Response and Autogenic Training

Persistent stressors can result in imbalance within us – that can be damaging. In effect, the stressors cause a physiological shift in body systems (e.g. permanently elevated cortisol levels), and this results in mental and physical distress / disease.

All humans experience the ups and downs of life. However, research indicates that it is not primarily the stressor itself that is the problem, but rather how we react to that stressor [Sapolsky 2007 p 606²]. For example, if we see ourselves as helpless and / or the victim, then this will send cascades of neuro-chemicals throughout the body which in this context are toxic. This means that the stressor is not the only factor; the other crucial factor is our response to a given stressor [Sapolsky 2007; Ross 2010; Sadigh 2019]. Micro-organisms that cause infections can of course be stressors, and in this context Claude Bernard said: “Disease is more than the presence of microorganisms. For disease to grow, the terrain of the body must be ready.” [Quoted by Sadigh 2020]. Extrapolating from Bernard, we can say that it is “Le milieu intérieur” that determines our

---

² Robert Sapolsky actually says: “Overwhelmingly, it is psychological rather than physiological stress, which activates the stress response chronically enough to have disease consequence.” The stressor may be an external event (such as having to work overtime – e.g. over a week-end). However, it is our response to the external situation that is critical. If we feel a victim, if we feel not in control [Ross 2010 p 64; Kivimäki et al 2002; Karasek 1970; 1979; 1988 – also known as Karasek-Theorell model], if we are negatively ruminating about the matter, these are all internal psychological dynamics that can result in allostatic load with the associated increased activity of the Hy-PACC pathways.
response to the stressors of life, the ups and downs of life. This internal milieu we can change by mental training, such as Autogenic Training, and thereby increase our resilience [see also Graham 2018; Southwick & Charney 2018 /2020].

Autogenic Training (and other forms of mental training / meditation) bring about a re-balancing of the body, and what Schultz terms the psycho-physiological shift [Schultz 1932-1987; Luthe & Schultz 1969 Vol 1]. That is, the regular practice of the AT Standard Exercises changes our body state (internal milieu) through the psycho-physiological shift, and thus acts as an anti-dote to stressors.

In this article we will be looking at some of the ways that Autogenic Training brings about these profound psycho-physiological shifts.

4. The psycho-physiological shift (the First Autogenic Switch)

The Autogenic Standard Exercises facilitate a switch from the Stress Response (SNS and the Hypothalamic Pituitary Adrenal Cortex pathway that releases Cortisol) to the Rest, Repair, and Recuperation of the Para-Sympathetic Nervous System – (technically the Ventral Vagal PSNS\(^3\)). This has been termed the psycho-physiological shift [Luthe & Schultz 1969 Vol 1 p 1]; and in de Rivera’s notation the First Autogenic Switch [de Rivera 2017 /2018]. i.e.:

a) Mental focus on the AT exercises results in  
b) Increased VV PSNS activity and  
c) Reduced SNS / Hy-PACC activity [see, for example, Gaete 2016; Creswell 2014].

The physiological shift is mediated through a) and b) above. These dynamics are depicted schematically in Figure 4A.

---

3 **VV-PSNS**: this is the Ventral Vagal PSNS associated with Social Engagement, embraced in the Polyvagal Theory [Porges 2011; see also B22 & 23]. Porges’ Polyvagal system is discussed in more detail in companion articles B22 and B23. The Myelinated VV-PSNS is to be distinguished from the (unmyelinated) Dorsal Vagal (DV) PSNS associated with, amongst other things, the freeze response (Fear Paralysis).
Schultz also called this the Autogenic Switch [de Rivera 2018 p 60]. Figure 4A gives the basic outline of this First Switch. However, other dynamics are axiomatically involved, and these include:

- Reduction in FEAR\(^4\) (anxiety) circuits
- Reduction in RAGE (anger) circuits
- Increase in positive Social Engagement circuits [Porges 2011]
- Increase in activity of CARE circuits and feeling safe, and associated
- Increase in oxytocin and endorphins.

We can also see all of these changes in terms of the normalisation [Sadigh 2020\(^5\)] of the Autonomic Nervous System with the re-establishment of VV PSNS dominance and a feeling of internal safety [Porges 2012; Barrowcliff 2019].

These dynamics are illustrated in Figure 4B.

The psycho-physiological switch can also be seen in terms of a *physio*-psychological shift. Our Autonomic Nervous System is constantly sending (afferent) messages from the body to the brain, to let the brain know what the state of the body is. Disturbed physiological states of the body can of course result in us feeling disturbed / distressed; on the other hand, settled states of the body will be fed back to us with the message that the body is calm. These perspectives are illustrated in Figure 4C Part I and II on page 8.

---

\(^4\) Using Panksepp’s notation

\(^5\) See Relaxation Response Part II and Part III for a further discussion on Micah Sadigh’s perspective on this.
Neuro-science and related matters
Autogenic Switches and Well-Being

Figure 4C Part I
SNS pathways to Brain when feeling not at ease /tense (e.g. prior to AT Session)
The activation of these pathways gives us the information that the body is in an alerted state; this may feel very uncomfortable.
This can be our state prior to an Autogenic Sequence

“All in the periphery is not settled”
Wallnöfer 2000 Adapted!

Figure 4C Part II
VV PSNS pathways to Brain following AT Standard Exercise Session
The activation of these pathways tells us that all in the body is calm and settled; so we feel settled, safe and in harmony.
This can be our usual state following an Autogenic Standard Exercise Sequence

“All in the periphery is quiet”
Wallnöfer 2000

Figure 4C
The Physio-Psychological shift in term of Autonomic Nervous System Afferents (ANS)
For further details of these ANS pathways, please see Sections 4 to 6 of the companion article:
E-O3: Look at the Cypress Tree – Autonomic Afferents and Well-Being

***    ***    ***

Before moving on to the Second Autogenic Switch (Section 7), we will consolidate our understanding of AT dynamics in the following two sections:
❖ 5. AT, the Relaxation Response, normalisation, and Amplified States of Consciousness and:
❖ 6. Cerebral Hemisphere Dynamics.
5. AT, the Relaxation Response, normalisation, and Amplified States of Consciousness

5.1 General Considerations and normalisation of ANS

Autogenic Training, as discussed above, is associated with the Relaxation Response – and the associated increase in (myelinated) VV PSNS activity [Porges 2012; 2017 – see also Polyvagal Theory]. It may though be more helpful to see AT in terms of the normalisation of a disturbed Autonomic Nervous System – i.e. and ANS that is in disharmony. Micah Sadigh considers the term Relaxation Response to be somewhat of a misnomer, as there is marked activity within the cells of our body during this “Relaxation Response”, that is allowing the cells to restore, repair, and heal themselves. He therefore uses the term normalisation of the ANS, in preference to the Relaxation Response – for a further discussion on this, please see Part II and Part III of the Relaxation Response in the glossary.

The Autogenic Switches also lead to an Amplified State of Consciousness Induction (ASCI) that Luis de Rivera explores in his Autogenics 3.0. In this context it may be helpful to see the development of AT in three phases, summarised in Figure 5.1:

<table>
<thead>
<tr>
<th>Version</th>
<th>Creator / author</th>
<th>Method / underlying principle</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Schultz</td>
<td>Autohypnosis; Passive Concentration</td>
<td>Relaxation</td>
</tr>
<tr>
<td>2.0 Autogenic Therapy</td>
<td>Luthe</td>
<td>Passive Acceptance</td>
<td>Neutralisation</td>
</tr>
<tr>
<td>3.0 Autogenics 3.0</td>
<td>de Rivera</td>
<td>Meditation</td>
<td>Self Development, embracing the Amplified State of Consciousness Induction</td>
</tr>
</tbody>
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Adapted from de Rivera 2018 p 17

Figure 5.1

Some basic concepts embraced in the development of Autogenics 3.0

Imported from Figure 3 of F1 on web: “A general introduction to Autogenics 3.0”, which discusses these dynamics further

In general terms, we can say that Autogenic Training facilitates the Relaxation Response [Benson 1975]. A helpful outcome of this for some is that disturbed sleep patterns may be improved [Robinson, Bowden, & Lorenc 2010].

However, the essence of mindfulness practice and meditation type disciplines is not to fall asleep, but rather to enter into a heightened state of consciousness, described as an Amplified State of Consciousness. Luis de Rivera over the years became interested in forms of mental training that induce this state, and these are now classified under the umbrella term: “Amplified States of Consciousness Induction” Therapies [ASCI for short – de Rivera 2018]. Prof. de Rivera states:
..... with the invaluable collaboration of Dra. Ryes Trujillo, we conducted an extensive comparative study on the psychological effects of different meditation methods. By and large, we demonstrated that the subjective phenomena produced or perceived in those states were substantially similar. The most significant differences were related to the experience of the meditator, regarding years and frequency of practice, rather than to the technique applied.

In an international meeting of psychotherapy in Switzerland, our research group suggested the general umbrella name of “Amplified States of Consciousness Induction Therapies” (ASCI Therapies, for short) to facilitate comparative studies of the interesting number of therapies using meditation methods.

de Rivera 2018 pp 16-17

5.2 The Relaxation Response associated with sleepiness

The implications of the above discussion are that the purpose of Autogenic Training is not, per se, to induce the Relaxation Response, but rather to regularly induce an Amplified State of Consciousness, through which self development and growth flourish. This does not mean that if we carry out an AT session and fall asleep, that is wrong; rather, that this is not the main purpose of AT. Let me give an example.

For decades, in the early afternoon, I often have a brief siesta – of five to ten minutes and awaken refreshed⁶. If I have limited time (such as seeing a patient within half an hour so so) or am feeling a little stressed, this often does not work – i.e. I do not fall asleep. However, on such occasions, if I do an AT sequence in a horizontal position, I often drift off briefly.

The result is that I subsequently feel refreshed and ready for the afternoon’s work. However, as indicated above, while this is an at times beneficial effect of AT, yet not its raison d’être. A physiological change of state has certainly occurred, and in this sense the First Autogenic Switch has been activated. We can distinguish two modalities of this first switch:

Mode A. The Amplified State of Consciousness induction [de Rivera 2018], and
Mode S. A secondary effect of the Relaxation Response, sometimes welcome, that induces a soporific / sleepy state. These are depicted in Figure 5.3 below.

5.3 First Autogenic Switch in summary /

⁶ As a child, I remember my father often did this; and at the time I was quite perplexed as to why anyone should need to do this. Only later did I find that such a siesta also worked very well for me!
5.3 First Autogenic Switch in summary.

Autogenic Training can induce calm and alert feelings; and it can also induce sleepiness (and falling asleep). Such sleepiness can be an indication that the SNS side of the ANS has been switched off – and the VV PSNS activated.

➢ This sleepiness, and inducing sleep, is an indication of the activation of the First Autogenic Switch (Mode S). It may also indicate that we are short of sleep.

However, as already mentioned, the essence of AT is not to induce sleep, but rather induce an Amplified State of Consciousness [de Rivera 2018 p 17]. In order to distinguish this from Mode S above, we call this Mode A of the First Autogenic Switch, and this is associated specifically with:

- Amplified State of Consciousness Induction
- Positive Social Engagement states [Porges 2011]
- Nurturing / CARE circuits [Panksepp 1998]
- Potential activation of PLAY circuits [Panksepp 1998]

Figure 5.3 indicates these dynamics

<table>
<thead>
<tr>
<th>First Autogenic Switch</th>
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<tbody>
<tr>
<td>Mode A</td>
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<tr>
<td>Mode S</td>
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</tbody>
</table>

Figure 5.3
Modes of the First Autogenic Switch

*** *** ***

Subsequently, Luthe described a Second Autogenic Switch, and this relates to improved communications between the two hemispheres. Before moving on to this Second Switch, we will review some basic aspects of our two cerebral hemispheres.

6. Cerebral Hemisphere Dynamics /
6. Cerebral Hemisphere Dynamics

6.1 Introduction:

Well-being and harmony are enhanced when our two cerebral hemispheres are communicating with each other (through the corpus callosum). Poor communication between the two sides can lead to feelings of distress – often associated with cognitive dissonance. Stressors that lead to such poor communication include:

i. Adverse childhood events
ii. Traumatic events
iii. Unresolved emotional issues
iv. Education pressures (for example, exclusively towards analytical/rational/verbal type functions).

Figure 6.1A
Types of Stressor that can impair the function of one or both hemispheres

Many of us coming to Autogenic Training may have experienced one or more of the above. This can lead to hemispheric discordance [see, for example de Rivera 2018 pp 166 – 170]. These dynamics are shown schematically in Figure 6.1B.

Notes on Figure 6.1B (1.11A)

i. In this example, the Left Brain is functioning satisfactorily – indicated schematically by the vertical blue arrowed line.
ii. However, the Right-Brain is not functioning appropriately; there is dis-equilibrium within the dynamics of the Right-Brain functions, and the processes are themselves inhibited.
iii. There is, in addition, a block in the normal two-way communication between the two hemispheres – symbolically represented by the two vertical red lines.
Such blockage in communication between the two hemispheres is the cause of much human distress.

### 6.2 Hemispheric Specialisation

For several decades it has been known that the two hemispheres of our brains each carry out distinctly different, yet vital, functions. Figure 6.2 below summarises some of these differences:

<table>
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<tr>
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<th><strong>RIGHT HEMISPHERIC FUNCTIONS / DYNAMICS</strong></th>
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<td>Non-verbal</td>
</tr>
<tr>
<td>Language related</td>
<td>Visio-spatial</td>
</tr>
<tr>
<td>Linguistic matters</td>
<td>“Spacio-cognitive maps”</td>
</tr>
<tr>
<td>Greater language acquisition ability</td>
<td>“Contextual understanding of meaning” *;</td>
</tr>
<tr>
<td></td>
<td>Metaphor**</td>
</tr>
<tr>
<td>Sequential / serial / linear type processing</td>
<td>Simultaneous / in parallel type processing</td>
</tr>
<tr>
<td>Temporal ordering</td>
<td>Present-moment centredness</td>
</tr>
<tr>
<td>succession; duration; causality</td>
<td>timeless perspective</td>
</tr>
<tr>
<td>(Ornstein 1977?)</td>
<td>(Lee 1973)</td>
</tr>
<tr>
<td>“clock perspective”</td>
<td>non-clock (time) perspective</td>
</tr>
<tr>
<td>Analytical</td>
<td>Synthesis type abilities</td>
</tr>
<tr>
<td>Rational</td>
<td>Intuitive</td>
</tr>
</tbody>
</table>
| Particularly suited to “scientific” rational type perspectives – which can become reductive if not linked with Right Hemisphere dynamics
|                                          | Holistic                                   |
|                                          | Ability to grasp patterns of relationships |
|                                          | Gestalt;                                   |
|                                          | Preferentially processes unconscious       |
|                                          | dynamics                                   |
|                                          | (Schore 2003A; 2003B; 2003C p 9)            |
|                                          | Dream type experiences                     |
| “Fact” based orientation                 | Symbolic orientation                       |
| W/ McG                                   | E/                                       |

*It states that: “East Asian cultures use strategies of both hemispheres more evenly, while Western strategies are steeply skewed towards the left hemisphere” [McGilchrist 2000 p 458]. And this is why his magnus opus is called: “The Master and his Emissary”. The title of the final section, following Chapter 12, is: “The Master Betrayed” – that is, the emissary, representing metaphorically the left brain, betrays the Master, who embraces left and right; and McGilchrist suggests that it is this has distorted our collective perspective in more recent centuries.

Now in the western world the left side of our brains is generally well developed, yet the right side is often not. The proper functioning of both hemispheres is essential for Well-Being. Prof. de Rivera comments:
The dominant hemisphere, in most people the left hemisphere, processes cognitive information in sequential, logical patterns and is good at finding cause-effect relationships and analysing details. The non-dominant hemisphere, usually the right, is more apt for global perception, intuitive grasping of complex situations, body awareness and creativity.

de Rivera 2018 p 68

Lack of development of the Right Hemisphere can lead to many problems, including impaired emotional development and an inability to see the whole picture – and so there is a lack of integration. In addition, conflicting information in the two hemispheres will give rise to hemispheric discordance, and this will be experienced as some form of distress. An example of hemispheric discordance is given in Figure 6.3 below.

6.3 Reception of conflicting messages (after de Rivera)

We become perturbed if and when we receive conflicting messages; and this can be particularly difficult to deal with when the conflicting messages are coming from different sides of the brain [de Rivera 2018 pp 147-172].

An example of this – extrapolated from de Rivera, would be if our boss says: “I love my work and my work force” in an angry voice and while scowling⁷. This is confusing to the workforce, and can lead to a feeling of dis-ease as a result of cognitive dissonance.

Figure 6.3  
Cognitive Dissonance arising in a worker
Modified from de Rivera 2018 p 169 and Luthe 1975

The immediate response is for us to assume that the boss is “a dangerous guy who can’t be trusted”.

A more flexible and creative formulation would be: “This guy may be nice, but seems prone to bad moods……perhaps something is upsetting her / him.”

Adapted from de Rivera 2018 p 170

⁷ The example that de Rivera gives is that of a teacher, when of course the effect on the pupil can be even more distressing.
As we develop greater internal balance, we can begin to deal with such conflicting / distressing matters more wholesomely. Such greater internal balance is facilitated by regular AT practice, and this shifts us into the Second Autogenic Switch.

7. The Second Autogenic Switch

7.1 Introduction – and Luthe’s insight regarding AT and Creativity

Research during the last decade or so has indicated that mental training such as AT brings about a Second Autogenic Switch, and this relates to improved communications between the two cerebral hemispheres. Luthe had “proposed the occurrence of a second switch at the cortical level to explain the development of creativity in long-term autogenic trainees.” [de Rivera 2018 p 70].

Autogenic Training has been shown to bring about enhanced communications between the two hemispheres, and this is now described as the:

- Second Autogenic Switch......and this is depicted schematically in Figure 7.1.

Figure 7.1
Some dynamics of the Second Autogenic Switch
Imported from Ross 2010 p 32: Figure 1.11B, with minor changes

Hemispheric Concordance
(View of brain from below)

Notes on Figure 7.1 (adapted from Ross 2010 Figure 1.11B)

i. Here the two hemispheres are functioning optimally, depicted schematically by the two vertical arrowed lines (dark blue and purple).

ii. There is excellent communication between the two hemispheres – illustrated by the horizontal blue and purple lines.

iii. As indicated in the figure, research (and the experience of therapists) suggests that certain practices such as Meditation and Autogenic Therapy can facilitate such Hemispheric Concordance – and facilitate the release of blocked emotions.

Hemispheric Concordance: the ability of the two hemispheres to communicate with each other appropriately, and thus share information from the two sides – for the well-being of the organism and the social and environmental milieu around.

---

8 For the avoidance of confusion / misunderstanding: this is cortical level meaning at the level of the two cerebral hemispheres, not at the cortisol / glucocorticoid level.
7.2 fMRI confirmation of Luthe’s Hypothesis

Research during the last decade has confirmed that there is an increased balance in hemispheric activity during Autogenic Training, as outlined below by de Rivera:

Now, our fMRI studies confirm that there is a shift from the usual left-brain cognitive dominance to right-brain cognitive dominance during the autogenic state. The frequent repetition (activation) of the Second Autogenic Switch enhances interhemispheric cooperation and explains other interesting effects of autogenics, like Autogenic Neutralisation, increased self-awareness, the emergence of repressed memories, and the unification of consciousness.

de Rivera 2018 p 70

While Figure 7.1 indicates some of the underlying dynamics of increased hemispheric communications, Figures 7.2A and 7.2B highlight some of the brain areas actually activated during Autogenic Training by skilled practitioners – that is the bedrock of increased hemispheric communication and concordance.

Figure 7.2A

fMR transverse view of the brain during the Autogenic State, showing bilateral activation of both sides of the frontal lobe

[de Rivera 2018 p 163; and www.icat.world; and https://icat.world/tabs-tenerife-autogenic-brain-scan/]

Figure 7.2B

fMR coronal view of the brain during the Autogenic State, showing bilateral activation of both sides of the corpus callosum

From Luis de Rivera 2018 p 164; and
www.icat.world;
https://icat.world/tabs-tenerife-autogenic-brain-scan/
7.3 Prof de Rivera – and the team that made the above research possible

As implied above, some years ago, Luis de Rivera invited a number of skilled Autogenic Practitioners to the lab in Tenerife, and the above fMRI scans are a composite of the results. Figure 7.3 below includes some of those who participated.

Figure 7.3
Some of those involved in the AT fMRI studies
https://icat.world/tabs-tenerife-autogenic-brain-scan/

*From left to right:* Jane Bird, Prof. Gonzalez-Mora, Dr Lucy Lyons O’Hagan, Prof. Luis de Rivera, Dr Alice Greene and Leonor de Rivera-Monterrey. Ten more volunteers, all of them expert practitioners of autogenics, participated in the study. In the background, the Heliport of the Hospital Universitario de Canarias studies in Tenerife.

8. A suggested third Autogenic Switch

When reading about Luis de Rivera’s above research, it occurred to me that there may be a third switch: in addition to the second Autogenic Switch involving bilateral Hemispheric activation, a distinct further switch is involved, that of the increased activation of the (medial) Prefrontal Cortex (mPFC).

In this section 8 we will initially look at further research linking Meditation practices (including AT) to the PFC and other relevant brain areas. The initial research I came across linked Mindfulness Meditation with changed dynamics of the PFC, and it is to this and other areas of research that we will turn our attention to first; this will include a discussion on the relevance of the Default Mode Network to Well-Being (Sections 8.1 to 8.5). In section 8.6 we move on to discussing specifically a third Autogenic Switch. This Section 8 is based on the premise that Autogenic Training is a form of Meditation\(^9\), and that there are overlapping areas of relevance from one form of meditation to another.

---

\(^9\) In Autogenics 3.0: *The New Way to Mindfulness and Meditation*, Luis de Rivera describes the ten Standard Exercises in terms of Somato-Sensory Meditation [de Rivera 2018].
As indicated in the introduction, some readers may prefer, at least initially, to move directly on to Section 8.6: Autogenic Training and the Third Autogenic Switch.

8.1 Research by Davidson, Kabat-Zinn et al

During the early 2000’s I became aware of the research of Richard Davidson, and in particular a 2003 article:

- Alterations in Brain and Immune function Produced by Mindfulness Meditation [Davidson et al 2003B].

This research involved cooperation between a number of esteemed departments in the USA, including: the Davidson’s Laboratory for Affective Neuroscience, Department of Psychology, University of Wisconsin, Madison, and Kabat-Zinn’s Stress Reduction Clinic, Division of Preventive and Behavioural Medicine, Department of Medicine, University of Massachusetts Medical School, Worcester, Massachusetts.

A brief summary of the conclusions of this research is given below:

These findings demonstrate that a short program in mindfulness meditation produces demonstrable effects on brain and immune function. These findings suggest that meditation may change brain and immune function in positive ways and underscore the need for additional research. Davidson et al 2003A; p 564

The study involved looking at changes in EEG activity during mindfulness training. Below is a pictorial representation of the research, linked in with that of earlier studies by Davidson [Davidson 2003B; see also Ross 2005X; Ross 2010]. Research had previously shown that distressing emotions are associated with increased activation on EEG of the Right Frontal Cortex, as illustrated, in Figure 8.1A

Davidson’s study on Mindfulness Meditation [Davidson et al 2003] shows a dramatically different effect on the Left Frontal Lobe, as illustrated in Figure 8.1B.
### Comments of Figure 8.1B

Mental training is associated with increased EEG activity of the left prefrontal cortex [Davidson 2003B p 335; Davidson 2003A; Ross 2010 pp 147-149; and B9 on website].

1. “The Left Frontal Lobe is associated with modulating positive / nurturing-type emotions; and with Meditative (and Autogenic) type states”.
2. The **Left PFC** is closely interconnected with:
   
   i. The **Left Anterior Insula**; and the
   ii. **Dorsal Posterior Insular Cortex**

In the 2003 book: “Destructive Emotions and how to overcome them” (a dialogue with The Dalai Lama narrated by Daniel Goleman), Davison – one of the contributors – goes further to say that such increased EEG activity in the Left Frontal Lobe is associated with positive emotions that act as an anti-dote to distressing emotions such as anger and fear. This is in keeping with Panksepp’s work [Panksepp 1998]. We illustrate this schematically in Figure 8.1C.

### Comments on Figure 8.1C

**Left Frontal Lobe EEG Activity is associated with positive feelings and emotions, and acts as anti-dote to negative / destructive emotions** [Davidson 2003B p 335; Goleman 2003 p 12], as illustrated in the Figure.

This overlaps/
This overlaps with the ancient concept of “Changing the Peg” [see Ross 2010 pp 152-154] and Spinoza’s concept that we cannot overcome a negative affect by reason alone, but by reason-induced-emotion [Spinoza 1677; Damasio 2003 pp 11-12]. A positive affect, such as CARE / nurturing, needs to be there.

The Left Frontal Lobe activity in this context is now thought to be related to the increase afferent Ventral Vagal (myelinated) PSNS activity to the Left Anterior Insular Cortex, which is axiomatically linked to positive emotions [Craig 2015]. This in turn is intimately linked to self-nurturing. [See also E-03 on web: www.atdynamics.co.uk ].

Davidson goes on to comment:

The findings from this study are the first to suggest that meditation can produce increases in relative left-sided anterior activation that are associated with reductions in anxiety and negative affect and increases in positive affect.

Davidson et al 2003A p 569

8.2A Preamble to 8.2B concerning the Default Mode Network

Some years ago researchers wondered what happens in the brain when we are not focused on anything particular, and our mind is in a fee-floating and sort of daydreaming state. They were very surprised to find that the brain in this state is particularly active, in areas that have become known as the Default Mode Network (DMN). In general terms, we can say that the DMN has two modalities of operating, one that can cause us great problems, and the other that can be of great benefit and restore health, as indicated in figure 8.2A below and on the next page.

<table>
<thead>
<tr>
<th>Mode</th>
<th>example</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode A:</td>
<td>This is the mode that we get into when we start to negatively ruminate about something. For example, if one morning we awake and feel sad, and then compare this with the feeling yesterday when we felt happy, we begin to feel even worse – and this may set off a series of negative ruminations, resulting in us feeling worse and worse.</td>
<td>This modality is generally unhelpful</td>
</tr>
<tr>
<td>Mode B /</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Mode B:
**Creativity and positive transformation**

This is a creative mode in which we are not thinking of anything in particular, and simply allowing the mind to wander – without any fixed agenda. This is associated with imagination, creativity, and aha moments.

**Historical examples**

Archimedes, on stepping into a bath, cried out *eureka* as he, in a flash, realised that the volume of water displaced by a solid in a liquid is exactly equal to the volume of the solid. This realisation greatly improved the ability to calculate the volume of an irregular solid object, such as an irregular rock or statue.

Another more recent example is that of August Kekulé (1829 – 1896), who discovered the structure of the benzene ring. While working on the structure, as many other chemists were doing at that time, he was perplexed as to the nature of its structure. Then, while daydreaming, he saw an image of a curled snake – and this led him to realise that the conundrum of the molecular structure of benzene might be solved by postulating that it had a circular structure – and this proved to be the case.

---

**Image of ouroboros thanks to:**
[https://en.wikipedia.org/wiki/August_Kekul%C3%A9#/media/File:Ouroboros-benzene.svg](https://en.wikipedia.org/wiki/August_Kekul%C3%A9#/media/File:Ouroboros-benzene.svg)

Please see the glossary entry for [Default Mode Network](#) for further details.

**Figure 8.2A within Part 2**

The ouroboros, Kekulé’s inspiration for the structure of benzene

---

Some forms of psycho-therapy have specifically used Amplified States of Consciousness to bring about transformation, including Ernest Rossi’s “Four Stage Creative process in psycho-biologically orientated psychotherapy” [Rossi 2002 p 66-68]. See also Ross 2010 pp 108-109, and 125-127, in which I discuss the Rossi model. When I wrote that essay (Essay 3 of the book), I would often go out for a walk following studying Rossi’s work, and on some occasions new insights would come to me. Going for a walk and not thinking of anything in particular can activate the creative side (Mode B) of the DMN. In 2010 I had not heard of the DMN, and in that essay I used the term “Trance Like States” when ideas / insights came to me on these walks; if I then incorporated them into the essay I indicated this with the symbol:

![T.L.S.](#)

Some of the research discussed below is in relation to Mode A, while other research relates to Mode B. Without this understanding, the research in this area can become very confusing and contradictory.
8.2B Effects of Meditation on brain structure / cortical thickness in PFC area

Daniel Siegel cites research that links mindfulness meditation with the Prefrontal Cortex, and so facilitates the integration of nine essential PFC functions\(^\text{10}\) [Siegel 2007 pp 47, 103; pp 341-345; Lazar et al 2005; Luders et al 2009]. In this section 8.2B we look at one of several studies indicating that meditation can increase the thickness of the medial PFC, and the implications of this.

Below are some important research findings of Kang et al [Kang 2013] and Jang [Jang 2011], with some comments.

i. Meditation increases the thickness of some Grey and White matter areas in the brain (compared with a control group).
   - These areas include the medial Prefrontal Cortex (mPFC) and the superior Frontal Cortex; in contrast to these areas there is a reduction in thickness in some posterior areas of the brain [Kang 2013].
   - Note that the mPFC is involved in emotional / bodily regulation (see also Siegel 2007).

ii. Meditation is associated with increased “functional connectivity” within the Default Mode Network (DMN) in the mPFC: [Jang et al 2011].
   a) The abstract of the 2011 Jang et al study included these finding:
   
   Meditation practitioners demonstrated greater functional connectivity within the DMN in the medial prefrontal cortex area …… than did controls. These results suggest that the long-term practice of meditation may be associated with functional changes in regions related to internalized attention even when meditation is not being practiced.

   Jang et al 2011: extract from abstract

   The important point here is the increase in connectivity between the various parts of the medical PFC. See also Glossary Figures G-01 and G-03, pp 42 and 49 respectively.

   b) In a separate paper, Kang et al 2013 come up with similar conclusions:

   Interestingly, the majority of brain regions showing significant group differences in cortical thickness correspond to the region known as the DMN. The DMN is known to be involved in internal mentation or attention that is detached from the external world (Buckner et al, 2008), which is consistent with the meditative state used in the present study.

   [Kang et al 2013 p 32]

   This implies long term meditation can change the actual structure of the brain. We will return to the significance of this when we consider the effect of Autogenic Training on the nine PFC functions described by Daniel Siegel.

---

\(^{10}\) See Section 9/10 below
8.3 Meditation and Gratitude

In meditative traditions there has long been an emphasis on the importance of \textit{gratitude} and, as it were, counting our blessings. Research indicates that a sense of gratitude significantly facilitates an overall sense of Well-Being [Wood et al 2010]. We never know what is round the corner: to be able to focus on this present moment is a great gift\textsuperscript{11}. There is an ancient Buddhist tradition of \textit{Dana Paramita}\textsuperscript{12}, which is one of the Six Paramitas [Hanh 1998], and is to do with: “giving, offering, generosity [op cit p 193].

Some years ago, based on Thich Nhat Hanh’s Chapter 25: Dana Paramita, I developed a handout that I give Autogenic students towards the end of their basic AT Course, which is called Dana Paramita. A modified version is now on the website, and this includes the following discussion on gratitude:

We can give of our gratitude to others and the whole cosmos; or, on the other hand, we can be resentful and living within a negative mind state. I was once having difficulty selling our flat in Edinburgh and was becoming upset and resentful about this. I spent a week-end away with my brother Brian; during this we each did a focused meditation, on a meditation card that we each drew separately. The card that chose me was “Gratitude”. To start with I was very irritated about this as it was the last thing I felt I wanted to reflect on when the flat was not selling. However, after a thirty-minute meditation on Gratitude, my whole perspective changed – and the irritation had dispersed.

\textit{*** *** *** *** ***}

I have a friend who is so positive about the present moment, the weather, the wonders of nature – whenever we meet, that my heart lifts.

We have a choice: we can see the world as being bereft of meaning and always think ill: or we can be aware with gratitude of every breath we breathe.

Extract from web: D2: 2011

Sharon Salzberg, in chapter 8 of her book “Loving Kindness”, focuses on mudita (Sanskrit / Pali word for Joy), which embraces the wonderful and generous concept of Sympathetic Joy for others’ good fortune [Salzberg 1995 p 119). Hanh comments that we can only develop Sympathetic Joy for others if we have developed “peace and joy” within ourselves:

\begin{quote}
\ldots\ldots\ldots\ldots\ldots\ldots A deeper definition of mudita is a joy that is filled with peace and contentment. We rejoice when we see others happy, but we rejoice in our own well-being as well. How can we feel joy for another person if we do not feel joy for ourselves? Joy is for everyone.
\end{quote}

Hanh 1998 p 174

\footnote{I am redrafting this section of this article on Monday, 23\textsuperscript{rd} March 2020; the COVID 19 pandemic is spreading world-wide; none of us can have any real idea as to the short and long term impact of this on us as individuals and globally. At one level we all know that life is impermanent; yet the present epidemic brings home to us how fragile life is for each one of us – our assumptive world has been rocked.}

\footnote{See Glossary and D2: Dana Paramita on the website \url{www.atdynamics.co.uk}}
There is an increasing body of research evidence indicating that gratitude, and a sense of gratitude, improves Well-Being [e.g. Kyeong et al 2017]. The Kyeong study compared the mental states of gratitude with those of resentment, and their findings suggest:

I. Mental states associated with gratitude significantly reduce heart rate, whereas those associated with resentment increase heart rate. We can take this as an indirect measure of increased Heart Rate Variability in the gratitude group.

II. There was a positive correlation between reduced heart rate and activation of the (ventro-) medial PFC in those practising gratitude meditation.

In the earlier paper of 2010, already mentioned, Wood et al [Wood 2010] gave a well-balanced account of the research linking Gratitude to Well-Being. The final paragraph of their paper includes this reflection:

In recent years, a large body of literature has developed showing that gratitude is related to a wide variety of forms of well-being. This literature stands in contrast to work showing that huge increases in income — an indication of our spending power — are needed for even modest gains in well-being (Boyce & Wood 2020). Perhaps instead of spending lives trying to amass ever more possessions, people would be better advised to appreciate more what they actually have (c.f., Lyubomirsky, Sheldon, & Schkade, 2005). Simple easy interventions have been developed that can be easily used in clinical therapy to increase gratitude, which may consequently improve well-being........

Wood et al 2010 p 903

Now, for many there is nothing particularly surprising in this conclusion. On the other hand, Wood et al give various examples of exercises that can increase our sense of gratitude, and so by inference our well-being. These are outside the remit of this present paper, and are planned for a thematically linked article:

- F 6.7: Constructive Feeling Meditation VII: Gratitude – embracing a sense of wonder....

This new Constructive Feeling Meditation will provide some quite extensive background to the concept of Gratitude, in addition to outlining an approach to the Meditation. The article will also discuss the links between wonder / awe, and improved immune function [Stellar 2015].

8.4: Autogenic Training and Prefrontal Cortex Activation

Daniel Siegel, as already indicated, cites research linking mindfulness and meditation to activation of the Prefrontal Cortex [Siegel 2007; also Section 8.2 above]. Increased activation of the PFC (and the Insular Cortex) in Autogenic Training has now also been demonstrated further [e.g. Schlamann et al 2010]. These should be regarded as provisional findings as the numbers involved in the research were small. The main findings of this study in the AT group (compared to the control group) are indicated in Figure 8.4A.
<table>
<thead>
<tr>
<th>Brain area activated [or not]</th>
<th>AT Group</th>
<th>Control Group</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefrontal Cortex</td>
<td>✓✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Insular Cortex</td>
<td>✓✓</td>
<td>✓</td>
<td>Degree of activation correlated with number of years of AT experience</td>
</tr>
<tr>
<td>Left post central areas</td>
<td>✓✓</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 8.4A**
Activation Patterns in fMRI in Autogenic Group compared with controls
✓✓ = Statistically significantly increased activation compared to control group
[based on Schlamann et al 2010]

**Comments on Study (Figure 8.4A):**

i. The AT Standard Exercise model used was slightly different from that of the British Autogenic Society, but in essence covered the same areas [Schlamann et al 2010 p 445].

ii. Regarding Insular Cortex in the AT group: the “correlation of insular activation suggests that these (AT) subjects are different from untrained subjects in emotional processing or self-awareness” [Schlamann et al 2010 p 444 (Abstract)]. In other words, experienced AT subjects are more able to deal with distressing emotions, brought about through greater self-awareness (see Section 8.6).

iii. The study is based on the assumption that AT works through auto-suggestion [Ernst & Kanji 2000; Kanji, White & Ernst 2006B; Stetter & Kupper 2002], which is valid depending upon the nature of the practitioner’s mental state during the AT sequence (almost like a Personal and Motivational Formula).

iv. A parallel and equally valid perspective is that in AT we, for example, tune into the actual state of warmth (e.g. in the limbs and Solar Plexus area), and this Mindful Attention (Passive Concentration) allows for the development of increased autonomic afferent awareness [Craig 2015] regarding the actual warm bodily state within the limbs / upper abdomen.

The purpose of the second Autogenic exercise (warmth in limbs) is to train the perception of thermogenesis by developing our awareness of the inner-temperature receptors, disregarding the information provided by the surface receptors\(^\text{13}\). de Rivera 2018 p 96

v. The traditional teaching regarding the efficacy of AT has focused on the psycho-physiological shift, which in autonomic terms means a shift from the SNS to the PSNS Relaxation Response [Benson 1975]. (For the avoidance of doubt, the PSNS here refers to the Modern Myelinated Ventral Vagal Branch of the PSNS – [Porges 2011; Porges and Dana 2018]).

\(^{\text{13}}\) The Myelinated VV PSNS is also that of the Social Engagement System [Porges 2011], and this will facilitate Mindful Awareness of what is going on in the body (e.g. warmth). Emotional feelings arising as a result of getting more in touch with the body are brought to us by the Autonomic Nervous System afferents, especially the VV PSNS afferents [Craig 2015].

vi/

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\(^{\text{13}}\) On a cold morning, the surface of the forearms and hands may of course be cold; so the attention is directed to the inner warmth of the arms (limbs). **Please note: this footnote added by IR – i.e. not in the original.**
vi. While this is undoubtedly the case, it is not the full story; the Autogenic Sequence changes the dynamics of the PFC, leading us towards greater **Self-Realisation** [Wallnöfer 2000 referring to Schultz].

This is of particular relevance in the context of the nine functions of the Prefrontal Cortex, that can be developed through mindfulness / meditative practices [Siegel 2007]; this is the subject of Section 8.5.

Figure 8.4B schematically illustrates the increased mPFC and Insular Cortex activity during Autogenic Training.

![Medial Prefrontal Cortex and Insular Cortex](https://human-memory.net/insula/)

**Figure 8.4B**

Schematic illustration of increased mPFC and Insular Cortex activity

Highly schematic

Insula image on right from: https://human-memory.net/insula/ with thanks

Our ability to read our own emotions appropriately is dependent upon the proper functioning of the **insula**, and the feedback it is getting from Autonomic afferent nerves [Craig 2015].

**8.5: Default Mode Network (DMN), Negative Ruminations, Meditation and Post Cingulate Cortex**

This section 8.5 is primarily focused on the role of the DMN specifically in the context not only of meditation, but also its activation during negative rumination. Some of the research findings can seem paradoxical and / or contradictory to the earlier discussions on increased PFC activity in meditation. For a fuller picture, please see glossary: Default Mode Network, which adds the important caveat that the DMN is active during, for example, creative processes [see also Graham 2018] and in some forms of psychotherapy [Rossi 2002; and see Section 8.2A above].

Some years ago a curious activity of the brain was found in those who were not engaged in any specific activity. That is, they were simply daydreaming or ruminating about the past or the future [Raichle 2001]. It was found that during these activities specific areas were active, and these included midline structures such as the medial Prefrontal Cortex (mPFC) – but especially the Posterior Cingulate Cortex – PCC [Brewer 2013 p 12].

Such daydreaming, or mind-wandering, is sometimes referred to as “self-referential processing”, and this correlates with human unhappiness14 [Brewer et al 2011 p 20254]. Craving

---

14 “a wandering mind is an unhappy mind” Killingworth 2010

[https://www.youtube.com/watch?v=jE1j5O7g0U&feature=youtu.be](https://www.youtube.com/watch?v=jE1j5O7g0U&feature=youtu.be)
comes under this category, and in Buddhist psychology is considered to be one of three “fundamental toxins of the mind” [Ekman et al 2005]. These are sometimes described in terms of the Toxic Trio. Addictions are a form of craving, as is thirst. Research has shown that thirst is associated with increased Post Cingulate Cortex (PCC) activity [Brewer 2017 at 7.20 – 8.30 mins]; this implies that physical craving for e.g. water / food when we are thirsty / hungry overlaps with the neural circuits when we are craving for a bigger this, a nicer that etc. This is an example of nature’s economy when one specific neural circuit is adopted for a subtly different purpose; craving also overlaps with biblical coveting (e.g. Naboth’s Vineyard [1 Kings 21]).

For millennia, eastern meditation traditions have emphasised the importance of being present in this present moment, and that this can act as an antidote to human suffering. There is a great difference in our mental state between identifying with a distressing emotion / thought – e.g. “I am angry”, and identifying what is going on within [Brewer et al 2011] – e.g.: “I am aware anger / irritation is arising within me”. In the former we are caught up in the emotion: “I and my anger become one”; in the latter, I am no longer caught up with it, rather, I am able to see the anger / irritation / disturbing emotion as separate from me. This is a practice of mindfulness.

In a small study Brewer and his team compared the brain activities in experienced meditators compared with controls – who had no previous meditative practice. Three meditative modalities were used:

- Concentration, in terms of focusing on the breath
- Loving Kindness Meditation, and
- Choiceless Awareness [see e.g. Kabat-Zinn 2006].

Their findings included:

i. Meditation was associated with reduced activity in both the mPFC and the PCC activity in the meditators compared with the control group.

ii. Loving Kindness meditation showed specific deactivation in the amygdala, suggesting reduced FEAR / anxiety [Panksepp 1998].

iii. The meditator group (cf. control) experienced significantly less mind-wandering.

iv. The experienced meditator group, compared to controls, “showed increased connectivity between PCC and task-positive regions, during resting-state baseline and all meditation conditions, including those involved in conflict monitoring, cognitive control, and working memory.” [Brewer 2011 p 20257].

- The implication being that experienced meditators are more adept at conflict monitoring and dealing with disagreements.

We illustrate and summarise some crucial aspects of the DMN in terms of self-referential processing (e.g. daydreaming / distressing ruminations) compared to meditative states in the following illustrations.

---

15 Previous studies have shown that mind-wandering has been associated with increased DMN activity.

16 “task-positive” brain regions include those that are “implicated in conflict monitoring, working memory, and cognitive control” Brewer et al 2011
Both the PCC and mPFC are part of the DMN

Figure 8.5A
Increased activity in mPFC and PCC when ruminating / “pursuing the past / getting lost in the future” [Hanh 1990] (on fMRI)

Original brain images from Shutterstock (£✓)

Based on Brewer et al 2011 PNAS

Figure 8.5B
Reduced mPFC and PCC activity during meditation (Choiceless Awareness, Loving Kindness, and Concentration (breath) (on fMRI)

The following four Figures in this section come from Brewer’s YouTube TED talk, based on his research.

Figure 8.5C
An expert meditator in the first and 4th fMRI scans
Above the white line increased activity is shown in red; below the blue indicating reduced PCC activity
It is suggested that this will be the pattern in the adept Autogenic practitioner.

Figure 8.5D
Novice meditator in 3rd of fMRI scans
Note intensity of the red above the white line, indicating great PCC activity of the wandering / ruminating mind.
It is thought that this will be typical of the student new to Autogenic Training in the early days / weeks of practice.

Having watched the Judson Brewer video a couple of times, I was intrigued by the fact that one of the novices was able to move into the meditative zone (ASCI) at his fourth practice. This is schematically illustrated in Figure 8.5E:

Figure 8.5E
Novice Meditator: Thinking or Feeling – fMRI scans during Run 3 and Run 4

In Run 3, the novice is thinking about breathing (and perhaps striving to breathe “correctly”); however, this is not effective: the red graph above the white line indicates great activation of the PCC.
In Run 4, the novice begins to feel the breath as vivencia; and, lo and behold, the PCC deactivates.
This is very pertinent in the context of the Autogenic Standard exercises: if we are *thinking* about heaviness, warmth, our breath, this will interfere with the psycho-physiological shift. Some years ago, one of the students at an Autogenic refresher session that I was running made an interesting comment. He said that (in any one AT Session) he did not move on from the (for example) heaviness exercise until he experiences heaviness in the limbs; this was part of his autogenic process. Recently, since watching the above Ted talk, I have experimented in some of my AT sessions to reflect the feedback of the novice depicted in Figure 8.5E. This approach is illustrated below (figure 8.5F):

<table>
<thead>
<tr>
<th>Standard Exercise</th>
<th>Modified format</th>
<th>Focus becomes</th>
<th>Realisation (or potential realisation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Arms and legs Heavy</td>
<td>Arms and legs... The present moment Vivencia (Live Experience) of the limbs</td>
<td>Heaviness in arms is present Heaviness in legs is present</td>
</tr>
<tr>
<td>II</td>
<td>Arms and legs Warm</td>
<td>Arms and legs... The present moment Vivencia (Live Experience) of the limbs</td>
<td>Deep warmth in inner arms is present Deep warmth in inner legs is present</td>
</tr>
<tr>
<td>V</td>
<td>Inner Chest Warm</td>
<td>Inner chest... Present moment Vivencia of inner chest</td>
<td>Growing awareness of glowing warmth within chest</td>
</tr>
<tr>
<td>VI</td>
<td>Heart Calm and Steady (or Regular)</td>
<td>Heart</td>
<td>Vivencia of inner chest...heart</td>
</tr>
<tr>
<td>X</td>
<td>Life Breathes Me (It Breathes Me)</td>
<td>Life</td>
<td>Breath</td>
</tr>
</tbody>
</table>

**Figure 8.5F**  
A modified approach to the Autogenic Standard Exercises using the Autogenics 3.0 de Rivera model [de Rivera 2017 / 2018]  
Vivencia Before Thinking / naming (e.g. “warm”)

The final illustration in this set illustrates an expert meditator. Some have likened meditative states to a sense of flow [see also Csikszentmihalyi 1992].

**Figure 8.5G**  
fMRI scan in well experienced (expert) meditator  
The blue graph below the white baseline indicates greatly reduced PCC activity  
Original illustration from Brewer 2013 You Tube TED Talk
In summary, forms of meditation are associated with reduced activity in the DMN, especially in the mPFC and PCC. These are the very brain areas that show increased activity with negative ruminations and self-referential processing such as comparing ourselves unfavourably with others (e.g. “I am not good enough”; “she is better than me”. Activity of this DMN is associated with anxiety, ADHD (Attention-Deficit Hyperactivity Disorder) and Alzheimer’s Disease [Brewer et al 2011].

The above summary appears to give a negative spin on the Default Mode Network.

However, as already indicated, this is not the whole picture.

- Other research indicates increased activation in mediation of the PFC (e.g. Section 8.4 above). In addition,
- The DMN also plays an important part in creativity, and these important dynamics are further discussed in the glossary: Default Mode Network.

*** *** ***

For the TED talk from which these images taken, see: Brewer
https://www.youtube.com/watch?v=jE1jSOm7g0U&feature=youtu.be (Persevere despite the initial feeling that this is not the correct web page.)

8.6: Autogenic Training and /
8.6: Autogenic Training and the Third Autogenic Switch

In this Section 8, so far, we have reviewed some pertinent research studies regarding meditation and brain dynamics, focusing in particular on the PFC. These are summarised in figure 8.6A.

<table>
<thead>
<tr>
<th>Study</th>
<th>Illustration / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1</td>
<td>Increased Left Frontal Lobe activity on EEG during meditation</td>
</tr>
<tr>
<td>8.2-J</td>
<td>Meditation associated with “greater functional connectivity within the DMN in the mPFC area”</td>
</tr>
<tr>
<td>8.2-K</td>
<td>Meditation results in increased thickness in mPFC</td>
</tr>
<tr>
<td>8.3</td>
<td>A sense of Gratitude increases our Well-Being. Meditation facilitates a sense of Gratitude.</td>
</tr>
<tr>
<td>8.4</td>
<td>Autogenic Training associated with increased PFC activation compared with controls</td>
</tr>
<tr>
<td>8.5</td>
<td>The form of meditation here showed “decreased mPFC and Posterior cingulate cortex” activity. This appears to be out of line with the above studies. However, the meditation group “showed increased connectivity between PCC and task-positive regions”</td>
</tr>
</tbody>
</table>

This suggests that meditators are more adept at conflict monitoring and dealing with disagreements, which is an aspect of mindfulness.

**Figure 8.6A**
Summary of some research findings relating to meditation / AT on PFC and DMN dynamics

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17 The implication of this research is that “the long-term practice of meditation may be associated with functional changes in regions related to internalized attention even when meditation is not being practiced” [Jang et al 2011]. Such internalised attention is a part of mindfulness, and the opposite of, for example, negative ruminations (pursuing the past).
It is suggested that, in the light of the above (and other) research, Autogenic Training also activates a third Autogenic Switch in terms of:

- Altered medial Prefrontal Cortex dynamics (in addition to some of the other Default Mode Networks already mentioned).

This in turn facilitates the nine Prefrontal Cortex functions described by Siegel [Siegel 2007], which are summarised in Figure 8.6B.

### Figure 8.6B: Nine Medial PFC Functions

1. **Bodily regulation**
   - If we become upset or flustered, our heart rate tends to rise, and our blood pressure may go up.
   - This will become less likely as we develop *mindsight*: in other words, *mindsight* has the ability to exert some control on our autonomic nervous system. In particular, it allows the (VV) Parasympathetic nervous system to exert its calming effect on our mind and body. This will be greatly facilitated by Meditation and / or Autogenic Training – for example, the judicious use of a Partial Exercise – such as Neck and Shoulders Heavy (or Warm in Autogenics 3.0 – de Rivera 2018).

2. **Emotional balance**
   - Our prefrontal cortex allows us to develop the skills to monitor our own emotions, and in particular can facilitate the development of positive emotions, especially as we begin to develop our skills in bodily regulation. Such emotional balance can be enhanced by Mental Training.

3. **Fear modulation**
   - This is actually part of bodily regulation. A new experience may trigger a FEAR (Panksepp 1998 & B3) response in us because it is pattern matched (within the amygdala circuits) with a previous fear trigger. This pattern matching may be inappropriate. (Note that old disturbing type memories and / or our imagination can also trigger this same FEAR-response.)
   - In any event, disciplines such as Meditation (and by extrapolation Autogenic Training) can activate the prefrontal cortex which in turn inhibits the amygdala, and ‘switches off’ the FEAR-circuits.

4. **Attuned communication**
   - As we develop *mindsight*, we become attuned to what is going on in the other person as well as within ourselves: if we can thus get on the same wavelength as the other person(s), this will greatly facilitate communication.

5. **Response Flexibility**
   - If we see our boss and imagine that she or he is angry with us, this will actually be pattern matched (Griffin & Tyrrell 2003) with our archetypal FEAR-system (e.g. a bear attacking us); and so our response may very well be acted out by these old archetypal neuro-circuits.
   - As we learn to step back from our immediate emotional response, we can de-personalise these primitive fears and so develop the ability to make a flexible response (also see B2).
   - The Partial Exercises, or the full AT Standard Exercise sequence, or the Three Minute Exercise, can help us in this.

6. **Empathy /**

---

18 *Mindsight* is the term that Daniel Siegel uses in his book: “Mindsight – Transform your brain with the new science of kindness”; the term very much overlaps with mindfulness. The subtitle in the American edition, interestingly, is “The new science of personal transformation”. See glossary entry for *Mindsight*. 
6. **Empathy**
   - Empathy goes deeper than sympathy. Sympathy is to do with being aware another is suffering; empathy is the ability to feel what it is like for the other – to as it were enter their mind and so experience what they are experiencing.
   - Such empathy will embrace what Siegel describes as “you maps” (i.e. mental maps of what is going on for the other) and from this we can create “we maps”, linking “you and me” [Siegel 2010 pp 7-9].
   - Empathy axiomatically overlaps with Theory of Mind, and the ability to put ourselves in the other’s shoes.

7. **Insight**
   - Siegel links insight with our ability to become aware of what is going on within ourselves.
   - It “allows us to make me-maps enabling us to perceive our own mind” (Siegel 2010 p 28).
   - Meditation facilitates our awareness of the nature of inter-being, which is axiomatically interlinked with insight and the concept of ubuntu.

8. **Intuition**
   - Carl Jung links intuition to our ability to sometimes know what logically we cannot.
   - Intuition allows us to get direct information from our emotions (e.g. Nurturing and CARE-circuits; SEEKING-circuits – Panksepp 1998; Panksepp & Biven 2012) and from the body, including the heart. It can thus embrace what is heartfelt: thus it goes beyond mere reason and logic. [See also Damasio 1994].

9. **Compassion for all**
   - Siegel calls this “moral awareness”. I have reframed this as compassion for all.
   - Mindfulness embraces the concept of the inter-relatedness of all; while some are suffering, in one sense we all suffer. So mindfulness leads to compassion and concern for all – and thus also for our planet.
   - Damage to the prefrontal cortex can lead to amoral behaviour. (Amoral: “having no moral quality, non-moral” [Collins English Dictionary]. In the present context it means the inability to exercise moral judgement due to damage to the PFC).
   - Compassion for all will embrace “we maps”; and in that sense dissolves the concept of us and them (or I+, U- in Transactional Analysis terms).
   - Embracing Inter-Being will lead to compassion for all.

Adapted from Siegel 2007; & 2010B

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**Figure 8.6B continued**

Nine Middle Prefrontal Cortex Functions associated with Mindsight

Adapted from Figure 2 of thematically related article C2

For the research basis of the above nine, please see Siegel 2007 pp 341-345 for selected references

Daniel Siegel’s research indicates that these PFC functions are activated with mindsight / mindfulness, which themselves can be seen as the outcome of appropriate regular meditation.

The third autogenic switch is brought about by the activation / altered dynamics of the medial PFC, and this in turn has a number of effects summarised in Figure 8.6C.

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19 In this model, we also have “me maps”, which help us to know what is going on within ourselves: the prefrontal cortex (PFC) is crucial for this – as of course are our basic five senses and our sixth sense associated with background feelings.
Figure 8.6C
Schematic Representation of Third Autogenic Switch

Comments on Figure 8.6C and the Third Autogenic Switch

i. The Third Autogenic Switch is best seen as a direct consequence of, yet distinct from, the first and second switches. That is, it is predicated on the Relaxation Response / Amplified State of Consciousness, and upon increased hemispheric concordance.

ii. The fundamental component is that of the manifestation of the nine medial PFC functions [Siegel 2007] brought about by Autogenic Training.

iii. The Figure indicates that the shift towards Ventral Vagal PSNS activity is crucial; and the felt sense of this will be through these afferents [Craig 2015]. These afferents manifest in us with the feeling that:

> “All in the periphery is quiet”

Wallnöfer 2000

iv. Implicit in the physio-psychological shift will be activation of CARE, PLAY, Social Engagement and wholesome SEEKING circuits [Panksepp 1998; Porges 2011].

v. One of the functions is that of fear modulation, and this is explicitly represented in the reduced FEAR circuits of the amygdala.

vi. Other manifestations of the third switch will be the Reflective Function [Knox 2003]; Self Realisation [Schultz quoted by Wallnöfer 2000 – see also glossary in website article E-03]; Individuation [Jung]; True Self [Winnicott ]; reframing [Gross 2002; p281; and glossary of E-03 on web]; a sense of awe / wonder (that in themselves also have a positive effect on our immune system) [Stellar et al 20115]; and Mindfulness [de Rivera 2018].
9. Epilogue – and Summary of the Three Autogenic Switches

Decades ago, Schultz described the psycho-physiological shift when studying the effects of Autogenic Training, and he called this “the autogenic switch”, which has now become known as the First Autogenic Switch [de Rivera 2018 p 60]. This can also be described in terms of the polyvagal theory [Porges 2011], in which there is a switch from SNS dominance (fight / flight modalities) to the myelinated supra-diaphragmatic VV PSNS. This in turn will be associated with increased Social Engagement, feelings of safety, and activation of Nurturing (CARE) – and potentially PLAY – circuits [Porges 2011; Panksepp 1998].

More recently, research has confirmed Luthe’s insight that AT results in increased creativity and well-being as a result of improved communications between the two hemispheres – the Second Autogenic Switch [de Rivera 2018 pp 60, 70, 160].

The above two Autogenic Switches, it is suggested, lay the foundation for the Third Autogenic Switch which activates / changes the dynamics of the medial PFC and, in this way, embraces the nine key mPFC functions and associated dynamics, such as our Reflective Function and Mindfulness. Figure 9, on the next page, encapsulates the essence of these three switches schematically.
Comments on Figure 9

1) First Switch: Psycho-physiological shift and Amplified State of Consciousness Induction
2) Second Switch: Hemispheric Concordance
3) Third Switch: medial Prefrontal Cortex activation as a result of the first and second switches – and the associated wholesome functions [Siegel 2007].

The implications of these three Autogenic Switches are potentially profound for each of us, if we continue with our practice. I will conclude with some reflections from Luis de Rivera. However, before that, I will complement de Rivera’s insight with another perspective on ASCI.

Yesterday evening (6th May 2020), I joined a NScience webinar with Daniel Siegel (Mindfulness, MWe, and Our Interconnected Reality). Towards the end of his talk, he suggested that we can look and experience our world, our life, and the cosmos, from two different perspectives.

Normally, we “occupy” the Newtonian world of cause and effect, subjective / objective, me / you, and these can sometimes be associated with grasping and craving – arising from a malfunctioning / unwholesome SEEKING system [Panksepp 1998]. This is the world of consumerism, capitalism, and to some extent the world of the SNS flight /fight, of fear and anger.

Yet this is only one Realm of existence. Another is that of quantum physics: of sub-atomic particles, on non-locality [Popescu 2014], of subatomic particle vastly separated in space affecting each other instantaneously, of the Participant Observer [Hanh 2017 p 35], and of Inter-Being. At the end of an AT sequence of Autogenics 3.0, we move to, with the Sue McLennan variation:

20 An Autogenic Therapist in Melrose, Scotland.
Life Breathes Me

As we follow the breath in our AT sequences, over time, the inference of “Life Breathes me” awakens in our soul – as the essence of Inter-Being, of Systems Theory, of Quantum Physics [Capra & Luisi 2014]. This moves AT from the mere Relaxation Response to the possibility of ASCI and the spiritual domain. This is the domain of music of the spheres, of Beethoven opus 109, 110, 111, and of Anton Bruckner at this greatest (e.g. his 7th, 8th, and 9th Symphonies) – when the music at times moves from Newtonian to the Transcendental in iridescent moments.

Luis de Rivera has observed that:

..........a loving understanding of nature and of fellow humans develops gradually with the regular practice of autogenics33. Ethical behaviour is the inevitable outcome of optimal physiological self-regulation, well-balanced psychological dynamics, and empathic socialisation. Rather than asking adherence to a set of precepts, I recommend the regular practice of autogenics, to secure the unfolding of your natural ability to become yourself entirely.

de Rivera 2018 p 27

33 Beyond Resilience – the capacity to stand trauma without deterioration – is the development of immunity to trauma through personal growth. My study of healthy persons who had surpassed severe crisis reveals that their post-traumatic growth follows a sequence of seven psychological steps:

i. Centring
ii. Keeping calm
iii. Minimising harm
iv. Understanding the situation
v. Deciding the condition
vi. Becoming a proactive person
vii. Evolving.

de Rivera 2018

(note 33 on p 204 with reference to p 27)

Layout changed in terms of numbered list
See also de Rivera 2002 Crisis Emocionales pp 173-188

The dynamics of the three Autogenic switches bring home to us the realisation that Autogenic Training is not simply a Relaxation modality; but rather it can take us on a path, through an Amplified State of Consciousness, towards Self Realisation, Mindfulness, ubuntu, and greater understanding of ourselves and others.

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September 2019 – July 2020
The following Sections 10, 11, and 12 (pp 38-60) cover, respectively:

-Thematically related articles on web;
-The Glossary, and
-References / sources.

## 10. Thematically related articles on web
(or at present works in progress)

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<th>Section</th>
<th>Title</th>
<th>Year</th>
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<tbody>
<tr>
<td>B5</td>
<td>Emotions, Frontal Lobe Dynamics, and Autogenic Training in the context of autonomic afferent lateralisation</td>
<td>2014</td>
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<td>B12</td>
<td>Affect Labelling, Autogenic Training, and reducing Emotional Distress</td>
<td>2011</td>
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<td>B19</td>
<td>Reflections on a Secure Base</td>
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<td>B20</td>
<td>Separation Distress and Well-Being – <em>Neuro-physiological reflections on developing a Secure Base</em></td>
<td>2018</td>
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<td>The Stress Response and Balance</td>
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<td>This article deals with the dynamics of the Stress Response and updates some of the concepts discussed previously [Ross 2010 E2]</td>
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<td>B22</td>
<td>A playfully sympathetic approach to the Polyvagal Theory: <em>An introduction to the concepts of Flourishing Autogenically (B23)</em></td>
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<td>Flourishing Autogenically – <em>Pathways to Well-Being and Feeling Safe Whatever our Background</em>. (A more detailed version of B22, and embracing in particular matters concerning PTSD)</td>
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<td>B24</td>
<td>Autogenic Switches and Well-Being</td>
<td>2020</td>
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<td>This deals with some of the underlying dynamics that can facilitate balance and harmony in those regularly practising Autogenic Training (this article)</td>
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<td>D2</td>
<td>Dana Paramita</td>
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<td>D4</td>
<td>Duukha, Impermanence, and Inter-relatedness</td>
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<td>C2</td>
<td>Mindsight – <em>our seventh sense and associated prefrontal cortex functions</em></td>
<td>2010-2011</td>
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<td>D-03</td>
<td>Look at the Cypress Tree</td>
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<tr>
<td></td>
<td>(short version)</td>
<td></td>
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<td>D-11</td>
<td>Sukha: Paths of Well-Being, PSNS Afferents, and Inner Warmth: from Dukha to Sukha</td>
<td>2017</td>
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<td>E-03</td>
<td>Look at the Cypress Tree – <em>Autonomic Afferents and Well-Being</em></td>
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<td>o Background Research Paper for talk given to the British Autogenic Society Annual Lecture London - 21st May 2016 (extended version of D-03)</td>
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<td>A general introduction to Autogenics 3.0 <em>(based on the work of Luis de Rivera)</em></td>
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<td>Some underlying neuro-physiological principles of change – towards Autogenic Transformation and Growth…... a prelude to F3-B</td>
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<td>F3-B</td>
<td>Basic Principles of Autogenic Training (Principles of Autogenic Transformation)</td>
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<td>F 5B</td>
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<td>F 6.7</td>
<td>Constructive Feeling Meditation VII: Gratitude – embracing a sense of wonder….</td>
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<td>F 7</td>
<td>Meditation on Five Sounds that can Heal the World</td>
<td>2019</td>
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</tbody>
</table>
11. Glossary

**Allostasis**
A concept that overlaps with that of homeostasis.

As originally conceived by Walter Cannon (Cannon 1914; 1932), the concept of homeostasis assumed that there were fixed (set) points for the multitude of physiological indices. A stressor would produce a disturbance of some of these indices, and the Stress Response would ensure that there was a return to the original value in due course.

- Allostasis embraces the idea that there may be a range of set points for these indices, depending upon various factors. For example, there is no one set point for the normal temperature of human beings: the temperature of women will depend on the phase of the menstrual cycle, and there is indeed a diurnal variation of temperature.
- Homeostasis is based on the concept of a local remedy for any physiological disturbance. Allostasis, by contrast, embraces the idea that any one physiological disturbance will have effects on other biological parameters, and that the full return to allostatic can only be achieved by interlinked ("global") responses (Sapolsky 2007 p 613). In this sense allostatic is a more holistic concept than homeostasis.
- Allostasis also embraces the concept that an appropriate response to a stressor may be through behaviour modification, which in humans implies the input of higher centres embracing cognitive, emotional, and ethical factors. Some such responses may be appropriate, while others may be damaging to the individual and society.
- The term has been widely used by McEwen, together with Allostatic Load (see below).

**Allostatic Load**
The build-up over time of inappropriate physiological responses to external or internal stressors; these may then lead, sooner or later, to physical (and mental) pathology. It can also be described as: "The wear and tear that results from chronic over activity or under activity of Allostatic systems."

- A term used by McEwen (McEwen 1998; McEwen & Lasley 2003) to denote a permanent change in the body's physiology / biochemistry brought about by stressors. In effect, the stressors are transduced into dis-ease; disease; and possibly early death. [An analogy can be found in the physics of metals: if a metal is stretched beyond its "elastic limit" it becomes permanently deformed.]
- Selye had much earlier suggested that the Stress Response could result in damage to the organism if the stressors were excessive or prolonged: this results in the Chronic Stress Response, which overlaps with the concept of Allostatic Load.
- The concept was originally introduced by Sterling and Eyer (1988) and Sterling (2003)

**Amplified State of Consciousness Induction (ASCI)**
A concept originating in de Rivera’s work indicating that different forms of meditation all result in an Amplified State of Consciousness. This is a much more profound change than the Relaxation Response.

- "ASCI principle: passive concentration induces an Amplified State of Consciousness.
  - Benson’s Relaxation Response is identical to the autogenic state described by Schultz and co-workers, so we could name this principle the Relaxation Principle.
  - I prefer ASCI (Amplified State of Consciousness Induction) because it conveys better the notion that, besides the psychophysiological changes, there is an amplification of:
    - the mental field,
    - inner world perception and
    - self-discovery.
  - The Standard Exercises work on this principle.”

[de Rivera 2017 /2018B]

Bullet points etc added - IR
### Changing the Peg

A concept from Buddhist psychology. It is suggested that negative mind states, including both destructive and negative emotions, can best be overcome by changing our inner mental state to one of a positive emotion / affect (Hanh 1998 p 207-209). This switch in our mental state is called changing the peg. Interestingly, Spinoza developed a similar concept in which he stated that we can only overcome a negative affect, not by reason alone, but by “reason-induced-emotion” (Spinoza 1677; Damasio 2003 p 11-12; Ross 2005X p 30-34).

- Studies in neuro-science support this concept; positive affects tend to act as anti-dotes to the informational substances associated with such negative mind states as anxiety, grief, and anger (Panksepp 1998; Ross 2005X p 31-32).

In addition, meditation, and so by extrapolation the AT state, activates the Left Frontal Lobe (prefrontal cortex) region of the brain, and this in itself reduces amygdala activity (especially fear / anxiety circuits) and dissipates any pre-existing negative affect (Davidson 2003B pp 212-338; Ross 2006A).

### Chronic Stress Response

Adapted from Ross 2010

The Chronic Stress Response occurs when an individual is subjected to prolonged stressors, including psychological stressors, which result in a prolonged Stress Response to successive stressors. Such a chronic Stress Response will result in cascades of stress related hormones / informational substances which, over time, may become toxic and so result in physical and / or mental damage – i.e. from physiological and mental dis-ease to pathological disease. The process by which this occurs is sometimes referred to as Allostatic Load.

### Cingulate Cortex

- **Anterior**

  The Anterior Cingulate Cortex is the autonomic motor cortex from where ANS motor (efferents) start their pathways to the body – e.g. to the heart, stomach, blood vessels [Craig 2015 p 45].

  - Sometimes called the Limbic Motor Cortex that deals with ANS motor (efferent) modalities [Craig 2015 p 45].

  It is anatomically close to the anterior insular cortex (see under Insular – Anterior Insular Cortex) which receives afferent autonomic modalities from the body via the posterior insular cortex.

  See glossary of E-03 for a more detailed account of the Cingulate Cortex in the context of Autonomic Afferents.

### Dana Paramita

In Buddhist psychology, there is a wonderful series of teaching called the six paramitas. The word paramita is well described by the Chinese symbol for paramita, which has to do with crossing to the other side of a river.

- The implication of the six Paramitas is that they can help us to move from our present state of suffering, strife and discontent to the other shore of gratitude, love, understanding and meaning.
- In order to cross over from the shore of suffering to the shore of joy and well-being, we have to do something: this something is called Paramita.
- No one else can do this work for us: we have to do it ourselves; this involves considerable effort.

One of the six paramitas is Dana Paramita – specifically to do with giving / offering something positive, and embracing generosity. See Hanh 1998 pp 192-194: and D2 on website www.atdynamics.co.uk

### Default Mode Network (DMN)

It had long been assumed that during periods of rest / inactivity, our brain would show little neuronal activity. Research over the last few decades has shown that this is not the case, and that some areas of the brain become active when we are not particularly thinking of anything (specific), yet the mind may be wandering / daydreaming. This active area at rest is called the Default Mode Network. These areas seem to be usually inactive during meditation, but not always – see below.

The following is I feel a good brief summary of the DMN concept:

“The default mode network (sometimes called simply the default network) refers to an interconnected group of brain structures that are hypothesized to be part of a functional system. The default network is a relatively recent concept, and because of this there is not yet a complete consensus on which brain regions should /
### Default Mode Network continued

Regions should be included in a definition of it. Regardless, some structures that are generally included are the:

- medial prefrontal cortex (mPFC),
- posterior cingulate cortex, and
- the inferior parietal lobule.

A few of the other structures that may be considered part of the network are the:

- lateral temporal cortex,
- hippocampal formation, and
- the precuneus.

“Thus, the default mode network is a group of brain regions that seem to show lower levels of activity when we are engaged in a particular task like paying attention[^21], but higher levels of activity when we are awake and not involved in any specific mental exercise. It is during these times that we might be daydreaming, recalling memories, envisioning the future, monitoring the environment, thinking about the intentions of others, and so on— all things that we often do when we find ourselves just "thinking" without any explicit goal of thinking in mind. Additionally, recent research has begun to detect links between activity in the default mode network and mental disorders like depression, anxiety, and schizophrenia. Furthermore, therapies like meditation have received attention for influencing activity in the default mode network, suggesting this may be part of their mechanism for improving well-being.”

[^21]: E.g. in some forms of meditation, but the matter is complex. Research also indicates increased functional connectivity between mPFC areas during meditation—with the emphasis on the *increased connectivity* section 8.2.

---

So the DMN is classically active when we are not thinking of anything particular, and / or are daydreaming and / or are lost in ruminations. This is not the whole picture, and we need to add some caveats:

- Ruminations are not helpful if we are “pursuing the past” or “getting lost in the future” [Hanh 1990]— in a negative spiralling down type way.
- The DMN seems to be involved in dissociative states [Graham 2018 p 20].
- Day-dreaming and allowing our mind to wander unchecked can be productive and creative, and may be what in going on during “Active Imagination” [Jung].
- Dreaming (associated with REM) is associated with DMN activity [Pace-Schott & Picchioni 2017]. Anton Bruckner is said to have had a dream in which a melody of his 7th symphony came to him.
- I think it is probably the case that the DMN is active in at least parts of the Four Stage Creative Process in “psychologically orientated psychotherapy” [Rossi 2002 Figure 2.11 p 68; and see Ross 2010 Essay 3 Part Six – pp 125-128].

Meditation generally involves some form of focused attention and normally shows *reduced* DMN activity. For example, Garrison et al in their study on meditators state:

“Meditation has been associated with relatively reduced activity in the default mode network, a brain network implicated in self-related thinking and mind wandering......”

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Extract from Neuropsychologically Challenged, with thanks: https://www.neuroscientificallychallenged.com/blog/know-your-brain-default-mode-network

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[^21]: E.g. in some forms of meditation, but the matter is complex. Research also indicates increased functional connectivity between mPFC areas during meditation—with the emphasis on the *increased connectivity* section 8.2.
In this study, meditation was found to be associated with relatively lower activity in regions of the DMN in meditators compared to controls during meditation compared to another active cognitive task, as indicated by a significant group by task interaction. Brain regions showing relatively reduced activity during meditation in meditators included the anterior cingulate cortex (see Cingulate Cortex, Anterior), fusiform gyrus, middle temporal gyrus, and precuneus. Meditators also showed relatively lower activity in DMN regions than controls during meditation as compared to rest.”

Garrison et al 2015 p 6

While the above evidence suggests that meditation is associated with reduced activity in the DMN, this does not appear to always be entirely the case. Research has indicated the important role of the Prefrontal Cortex in meditation (see for example Siegel 2007), and this present article cites the research by Schlamann et al [Schlamann 2010] indicating increased PFC activity in Autogenic Training [2010]. (See also section 8.4 above. This “discrepancy” may partly be because there are different areas within the PFC.)

In summary, we can say that:

- the DMN is active when we are not thinking of anything in particular; and includes daydreaming and negative / distressing ruminations – such as when we are “pursuing the past” and / or “getting lost in the future” [Hanh 1990]. This can be the case when our mind wanders during an Autogenic Training session, and / or when we are anxious.

- During meditative states, the DMN is generally quiet. However, research by Jang et al 2011 indicated increased functional connectivity within the DMN in the mPFC area.

- During meditative states there is evidence of positive dynamic changes in the mPFC – in terms of the associated (mPFC) nine functions (see Figure 8.6B) described by Siegel [Siegel 2007].

Notwithstanding the above, Figure G-01 below indicates some of the areas normally associated with the DMN.

**Default Mode Network**

| Precuneus |
| Posterior Cingulate Cortex |
| Inferior Parietal Lobule (Anatomically on surface of brain) |
| Medial PFC |
| Lateral Temporal Cortex (Anatomically on surface of brain) |
| Hippocampus |

**Postscript on the DMN:** Linda Graham, in her excellent and informative book on Resilience, says:

“You can instantly pull the brain out of rumination or dissociation by focusing your attention on something in the present moment – the sensation of breathing or of your feet touching the ground. But you can also use the positive aspect of the default network, imagination and free association, to spontaneously and randomly create new insights and behaviours from your own deep, intuitive, wisdom.”

Graham 2018 p 18
| **Diffusion Tensor Imaging** | Diffusion Tensor Imaging — Fractional Anisotropy  
“Diffusion tensor imaging is sometimes employed preoperatively to attempt to establish the location of important fibre tracts, such as the corticospinal tract, and to determine whether there is displacement, infiltration or destruction of such tracts. The diffusion-weighted images displayed as part of routine MRI are ‘isotropic’ — that is the differences in directional water diffusivity (greater ease of diffusion along axonal tracts, for example) are essentially nullified by averaging of directional anisotropy. The goal of diffusion tensor imaging is essentially to discover for each voxel which way water diffuses most readily, and this has been shown, in an experimental cat model, to be along the orientation of major white matter fibre tracts. A map of directional anisotropy (most commonly calculated as ‘fractional anisotropy’) can approximate white matter tract configurations by displaying diffusivity along three principal axes in three different colours.”  
Ankenbrandt & Paleologos 2008  
DTI can thus give us general information regarding the direction of neuronal impulses in the examined neuronal tracts. |  |
| **Eu-molecules** | Similar in concept to Sel’s Eustress. A term coined by IR (Ross 2005X - unpublished) to describe the cascades of life-enhancing informational substances that flow through the body when we are in a state of harmony; when our thoughts are positive and / or nurturing; and when we are in a positive mental state / emotion (affect). If we smile gently, that will be associated with cascades of informational eu-molecules. (Compare with Mal-molecules - see below in glossary.)  
- Note that molecules are, obviously, not in themselves good or bad. However, on-going cascades of informational substances that flow through our body when we are in harmony and / or in a positive mood / affect will have beneficial effects on our health and being. In such a context these informational substances are called eu-molecules.  
- Such eu-molecules may play a part altering the expression of genes (epigenetics). |  |
| **Eustress** | The term used by Sel [1975] for positive, life enhancing stress.  
[Eu- : Greek for good.] |  |
| **Fear Paralysis** | Sometimes described as the Freeze Response, and to be distinguished from the Stress Response which involves a different part of the Autonomic Nervous System (i.e. SNS).  
- Note that PTSD is the term that took over from Shell Shock of the First World War (1914-1918) and Battle Field Neurosis of the Second World War (1939-1945).  
- Fear Paralysis is generally a more apt term, and occurs when the ANS reverts back to the primitive Dorsal Vagal (DV) PSNS.  
See Polyvagal Theory |  |
| **Gratitude** | We often think of gratitude in terms of thanks to other people who have encouraged us, mentored us, and helped us on our path through life. These are important dimensions of gratitude.  
- Crucial to our well-being is also the concept of gratitude to nature, to mother-earth (or a deity / deity that resonates with us) for all that is.  
We only are because of countless other beings, nature, the sun, the cosmos. All is inter-related; this is sometimes called Inter-Being: a wonderful concept that interlinks with the Systems View of Life [Capra & Luisi 2014]. |  |
### Happiness

**Adapted from glossary of Ross 2010**

The word **happiness** has been used in the main text from time to time. It is in some ways a confusing word, meaning different things to different people; and it is also embedded in the American (USA) Constitution. In terms of human psychology and general well-being, the construct can be helpful. Dr Martin Seligman, a psychologist at the University of Pennsylvania (and one of the founders of the Positive Psychology movement in North America) developed the concept, which embraces:

- Pleasure / positive emotion.
- Engaged, goal directed pursuits / occupations (i.e. we are involved in, and committed to, various pursuits / activities).
- Meaning; and / or having a connection to some larger purpose. (This might be, for example, the ecology of our planet in the context of global warming.)

(paraphrased from Davidson 2005, citing Seligman)

Angela Clow, Professor of psychophysiology at Westminster University, suggests that the concept of **Well-Being** may a better word than happiness for British (as compared with North American) citizens (Professor Angela Clow in a talk on “Stress, Health and Happiness” at the Edinburgh International Science Festival on 09.04.2006).

Happiness as used here overlaps with Well-Being, a profounder concept than pleasure.

### Heart Rate Variability (HRV)

**Adapted from glossary of E-03**

The heart rate varies slightly with breathing:

- The inbreath is associated with slight speeding up of the heart (SNS modulated);
- The outbreath with a slight slowing of the heart, brought about by the influence of the myelinated vagal efferents (to the heart).

HRV increases when we are relaxed, and it is in effect an indirect measure of (VV) PSNS activity; the greater the HRV, the more PSNS activity is going on in the body. Longer outbreaths, which can be consciously induced, tend to increase HRV, and this is sometimes suggested to facilitate relaxation.

- In the context of Autogenic Training Standard exercises, this is probably problematic as one of the vital elements of the AT sequence is that we are not actively trying or striving to do anything.

Some experienced AT practitioners sometimes, at the end of the standard sequence, may stay in the Autogenic state and gradually allow the outbreath to be prolonged; on physiological principles this would seem to be reasonable. From a technical point of view for purists, HRV means that the heart rate is not exactly regular, rather it is regularly irregular. For this reason, some have advocated the expression “heartbeat calm and steady” as the third standard exercise**, rather than the original: “heartbeat calm and regular”. In the spirit of the original Schultz concept, perhaps “heartbeat is rhythmically regular” would be more technically correct!

(** In the Luis de Rivera Autogenics 3.0 model, this is the sixth of ten Standard Exercises).**

### Homeostasis

The inbuilt feedback mechanism / systems whereby an organism maintains equilibrium by a tendency to compensate for any disrupting changes, e.g. maintaining roughly the same body temperature in both freezing and very hot conditions.

- If we are confronted by a bear, the body systems respond with the Fight / Flight / Freeze response – which from an evolutionary perspective obviously had survival significance: the **Stress Response** proper (Cannon 1936) allows the body systems to return to homeostasis following such a threat.
- The homeostatic concept is fundamental to an understanding of physiological processes. However, the newer concept of **Allostasis** may better reflect the totality of what is really going on.

**Concept originally developed by Walter Cannon**

### Homeostatic Emotions /

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**Homeostatic Emotions**

*Extract from glossary of E-03*

**Homeostatic Emotions include:**
- Pain (first pain = pricking pain; and second pain = burning pain)
- Temperature (cool; warm)
- Itch
- Muscle ache
- Gastric distension
- Vasomotor flush
- Taste: e.g. Sweet / Salty
- Affective / Affiliative / Sensual Touch.

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**Background:** do emotions determine motivation, or does motivation determine our emotions? The first sentence of Chapter 3 (Emotional Systems) in “Mindful Compassion” states:

- “Motives guide us in life, but they need emotions to guide them.” [Gilbert & Choden 2013 p 71]

So our motives are activated / guided by our feelings, or at least they require feelings to be wholesome motives. What is an emotion? A feeling that requires a response – to satisfy the feeling or to consummate it. A feeling or sensation that requires a response to keep the individual in harmony can in this context be regarded as a homeostatic emotion, which we will become aware of as a result of the input from homeostatic afferents. Craig defines a homeostatic emotion as:

- “a homeostatically motivated behaviour coupled in humans with a concomitant affective feeling from the body” [Craig 2015 p 303].

This then implies that homeostatic emotions embrace such modalities as pain and temperature (e.g. feeling pleasantly warm) – see below.

Feelings such as: thirst / hunger / feeling too cold can be regarded as homeostatic emotions. In the case of thirst, for example: we become aware of our thirst, and that then motivates our behaviour to seek water / fluid refreshment. The primary process emotion that is activated in this pursuit for water is the SEEKING system [Panksepp 1998].

The SEEKING system has been described by Panksepp in terms of a general "foraging / exploration / investigation / curiosity / interest / expectancy / SEEKING- system" (Panksepp 1998 p 145). So when we are thirsty, if we have interest / expectancy of finding water we seek out the right place. In the case of the Bushman, when the particular Bushman community are all hungry, the men go out with expectancy for the whole group.

The increased bodily awareness that develops with the regular practice of Autogenic training enables us to become more in touch with what is going on in our bodies – and thus with our homeostatic emotions.

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**HyPACC**

The Hypothalamic Pituitary Adrenal Cortex pathway that releases Cortisol; part of the **Stress Response** pathway.

**Inferior parietal lobule**

Sometimes classified as part of the **Default Mode Network**. Functions include the perception of the underlying emotions tin the facial expressions of others, and interpretation of sensory information

**Informational substances**

*From glossary of Ross 2010*

"Although peptide structures are deceptively simple, the responses they elicit can be maddeningly complex. This complexity has led to their being classified under a wide variety of categories, including hormones, neurotransmitters, neuromodulators, growth factors, gut peptides, interleukins, cytokines, chemokines, and growth-inhibiting factors. I prefer a broad term coined originally by the late Francis Schmitt of MIT - informational substances – because it points to their common function, that of messenger molecules distributing information throughout the organism."

Pert 1997; p 71

**INSULA**

(Insular Cortex)

(plural of insula: insulae)

A succinct description of the functions of the insula that I have found helpful is:

- “The insulae are believed to be involved in consciousness and play a role in diverse functions usually linked to emotion or the regulation of the body’s homeostasis. These functions include compassion and empathy, perception, motor control, self-awareness, cognitive functioning, and interpersonal experience. In relation to these, it is involved in psychopathology.”


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22 The notation of the insular cortex is a bit perplexing. It can either be called the insula, without an “r”, or the insular cortex.
Antonio Damasio was one of the first neuroscientists to recognise that the insular cortex plays an important role in mapping somatic states – i.e. our bodily feelings [Damasio 1999].

Damasio’s perspective was reinforced by the work of Bud Craig on ANS afferents [Craig 2015], and this is reviewed in some detail in companion article E-03.

ANS afferents give us detailed information as to what is going on at any point in time in the body, and this information is sometimes described in terms of our “Homeostatic Emotions”.

Anatomically it can be described as an “island” within the “cerebral cortex that is hidden deep within the Sylvian fissure on each side of the anthropod human brain” [Craig 2015 p 304]. The Sylvian fissure, also know as the Lateral Sulcclus, runs along the cerebral cortex and separates the temporal lobe from the frontal lobe. If it is pulled open, it “exposes the middle portion of the insula”, as illustrated on the right [Craig 2015 p 304].

Image of Insular Cortex from: https://human-memory.net/insula/

**Anterior Insular Cortex**

See E-03 for a discussion on the significance of these dynamics in the context of Autogenic Training

In the context of the lateralisation of ANS afferents, this is the area in the brain where these afferents terminate; more specifically:

- SNS afferents from both sides of the body terminate in the Right Anterior Insular Cortex.
- PSNS afferents from both sides of the body terminate in the Left Anterior Insular Cortex.

The Anterior Insular Cortex in this context can be regarded as the Limbic ANS sensory cortex, analogous to the classic somato-sensory cortex which itself lies just behind (posterior to) the classic motor cortex.

Note that the ANS motor cortex is in the Anterior Cingulate Cortex which lies quite close to the Anterior Insular Cortex – thus enabling fast (unconscious) communication between the two.

(See Glossary of E-03: SNS afferent and efferent connections with the Anterior Cingulate Cortex, Glossary Figure G-03, p 71).

Section 8.1 in the present paper specifically links Left increased EEG activity in the Left Anterior Insular Cortex activity with Meditation.

**Left Anterior Insular Cortex**

PSNS afferents from both sides of the body terminate in the Left Anterior Insular Cortex. On the other hand, SNS afferents from both sides of the body terminate in the Right Anterior Insular Cortex.

- For further details of these dynamics, please see thematically related article E-03.

**Posterior Insular Cortex**

In the context of this present article, this extract from neuroscientifically challenged is pertinent.

“The posterior cingulate cortex, or PCC, lies just behind the anterior cingulate. Although it is believed the PCC has important roles in cognition and affect, there is some debate as to what exactly those roles are. Neuroimaging studies indicate the PCC is active during the recall of autobiographical memories. It is also activated by emotional stimuli, and thus some have suggested it may be recruited for the recall of memories that have an emotional quality (e.g. autobiographical memories). The PCC is also considered part of the default mode network, a group of brain structures that are more active when an individual is not involved in a task that requires externally-focused attention.

- For example, the PCC is stimulated when someone is daydreaming or recalling memories.

Some have asserted that the PCC helps to regulate the balance between internally and externally-focused attention, making it a crucial structure in awareness and attentional focus.”

https://www.neuroscientificallychallenged.com/blog//know-your-brain-cingulate-cortex (bullet point added)
<table>
<thead>
<tr>
<th><strong>Inter-Being</strong></th>
<th>A term coined by Thich Nhat Hanh [Hanh 1998 e.g. pp 24-27; 2012 pp 55-61]</th>
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<tbody>
<tr>
<td><strong>Extract from glossary of D11 on web</strong></td>
<td>“Interbeing” is a word that is not in the dictionary yet, but if we combine the prefix “inter” with the verb “to be”, we have a new verb, “inter-be”. If we look into this sheet of paper even more deeply, we can see the sunshine in it. If the sunshine is not there, the forest cannot grow. In fact, nothing can grow. And so, we know that the sunshine is also in this sheet of paper. The paper and the sunshine inter-are. [Hanh 2012 pp 55-56]</td>
</tr>
<tr>
<td><strong>In the same way as the sheet of paper, if we look deeply into each human being we see that our existence and being is interdependent and inter-related to everything: the cosmos, our sun, the moon, mother earth, our ancestors, the clouds, the air, and ground of our being. The concept of inter-being is fundamental to Buddhist psychology. The realisation of the inter-relatedness of all things acts as an anti-dote to the toxic trio. A modern realisation of inter-being can be found in the Systems view of life [Capra &amp; Luisi 2016].</strong></td>
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<thead>
<tr>
<th><strong>Jen</strong></th>
<th><strong>Source A: Joseph Needham</strong></th>
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<tbody>
<tr>
<td><strong>See also, and compare with, Ubuntu</strong></td>
<td>The term Jen has been variously translated, as “it is almost impossible to translate” [Needham 1956 p 11]. He gives various terms for it, including: ‘love of man’, ‘virtue’, ‘benevolence’ (Legge); humanitas; and a translation that Needham finds acceptable: ‘human heartedness’, after Chhen Jung-Chieh and Chou I-Chhing [Needham 1956 p 11].</td>
</tr>
<tr>
<td><strong>Source B: Alan Watts</strong></td>
<td>Alan Watts seems to have a good sense of the meaning of the word, and what follows is based on Watts. In ancient China there was a human quality regarded more highly than any other virtue: higher, for example, than righteousness, higher than benevolence.</td>
</tr>
<tr>
<td>* “This quality was known as Jen, which can perhaps best be translated as human-heartedness”. (Watts 1995; page 25).*</td>
<td>I would see Jen as a natural development from the concept of Inter-Being, and overlapping with ubuntu.</td>
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<thead>
<tr>
<th><strong>Mal-molecules</strong></th>
<th>A term used by IR derived originally from Selye’s concept Eu-stress; hence Eu-molecules (see above in this glossary; and referred to in Ross 2005X – unpublished).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adapted from glossary of Ross 2010</strong></td>
<td>Mal-molecules is a term used to describe on-going and persistent cascades of informational substances when we are stressed and / or when we are in a negative / destructive mood or affect. For example, every time we recall a past event that still makes us angry, we are actually setting in motion cascades of (potentially) mal-molecules. Recurrent cascades of such mal-molecules can, over time, lead to Allostatic Load. [Unresolved and unremitting persistent grief would be another example]. Note that molecules are, obviously, not in themselves good or bad. However, persistent and unremitting cascades of some informational substances (molecules) can lead to damage; and these we call mal-molecules.</td>
</tr>
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<tr>
<th><strong>Mindsight</strong></th>
<th>Mindsight is the term that Daniel Siegel has coined for his book: ‘Mindsight: Transform your brain with the new science of Kindness’ [Siegel 2010B]. It very much overlaps with concepts arising through meditation and mindfulness. In his introduction to the book, Siegel says:</th>
</tr>
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<tr>
<td><strong>(Siegel 2010B)</strong></td>
<td>“Mindsight is a type of focused attention that allows us to see the internal workings of our own minds. It helps us to be aware of our mental processes without being swept away by them, enables us to get ourselves off the autopilot of ingrained behaviours and habitual responses, and moves us beyond the reactive emotional loops we all have a tendency to get trapped in. It lets us ‘name and tame’ the emotions we are experiencing, rather than being overwhelmed by them......”</td>
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<td></td>
<td>Siegel 2010B pp xi – xii</td>
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<td>In some respects it overlaps with the approach of Mindfulness Based Cognitive Therapy for Depression [Segal et al 2002; 2013]</td>
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</table>
**Naming and Taming**

Our human tendency is to ignore or suppress feelings that we do not like. However, blocking feelings leads to even bigger problems [see F4 on Web: Some Consequences of Blocking Feelings......of not allowing ourselves to feel the feeling].

One way to explicitly acknowledge feelings that we do not like is called Affect Labelling, which has been well researched [Creswell et al 2007; Lieberman et al 2007]; in this we silently label the distressing emotion within. For example: “anger”; “irritation”; or perhaps more effectively: “irritation is arising in me”, or: “Hallo irritation, I see you are back again”.

The name Affect Labelling is rather technical, and Daniel Siegel’s term for it of “Naming and Taming” is more user friendly [Siegel 2010B pp 116 & 246].

Also see:
- B12: Affect Labelling, Autogenic Training, and reducing Emotional Distress

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**Polyvagal Theory**

All parts of the system, when operating appropriately, are essential for well-being.

Porges 2011 pp 16-17

Adapted from Glossary of E-03

The Polyvagal Theory has been developed by Porges over the last four decades or so. In essence, it can be described in terms of three components of the Autonomic Nervous System.

1. **The Primitive and unmyelinated** (Doral Vagal) Para-Sympathetic Nervous System (PSNS) dating back to the evolution of vertebrates. This is the system that operates unconsciously when an organism is severely threatened and “feigns death” / freezes; this is associated with behaviour shutdown. In essence, this is the:
   - Immobilisation System with fear – when an organism is under severe threat with no possibility of flight or fight. (Sometimes called Fear Paralysis).
   - The primitive PSNS evolved in evolution in the context of Immobilisation associated with unconsciously perceived life threat.
   - This system worked well for reptiles, but is potentially lethal for mammals – as the shutting down of systems can threatened the integrity of the mammalian brain which is sensitive to reductions in oxygen supply.

2. **The SNS flight / fight system.** This is in essence the Mobilisation system – e.g. when we are in danger.
   - Mobilisation with fear – for either fight or flight.

3. **The Myelinated (Ventral Vagal) PSNS** that evolved in mammals and is fundamental to Social Engagement / Social Communication. This involves, for example:
   - Facial Expression
   - Listening
   - Vocalisation

   This myelinated vagal system can only operate properly in situations where we are feeling safe. Myelin covers nerves and allows the neuronal messages to be transmitted much faster than is the case with unmyelinated nerves.

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**Prefrontal cortex**

In this article we are particularly looking at the relevance of meditative approaches to the nine prefrontal cortex functions described by Siegel [Siegel 2007; and see, for example Section 8.6 with figure 8.6B]. These nine functions Siegel specifically relates to the medial prefrontal cortex (mPFC).

However, the PFC has other functions as well, and it is helpful to bear in mind the following:

i. The PFC has an important role in ‘executive functions’ – these include “self-control, planning, decision making, and problem solving” [NSC].

ii. Generally, it is not possible to assign specific roles to specific parts of the PFC.

iii./
### Prefrontal cortex continued

- **iii.** The PFC receives sensory inputs from various parts of the body/brain, as a result of which it is thought to plan the appropriate responses, and then communicate these to other parts of the brain “to enact a response” [NSC].

NSC and the above based on:  
https://www.neuroscientificallychallenged.com/blog/2014/5/16/know-your-brain-prefrontal-cortex with thanks.

### Prefrontal cortex areas

<table>
<thead>
<tr>
<th>PFC</th>
<th>Dorsomedial PFC</th>
<th>Dorsolateral PFC</th>
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<tbody>
<tr>
<td></td>
<td>Ventromedial PFC</td>
<td>Ventrolateral PFC</td>
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<td></td>
<td>Orbitofrontal PFC</td>
<td></td>
</tr>
</tbody>
</table>

**Figure G-03**  
Basic anatomical areas within the Prefrontal cortex  
Source:  
https://www.neuroscientificallychallenged.com/blog/2014/5/16/know-your-brain-prefrontal-cortex with thanks

### Present Moment

A term frequently used in meditative practices, in the context of being in the present moment: that is, being fully focused in this present moment. It is the opposite of ruminations about the past or the future that can easily (pre)occupy our minds much of the time.

The term can be quite easily misunderstood, as the following makes clear when Jon Kabat-Zinn was discussing the nature and meaning of the Present Moment.

- “When I was talking to a reporter (about the work of the Stress Reduction Programme in Massachusetts Medical Centre), she said: ‘Oh, you mean living for the moment.’ I said: ‘No, it isn’t that. That has a hedonistic ring to it. I mean to live in the moment.’ ” [Kabat-Zinn 1991 / 2004 p 19].

Thich Nhat Hanh wrote a wonderful book called: “Present Moment, Wonderful Moment” [Hanh 1993]. Each moment of our lives can have an aspect of magic in it, if we are really present. It is to do with savouring and being fully present in whatever we are doing/observing/being. This may be listening to a blackbird singing, being absorbed in a bee on a flower, or seeing a smile on a child’s face.

The concept overlaps with the Spanish term *vivencia* – the live experience of this moment. In an Autogenic sequence, we develop our skills in being in the present moment: e.g. “Arm and Legs Warm” in which we are fully focused on the limbs as we say the phrase, and receptive to the live experience in the body at that moment.

### Precuneus

“The precuneus is a brain region involved in a variety of complex functions, which include recollection and memory, integration of information (gestalt) relating to perception of the environment, cue reactivity, mental imagery strategies, episodic memory retrieval, and affective responses to pain.”

From: [https://www.sciencedirect.com/topics/medicine-and-dentistry/precuneus](https://www.sciencedirect.com/topics/medicine-and-dentistry/precuneus)
**Psycho-physiological Shift**
Modified from glossary of Ross 2010

A term originally used by Schultz (*Umschaltung* – Schultz 1932; 1991) to describe the psychological and physiological changes that come about unconsciously when we are doing a session of Autogenic Training (Standard Exercises). These changes are associated with activation of the Ventral-Vagal branch of the Para-sympathetic Nervous System [Porges 2011] and the concomitant rest, repair and recuperation modalities associated with this.

This psycho-physiological shift “facilitates and mobilises the otherwise inhibited activity of recuperative and self-normalising brain mechanisms” (Luthe & Schultz; 1969; p 1).

It is suggested that this process will be associated, at least in part, with the Gene Expression Protein Synthesis (GEPS) cycle [Rossi 2002; and Essay 3 and 7 Ross 2010]; and that as a result of repeated AT practice, new neural pathways will be laid down in the brain – in addition to the synthesis of Eu-molecules through the GEPS.

Eu-molecules are to be distinguished from Mal-molecules.

**Reflective Function**

The Reflective modality of humans has been a crucial part of many spiritual traditions, going back millennia. Jung’s approach to psychology and individuation is based on reflection, and Knox highlights the importance of this approach for our well-being in a chapter of one of her books [Knox 2003 Chapter 6: “The Reflective Function”].

➢ For a more detailed discussion on the Reflective Functions, please see the glossary of the complementary web article E-03.

**Reframing**

Abbreviated from glossary of E-03

Re-appraisal (reframing) is a specific psychological method which can be used to overcome previous negative outlooks or affects. When undertaken in a relaxed frame of mind, as in therapeutic hypnosis (Rossi 2002), Positive Mental Training (Dobbin 2009), or within an Autogenic Training session, it can be particularly effective. Such approaches to Affect Regulation are thought to involve dorso-lateral Prefrontal Cortex (dIPFC) to Amygdala circuits via the ventro-medial (cingulate) vmPFC. Note the vmPFC to the amygdala pathways are also active during Extinction (Delgado et al 2008). Both re-appraisal and extinction result in diminished Amygdala activity, and thus in reduced (or obliterated) fear in the context in which they are being carried out (i.e. the specific fear that is being addressed at that time – for example, authoritarian male figures).

See also:
- Figure 8.6C above, and
- “Autogenic Training and some PFC modalities” in the glossary (Prefrontal Cortex Part A) of thematically related web article E-03:Figure G-11A; and
- Ross 2010 pp 209-213

**Relaxation Response**

Part I
Updated from Glossary of E-03

In basic neuro-physiological terms, this can be seen as the opposite of the Flight / Fight Response (the Stress Response).

The Relaxation Response is associated with rest, repair, and recuperation – and increased VV PSNS activity, and was studied extensively by Herbert Benson (Benson 1975; 1985). Benson’s original research showed that meditative type approaches (which he re-named the Relaxation Response), resulted in, for example, reduced heart rate, reduced blood pressure, reduced oxygen consumption, reduced muscle tension and increased alpha wave activity on EEG.

The modalities he studied for bringing about this response included:

- Transcendental Meditation
- Zen & Yoga
- Autogenic Training
- Progressive Muscular Relaxation
- Hypnosis with suggested deep relaxation and
- Sentic Cycles [Benson 1975 Table 2 pp 70-71; also see Ross 2010 pp 65-72].
**Relaxation Response**

**Part I continued**

- An understanding of the Relaxation Response dynamics is fundamental to understanding the healing and therapeutic aspects of, for example, Meditation, Therapeutic Hypnosis, Positive Mental Training and Autogenic Training / Therapy.
- Whole mental transformation can only come about if we increase our PSNS afferent input (to the Left Anterior Insular Cortex), which in turn increases positive affect (and axiomatically reduces negative affect) [Craig 2015; Ross 2016 Glossary p 109].

In more recent times it has become appreciated that the Relaxation Response is associated with increased Heart Rate Variability, an indirect measure of PSNS activity (including myelinated vagal afferent and efferent activity). Such increased VV PSNS activity is also associated with increased positive Social Engagement [Porges 2011].

The increased PSNS afferent activity associated with the Relaxation Response will facilitate positive emotions / feelings [Craig 2005; 2015].

In terms of meditative disciplines such as yoga, vipassana, and Autogenic Training, a better description of the state they produced is Amplified State Consciousness Induction (ASCI), as described by de Rivera (e.g. de Rivera 2018 pp 14-18). (See also Section 5 of this present article B 24.)

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**Relaxation Response**

**Part II**

**Concept re-assessed**

*Based on constructs illuminated by Micah Sadigh [Sadigh 2020]*

The above description has been the conventional wisdom for several decades, and has a value when being contrasted with the Stress Response. However, Micah Sadigh challenges the perspective of the Relaxation Response with sound arguments, which embrace the following:

i. Individual human cells are never at rest, never “relaxing”.

ii. During the Stress Response, they will be in a Catabolic Mode, meaning that they are expending energy for a particular purpose – e.g. the flight or fight response.

   o **Catabolism**: the break down of complex molecules with the release of energy – as required when for example we are digging for potatoes or climbing stairs. Catabolism is central to the flight / fight response

iii. When the Stress is over, they go into the Repair mode, in which the cells are still active in that they are restoring the milieu within the cell back to equilibrium – that is, the Anabolic Mode.

   o **Anabolism**: the metabolic process that includes the building up of simple molecules to more complex molecules, some of which will be stored as a future energy reserve. This will also involve repair and restoration of the cell following energy expenditure / stressors.

iv. From this perspective, it is perhaps much more accurate to describe this state as the Repair and Recuperation mode. Rest may of course be involved in this by the individual who has had a tiring day, yet this “rest” is more to allow the cells to restore themselves, some of which may have been damaged by the stressors of the day.

This being the case, it is perhaps inappropriate to discuss Autogenic Training in terms of the “Relaxation Response”. Rather, AT embraces the repair and restoration mode, yet it also can embrace and **Amplified State of Consciousness Induction – ASCI** [de Rivera 2018].

A more appropriate term for the Relaxation Response may be the Restoration Mode. Whichever term we use, both are deeply rooted in the VV PSNS dynamics of the Polyvagal Theory.

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1. It is curious that in his popular books Benson rarely if ever mentions the Parasympathetic Nervous System per se. However, he does discuss in some depth the fact that the Relaxation Response (through meditative-type practices) has been elicited throughout the ages: “The altered state of consciousness associated with the Relaxation Response has been routinely experienced in Eastern and Western cultures throughout the ages” [Benson 1975 p 75; and pp 74-98]. Luis de Rivera feels that the term “Altered State of Consciousness” can have misleading / negative connotations, and so the term “Amplified State of Consciousness Induction” was adopted (Switzerland 12th World Congress of International Federation of Psychotherapy 15th -16th June 2010 [de Rivera 2018 p 200 reference 12].

2. Micah Sadigh challenges this well-established view of the Relaxation Response – see Part II below.
When we have had a busy day and / or feel stressed, we certainly need time for relaxation. In this context, this mean mental relaxation; this will allow repair and restoration to occur at the cellular level as the cells go into an Anabolic Mode. In other words, while we are mentally relaxing, our cells will be in an active anabolic mode restoring them back to a normal / healthy base line; associated with a normalisation of the ANS [Sadigh 2020].

So to summarise: periods of rest and relaxation are essential for our well-being: during these periods of rest, the cells of our body are still active, and at this cellular level there is a switch from Catabolism to Anabolism, allowing the restoration of Body-Mind.

If such rest is not possible or not taken, Allostatic Load may result.

A term used by Schultz which seems to very much overlap with Luthe’s concept of the Authentic Self. In the context of Autogenic Training, Schultz said: “In this sense our work leads towards the highest goal of psychotherapy (the highest stratum of existential values), to self-realisation.” [Quoted by Wallnöfer 2000 –see also appendix C in website article E-03.]

For more details, with associated diagrams, please see web article B-20 (Separation Distress and Well-Being – Neuro-physiological reflections on developing a Secure Base) Figure 10, p 60 : ‘Mental Training, Primary Process Emotions and Self-Realisation’ and p 80 of glossary under ‘Self Realisation’ – including Glossary Figure G-04.

The term spiritual, in the present context, does not assume a belief in God, gods, or any particular religious set of beliefs. The following definition of spiritual I have found most helpful in (clinical) practice:

- “By spiritual we mean the needs and expectations which all humans have to find meaning, purpose and value in life: even people who are not religious have belief systems that give their lives meaning and purpose. Spiritual distress can hinder physical healing, and its identification may improve healing outcomes. Thus we consider this a dimension relevant in holistic health care.”

Quoted from: The Department of General Practice (Edinburgh University); notes for 5 Year Medical Students – 2002.

Also see Frankl 1946 / 1984.)

A further interesting perspective on spiritual is given by Pollard:

- “Some people find spirituality through religion; others find it through science, music, art or a connection with nature, while still others find it in their personal values and principles. No matter how it is defined, this elusive entity describes the way we find meaning, hope, comfort and inner peace in our lives.” (Pollard 2004)

An ambiguous word. It is helpful to distinguish:

- The stressor, that is the event / experience that induces the Stress Response;
- the Stress Response, the physiological and emotional response to the stressor – in the context of evolution, this was an adaptive response;
- the Chronic Stress Response, associated with damaging long-term responses to the stressor – that can lead to physical and emotional ill health.

An event, experience (e.g. a previous emotional trauma) that causes stress (the Stress Response). Stressors can be divided into: External Stressors, such as excessive pressure at work; and Internal Stressors, such as un-resolved emotional issues, previous childhood abuse, and on-going physical or emotional pain.

- Research indicates that it is particularly internal stressors (especially if they are recurrent or chronic) that can be damaging (i.e. producing Allostatic Load) and lead to physical and mental ill health [Sapolsky 2007].
- “Anything that perturbs homeostatic balance” (Sapolsky 2007 p 607)
**Stress Response**

**Part A**
(Cannon 1936)

As originally conceived by Walter Cannon (Cannon 1936), the Stress Response is the set of adaptive biological systems that enable an organism to return to homeostasis following a physical / environmental challenge. cf. The Relaxation Response [Benson & Klipper 1975]. Notwithstanding Cannon’s concept, the Stress Response is often taken to include potentially damaging effects – see below.

**Stress Response**

**Part B**

Adapted from Ross 2010
(for Chronic Stress Response see below this entry)

As originally conceived by Walter Cannon (Cannon 1936), the Stress Response is the appropriate physiological and biochemical response to a **stressor** that results in the restoration of **Homeostasis**. Thus, from the evolutionary perspective, it is an appropriate adaptive response. It embraces several key aspects including:

i. Activation of the SNS including the release of Catecholamines – adrenaline & nor-adrenaline. This is this series of essays notated as the Type I Stress Response. [This is alluding to Essay E2 in Ross 2010 pp 43-96: “The Physiology and Biochemistry of Stress in relation to Autogenic Training including the dynamics of the Relaxation Response”].

ii. Activation of the Hypothalamic-Pituitary-Adrenal-axis with the release of cortisol; notated as the Type II Stress Response [Ross 2010 op cit.].

iii. Activation of other Stress Response hormones such as beta-endorphins, vasopressin, prolactin, glucagon.

iv. Reduced secretion of hormones (informational molecules) such as oestrogens / androgens, growth-type hormones, and energy storage (e.g. insulin).

v. Suppression of the VV PSNS.

The restoration of homeostasis, or homeostatic balance, means the return to health and **Well-Being**.

Should the stressor become prolonged, or the psychological response to the stressor become mal-adaptive, this may lead to a Chronic Stress Response (See Stress Response Part C below), with resultant **Allostatic Load**.

Different stressors will activate the Stress Response in subtly different ways: these are called the stress signatures.

(Based on various sources including Sapolsky 2007 pp 606 – 615)

**Stress Response**

**Part C**

“Chronic”

Adapted from Ross 2010

The Chronic Stress Response occurs when an individual is subjected to prolonged **stressors**, including psychological stressors, which result in a prolonged Stress Response to successive stressors.

- Such a chronic Stress Response will result in cascades of stress related hormones / informational substances which over time may become toxic and so result in physical and / or mental damage – i.e. from physiological and mental dis-ease to pathological disease.

- The process by which this occurs is sometimes referred to as **Allostatic Load**.

**Theory of Mind**

The initial development of the so-called Theory of Mind matures (normally) in childhood. It is the capacity, as it were, to understand someone else’s perspective, rather than simply our own perspective.

- Three-year-old children have not normally developed this capacity; whereas,
- by the age of four years, children normally have. It underpins empathy. See also Inter-Being, and B 19 on web Section 6.6 and the longer Glossary entry there.

**Thermogenesis**

From glossary of F1 on web

Thermo-genesis here refers to the heat created within the body as a result of on-going metabolic (chemical) activity within each cell of the body. This activity creates heat: deep inside our bodies the temperature normally remains constant at around 36.5–37.5 °C (97.7–99.5 °F).

In the warmth exercises in Autogenic Training, we can tune into an awareness of this inner warmth. All of the Standard Exercises reflect actual bodily states, and so the AT approach in this sense means:

- tuning into various actual, real, states of the body [see also de Rivera 2018];
- in the case of the warmth exercises, this means feeling the warmth of the inner body as a live experience (**vivencia**); not as a theoretical concept and not as a striving for warmth.
### Toxic Trio

**An ancient precept from Buddhist Psychology**

Abbreviated and adapted from glossary of E-03

Human suffering is deeply rooted in both our neuro-physiology and in the assumptions that we make about the world. Ekman [Ekman et al 2005] wrote a wonderful succinct article about human suffering (dukha) which focused particularly on what is regarded as the Toxic Trio, which are:

- Hatred and ill-will towards other people / phenomena;
- Craving; and
- The delusion that we have a permanent separate self. This delusion, in Buddhist psychology, arises because we are living in ignorance of the inter-relatedness of all things: nothing exists in isolation; everything is interlinked with everything else (see also **Inter-Being**).

Hatred and ill-will towards others can be considered in terms of neo-cortical elaborations of the primary process emotions RAGE and FEAR [Panksepp 1998]. Craving, in the sense of ego-motivated craving, can be seen in terms of a toxic manifestation of the SEEKING system.

### Ubuntu

**See also Jen**

**Also see:**

Ngomane 2019

An African concept that in essence is a reflection of **Inter-Being**. The spirit of ubuntu can perhaps best be described in the following short story:

An anthropologist once proposed a game to some children of an African tribe. He put a basket of fruit near a tree and told them that whoever got there first won all the sweet fruits. When he gave them the signal to run, they took each other’s hands, running together, and then sat down in a circle and enjoyed their fruits.

The anthropologist was perplexed, and asked them why they chose to run as a group when they could have had more fruit individually. One some silence, on child spoke up and said:

° “UBUNTU. How can one of us be happy if all the other ones are sad?”

‘UBUNTU’ in the Xhosa culture means: “I am because we are”

**What follows below has been added as a result of Annie Sturgeon asking me the difference between Jen and Ubuntu; this is a good question, and this is my formulation**

The concept of ubuntu overlaps with, yet is not the same, as **Jen**.

If we are born into a society where ubuntu is the quintessence of the communities of that culture, then, in general terms, Jen will develop naturally [Ngomane 2019].

If, on the other hand, we are born into a culture in which individualism, “me first”, and ego dominate, then there may be no sense of ubuntu, and Jen will not naturally develop. That is to say, Jen will not develop as a natural and wholesome Habit Energy [Hanh 1998; and see Glossary of D11 on web]; rather, it will have to be worked on by each person — as part of the maturational process of life.

### Vivencia

**Extract from glossary of F1 on web**

A Spanish term used by Luis de Rivera that does not have an exact English translation [de Rivera 2018]. It is sometimes rendered as “Live Experience” with perhaps added associations of numinous.

Such live experiences are the opposite of left-brain analytical thinking. If we go out in the country at night and look at the starry heavens, or the emerging bud of a tree in spring, then we can have a live experience if we are there in that present moment.

The non-striving focused attention of the Standard Exercises in AT allows us to tune into the live-experience of the body at that moment, and in each subsequent moment.

### VV-PSNS

**Ventral Vagal Parasympathetic Nervous System**

An abbreviation for the Vental Vagal Para-Sympathetic Nervous System that is myelinated. It is this part of the PSNS that is involved in the Relaxation Response, and also facilitates Social Engagement. The VV-PSNS is myelinated; that is, the nerves are covered with a myelin sheath which allows for faster transmission of neuronal impulses.

It is to be distinguished from the most ancient part of the ANS, that of the *unmyelinated* Dorsal Vagal PSNS that is activated unconsciously in life threatening situations when there is no prospect of escape (sometime called the Freeze Response or Fear Paralysis).

See also **Polyvagal Theory**.
Well-Being
Adapted from glossary of E-03

Dr Martin Seligman, a psychologist at the University of Pennsylvania, has been one of the key players in the development of Positive Psychology in North America [Seligman 1990]. Seligman suggests that we can regard happiness as embracing three components. Angela Clow, Professor of psychophysiology at Westminster University, suggests that the concept of Well-Being may be a better word than happiness for British (as compared with North American) citizens (Professor Angela Clow in a talk on "Stress, Health and Happiness" at the Edinburgh International Science Festival on 09.04.2006).

Dr Seligman's definition of happiness can be reframed as Well-Being to embrace:

- Pleasure / positive emotions.
- Being engaged in wholesome pursuits / occupations. i.e. when we are involved in, and committed to, various pursuits / activities. The construct of Well-Being is thus not one of a passive "happy" state, but one that is engaged in – and I would add mindful – activity.
- Meaning; and / or having a connection to some larger purpose. (This might be, for example, the ecology of our planet in the context of climate change.) [See also Frankl 1946; 1952]. However, Well-Being requires us to embrace and acknowledge our distressing feelings and thoughts, and thus helps us to avoid negatively ruminating. See also the Rumi poem the Guest House on, for example: [http://www.sagemindfulness.com/blog/rumi-s-poem-the-guest-house](http://www.sagemindfulness.com/blog/rumi-s-poem-the-guest-house).

Well-Being, in its deeper sense, is clearly far more than an individual matter. It also links in with the concept of Inter-Being, the inter-relatedness of all things [Capra and Luisi 2014], and mindfulness.

- In this sense the Well-Being of each individual is intimately linked with the wellbeing of all.
- See also Jen and Ubuntu.

Mental Training such as Meditation / Autogenic Training facilitate these processes [de Rivera 2018 p 27; and footnote 33 on page 204].
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