

Emotional Triggers and the Refractory Period

1. Bears and the refractory period

If we had been alive millennia ago and had seen a bear walking towards us, we would no doubt have tried to run away. The fact that we are alive today indicates that our ancestors had a very good Fight & Flight Response. Now neuro-physiologically, the process is not quite what we might expect: the sequence of events is, in general terms¹, as follows:

<ol style="list-style-type: none"> i. Our brain processes the images of the bear coming towards. ii. Messages are relayed to the amygdala (part of the limbic system) that alert the FEAR-circuits at an unconscious level. iii. Messages are then sent direct to the rest of the body as part of the Flight Response; iv. We start to run away. 	Refractory Period (Ekman 2007)
Only later do we become aware of the emotion fear when it becomes conscious as a fear-feeling modulated in the neo-cortex.	

The stages i. to iv. are all unconscious, and embrace what has been called the Automatic Appraisal phase; the duration of this period is called the Refractory Period (Ekman 2007; Dalai Lama & Ekman 2008). Automatic Appraisal takes place at an unconscious level, and so overlaps with the “Automatic Reactions” referred to by Kabat-Zinn (1990 - e.g. pp 248-253).

The implication of this is that there is an unconscious “Refractory Period” between the Trigger of the emotion (in this case the bear) and the conscious realisation of the bear, which we can call the Feeling (i.e. the subjective awareness of the emotion – Damasio 1999). This sequence of events is depicted schematically in Figure 1:

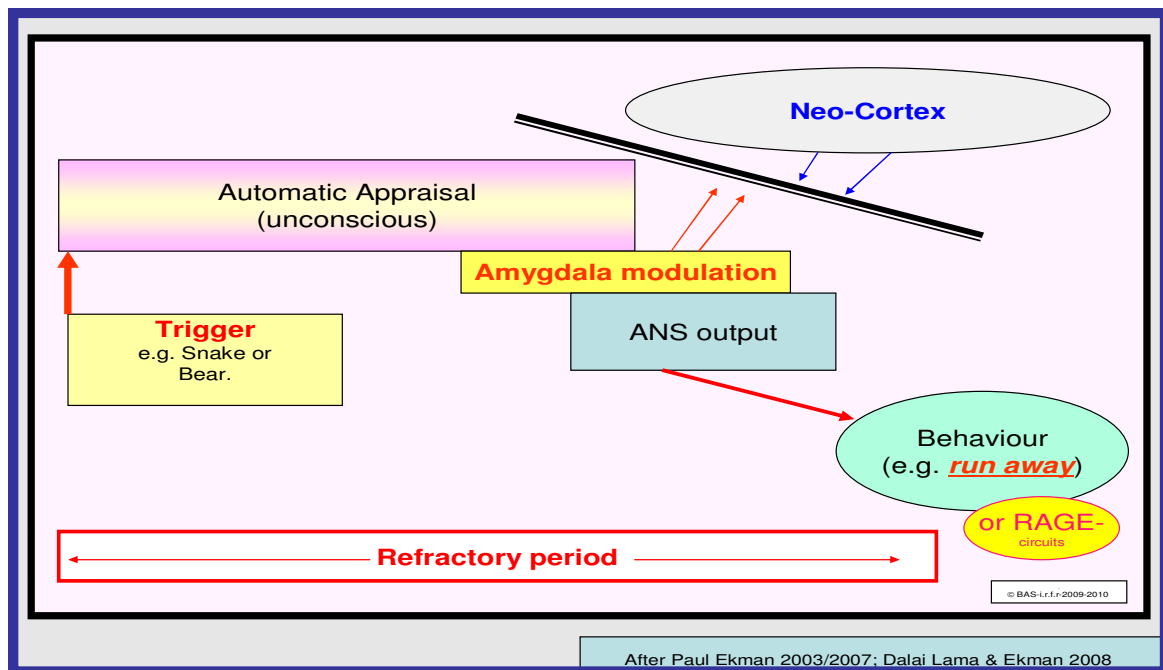


Figure 1
The Trigger and Refractory Period Dynamics *in schematic form*

Comment on Figure 1:

- This is actually an example of the Stress Response described by Selye (Selye 1956; 1974). Flight is associated with activation of the FEAR-circuits; Fight with the RAGE-circuits (Panksepp 1998).
- Note the extended refractory period.
- ANS: Autonomic Nervous System – and here it will be the Sympathetic Nervous System (SNS – part of the ANS) that is activated
- Also note that the notation used here is different notation from that used by Kabat-Zinn 1990 – please see comment at end of this handout.

¹ This understanding of the basic theory of Emotion comes from the James-Lange model rather than the Cannon Baird Theory. (See also handout Zz-53)

While the unconscious FEAR-circuits of the amygdala are being activated, the connections with the neo-cortical thinking parts of the brain are closed down, depicted by the diagonal black double line (in Figure 1).

So it is not quite correct to say we run away because we are afraid: it is probably more accurate to say that we have already started to run before we consciously experience the feeling of fear.

Why is this important?

The importance of this is that our brain starts processing our emotional response before we become subjectively aware of what is happening. In the case of the bear, this does not matter, because in the example given the important thing is that we start running, whether or not we are consciously aware why we are running. However, if we are becoming angry with another human being, this can matter very much: for we may be on the threshold of our RAGE-circuits (Panksepp 1998) taking over our actions. Note that when we are angry blood is preferentially directed to our hands / upper limbs – Ekman 2008 p 41; in fear it is preferentially directed to our lower limbs. Why is this important?

2. Anger and the Refractory Period:

Many things can trigger our anger: for example, a comment by another person or a broken shoe lace. The comment by the person may be provocative, but actually it is our conscious (and unconscious) interpretation of the comment that is critical.

Men are disturbed not by things,
but the views they take of them.
Epictetus
first century Greek Philosopher.

Once again, there will be a Refractory Period between the trigger of the emotion, and our *conscious* subjective feeling. In the case of anger being triggered, this may – as indicated above – result in the activation of our RAGE-circuits: once these are in operation, we may no longer be able to control our actions². This is depicted in Figure 2.

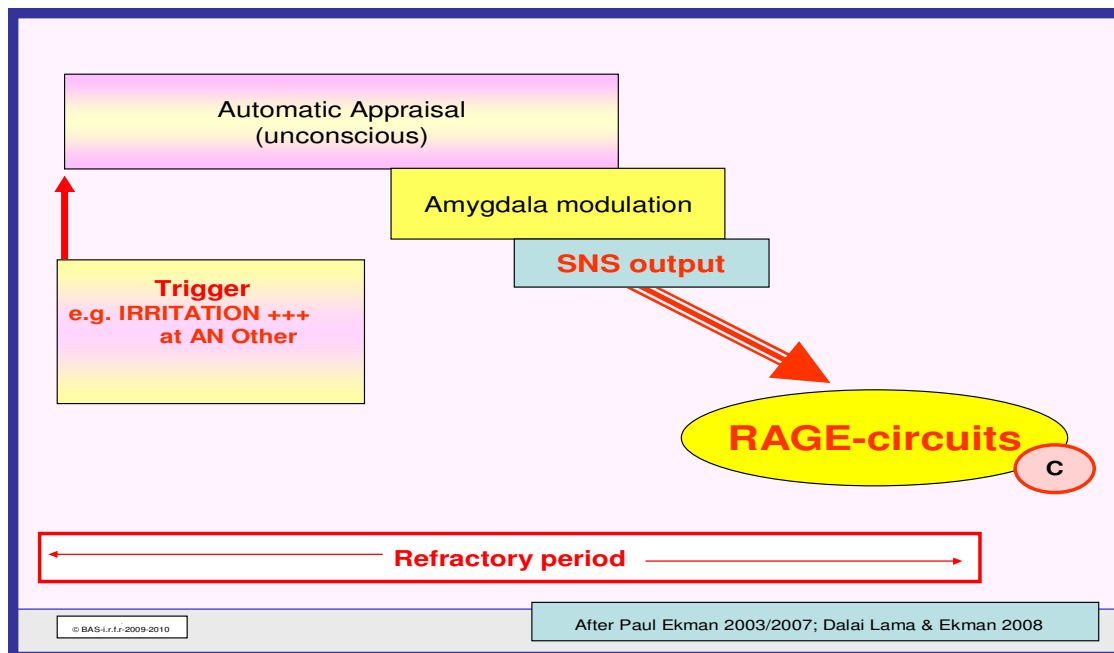


Figure 2
Irritation triggers can lead to RAGE-circuits being activated

Comment on Figure 2: The RAGE-circuits are activated during the unconscious Refractory Period, when communications with the neo-cortex are closed down; only later do we become conscious of what is happening – depicted by C in the figure.

- Note again the extended refractory period.

If we are not in control of our actions, we may do something terrible.

² Once again, the communications between the amygdala / limbic system and the neo-cortex, our thinking-rational-ethical brain, will be closed down

3. Emotions and rumination

Simply thinking about or recalling a past memory can set in motion the Automatic Appraisal that then triggers the ANS (SNS) response: and in this case it is possible for us to keep ruminating over the events / thoughts while under the influence of these toxic physiological processes, which will colour and distort our perceptions – and can keep us in an irritated mood for hours. As a result of this, we may do something that we subsequently profoundly regret. This sequence of events is shown schematically in Figure 3.

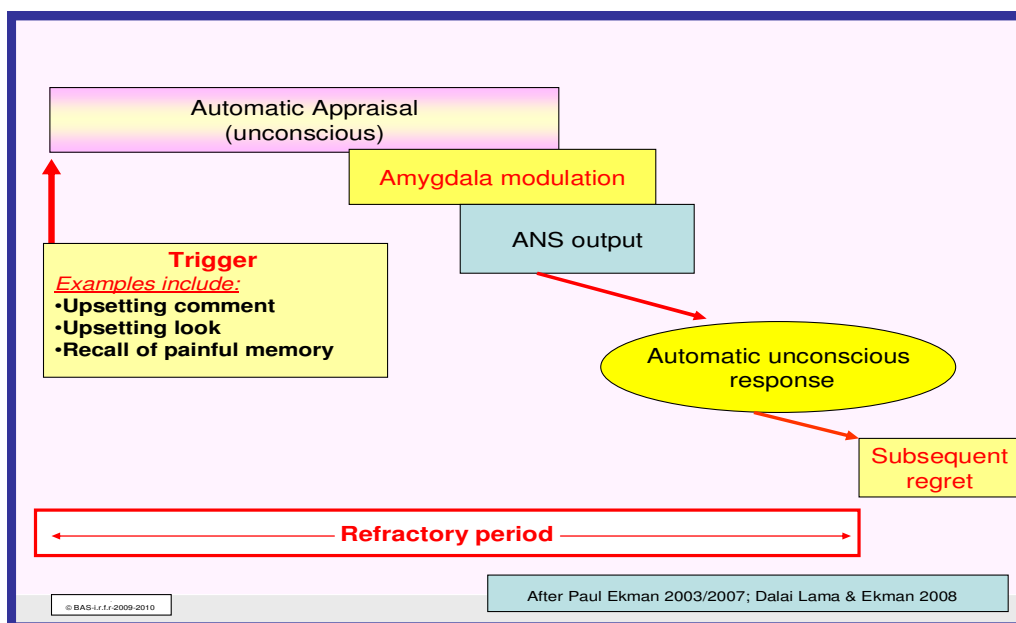


Figure 3
Automatic Appraisal can lead to “automatic actions”
that we subsequently regret.

Note again the extended refractory period.

So is the situation hopeless? Are we sometimes at the mercy of our biologically determined Automatic Appraisals and responses?

4. Mindfulness and reducing the Refractory Period

Research has shown that we can change our responses to such triggers. The first thing is perhaps to become more aware of our own body and physiology – which can alert us to something going on inside that has been triggered by, for example, a remark or memory. This ability to become aware of what is going on within, and to change the outcome, has been described as meta-attention:

The role of self-awareness, this meta-attention, is to train the practitioner to the point where the person is able to detect, even before the actual emotion has arisen, a proneness to this emotions. So the more advanced you are, the earlier you will be able to detect the potential for the arising of that emotion.

Dalai Lama (Dalai Lama & Ekman, 2008 pp 23-24)

If we can begin to detect “the arising of that emotion” earlier and earlier, we can, in time, learn to prevent an inappropriate Automatic Response. (Such awareness will involve neo-cortical – including frontal lobe – circuits.) Victor Frankl, the renowned psychiatrist and founder of logotherapy, put it this way:

Between the stimulus and the response there is a space.
In that space is our power to choose our response.
In our response lies our growth and our freedom.

Victor Frankl

Author of Man's Search for Meaning

Thanks to Hephzibah Kolban for drawing my attention to this quote

In essence Victor Frankl is here saying that we have the potential to develop a skill that allows us to override our automatic (unconscious) response, such as RAGE- or PANIC-, as we become increasingly mindful of the “space” we have following the stimulus, that then gives us the ability to choose our response.

The development of such meta-attention can be facilitated by:

- i. Meditation^{3*}; for example, both the body scan and focusing on the breathing will in time increase our awareness of what is going on within – and hence help to develop our meta-attention.
- ii. Autogenic Standard Exercise practice
- iii. Autogenic Partial Exercises
- iv. Mindfulness; and
- v. Being in the Present Moment.

We can summarise the benefits from developing such meta-attention⁴ thus:

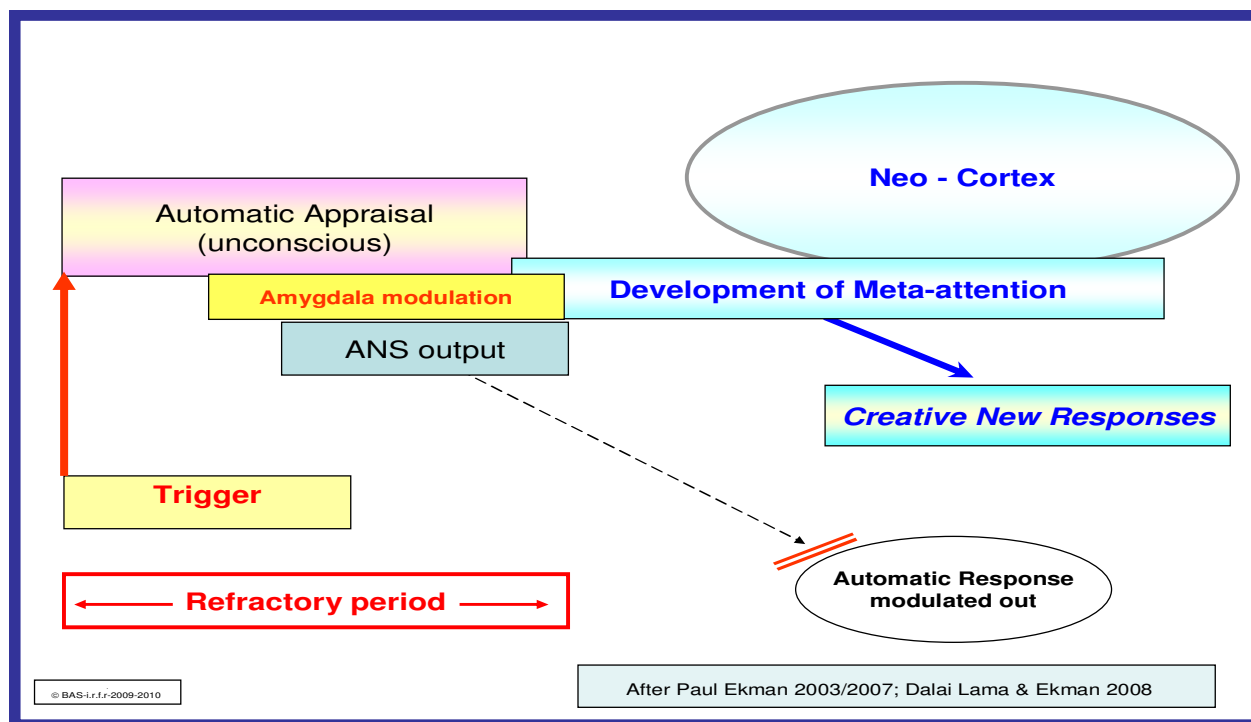


Figure 4
Meta-attention and modulating out inappropriate responses
(all figures highly schematic)

Note the much shorter Refractory Period compared to Figures 1, 2 & 3.

So if, for example, someone makes a negative comment, we can develop the ability to become aware of any physiological effect this has upon us earlier and earlier (i.e. within seconds or micro-seconds), and thus greatly reduce the duration of the Refractory Period. By developing our mindfulness and meta-awareness, the automatic response of, say, barely disguised anger can be modulated out within an inner milieu of non-judgement and non-irritation.

Thus development of self-awareness and Meta-attention can help us to prevent inappropriate responses to our emotions

These various dynamics discussed above are illustrated schematically in Figure 5.

³ * Meditation is associated with increased Left pre-Frontal Lobe Activity (Goleman 2003); there is evidence to suggest that this is also the case with Autogenic Training.

⁴ Note that Ekman's concept of meta-attention overlaps with Siegel's concept of Mindsight (Siegel 2010; see C1 – Mindsight – on this website.)

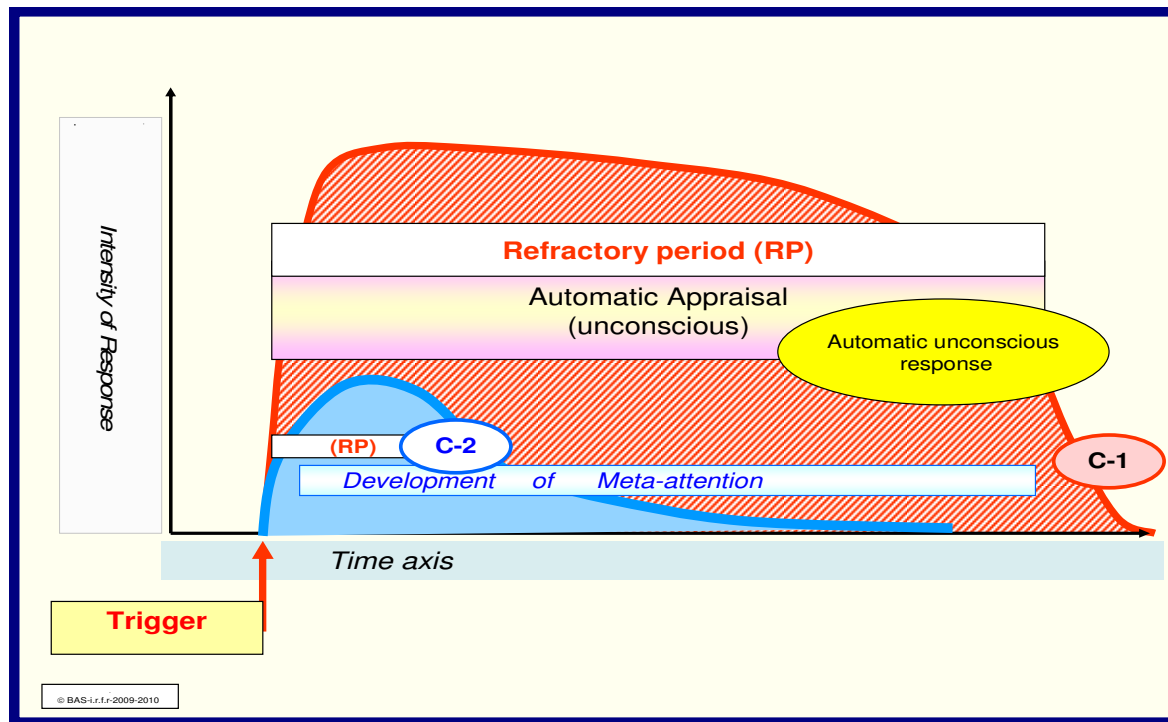


Figure 5
The development of Meta-attention in contrast to the un-skilful (and unconscious) response to an emotional trigger

Comment on Figure 5

- i. The normal response is shown by the red graph, with an extended Refractory Period (RP) associated with the unconscious Automatic Appraisal, and then the automatic response which starts before the conscious awareness (C-1) of the situation develops.
- ii. The development of the skill of meta-attention results in a much reduced Refractory Period (RP) and this is shown in the blue (lower) graph.
 - Here, Conscious awareness (C-2) is realised much earlier, and this effectively leads to the blocking of the unhelpful or counter-productive “automatic unconscious response”.

So as we become more mindful of what is going on within us, we can reduce the Refractory Period, and deflect or change our previous inappropriate automatic responses.

Note on notation used in this article

Please note that the notation used in his paper is different from that of Kabat-Zinn (1990 pp 235-241; 248-253). In this paper, following Selye (1956 p 111) and Chandra Patel (1989 p 3), the basic response to stressors is called the Stress Response, and not the Stress Reaction, as Kabat Zinn notates it. This Stress Response is shared with all mammals (Panksepp 1998), and in its original manifestations aided the survival of the individual animal / human – as part of the original Fight (RAGE-) or Flight (FEAR-) Response. Only later, with the development of civilisation, did this Stress Response become mal-adaptive – for example, when it is set off by an angry boss rather than a hungry bear. This mal-adaptive response can lead to mental and physical disharmony – and ultimately disease (in the form of allostatic load) [e.g. McEwen & Lasley 2003].

Selye's notation has the advantage of resonating with Benson's complementary Relaxation Response (Benson 1975; 1984): complementary in that for health we need both responses. Note that the Relaxation Response is activated by disciplines such as Meditation, Positive Mental Training, and Autogenic Therapy.

Sources and references include

Benson, Herbert; and Klipper, Miriam Z; 1975. The Relaxation Response;	ISBN 0-00-626148-5
Benson, Herbert; and Proctor, William. 1984. Beyond the Relaxation Response.	ISBN 0-00-626852-8
Benson, Herbert; Stark, Marg: 1996. Timeless Healing: the power and biology of belief.	ISBN 0-684-81782-9
Dalai Lama & Cutler, Howard C. 1998. The Art of Happiness – a handbook for living.	ISBN 978-0-340-75015-5 [N.B. See Happiness and Well-Being .]
Damasio, Antonio R. 1999. The Feeling of What Happens. Body and Emotion in the Making of Consciousness.	ISBN 0-15-100369-6
Dobbin; Alastair E. 2008. Seminar given to GP Registrars, Pfizer Institute, Edinburgh on 12.02.2008; slide talk subsequently available from AED website Hypnodoc http://www.hypnodoc.co.uk/resources.html	
Ekman, Paul: 2007 (second edition; first edition 2003). Emotions Revealed.	ISBN 13-13-978-0-8050-8339-2
Ekman, Paul, (Ed) and Dalai Lama: 2008. Emotional Awareness: overcoming the obstacles to psychological balance and compassion.	ISBN 13: 978-0-8050-8712-3
Frankl, Viktor E.: Man's Search for Meaning; 1946; 1984; Pocket Books; Simon & Schuster.	ISBN 0-671-02337-3 [Note: I am not sure of the origin of the quote for Victor Frankl in the text – and whether it comes from this book]
Goleman, Daniel: 2003; Destructive Emotions – and how we can overcome them: a dialogue with The Dalai Lama narrated by Daniel Goleman;	ISBN 0-7475-6182-6
Kabat-Zinn, Jon 1990 (2006). Full Catastrophe Living⁵: How to cope with stress, pain and illness using mindfulness meditation.	ISBN 0-7499-1585-4
McEwen, Bruce; & Lasley, Elizabeth N: 2003. Allostatic Load: When Protection Gives Way to Damage. Advances; in Mind-Body Medicine; Spring 2003; 19; (1); 28 - 32]	
Panksepp, Jaak: 1998. Affective Neuroscience: The Foundation of Human and Animal Emotions;	Oxford University Press; ISBN 0-19-509673-8.
Patel, Chandra: 1989; Stress Management – the complete guide; Optima books 1989.	ISBN 0-356-15641-9.
Selye; Hans: 1956 / 1976. The Stress of Life.	ISBN 0-07-056212-1
Selye; Hans: 1974 / 1975; 1984; Stress without Distress: The McGraw-Hill Co. Inc.; New York.	ISBN 0-07-056212.
Siegel, Daniel. 2010. Mindsight - transform your brain with the new science of Kindness	ISBN 978-1-85168-761-9

- Those references in blue are perhaps the most helpful for facilitating appropriate inner transformation – from the perspective of the Mindfulness Based Stress Reduction Course by Hephzibah Kolban at Wellspring – (and for Autogenic Training).

Linked themes in this Autogenic Dynamics section

C1	Mindsight – our seventh sense
C3	The Hub of Mindsight
D1	Reflections on foundations for mindful living [Zz-18]
D3	Store Consciousness and Watering our Positive Seeds.
	Also available on request: Zz-40A Autogenic handout: Confronting Negative Thoughts and Feelings

Post Script: the Autonomic Nervous System (ANS) is divided in to two parts:

- i. The Sympathetic Nervous System (SNS) which is the part activated in, for example, the Stress Response; and
- ii. The Para-Sympathetic Nervous System (PSNS) which is active in, for example, the Relaxation Response – which is associated with rest, repair and recuperation: and, as indicated above, is activated in disciplines such as Meditation, Positive Mental Training and Autogenic Training.

⁵ I was initially put off with the slightly curious title of this book. However, it refers to those of us who have suffered from a major trauma in our lives – such as a heart attack, a close bereavement, a difficult partnership break up, and / or cancer. The relevance of this is that even with such major catastrophes in our lives, we can go on to live a full and healthy life.