Chapter 1

Explication of Meditation

1.1 Introduction

The considerable advances in technology over the last hundred or so years and the subsequent advent and refinement of neuroelectric and neuroimaging techniques have enabled modern researchers to pursue their investigations of the brain and nervous system under increasingly favourable conditions. Instrumentation such as electroencephalography (EEG), functional magnetic resonance imaging (fMRI), positron emission tomography (PET) and single photon emission computed tomography (SPECT) facilitates exploration in a high resolution temporal and spatial domain. These technologies make the task of correlating mental and behavioural phenomena with neurophysiological modulation considerably more practicable. Neuroscientists have widened their scope of inquiry due to the now accepted hypothesis that all emotional and cognitive processes have specific measurable neurophysiological associations. Moreover, the neural underpinnings of mental processes can alter throughout one's lifetime in response to particular tasks and behaviours. One mental behaviour that has become increasingly popular within this expanded scope is the practice of meditation. In 2003, Newberg and Iversen stated that

> "[t]he complex mental task of meditation is potentially one of the most important areas of research that may be pursued by science in the next decade. Meditation offers a fascinating window into human consciousness, psychology, and experience; the relationship between mental states and

body physiology; emotional and cognitive processing; and the biological correlates of religious experience."

Western[1] empirical science has made remarkable advances in understanding the natural world, relative to the limited sciences developed in the Eastern world. On the other hand, the systematic investigation of phenomenological experience in Eastern countries like India, Tibet, China and Japan is superior to any phenomenological approaches so far established in the West. Consequently, both "sciences" have insights which the other lacks and both have valuable contributions to make in understanding the effects of meditation.

One tradition that offers a wealth of insights into the mind and subjective experience is Buddhism. Buddhists have advanced their methods of studying phenomenology to such a degree that the tradition has been referred to as a "contemplative science" (Wallace 2007). For centuries, Buddhists and practitioners from many other traditions have made empirical, introspective examinations of phenomenal experience via the practice of meditation. The capacity of meditation to offer a therapeutic intervention to brain and stress-related disorders has been a focus of western psychologists for decades. In addition, philosophers and neuroscientists have been interested in meditation as an "altered state of consciousness" (Aftanas & Golocheikine 2001) and the opportunity it provides for studying the nature of consciousness (Wallace 2003). This exploration has been encouraged by 1) the practitioner's abilities to induce distinct physical and mental states during the practice of meditation, and 2) the developed mental and behavioural changes which persist in an individual after years of meditation, referred to as traits. It is because one objective behind meditation is to refine one's state of consciousness to such a degree that it can be used to examine itself (Wallace 1999) that makes it such an interesting human behaviour to investigate.

[1]The antiquated terms "East" and "West" are contrived by European Christendom, solidified by the Crusades and popularised by scholars on Orientalism and Indology. Nevertheless, the terms do, with reasonably accuracy, delineate the distribution of the two major families of world religion, Dharmic religion and Abrahamic religion, which highlights certain cultural differences between the far east and the rest of the world.

For more than five decades, experimentalists have sought to understand the physiological correlates of meditation. Over 1700 published research articles[2] on meditation during this time attests to the intrigue of this mental practice to science. This fact notwithstanding, meditation is a term used with a regular lack of discernment by those naïve to the particularities of the practices studied, contributing to confusion not only in the scientific community, but in the general population as well. This nescience, contemporaneous with inadequate experimental rigor (lack of replication of critical conditions and poor methodological sophistication) and insufficient technical expertise, variation among meditative techniques and degree of experience in subjects studied, and the heterogeneity of meditative states, has given rise to the variegated and often contradictory data still found in publications (for review, see Cahn & Polich 2006). In order to navigate the plethora of data and consequent interpretations with some clarity, it is vital to gain a degree of comprehension about meditation and the various ways in which it is described.

1.1.1 Toward an operational definition

Much of the previous work on meditation has not included sufficient descriptions of the technique under investigation and certainly not enough phenomenological evidence to help further our understanding of consciousness. The term "meditation" is now used with such popularity and to describe such a wide range of practices that it has lost its precision, and consequently, the diverse array of meditative practices has been trivialised (Lutz et al. 2007). More recent work has appreciated this requirement for detail and has made the necessary effort in clarifying the processes and functions implicit in the various meditative techniques (Brefczynski-Lewis et al. 2007; Lutz et al. 2008).

Many authors have oversimplified the classification of meditation practices by focusing on too few key instructions. While it is unreasonable to ask that a tradition's entire philosophy and methodology be encapsulated in any single

[2]The number of articles indexing the term "meditation" on PubMed at the time of submission was 1768.

research article, it is important to remain aware of the behavioural and cognitive styles that are employed in different practices and attempt to describe them thoroughly. In addition to this, great care must be taken to eschew the ill-defined expressions that plague many modern writings on contemplative practices.

Traditional accounts of meditation styles and states are customarily detailed and complex. Techniques frequently seem paradoxical (Shear & Jevning 1999), even within a single tradition, with descriptions often containing logical incongruities and direct contradictions (Austin 1999). Almost always couched in cultural-specific language, these descriptions vary widely across contemplative traditions, from specific techniques to broad metaphysical assertions. As such, traditional meditative teachings are difficult to comprehend from a western scientific perspective. The dialogue between meditators and scientists therefore relies considerably on both the practitioner's ability to transliterate their meditation tradition's principles and communicate them clearly to researchers, and just as importantly, the researcher's capacity to understand and apply these translations to their research.

Over thirty years ago, Herbert Benson (1975) synthesised a simple relaxation technique from traditional practices of Zen and Yoga meditation, Western prayer methods and secular relaxation practices such as autogenic training, progressive relaxation and hypnosis, which he designated the *Relaxation Response* (RR) (Beary & Benson 1974; Benson 1983). The idea was to identify the neurophysiological correlates of popularly studied techniques such as Transcendental Meditation, namely decreases in oxygen (O_2) consumption, carbon dioxide (CO_2) production, heart rate and respiratory rate; hypometabolic changes he also labelled a *relaxation response*[3] (Benson et al. 1974). The *Relaxation Response* was devised to establish if the *relaxation response* was confined solely to practices like Transcendental Meditation (TM) or if it was a common state resulting from all meditation techniques. Benson (1983) considered the majority of the world's meditative and religious practices such as those practised in early Chris-

[3]As the reader may very quickly become aware, these labels can lead to confusion. Therefore, capitals will be used for the actual technique name (*Relaxation Response*) to distinguish it from the physiological effects (*relaxation response*) elicited from practising the technique.

tian and Judaistic contemplation, Sufism, Shintoism, Taoism, Indian Yoga and some shamanistic traditions to all have this underlying physiological response. The simple secular technique that he developed involved the components of: 1) a mental device to focus one's attention on (for example, counting breaths); 2) a passive attitude which ignores competing thoughts or stimuli; 3) decreased muscle tonus; and 4) a quiet environment.

While the idea behind developing the *Relaxation Response* is understandable, that is, attempting to identify essential hypometabolic elements common to all practices of meditation (Beary & Benson 1974), Benson and his colleagues did little more than relabel Zen meditation with confusing terminology. Meditation and contemplative practices across all traditions are complex and multifaceted (Dunn et al. 1999) and involve alterations in cognitive, emotional and attentional processes which are inextricably connected to other physiological changes. The differences between simple relaxation and the concentrative meditation techniques Benson (1983) refers to, are primarily the two major cognitive faculties of 1) focusing one's attention on an object, for example, a bodily sensation or counted breaths, and 2) employing the faculty of *meta-awareness,* which allows an awareness of the mental condition, such as wandering focus or torpidity. While the practices of contemplative and concentrative meditation may share with relaxation an autonomic quiescence, physiological responses once termed hypometabolic (Jevning et al. 1992), such changes are certainly not the goal of the majority of meditation practices (Buzsáki 2006). Most meditation techniques such as Buddhist concentrative meditation involve highly detailed and complex methods for refining focus and meta-awareness, counteracting mental obstacles and distractions, and developing enhanced levels of emotional balance (Wallace 2006) in order to induce lasting changes in one's mental behaviours. As such, hijacking the basic principles of concentrative meditation and relabeling them a "relaxation technique" (Beary & Benson 1974) is confusing and misleading.

With this in mind, it is necessary to establish how various techniques are applied within each tradition and how terminology is used to describe the states

reached during the respective meditations. With appropriate terminology it should be possible to use evidence from certain previous studies to construct useful theories of meditation and plan future studies.

1.2 Definitions and descriptions

Meditation has been described as "a family of complex emotional and attentional regulatory strategies developed for various ends, including the cultivation of well-being and emotional balance" (Lutz et al. 2008). However, meditation is also used to describe very disparate techniques such as mantra recitation, visualisation, attentional focus on objects, argument and discourse analysis, as well as objectless practices.

Two important aspects concerned with all meditative techniques and important when describing meditation practice are *instruction* and *performance*. Instruction (what one should do) ranges from broad considerations such as light and noise levels in the surrounding environment and bodily posture, to more subtle and complex directions, such as position of tongue and hands, direction of eyes and chosen aperture of breath (nose or mouth). Instruction also addresses how one manages attention and if appropriate, the primary object or set of objects used during meditation, for example breathing sensations, a mantra or compassion.[4] Instructions for meditation can vary widely across techniques and are given in order to create an external and internal environment which is conducive to meditation. Meditators, especially beginners, will often begin meditation with a strong instructional set in mind which is revisited throughout a session to provide self-guidance and technique reinforcement. Although these directions are encouraged to be revisited during practise in order to prevent mental or physical digression, less and less regard is given to them as the practitioner progresses and becomes more skilled in meditation. Dissimilar instructions can lead to similar subjective experiences but also completely different ones, which is part of the reason why describing them thoroughly is so important.

[4]Here compassion is considered as an abstract mental object.

Performance (what one actually does and how well) relates to the phenomenological aspect of meditation. While one might be following specific instructions effectively, what occurs experientially as a result can be quite different. Performance encompasses mental faculties such as focus and meta-awareness and the degree to which they are present and effective, as well as mental and physical states such as drowsiness, hyperarousal, clarity and stability. Performance can also be influenced by the mental approach taken during meditation, for example motivation (why are you meditating?) and intention (how do you hope to benefit?).

Meditation is traditionally practised under the guidance of a teacher who gives direction based on knowledge and personal experience. This instructional knowledge provides students with means to prevent them from digressing into states of dullness and torpor (Trungpa 1991). Students are required to place a certain amount of faith in a teacher's and technique's efficacy to produce claimed results, but this does not mean blind, unquestioning belief in a particular doctrine or set of ideologies. This faith is likened to a student learning a specific technique, for example microscopy. The technique is shown to them by an experienced mentor and the student trusts that the method has been tested and successfully replicated numerous times in the past.

After many years of practice, meditation techniques become natural and effortless, such that virtuosos can slip into stable meditative states soon after composing themselves in the appropriate manner.

1.2.1 Concentration, mindfulness and a new classification

Either on their own, or in some weighted combination, the practices of concentration and mindfulness are at the core of most of the world's major meditation traditions (Dunn et al. 1999). The definitions are used to delineate the specific psychological processes implicated in these two practices, that is, the way attention and awareness are managed during meditation.

Concentration

Concentrative meditation involves the voluntary direction of attention towards a single-point or object, which acts as an anchor for one's mind during meditation. One's focus is eventually confined to a single stimulus, or an invariant set of stimuli, such as the rise and fall of the abdomen during breathing. When thoughts arise, one's attention is directed back to the chosen object of meditation. This method of holding one's attention to a single object, particularly the breath, is common across a large number of introspective traditions and is used to refine concentration which can later be applied to a variety of insight practices. Such focused attention is required in degrees for everyday functioning, sometimes reaching very high levels, for example, during sport or academic activities.

It is alleged that extended periods of single-pointed attention gives rise to what is called "access concentration" or samadhi (Sanskrit) as this type of concentration leads one into deeper stages of concentrative meditation. Evans-Wentz (2000) describes samadhi as a state of "non-distraction" where the meditator is in a state of mental concentration, and the intrusion of thoughts, even about meditation itself, is prevented. Indeed, one's meditation is inhibited by the thought "I am meditating." This state is a result of centering the mind on a single object such that one is completely concentrated. The Sanskrit word dhyāna (Sanskrit, pronounced jhana in Pāli) refers to changes in experience, described by way of psychological factors (viz. calm, balance, focus, bliss and joy). The term is generally translated as absorption and refers to the process of the mind becoming "absorbed" into the object of focus. Evans-Wentz (2000) describes how when, "devoid of formative activity... the mind in its natural, or primal, state of quiescence... induces an ecstatic condition of consciousness such as saints and mystics of the West have called Illumination."

One of the earliest studied forms of mediation was a concentrative practice called Zen. Zen meditation utilises very similar techniques to those used in this study. In fact, the Japanese word "Zen" is derived, through the Chinese word *ch'an*, from the Sanskrit word for meditation or absorption, *dhyāna* (Fromm

1992). Practitioners of Zen sit with their backs extended on a round cushion in full cross-legged position (the right foot placed on the left thigh and the left foot placed on the right thigh). The left hand is placed palm-up, in the palm of the upward facing right hand, with both thumbs slightly touching together. Generally, Zen begins with focusing the attention on the breath in order to develop a basic level of concentration required for more advanced techniques. During a session, meditators keep their eyes open and focus looking downward (approximately one metre ahead) and breathe into the abdomen through the nose. Zen meditative techniques often involve the enhancement of the meta-awareness similar to Vipassana practice, however, the traditions vary in their ways of understanding and enhancing meta-awareness. In summary, Zen employs concentration where the meditator develops sustained attention on a single object as well as (and often subsequently) a receptive, open awareness of bare experience without interpretation, judgement or reaction. The receptive aspect of Zen meditation relates to *mindfulness* and *insight* practices.

Mindfulness

During mindfulness meditation, one develops an "open-awareness" which allows one to be aware of *all* stimuli, both internal and external, that is, "the non-habitual division of attentional resources among all sources of stimuli" (Dunn et al. 1999). This open receptivity to all stimuli is maintained while any analysis, judgment, classification or evaluation of them is inhibited. One might relate to such an experience when considering a walk in nature. There is no particular focus on any one object, but rather an open awareness which encompasses all sensations; visual, auditory, tactile and olfactory. This mode of being is very unrestricted, readily allowing any novel stimuli into awareness. Zazen and Vipassana meditation, practiced by Zen and Theravadin Buddhists respectively include this mindfulness component, generally in conjunction with a concentrative form of meditation. It is often necessary for practitioners to cultivate stability and clarity of focus (§1.3.4) via a concentration practice before attempting mindful-

ness, as their minds will likely become easily caught up in specific ideas rather than maintaining a broad non-judgemental awareness.

To complicate matters, the term *mindfulness* has previously referred to the focusing aspect of the mind in literature, whereas *awareness* relates to the faculty of meta-awareness which surveys the focus and its relation to the intended object (Lutz et al. 2007). Mindfulness of breathing (ānāpānasati, Pāli), specifically mindfulness of the in- and out-breath, is the most basic technique described in Buddhist literature. These terms, however, are used differently in various traditions. For example, the Vipassana and Mindfulness-Based Stress Reduction (MBSR) traditions use the term *awareness* to refer to concentration or focused attention, and the term *mindfulness* for the meta-awareness that surveys the focus. On the other hand, Tibetan traditions relate *mindfulness* to the aspect of meditation that involves both focus and meta-awareness and the stability of the meditative state, and *awareness* to the insight process and clarity of the meditative state (for a detailed discussion, see Lutz et al. 2007).

Given this history of complex nomenclature and recent multiple meanings of identical terms, a less confusing schemata might be useful. As science has availed itself to all of the above techniques at one time or another, an attempt has been made in this thesis to represent different practices of meditation in a way which may be a valuable addition.

Object-based and non-object-based meditations

In review of traditional and scientific literature, all meditation techniques can be considered to begin with the management of attention with respect to a single object or single set of objects (for example, the breath, a sensation, an internal or external image or compassion) or multiple objects (surrounding environmental stimuli or bodily movements). Although most meditations involve mental interaction with one object or a set of objects in order to settle and concentrate the mind as the only activity, several techniques are defined by their emphasis to move attention beyond the object and to facilitate the experience of a non-

judgemental, content-free awareness. Therefore, a meditative technique is either actively involved with or based on an object *or* briefly utilises object-focus as mental preparation, that is, as a springboard into a practice of meditation without an object.

By classifying meditative techniques on the presence or absence of object emphasis, the two main meditation approaches of concentration and mindfulness, as generally delineated in recent literature (Lutz et al. 2007) can be redefined. Concentration meditations can be organised as object-based meditations (for example, using a mantra, sensation, image or concept) which involve the continued management of focused attention with regard to a single object or set of objects. Mindfulness meditations are non-object-based meditations, relying instead on open or diffuse non-judgemental awareness of the internal and external environment. The latter approach is essentially an elaboration of the faculty of meta-awareness, augmented beyond the incorporation of object-focus to become "awareness of the phenomenal experience of objects or of events" (Cicogna & Bosinelli 2001) (refer to §1.3.4 for a more detailed discussion). Any object-based attentional meditation approach (OBAMA)[5] generally involves the faculty of meta-awareness to monitor focus and arousal, but they all essentially begin with, and are maintained by, the single-pointed concentration of an object. This technique also requires the concomitant suppression of distracting thoughts or "mental chatter". Well-known examples of an OBAMA include Zen, compassion meditation, most yoga techniques and Transcendental Meditation (TM). On the other hand, any technique which actively strives for a state of open-awareness can be defined as a non-object-based awareness meditation approach (NOBAMA). NOBAMA practices include Mindfulness-Based Stress Reduction (MBSR), Mahamudra or Dzogchen, Vipassana and Vipassana derivatives such as insight meditation (although, as mentioned before, these techniques may stabilise the mind initially using an OBAMA).

Additionally, an OBAMA can either involve a strong emphasis on developing and maintaining meta-awareness during deep meditation (Lifeflow meditation

[5]With apologies to American President Barack Obama.

used in this research and Zen) or it does not (TM and most yoga practices). As Buzsáki (2006) rightly points out, meditative techniques may only be considered effective within the philosophies they serve. The emphasis on most yoga techniques to enter deep meditative absorptions whilst maintaining minimal, if any, meta-awareness is part of their philosophies and practices, that is, the repeated and enduring effort aimed at the elimination of the desire for sensory experiences (Bærentsen 2009). The lack of meta-awareness during meditation in TM and most yoga techniques (for example, Nidra, Raj, Kriya, Bhoogarbha Samadhi and Ananda Marga) originates from an early divergence in methodologies (§1.3.3). It was observed that while deep meditative absorption can be temporarily rewarding, the preservation of meta-awareness during meditation leads to the ability to examine mental processes in such a way that allows a meditator insight into their mental habits and assumptions about identity and emotions. This emphasis on developing meta-awareness (referred to in literature as mindfulness meditation) lead to the development of insight practices in Buddhism (*vipasyana*) which are essential for addressing mental and emotional imbalances. Yoga techniques and TM therefore differ substantially from OBAMAs involving strong meta-awareness, as has been aptly demonstrated in alpha blocking and habituation studies (§2.2.1).

Transcendental Meditation is a passive meditation adapted for Westerners from Indian Vedic traditions by Maharishi Mahesh Yogi in 1975. TM involves sitting quietly with eyes closed and repeating a word or sound (mantra) while thinking about nothing and letting the mind drift (Morse et al. 1977). TM involves no prescribed method of concentration, physical postures or breathing exercises and has been described as an effortless yoga-derived technique (Fenwick et al. 1977) practised for mental relaxation (Herbert & Lehmann 1977). The continued practise of TM eventually leads to an alleged "expansion of the consciousness" (Herbert & Lehmann 1977). The allocation of a student's personal mantra is "purportedly based on the TM teacher's learned ability to match mantra with subject" (Morse et al. 1977). However, there seems to be some discrepancy in the literature over the actual meaning of the mantra. One study

reports a mantra as personal and given "during a semi-religious initiating ceremony" (Morse et al. 1997) while others report the mantra as a "sound free of any meaning" (Stigsby et al. 1981). Morse et al. (1977) found no difference between TM and simple word meditation (silently repeating a choice of "one", "om", "flower", "garden", "river" and "sail") after a study measuring respiration rate, pulse rate, blood pressure, skin resistance, EEG and muscle activity. Regardless of what importance the mantra is given in any particular study, researchers are doing the science little service by referring to a mantra as a "mystical Sanskrit sound" (Morse et al. 1977).

Transcendental Meditation is currently the most comprehensively studied meditation technique with the largest number of scientific publications. While this extensive scrutiny of the technique may appear to demonstrate an admirable conscientiousness on the part of researchers, a number of publications stretch credulity (one example being the supposed effect of yogic flying assemblies on fluctuations in the stock market (Travis 1991)) and are, to put it charitably, nonsense. Some of the research (Dillbeck & Bronson 1981; Travis et al. 2002) was done under the funding of the Maharishi University of Management, an institute established to study the TM technique. The tendentious research of the Maharishi University features largely in the published works and debatably involves partiality.

Here will be described an OBAMA based on traditional Theravadin Buddhist meditation as interpreted and taught by the Lifeflow Meditation Centre.

1.3 Buddhist concentrative meditation: techniques and states

1.3.1 Introduction

Traditional and contemporary contemplative practices utilise diverse and complex nomenclature to describe the various states and techniques of meditation. Often the terms and concepts from these traditions are at variance with each other

and sometimes even diametrically opposed (see Lutz et al. 2007 for examples). Although the following definitions and descriptions may well be adding to (and possibly complicating) the plethora of locutions, they result from extensive dialog between researchers and practitioners in an attempt to transcribe traditional teachings into a language which is appropriate to both parties. This account relies on the meticulous transliteration of Buddhist manuscripts by Dr Graham Williams and Mr John Burston who are respectively Director and General Manager of the Lifeflow Meditation Centre. They have translated and interpreted cultural-laden meditation instructions into westernised jargon-free terminology that can be understood from a neuroscientific standpoint. The purpose of understanding these techniques from such a standpoint is necessary in constructing relevant theories and experimentally testable hypotheses. Although many of the concepts outlined below can be found across other traditions and have been discussed previously, the following classifications are not meant to represent any other meditation techniques or experiences, other than those from the Buddhist tradition, explained and practised by our colleagues at the Lifeflow Meditation Centre.

1.3.2 Meditation in traditional literature

In the 1930s, a steatite seal depicting a cross-legged figure was unearthed by Sir John H. Marshall during the excavation of the Mohenjo-daro archaeological site in the Indus Valley. This discovery implies that a style of meditative concentration, potentially "a form of ritual discipline suggesting a precursor of yoga" (Possehl 2002), may have existed as long as 4600 years ago (Marshall 1931). Irrespective of the exact Vedic technique intimated by the seal and its age, India has a rich and extensive tradition of meditative and contemplative practices.[6] Thus, when Siddhattha Gotama, known as the Buddha (literally "enlightened" in Sanskrit) began teaching his insights, innumerable meditative techniques already

[6]This antiquity dwarfs the history of meditation or hesychasm ("to keep stillness") in Western culture, which can be found as early as the 4th century, but its practice gradually diminished "due to the condemnation of the church, the decline of contemplative practice in general and of deep meditative concentration in particular" (Wallace 2005).

existed in India, generally monopolised by the ruling class of Brahman priests or wandering ascetics. As was the case for many methods of yoga existing at the time, the teachings and practices of the Buddha were preserved by adherents and institutions via replication, often through unbroken lineages of teacher-student relationships (Trungpa 1973). The popularity of Buddhism stimulated its spread throughout Asia where it adapted itself to pre-existing primitive and animistic religions, such as Shinto in Japan (to become Zen Buddhism) and Bön in Tibet (to become Vajrayana, or tantric, Buddhism). The absence of dogmatic injunctions and metaphysical ideologies facilitated this migration whilst maintaining Buddhism's essential methods and philosophies. The Theravadin tradition is the oldest surviving Buddhist school and author of the Pāli Canon (the standard collection of Buddhist scriptures), preserved orally in the Pali language until it was committed to writing approximately three hundred years after the death of the Buddha (Warder 1980). The writings represent the closest approximation to what the Buddha actually taught and are categorised into three collections or "baskets" (pitika, Pāli): 1) the Vinaya Pitaka, dealing with ethical guidelines for the monastic community, 2) the Sutta Pitaka, mainly concerning discourses of the Buddha, and 3) the Abhidhamma Pitaka, on the subjects of philosophy and psychology. The last category contains the mental practices of meditation and introspection from which the majority of the instructions used by the Lifeflow Meditation Centre are derived (Burston & Williams 2005).[7]

1.3.3 Philosophical framework of Buddhism

Whilst meditative techniques may only be considered effective within the philosophies they serve (Buzsáki 2006), the aspiration of many contemporary disciplines (Burston & Williams 2005; Kabat-Zinn 2003) and indeed the scientific community, is the extraction, understanding and utilisation of those features which remain useful when removed from the cultural context and metaphysical jargon of

[7]It is worth mentioning that the Lifeflow technique also draws influence from the Mahamudra tradition of Tibet which emphasises intensive meditation to develop mental quiescence (śamatha, Sanskrit) and penetrative insight (vipaśyanā, Sanskrit) (Wang-ch'ug dor-je 1978).

the technique. An attempt at this goal requires a brief appraisal of the philosophy of Buddhism from which the practices investigated in this project are derived.

For centuries, expert meditators have made empirical, introspective examinations of phenomenal experience and classified their observations based on feelings or sensations, perceptions and volitions. These mental processes are integral to the practices of meditation and relate to a complex aspect of Buddhism's conception or model of the processes of consciousness (Guenther 1976). Buddhists categorise all individual experience into five levels or "aggregates" (Govinda 1974). Put very simply, the first aggregate (form or matter) relates to the physical sense organs interacting with the external world, the second (sensation or feeling) is the resulting experience from this interaction, the third (perception or discrimination) describes the basic registration of objects (sounds and shapes), the fourth (mental formations or impulses) include all types of thoughts, ideas, opinions, prejudices and decisions evoked by an object, and the fifth (consciousness) is subjective experience and awareness of mental objects (meta-awareness) (Burston & Williams 2005; Guenther 1976). This representation of interactions between the external world and individuals is impressive given the date of conception and is remarkably similar to what is known about cognition (Kandel et al. 2000) and what has been proposed by philosophers of the mind (Russell 1996). This model of consciousness has potential to guide the progress in understanding the way the brain works. Table 1.1 outlines a summary of similarities between the Buddhist model of consciousness and what is known in neuroscience. Further discussion on the similarities between the Buddhist aggregates and neuroscience is provided in §§3.1, 4.2 and 6.1.

According to Buddhist texts, the three most frequent *dis*-eases or mental afflictions that beset humans and perpetuate their individual and collective suffering are: 1) cupidity or greed; 2) antipathy or hatred; and 3) bewilderment or delusion (Guenther 1976; Govinda 1974). A number of obstacles that people face in varying degrees and at different times in their lives with respect to overcoming these unskillful traits are craving, ill-will, laziness, anxiety and doubt. While this may

Buddhist model	Neuroscientific model
The first aggregate: form or matter (rūpa, Pāli) Related to the physical world as well as the physical sense organs of the human body. The interaction between an external object or stimulus (such as a sound) and its associated sense organ (such as the ear) begins with this experientially irreducible physical/physiological phenomena.	**Exteroception** Physiological methods of perception involve the initial detection of stimuli by sensory systems, reflected by activity in the brainstem within the first 10 ms of the onset of a stimulus (Luck 2005). Senses include traditional Aristotelian classifications of sight, hearing, touch, smell, taste. Additional senses are nociception (pain), equilibrioception (balance), proprioception & kinaesthesia (joint motion and acceleration) and thermoception (temperature differences).
The second aggregate: sensation or feeling (vedanā, Pāli) The resulting experience from the previous interaction with an external object is also referred to as "contact" (phassa, Pāli) and is described as either pleasant or unpleasant or neutral.	**Primary cortical processing** Beyond the initial detection of an external stimulus by the senses, early sensory processing in stimulus-related brain regions and primary cortices occurs between 10 and 50 ms (Nunez & Srinivasan 2006).
The third aggregate: perception or discrimination (saññā, Pāli; samjñā, Sanskrit) Also referred to as perception, conception, apperception or cognition. This level relates to the recognition of an object (for instance, the sound of a bell or the shape of a tree) and also involves making comparisons against memory patterns (Burston & Williams 2005).	**Higher cognitive processing** The activation of cortico-cortical pathways is necessary for the evaluating and interpreting processes of prefrontal brain structures (Baijal & Srinivasan 2009) based on pre-stored mental patterns and memories (Helmholtz 1878).
The fourth aggregate: mental formations or impulses (saṅkhāra, Pāli; samskāra, Sanskrit) This level includes mental habits, thoughts, ideas, opinions, prejudices, compulsions and decisions.	**Association cortical processing** Mental activity such as "stimulus-independent thought", "internal narrative" and "introspection" (Fair et al. 2008) are related to the default mode network (Morcom & Fletcher 2006). This level also involves emotional processing which requires the activation of the limbic system.
The fifth aggregate: consciousness (viññāṇa, Pāli; vijñāna, Sanskrit) At this point both Buddhist and neuroscientific models become very complicated. This level can be regarded as a holistic experience rather than the more specific processes mentioned previously.	**Consciousness** Conceptions of consciousness in neuroscience are widely varied and the similarities between the two models is less clear here. It is possible that consciousness already exists at the previous level.

Table 1.1: **Similarities between Buddhist and neuroscientific models of consciousness.** Shown here are the five levels or "aggregates" in the Buddhist model of the processes of consciousness alongside related descriptions from a neuroscience perspective.

lead people to misunderstand Buddhism as having an attitude of pessimism or nihilism, scholars point out that Buddhism is realistic and objective and affirms that change is possible. The Buddha claimed that "the present is conditioned by the past, but we can decide the future by appropriate actions in the present" (Johansson 1969). In other words, "every man is his own master" and has within himself the potentiality of mental refinement and self-transformation, that is, to become a man *par excellence* (Rahula 1959).

Such perspicacity in the Buddha came about from an empirical approach of direct observation; both outwards via the senses and inwards via introspection. This method of self-analysis led to the understanding of reality as a dynamic process which is constantly in flux, where observable, seemingly static phenomena are the result of numerous causes (Rahula 1959). Although this law of cause and effect seems obvious to us now in light of our scientific understanding of the universe, this observation was made a century before the birth of Socrates. Buddha's discoveries were expounded as a highly sophisticated and complex set of philosophical and psychological teachings, all of which were encouraged to be verified and replicated by others. The Buddha's ideas went against the prevailing Hindu and Vedic philosophy of the time (where the soul or metaphysical self (atta, Pāli; ātman, Sanskrit) was thought to be a permanent, transcendental entity existing from lifetime to lifetime), by regarding not only physical phenomena as being subject to the law of cause and effect, but also, and most importantly, experiences and the mind. Buddha's empirical, introspective observations of the mind revealed the "self" to be nothing but an aggregation of feelings or sensations, perceptions and volitions (Johansson 1969). These three processes are directly related to the Buddhist meditative absorptions (§1.3.5). Additionally counter to conventional culture, the Buddha claimed no divine inspiration or revelation and all his realisation and attainments he attributed to human endeavour and human intelligence (Rahula 1959).

The Buddha outlined four constitutional insights and teachings. Abridged, they are: 1) all humans experience various kinds of suffering or uneasiness (First

Noble Truth); 2) this suffering is caused by certain misapprehensions about reality and specific psychological and cognitive deficiencies and/or imbalances (Second Noble Truth); 3) there are methods available to remedy these afflictions (Third Noble Truth); and 4) the methods involve critical self-analysis via the refinement of mental processes such as concentration, introspection and experiential understanding,[8] referred to as the Noble Eightfold Path (Fourth Noble Truth). In this way, the Buddha has been analogised to a physician; firstly diagnosing the illness, next discovering the cause for the arising of the affliction, then considering its removal and lastly applying the remedy (Rahula 1959). The remedy, or Noble Eightfold Path, is a systematic advisement for developing mental faculties and refining consciousness in order to combat and eventually extinguish individually, as well as socially, deleterious mental states and traits. Therefore the "central goal of Buddhist practice is the elimination of suffering... [and] that any effective method to eliminate suffering must involve changes in one's cognitive and emotional states, since the root cause of suffering is a set of correctable defects that affect all the mental states of an untrained person" (Lutz et al. 2007). Quite contrary to the consensus held by current psychology, which sees the mind as inherently defective (Wallace 2003), the Buddha maintained that with sufficient training the mind could become "concentrated, purified, and bright, unblemished, free from defects, pliant, malleable, steady, and attained to imperturbability" (Walshe 1995). Two divisions of the Noble Eightfold path deal with moral or ethical instruction and the orientation of perspective,[9] while the third division consists of contemplative and meditative practices.

Based on techniques and philosophies laid out in traditional texts, four rele-

[8]Experiential understanding here is differentiated from mere intellectual knowledge. For example, while it is possible to know all the facts about what it is like to ride a bike, possessing this information is incomparable to the actual, direct experience of riding. Similarly, the knowledge of meditative practise is a necessary, but not a sufficient contingent for the experience of meditation.

[9]The way of looking at reality is taken under advisement of what are called the three marks of existence: 1) impermanence; 2) non-self; and 3) suffering. Respectively, these are 1) the apprehension that our thoughts and emotions (as well as all compounded things) are inconstant, unsteady, and transient, and as such 2) do not constitute a fixed and essential identity as we mistakenly believe, such that any mental and emotional habits which reflect this belief are baseless. Therefore, 3) when we are unable to view phenomena in this way, we end up causing significant problems for ourselves and others.

vant features common to Buddhist practices can be identified. These are: 1) that the practices induce predictable and distinctive states which are characterised by certain physical and/or cognitive features; 2) the repetition of such states predictably affects the mind and body in ways which enhance desirable traits and inhibit undesirable ones; 3) the ability to induce and maintain these states improves over time; and 4) practices used to induce these states are often learned from an experienced teacher (Lutz et al. 2007).

From these features, three general strategies can be stated as a way to experimentally investigate meditative practices from a neuroscientific standpoint. These are: 1) the claimed production of a distinctive and reproducible state that is phenomenally reportable; 2) the claimed relationship between that state and the development of specific traits; and 3) the claimed progression in the practice from a novice to an expert (Lutz et al. 2007). Through training and experience, an individual can learn to recognise states of meditation and move between them at will. The level of mental stability achieved during meditation practice, as well as success in reaching and holding different states, can be assessed by an experienced teacher through feedback with a novice student.

1.3.4 Mental strategies of meditation

1.3.4.1 Focus and meta-awareness

The two processes required to develop and sustain states of meditative absorption are called *focus* and *meta-awareness*. Both are needed to change one's mental state from scattered and wandering to concentrated or focused. Generally the mind is constantly generating stories and ideas, constructed from past memories, personal history and experience, and overlaid with preconceptions and expectations. Not only is the mind frequently occupied with these ruminations, but it is incessantly moving from one thought to another. One need only to try and attend to a chosen object for several minutes to reveal how little control we have over what happens in our minds (Wallace 2006). The practice of focusing the attention can be seen as training the mind and strengthening the management of

our own consciousness.

Many moments of our lives are spent in what the Buddhist tradition would call a light meditative state. For example, during deeply-involved writing, one is completely focused on the task at hand and as such, one is no longer entertaining thoughts about other things. Other examples where the mind is often found to be single-pointed in its focus are listening to music, walking in nature and playing sport. Meditation provides a way of training in this singular focus so that it can be exercised *voluntarily* whenever it is required. It is obvious that the ability to remain completely focused without distraction would provide an enormous advantage in any activity, such as sport, as has been aptly demonstrated by the professional golfer Tiger Woods.[10] Training oneself to attend single-pointedly to such a degree allows one to investigate mental phenomena in a way that is analogous to using a powerful, finely-tuned instrument to observe bacteria or the cosmos (Wallace 2003).

Focus The term *focus* refers to the attentional or concentrative aspect of meditation which is an intentional, effortful and conscious mental act directed towards and onto an object. The object is "attended to" and is not something to be studied but rather it provides an anchor from the incessant movement of the mind, eventually leading to a state where discursive thinking (viz. the normal inner verbal dialogue) temporarily ceases. The meditator makes a willful decision to direct his/her attention onto a selected object, the act of which requires a degree of effort. The amount of effort necessary depends on the mental climate at the time and the state of meditation one is in. That is, the more turbulent one's mental activity, greater is the effort needed to direct the focus away from thoughts and hold it on the object, a process which becomes easier as the mind settles into deeper states of meditation. The meditation object is more often

[10]Tiger has meditated since he was young and admits to this Buddhist technique assisting him in remaining undistracted whilst playing golf (Evans 2008). Incidentally, the 2000 Olympic archery gold winner Simon Fairweather has had the fortune to experience the more unique concentration training methods of Korean archery coach Kisik Lee, such as "turning the water sprinklers on to the archers as they are about to shoot and blaring loud music through speakers at them" (Cranley 2004). The latter training technique essentially trains the mind to remain fixedly concentrated on the object of interest whilst ignoring all other distractions.

than not chosen to be a localised sensation of the body, for example, the feeling at the nostrils or the movement of the abdomen while breathing, and as such meditation is commonly defined as "moving the mind from focusing on thoughts to focusing on sensations" (Burston & Williams 2005). The stability and clarity (see below) of one's focus also depends on several factors, including the degree of expertise, the depth of the meditative state and the obstacles of hyper-arousal and drowsiness (see below).

Accordingly, four aspects for developing focus can be outlined:

1. A suitable object on which to focus;
2. The decision to focus the mind on an object;
3. The effort required to direct and hold the focus on the chosen object (Burston & Williams 2005); and
4. The cultivation of sufficient stability and clarity of the focus.

Meta-awareness The mental function of focusing the mind on an object is accompanied by what is called the faculty of *meta-awareness,* which enables one to monitor if the focus is on the intended object. Meta-awareness is an awareness of mental life itself (Cicogna & Bosinelli 2001) such as thoughts, memories and emotions. It describes the reflective, meta-cognition on "awareness of the phenomenal experience of objects or of events: *awareness that/of*" (Cicogna & Bosinelli 2001). For example, "I am aware that I have awareness of a fox crossing the road." It has also been described as "thoughts about one's own conscious experience per se... Your own conscious experiences, feelings and actions are the objects of your thoughts" (Farthing 1992). The efficacy of meta-awareness during meditation is also dependent upon experience and the state of meditation. It provides a quality-control function which surveys the operation of focus and enables action when the focus wanders. When one's focus wanders from the intended object, eventually there is awareness of the digression and this digression is ideally prevented from becoming "a new source of distraction, [if one should]

berate oneself for allowing the mind to wander" (Lutz et al. 2007). A conscious decision is then made to either bring the focus back to the object or continue to let the mind wander. If the former is chosen, as is generally the case when developing meditative concentration, the attention is effortfully redirected back to the object. The monitoring and alerting quality of meta-awareness is also present during the redirection of focus as it is needed to monitor how effectively focus is returned to the object (Burston & Williams 2005) and "sound an alert" if one is distracted again in the process. Alternately, meditators can choose to allow their focus to wander from the object to thoughts, for allowing this to happen may reveal insights into mental habits and behaviours and aid in resolving personal or social problems (Wallace 2005).

Another function of meta-awareness is to monitor the level of arousal and if there is an increase in either hyper-arousal or drowsiness, one's focus is manipulated in order to regain a balance between the two.

The success and efficacy of the two faculties of focus and meta-awareness varies respectively as the meditator accesses different meditative absorption levels. That is, initially less focus will be achieved as the mind is perturbed by thoughts and effort is required to direct and hold the focus. However, as deeper levels of meditation are attained, practitioners find that it becomes easier to stay focused on the object and one has more effective meta-awareness of the subtle fluctuations and deviations of focus that remain (Table 1.2).

The faculties of focus and meta-awareness are directly linked to a four-step technique used in this thesis and taught by meditation practitioners and teachers Dr Graham Williams and Mr John Burston. The four steps in this technique are required to develop meditative concentration and are constructed around the faculties of focus and meta-awareness:

1. Relax the body;

2. Focus on one object;

State	Focused achieved (1)	Meta-awareness efficacy (2)	Balance (3)	Effort to hold & return focus (4)	Time to return focus (5)
Mind-wandering	0-100%	very low-low	-	very large - very small	very long - very short
Preparatory State	50-80%	average-high	+/-	large	long
First Absorption	80-90%	high-very high	+	average	short
Second Absorption	90-95%	very high	+	small	very short
Third Absorption	90-95%	very high	+	very small	very short
Fourth Absorption	90-95%	very high	+	very small	very short

Table 1.2: **States of meditation and the qualities present therein.** (1) Percentage of time spent with 100% focus on the meditation object; (2) the effectiveness of meta-awareness; (3) the balance between hyper-arousal and drowsiness (- absent; + present); (4) the effort required to hold the focus on the object and return the focus back to the object; and (5) the time taken to return the focus back to the object.

3. If thoughts arise, become aware of them; and

4. Let go of thoughts and return to focusing on the object.

Relaxation techniques (§1.3.5) are used intentionally to reduce any muscle tension in the body during step one, which requires focusing on sensations in the body. In step two, effort is used in order to direct the focus away from extraneous thoughts to a single object. The third step involves meta-awareness of a wandering attention, viz., noticing any potentially distracting thoughts when they arise. Finally, in step four, a conscious decision is required to let go of these thoughts and return the attention to the object.

1.3.4.2 Stability and clarity

For meditation involving an object (OBAMA), two fundamental qualities must be integrated in order for meditative development to occur. These are the *stability* and *clarity* (or acuity) of one's focus during meditation. Stability refers to how well one can maintain an uninterrupted focus on the object, that is, unperturbed by other events such as thoughts, emotions or sensory phenomena (Lutz et al.

2007). Clarity refers to how vivid or clear the object appears in one's focus. Balancing these two qualities is the delicate task of the meditator and often novices find when one is greater, the other is lacking. For example, the meditation may be very steady and uninterrupted but the object is vague and unclear, or vice versa. Stability and clarity can be monitored by meta-awareness and corrected with focus and the development of these qualities is impaired by hyper-arousal and drowsiness.

1.3.4.3 Hyper-arousal and drowsiness

If too much physical or mental tension is generated and/or maintained during meditation, an over- or hyper-aroused state may develop. In this case, although the object will be very vivid, one is easily distracted from the focus on the object. In addition, a low level of meta-awareness exists at this point. Therefore, mental digressions are not easily recognised and one may spend the entire meditation session wandering "mindlessly".

Conversely, drowsiness often appears when one is too relaxed during meditation and consequently the clarity of the object is reduced and one becomes mentally dull. Continued mental dullness in meditation will eventually lead to a loss of focus of the object and ultimately may lead to sleep. During this state, one will not be particularly aware of what one is doing (Burston & Williams 2006) as again, there exists a low level of meta-awareness. Consequently, the experienced torpidity is generally not detected quickly and the problem can persist until there is recognition of the situation, or as stated above, one simply falls asleep.

Stability and clarity in meditation arise by virtue of balancing hyper-arousal and drowsiness. Various techniques of relaxation and arousal are often employed to find a balance of stability and clarity which is monitored by the faculty of meta-awareness. For example, if the meditator becomes drowsy, the clarity of the object is reduced. This situation is countered by focusing one's attention more "tightly" on one smaller aspect of the object. Conversely, if one becomes hyper-aroused, the countering technique is to "loosen" and relax the focus. If

one uses breathing as the mental object, one may narrow the focus to a reduced area, for example, a constricted spot below the nose or focus on the in-breath to increase arousal. On the other hand, decreasing arousal may involve opening out one's focus to a broader area, for example, the entire abdominal region, or focusing on the out-breath.[11]

1.3.4.4 Balance (or equanimity)

When a meditator is balanced between hyper-arousal and drowsiness, he/she is in a balanced or equanimous state. Balance is required before one can enter any meditative state. If one is overly aroused, the mind will wander from the object and if one is too drowsy, the mind will become too dull to maintain focus.

Therefore, the three intrinsic qualities of meditative states are:

1. Physical calm;
2. Focus; and
3. Balance (between hyper-arousal and drowsiness).

1.3.5 Description of states

According to the Buddhist tradition, daily life is often occupied by what are considered to be light meditative states. These states include the aforementioned examples when the mind is focused solely on a single object, for example, a sound or a sensation. The following descriptions concern not only these, and deeper, meditative states, but also what are generally referred to in western terms as states of distress or mental suffering, described in Buddhist literature as *states of emotional conflict* (Burston & Williams 2005). These states are not considered meditative and describe occasions when one has become completely engrossed with a succession of thoughts or "stories" (along with accompanying emotion(s)),

[11] Interestingly, pharmacology experiments monitoring field potentials in cats have reported synchronous rhythmical firing in the limbic system and brain stem that demonstrated increased activity during inhalation and decreased activity during expiration (Austin 1999). The same discharge correlations have been demonstrated in the human amygdala and hippocampus (Frysinger & Harper 1989).

so much so that one's phenomenal awareness of other objects and events is inhibited. On such occasions, one's self-awareness is also virtually non-existent. With these two modes of awareness absent, someone in a state of emotional conflict has little thought for the consequences of their actions on themselves or others, making the management of these disadvantageous states of central importance to Buddhist contemplative practice.

All of the above states can occur during the course of one's day, however, the Buddhist tradition emphasises the practice of meditation in order to enhance these meditative states and inhibit any harmful states of emotional conflict. The states of emotional conflict are not considered to be solely representative of daily life and are often very rare, however, these states begin this section as they describe the most "un-meditative" state of mind.

1.3.5.1 Mind-wandering (or states of emotional conflict)

Mind-wandering is traditionally referred to (in Buddhist writings) as "the hindrances" or states of emotional conflict (viz. craving, anger, *Schadenfreude*). These conditions are characterised by the mind being temporarily locked in thoughts (sometimes associated with images) and are often accompanied by a strong sense of agitation, restlessness or apathy (Burston & Williams 2005). Generally, one is not even aware of this state, as the preoccupation with the series of thoughts and images is so strong. During this "hindered" state, sensory information is rarely registered consciously (unless provoked into awareness by something like pain or a loud noise) and awareness around oneself is limited, as the mind is completely engrossed by present intellectual fabrications. Most people have experienced such circumstances. Consider being bumped into on a train and whilst your focus is being directed toward thoughts of your antagonist, and perhaps feelings of irritation or anger, it is directed away from your pocket and the sensation of your wallet being stolen. While the mind is so immersed in its own constructions, it is hindered in its ability to process external events consciously. This state of conflict is not a meditative state and has been included to assist in

defining and clarifying the following states of meditative absorption (Burston & Williams 2005). Meditation is used to induce states which allow the practitioner to enhance desirable traits and inhibit undesirable ones (Lutz et al. 2007). By allaying the aforementioned hindrances and any "mental chatter", sufficient attentional stability and clarity is gained in order to access more refined and subtle states of concentration and awareness.

1.3.5.2 Preparatory concentration

To initiate meditation, three techniques are used in order to direct the mind to the body, away from extraneous thought. These are: 1) loosening; 2) sitting; and 3) listening. The following elaborations of these three steps are taught by teachers at the Lifeflow Meditation Centre (Williams 2008) and generally take place in the order given below.

1. Loosening:

    - Gently shaking the body and limbs;
    - Loosening the shoulders with shoulder rotation movements;
    - Stretching the shoulders and neck;
    - Massaging the back of the neck; and
    - Moving the body from side to side.

2. Sitting:

    - Sit in the chair with feet flat on floor, backside well back in the chair and hands resting in the lap or on the legs;
    - Gently rock the torso side to side, diminishing the magnitude until the body reaches a vertical equipoise;
    - Gently rock the head and neck side to side, diminishing the magnitude until reaching a vertical equipoise;
    - Slightly tuck in the chin and open up the back of the neck;

- Close the eyes gently;
- Loosen the tongue and jaw; and
- Loosen the shoulders and stomach.

3. Listening:

   - Extend your awareness to the surroundings in all directions, becoming aware of all of the sounds around you; and
   - Allow your awareness to rest in the sensation of the sound, just as sound.

Attention is then directed to any *single* sensory stimulus. Most commonly, the stimulus attended to is external and of an auditory, tactile or visual nature, although can include anything, for example, gustatory or olfactory. The chosen stimulus can even include a mental object such as a thought, memory or image. These stimuli essentially provide a way to focus and calm the mind by confining attention to a single object, allowing the mind to detach, and remain excluded from, ruminating thought. Although the object of focus can be mental, the use of external stimuli such as sensations or sounds is the easiest way for beginners to attain deeper states of meditation, as attention is often unstable and susceptible to distraction.

During preparatory concentration, especially for beginners, one's attention will often skip from object to object, sometimes quite rapidly (for example, the breath, a pain in foot, a bird call, the thought "why am I doing this?").[12] This slightly scattered attention is due to the relatively weak focus present at this stage (50-80%)[13] and one requires substantial effort to return and hold the mind to the meditation object (Table 1.2). This augmented effort is due to the degree in which the mind is heavily engaged in thought activity. Therefore, during

[12]The cover of Daniel Dennett's 2005 book "Sweet Dreams: Philosophical Obstacles to a Science of Consciousness" provides a wonderful example of mind-wandering. The cover artwork illustrates a train of thoughts as the mind moves from one idea/concept to another, often via association.

[13]The percentages here and those hereafter are rough and somewhat arbitrary numbers, but necessary in terms of clarifying the states of meditation from a neuroscientific perspective.

this preparatory state, the mind has still not constrained itself entirely to the intentional object and some time is still spent digressing into irrelevant cogitations. Meta-awareness efficacy is also low, so these digressions may not be quickly realised and hence the time to return to the object may be long.

Nevertheless, the mind has now settled significantly from its "normal" discursive condition and individuals frequently experience joy. Everybody has experienced the significant manifestation of emotion(s) that can result from entertaining particular thoughts, such as recalling a conflict or imagining an intimate encounter. The joy experienced in the preparatory stage coincides with disengaging the mind from its customary ponderings and the numerous emotional associations which accompany these. Consequently, the body also develops a relaxed and calm condition, both as a result of sitting still and relaxing, and from the reduction in arousing and stimulating rumination. Such bodily sensations are reported by meditators as pleasant at this stage and are subjectively reported as "bliss". Before one enters meditative absorptions, these qualities of joy and bliss are only present minimally, if at all.

Although many methods can be utilised to access the absorptions, focus on the breath is commonly used in the meditation technique studied here. Therefore, the following descriptions will refer to the breath as the meditation object. Initially, one directs the attention away from extraneous thought to the sensation of the breath, either at the tip of the nostrils or at the chest or abdomen. At this stage, one can still be quite easily distracted away from the breath by interrupting thoughts.

The first absorption

Through the sustained aforementioned effort, a meditator can eventually confine attention to a single object. By virtue of holding one's attention to a meditation object, the mind becomes restricted in its activity and a reduction in extraneous thought will result. At this stage, although mental activity has diminished, thoughts will still occur, but now solely in relation to the object. In other words,

the meditation object is still given a label and identified as "breath" or "sensation" for example and may be qualified or limited by an adjective, for example, "long" or "smooth", respectively. Ideally, a meditator will remain in the first absorption at this stage, as mental processes are still closely linked with the object and thoughts represent only one degree of separation from the object. Whenever the mind digresses beyond these "first degree" descriptions and on to more complex and elaborate mentations (for example, "my breath is transporting oxygen to bind to haemoglobin in my red blood cells"), the meditator loses their focus of the object and is subsequently entangled in the resulting train of thoughts. This said however, these digressions now occur considerably less than during the preparatory concentration stage and a wandering attention is now detected more quickly through greater meta-awareness. Less effort is required to return and hold the focus to the object and there is also less likelihood of the attention wandering, as there is greater focus on the object. Although there is still a strong sense of separation between the experienced physical sensations and the one who experiences them, generally when the mind becomes confined to an object with such a high degree of focus, any other sensations are shifted to the background.

During the first absorption, the focus of the breath involves counting the breaths, for example, in-out "one", in-out "two", etc. This is done to maintain thoughts that are of one degree in separation (for example, "one" breath), in order to prevent from sinking into deeper states of meditation. However, as stated earlier, when one follows more embellished trains of thought such as "my diaphragm is expanding" or "my blood is being oxygenated", one will return to the preparatory state of concentration.

The second absorption

In the second absorption, all thought processes based on concepts consisting of names or descriptions cease entirely. The mind is still receiving external sensory information and converting it to recognisable "objects" in the mind. That is, when sufficient sensory stimuli are received and compared to stored memories, a known

object is created. The object of attention is recognised but is not accompanied by a label. Therefore, at this stage these objects are no longer "named" using words (Burston & Williams 2005), given specifications or described in any way. In other words, thinking stops. As such, there is no sense of any degree of separation between the mind and the object, and consequently the mind becomes strongly absorbed in the experience of the object. Subjectively, a strong sense of union with the object arises at this point by virtue of a strong, sustained focus. How well this state is maintained depends on the meditator's experience and the faculties of focus and meta-awareness. At this stage, meta-awareness has become quite effective in monitoring deviations and a higher degree of focus than the previous absorption is now achieved. Even less effort is required to hold and return the focus to the object and the time taken to return to the object when the focus has wandered is very short.

Meditators can experience hypnagogic hallucinations and sensations at this point. The experiences bear similarity to the state of intermediate consciousness preceding sleep where imagery and visions spontaneously arise in the mind. These experiences are a result of the reduced visual and other sensory input entering the brain. What we "see" at a conscious level is the summation of 1) the detection and processing of light stimuli by the brain and 2) what Helmholtz (1878) called "unconscious inference", that is, the process of matching and interpreting images based on pre-stored mental patterns and memories. As the meditator sits still, with eyes closed in a quiet room, the brain slowly becomes depleted of proprioceptive, visual and auditory input. Consequently, this allows the "unconscious" activities of the brain to come to the fore and hence, meditators are often confronted with internal sensations, images and sounds. These experiences can sometimes be so strong that one feels that they are actually happening. For example, one may experience visions and "see" a coloured light or shape during meditation, which looks very real, but disappears as soon as one opens one's eyes. It is at this stage meditators spontaneously experience feelings of bliss, something that can be voluntarily intensified by more advanced practitioners (Burston &

Williams 2006).

To access the second absorption using the breath, meditators stop counting their breaths and start to focus on the sensation of the in- and out-breath moving through the torso. The movement of the focus from the breath entering and leaving the nostrils, to the sensations in the abdomen, lowers the location of the attention which acts to reduce arousal. For this reason, meditators may experience a sense of slowly turning or sinking during the practise of this technique. Mental imagery is sometimes used in conjunction with breathing, such as visualising the breath moving through an imagined channel in the body.

The third absorption

Once the third absorption is reached, one's focus is solely on the direct sensory impressions from contact with the object. These sensations may be pleasant or painful, although there is no emotional response when this occurs, that is, one does not desire more of (approach), or have aversion to (avoidance), the experience (Burston & Williams 2005). For example, the breath may be noted as a pleasant sensation but one is not filled with the desire to obtain more of this pleasant experience. These sensations have no direction or movement and the distinction between the sensation and the one experiencing the sensation is significantly diminished.

At this stage, meditators report a sense of being physically unable to move their bodies. Subjectively, this experience is comparable to the state where one awakens from deep sleep into essentially a normal fully awake state and is unable to move, referred to as hypnopompic paralysis.[14] Meditators also report experiences of losing the boundaries of their bodies, having no sense of spatial orientation, being unable to exactly define the location of sensations in the body, experiencing open spaciousness, and sometimes a pervasive feeling of heaviness or lightness. Any visions and/or images from the previous absorption now cease.

When the breath is used to access the third absorption, practitioners slightly

[14]Physiologically, hypnopompic paralysis relates to the partial or complete skeletal muscle paralysis which occurs during REM (rapid eye movement) sleep, linked to the post-synaptic inhibition of motor neurons from centres in the pons.

slow their breathing and increase focus on the in-breath, as well as let go of any mental imagery. The overall percentage of focus has more or less remained the same, but now the focus is on breathing in. At this stage, the breath is felt solely as a sensation and one no longer feels any emotional approach or avoidance toward the object.

1.3.5.3 The fourth absorption

At this stage, the mind has become completely absorbed in the object, so much so that there is no longer *any* distinction between the meditator and the breath, that is, subject and object. It is as if the mind *is* the breath. Consequently, a very high level of focus is present and meta-awareness is very effective. Here also, the attention is completely directed to the meditation object and the registration of pleasant or painful sensations is no longer perceived in relation to the object (Burston & Williams 2005). In addition, one no longer references the object as a separate phenomenon. This is the deepest state of meditation where one experiences a very stable and vivid, single-pointed concentration. The meditator is so focused and relaxed that the breathing is reported to pause from time to time.

To access this absorption using the breath, a meditator changes the focus to, and slows, the out-breath, attentive to "breathing out to the end of the breath" (Burston & Williams 2005). Once in this absorption, one's experience entirely becomes the breath and there is no distinction between the breather and the breath.

1.3.5.4 The formless absorption

Traditional literature describes two kinds of absorptions, the formed or material absorptions and the formless or immaterial absorptions, referring to the nature of the object of meditation. In immaterial absorptions, there is no longer any concern with the initial meditation object. Although four formless absorptions are described in Buddhist writings, this study only investigated the "first" formless absorption, called infinite space, hereafter referred to as the formless absorp-

tion. The formless absorptions are not referred to as deeper levels, but rather developments of the fourth absorption. The name formless refers to moving the awareness away from the object, viz. the breath, and no longer relating to it on any level (thinking, emotional or sensational). The breathing is also reported to pause from time to time during this absorption as well. After establishing the fourth absorption, subjects move their attention from the breath to opening up and expanding their mind out into infinite space (Burston & Williams 2005).