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The Buddhist Noble Truths: Are They True?

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Abstract: Scholarship has not so far raised the question whether the so-called Buddhist noble truths are actually true. The present article addresses this question in light of recent developments in neuroscience and psychology. It bases itself primarily on the theory proposed in some publications by Mark Solms, and on some other recent discoveries in psychology. Concentrating on the role of memories in the formation of personality, it draws attention to the potential effects of memory reconsolidation on those memories and shows how cessation of suffering and cessation of desire make sense in this context. Access to the relevant memories presents itself as a little understood process. Proposals are made as to how it may be attained.

Keywords: Buddhism; suffering; consciousness; memory reconsolidation; neuropsychology; wanting; mental absorption; psychedelics

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1. Introduction

The four noble truths are believed to be the teaching of the Buddha in a nutshell. They are frequently mentioned in Buddhism's early texts. Their role and position in the history and development of Buddhism can be studied.[1] Quite apart from that, their truth claims can be studied independently. This has not so far been done. The present article will attempt to do so. It is therefore not about Buddhism as it is, should be, or has ever been. Nor does it address itself primarily to Buddhists.[2]

The four noble truths are clearly and explicitly presented as being true. Despite this, no modern scholar appears to have publicly asked the question whether these four noble truths are actually true.

It goes without saying that scholars who study a religion have to be careful with respect to its truth claims. Many religions accept metaphysical "truths" that only their adherents will accept as true. In certain religions, those "truths" are thought to be so important that believing them is by itself a crucial step toward the ultimate reward that those religions promise their "believers". Think of Christianity as an example. Jesus, according to the gospel of John (8.24; King James Version), pronounced the following words: "I said therefore unto you, that ye shall die in your sins: for if ye believe not that I am *he*, ye shall die in your sins." More often than not, such religious "truths" are beyond verification. Scholars are excused for taking them with a grain of salt or rather, for adopting an attitude of methodological agnosticism.

The Buddhist four noble truths are nothing of the kind. The meaning they convey is straightforward and believing them does not, by itself, get believers any closer to the goal they aspire to attain. Methodological agnosticism is therefore out of place (not to speak of the grain of salt). Why, then, is their truth claim habitually discarded, or worse: ignored, without any attempt at justification?

It must be admitted that the four noble truths are not self-evidently true; they embody claims that a priori might be true or false. Until recently, science was not in a position to give even an informed opinion about their truth value. This is now changing. Academic psychology and neuroscience have made important steps forward and have now started to encroach upon the realm covered by those self-proclaimed truths. The purpose of this

paper is to explore whether and to what extent these scientific developments throw new light on the issue. More precisely, it will look upon the four noble truths as psychological claims and consider whether these claims can stand up in light of the available evidence.

Let it be clear from the outset that this study adopts an approach altogether different from that of certain recent studies on the link between Buddhism and neuroscience. Those studies focus on meditation and its neural correlates. As interesting as it may be, that research does not deal with the four noble truths as a separate item of study and is therefore of little help in our present investigation.[3]

Which are the four noble truths? The shortest formulation we find in the ancient texts is *suffering, its origin, its cessation, and the path leading to its cessation*.[4] More elaborate is the following passage, allegedly spoken by the Buddha in his first sermon:

> This, O monks, is the noble truth of *suffering*: Birth is suffering, old age is suffering, sickness is suffering, dying is suffering, to be united with the unloved is suffering, to be separated from the loved is suffering, not to obtain what one desires is suffering, in short, the five-fold clinging is suffering.
>
> This, O monks, is the noble truth of the *origin of suffering*: it is the thirst which leads from birth to birth, together with lust and passion, which finds gratification here and there: the thirst for pleasures, the thirst for being, the thirst for non-existence.
>
> This, O monks, is the noble truth of the *cessation of suffering*: the complete and passionless cessation of this thirst, letting it go, expelling it, separating oneself from it, giving it no room.
>
> This, O monks, is the noble truth of the *path which leads to the cessation of suffering*: it is this noble eightfold path, to wit: right faith, right resolve, right speech, right action, right living, right effort, right thought, right absorption.

We are not at present concerned with philological details, nor indeed with historical questions such as whether the historical Buddha pronounced these words in his first sermon, or indeed ever. We are only interested in the truth claims contained in these and other such passages.[5]

Does our present understanding of human functioning allow us to consider these questions in a purely scientific manner? To the best of my knowledge, no one—and this includes Buddhist practitioners and "believers" but also modern scholars and scientists—has ever tried to do so. Let me add that I consider it self-evident that, to carry out such research, adherence to any tradition (including any Buddhist tradition) cannot but limit one's options.

In what follows, a number of questions will be raised. Does it make scientific sense to claim that human existence is predominantly suffering? Is human functioning without suffering theoretically possible? If so, what method might lead to the permanent elimination of suffering? And what is the role of desire ("thirst") and related feelings in the production of suffering?

2. Suffering

Ideas about the importance of suffering in human life vary. Plenty of people would agree with what Bertrand Russell wrote in the Prologue to his *Autobiography*: "This has been my life. I have found it worth living, and would gladly live it again if the chance were offered me."[6] They may consider that only those who are clinically depressed, or victims of much bad luck, think that life is predominantly suffering. I have not come across the opinion that the Buddha must have been clinically depressed,[7] but many may feel that he must have been a bit too sensitive for his own good. Or they may think that the miseries of early urbanization made him overlook the beauty of life (so, e.g., Gombrich 2006, pp. 58–60). In other words, they may be tempted to explain the first noble truth of Buddhism (i.e., the truth of suffering) in terms of the character or social circumstances of its founder. We are at present not interested in either of these two.

Can the so-called first noble truth claim to be true in an objective sense? The very question may puzzle people. Critics will point out that suffering is by definition subjective, so that it is self-contradictory to look for objective truths about it. There is no way, they will say, to prove someone wrong who has a positive view of human existence. Nor can there be logical arguments to refute the opposite, viz., that human existence is suffering. It is all a matter of personal taste, or judgment.[8]

To show that the situation may be a bit more complicated, consider the following. Medieval legend tells us that King Alexander travelled through the sky in a vehicle drawn by two griffins. (Griffins are legendary winged animals, having the body, tail and back legs of a lion, and the head and wings of an eagle.) The griffins were lured by baited sticks that they could not reach. By moving towards them, they pulled the vehicle upward, and with it Alexander who held the bait above but out of reach of the poor creatures. Their efforts were essentially in vain (see Schmidt 1995).

We call these griffins "poor creatures". But is this how they would think about themselves? Perhaps they had a great time, sincerely believing that a wonderful meal would soon be within their reach. What if we, ordinary human beings, are driven by a psychological mechanism that is not altogether different from that of the griffins? Is it possible that we are chasing after goals that we can never reach? Are we perhaps victims of what has been called *wilful blindness* (on which, see Heffernan 2019)?

A recent author, Will Storr, makes an observation that is in essence not altogether different from the story of Alexander's griffins, but that concerns humans, not griffins. He says: "Humans might be in unique possession of the knowledge that our existence is essentially meaningless, but we carry on as if in ignorance of it. . . . The cure for the horror is story. Our brain distracts us from this terrible truth by filling our lives with hopeful goals and encouraging us to strive for them. . . . It gives our existence the illusion of meaning and turns our gaze from the dread."[9] Seen this way, our goals may be more complicated and more sophisticated than those of the griffins but, like theirs, unattainable.

Can we conclude that *we*, like Alexander's griffins, are "poor creatures"? Is an objective discussion of this question possible at all? Is it not self-contradictory to try to have an objective discussion about subjective judgments? I propose that it is not self-contradictory on condition that we have a scientific theory that explains how feelings "work".[10] Can there be an objective scientific theory about subjective states? Many recent theories about brain and mind have very little to say about feelings and next to nothing about suffering in general.[11] An important exception is the theory proposed by Mark Solms, who bases himself on earlier work by himself and others.[12] I will base my reflections on this theory.[13]

Solms is a neuroscientist who maintains that consciousness in its most elementary form is not cognition, but feeling, affect.[14] Feeling is part of consciousness in all its forms, and feelings are necessarily conscious.[15] Feelings, moreover, have valence, which means that they are felt to be either "good" or "bad"; that is, they are either pleasurable or unpleasurable.

> Affective valence—our feelings about what is biologically "good" and "bad" for us—guides us in *unpredicted* situations. . . . [T]his way of feeling our way through life's unpredicted problems, using *voluntary* behaviour, is the biological function of consciousness. (Solms 2021, p. 190)[16]

Consciousness in its most elementary form, Solms points out elsewhere,

> is a sort of alarm mechanism, which guides the behavior of self-organizing systems as they negotiate situations beyond the bounds of the preferred states, in so far as they are not equipped with automatized (or automatable) predictions for dealing with them. (Solms 2019, p. 13)

Solms's quest as to how and why consciousness comes about is directly relevant to our reflections.

How *does* consciousness come about? This is not the place to deal with the details of Solms's theory, which is in part difficult and technical.[17] Some of its elements, however, may

help. The theory starts from the observation that "living systems resist entropy through the mechanism of homeostasis" (Solms 2021, p. 159).[18] There are many homeostatic systems in the world that are *not* conscious, including refrigerators or even living organisms such as plants. They all interact with their environment and react to it in an appropriate manner. However, biological self-organizing systems—which, too, are homeostatic—"must test their models of the world, and if the world does not return the answers they expect they must urgently do something differently or they will die." (Solms 2021, p. 168). Consciousness can come into play when the demands made on the organism are so varied that automatic responses cannot cope with them.[19] That is to say, consciousness can provide responses to new situations and new challenges.

It follows, then, that we, like all other homeostatic systems, strive after homeostasis. Consciousness comes into play when homeostasis is threatened and cannot be maintained through automatic responses. This has a surprising consequence:

> the surprising upshot remains that *consciousness is undesirable* in cognition. What we are all aspiring to . . . is not pleasure (decreasing need) but zombiedom (no need). No need implies perfect predictions, which means no errors, and therefore no call to increase the precision on incoming signals, and therefore no feeling. Peace at last. (Solms 2021, p. 221)

Solms's theory implies that feelings—and with it, consciousness—arise when the predictions of a homeostatic system are confronted with errors that require increased precision. Without those, feelings and consciousness will not arise. To put it differently:

> the Nirvana[20] that the ideal self-organizing system . . . strives for can never be attained in a real biological system, for the simple reason that change (both external and internal) always happens. (Solms 2019, p. 13)

As negative as these passages may sound, they say nothing about feeling and are therefore not directly relevant to our quest about suffering.[21] Feeling and consciousness come about when the demands made on the organism are so varied that automatic responses cannot cope with them. However, in such situations not *all* needs will be felt:

> Needs cannot all be felt at once. They are prioritised by a midbrain decision triangle . . . (Solms 2021, p. 303)

With respect to these prioritized, conscious, needs, the following rule applies:

> deviation away from a homeostatic settling point (increasing uncertainty) is felt as unpleasure, and returning toward it (decreasing uncertainty) is felt as pleasure. (Solms 2019, p. 7)

That is to say, feelings—and therefore pleasure and unpleasure—only accompany prioritized needs, not other needs.

It follows that we will be simultaneously conscious of only a subset of all the needs we have; these are the prioritized needs. Consciousness chooses a course of action that resolves, or seeks to resolve, a number of these, often in sequence. Certain other conscious needs will not be resolved and will give rise to unpleasure. Seen this way, we are constantly chasing ways to increase pleasure while reducing unpleasure. The question is: Do we succeed in tipping the balance in our favor, by creating more pleasure than unpleasure?

Some factors must be kept in mind. First of all, pleasure and unpleasure that derive from different needs cannot simply be added or subtracted.[22] The feelings related to different needs have different *qualities*.[23] The unpleasure resulting from separation from someone dear to us, for example, feels different from the unpleasure related to hunger. And resolving one need does not normally resolve another. And yet, the pleasure that a good meal provides can be reduced by the unpleasure resulting from separation from a loved one. In spite of the differences in quality, someone may decide to forgo, say, a delicious meal if by doing so they can see the person they long for. In other words, different kinds of pleasure and unpleasure are somehow compared and added to or subtracted from each other.

More important in the present context is the following. Non-prioritized needs, as long as they remain non-prioritized, are not felt. As such, they give rise to neither pleasure nor unpleasure.[24] However, when circumstances change, they *can* become conscious. What this means is that a number of needs are *potentially conscious*. In normal circumstances they will not be pleasurable or unpleasurable, but in certain situations they can become so.

We have already seen that *all* needs cannot be felt at once, but a certain number of them will.[25] The number of needs that *can* be felt simultaneously is not the same for all people in all circumstances. In some people, in some circumstances, their number is higher than in others or in other circumstances. This is not a topic addressed in Solms's theory, which proposes an explanation for consciousness *tout court*. Differences between individuals are of no interest in that context.

However, such differences exist. Perhaps this is not surprising. People who are in a coma or in deep sleep have no consciousness. Those who awaken from a coma or from deep sleep will become conscious, but to varying degrees. More consciousness implies more awareness of one's needs and therefore more feeling. What this suggests is that there are degrees of consciousness. This also implies that there can be differences between different persons, or indeed between one and the same person at different times.

Consider now a person who, for whatever reason, is conscious of more needs than someone else. Beside feeling the pleasure related to the resolution of some needs, that person will feel the unpleasure of other needs that cannot be resolved (at that time, or at any time). Taken together, the overall outcome will be pleasurable or unpleasurable, depending on the degrees of positive and negative feelings. Well, the needs that remain unconscious in certain people become conscious in others. Surveying those feelings, those others may draw a negative balance where those who are confronted with fewer negative feelings because they are conscious of fewer needs may not do so. Such persons would be what we call sensitive persons. Day-to-day life for them may involve more unpleasure, more suffering, than for others.

These reflections confirm what we know already, namely, that some people are more sensitive than others. However, they do more. They show that the same needs that give one person an excess of unpleasure by becoming conscious may remain unconscious in another. The same unresolved needs can bring suffering to some and not to others. The underlying situation in these two cases is identical. That is to say, the source of suffering is present in both, but may manifest itself in the sensitive person and not in the less sensitive one.

If what has been said so far were the whole story, it would come close to providing an answer to our question: "The first noble truth, is it true?" The answer we would arrive at is: Yes, to the extent that people are aware of their conflicting needs; in other words: if they are sensitive enough. It would imply that all is perhaps *not* suffering for those who are *not* sensitive enough. It is tempting in this context to cite a classical Indian text on Yoga that states that all is suffering for *those who have discernment*. The commentary explains: "A wise man is like an eyeball. Just as a fine thread of wool fallen upon the eyeball by its touch gives pain, but not so when it falls upon other parts of the body, so these pains [from subliminal-impressions] hinder the yogin only, who is like an eyeball, but not any other perceiver."[26]

What has been said so far is *not* the whole story. A crucial element must be added. Humans and many other animals are in possession of a faculty that profoundly changes the picture. It is the faculty of concentration. When several needs are prioritized and become conscious, we have the possibility to concentrate on some of them at the expense of others. While we pay attention to one (or a small number) of those prioritized needs, the other prioritized needs are suspended and will therefore not be felt, or only weakly; the "full weight" of consciousness now falls on the needs that have been singled out. The suspended needs—i.e., the needs from which attention is withdrawn—now find themselves in an intermediate space: they solicit conscious attention, which is not, however, available (though usually only for a short while) because all (or most) of it is directed elsewhere.

The faculty of concentration is vital for our survival, as it is for that of so many other animals.[27] It is also relevant to our enquiry. If suffering results when many needs become simultaneously conscious (as was argued above), temporary suspension of needs that cannot be resolved will reduce suffering. And the reduction of suffering is likely to be stronger when more such needs are suspended.

This almost inevitably takes us to what is known by the name "flow", a notion introduced in the nineteen seventies by Mihaly Csikszentmihalyi and extensively studied ever since. Flow is a "transient state [that] is characterized by focused attention on a limited stimulus field containing challenges matched or marginally higher than the person's skills, and it is sought out by people because the state is an enjoyable one that they wish to experience again and again" (Csikszentmihalyi and Nakamura 2018, p. 102). Moreover, "[i]ntense concentration [is] perhaps the defining quality of flow" (Csikszentmihalyi 2014, p. 243; from Nakamura and Csikszentmihalyi 2002). Csikszentmihalyi and Nakamura (2010, p. 181) say the following about it:

> In our studies of "optimal experience," one fundamental finding has been that when people enjoy most what they are doing—from playing music to playing chess, from reading good books to having a good conversation, from working their best to trying to beat their own record in sport—they report a state of effortless concentration so deep that they lose their sense of time, of themselves, of their problems. We have called this the "flow experience," because so many of the persons describing it used the analogy of being effortlessly carried by a current—of being in a flow.

Flow is a form of concentration—*intensive* and *deep* concentration, as Csikszentmihalyi puts it—that yet differs from ordinary concentration, primarily by being deeper. It appears indeed that concentration can be of different depths, a topic to which we will return later in this article.[28]

Csikszentmihalyi and Nakamura contrast the state of flow with diffuse attention, "what the Buddhists call the *monkey mind*, jumping from one stimulus to the other", a state that is generally experienced as less desirable.

The illustrations given in the above quotation—playing music, playing chess, reading good books, having a good conversation, working one's best, trying to beat one's own record in sport—suggest that flow accompanies most if not all forms of distraction. Paul Bloom (2021) goes further and points out that many instances of what look like self-inflicted suffering evoke states of flow, thus complicating our understanding of the economy of suffering.

We must conclude that mental concentration can reduce suffering. We are not the only ones to draw this conclusion. According to the early Buddhist texts, when the Buddha toward the end of his life suffered from illness, he stated that his body only found comfort when he entered a state of mental absorption.[29]

Where does this leave us with regard to the first noble truth? Is life predominantly suffering? Do we resemble the griffins who pulled Alexander's vehicle? The situation is more complex than it may appear at first sight. On the one hand, the simultaneous presence of competing conscious needs is likely to produce an excess of suffering. On the other, there is an escape, but this escape is only temporary: distraction. Distraction can often suspend unresolved needs and the unpleasure resulting from them. Almost any physical or mental activity can be a distraction, as long as it is carried out in a state of effortless concentration, of flow.[30] One particularly efficacious distraction is hope. We share this distraction with Alexander's griffins. They could be happy, inspired (i.e., distracted) by hope. Presumably we have a far greater choice of distractions than griffins do but we, too, may end up hoping that tomorrow will resolve today's problems, forgetting that hope is but another distraction. Alexander's griffins could believe they were happy, distracted by hope, and so can we. However, hope—as pointed out by Friedrich Nietzsche—"is the worst of evils because it prolongs the torments of man".[31]

3. Cessation of Suffering

The above reflections suggest that there is a way in which the first noble truth can be looked upon as true, though subject to certain qualifications. Do they help us make sense of the claim that the cessation of suffering is possible?

For obvious reasons, the answer that there will be no suffering in death, or in coma, or in deep sleep, or even in states of reduced consciousness, is of no interest in the present context. Following Solms, we look upon suffering without consciousness as an oxymoron. We must rather ask: Can there be an end to suffering in a fully conscious living person? A permanent state of distraction—i.e., something like an uninterrupted and endless state of flow—would do the job, but cannot be attained in normal life. The conscious needs that are suspended in states of distraction cannot remain suspended forever.

Keep also in mind that the early Buddhist tradition does not claim that *all* forms of suffering can come to an end in a conscious and alive person. It makes no secret of the fact that the historical Buddha apparently suffered from ill health toward the end of his life (and that indeed he *did suffer*).[32] Our question is therefore: In what way does a substantial and lasting reduction of unpleasure fit into our neuropsychological model? And our reflections so far propose the following answer: Suffering can be reduced to a minimum if the conflict between needs is reduced to a minimum. Without such conflict those needs will not give rise to suffering and there will not even be need for distraction.

This leaves us with another question: Why are our fundamental needs in conflict with each other? Where do these conflicts come from?

It turns out that some of those needs are innate, while others are acquired through experience. More specifically, new needs can be constructed through emotional learning. What is more,

> the ideal of such emotional learning is to automatize the acquired predictions. . . . Naturally, we need to forge new predictions which are at least as reliable as the innate ones, and to the extent that we achieve this (i.e., to the extent that prediction errors wane), to that extent acquired emotional predictions are automatized through consolidation, right down to the level of procedural memory systems (which are 'hard to learn and hard to forget' . . .). In this way the acquired predictions come to resemble the instinctual ones, not only in their functional properties but also in their subcortical anatomical localization. (Solms 2019, p. 13)

Responses that are newly acquired with the help of consciousness may themselves become automatic if and when they do not need conscious supervision any longer. This is a familiar phenomenon. Learning to ride a bicycle initially requires close conscious supervision, but after a while the required movements become habits and no longer require consciousness.[33]

> Reliably successful choices result in long-term adjustments of sensory-motor predictions. Thus, exteroceptive consciousness is predictive work in progress, the aim of which is to establish ever deeper (more certain, less conscious) predictions as to how needs may be resolved. This long-term consolidation—and the transition from "declarative" to "non-declarative" memory systems—requires reduction of complexity in the predictive model, to facilitate generalisability. We aspire to automaticity—absolute confidence—but we can never achieve it completely. To the extent that we fail, we suffer feelings. (Solms 2021, p. 304)

What this implies is that we have far more than only innate needs. As a result of learning we end up with numerous needs (perhaps better: predictions as to how needs may be resolved). Innate needs will in this way be overgrown with predictions that may in many cases contradict each other, leaving the impression that we are confronted with many irreconcilable needs. The vast majority of those predictions will ultimately rest on memories of past experiences. As we saw, successful "emotional predictions are automatized through consolidation . . . In this way the acquired predictions come to resemble the instinctual ones" (Solms 2019, p. 13, quoted above). What this means is that many of our needs, if not all of them, have at least in part been formed early in our lives and are the result of

events that once gave pleasure (or unpleasure) but may no longer do so now.[34] Given their multitude and variety, it is not surprising that unconscious needs can give rise to unpleasure when they become simultaneously conscious.[35] Once in place, these predictions stay put even if it turns out that they are in conflict with the predictions linked to other needs. They are now *entrenched* and resist change.

We will soon discuss the recent discovery that emotional memories can be *erased* through the process of *memory reconsolidation*, a process that requires the reactivation of the original memories and will play a crucial role in our discussion of the cessation of suffering. Before we turn to it, it is necessary to recall that entrenched thoughts and behaviors play a crucial role in the development of a number of psychopathologies;[36] these notably include addiction and the consequences of trauma. However, the same mechanism is at work in those who do not develop psychopathologies. One can therefore usefully speak of "mini-addictions" and "mini-traumas" as factors that play a role in personality formation in general.[37]

This is what Marc Lewis (2015, pp. 7–9) says about addiction:

> . . . addiction develops—it's learned—but it's learned more deeply and often more quickly than most other habits, due to a narrowing tunnel of attention and attraction. A close look at the brain highlights the role of desire in this process. The neural circuitry of desire governs anticipation, focused attention, and behaviour. So the most attractive goals will be pursued repeatedly, while other goals lose their appeal, and that *repetition* (rather than the drugs, booze, or gambling) will change the brain's wiring. As with other developing habits, this process is grounded in a neurochemical feedback loop that's present in all normal brains. . . . Addiction is unquestionably destructive, yet it is also uncannily normal: an inevitable feature of the basic human design.

Note that the neurochemical feedback loops underlying addiction are present in all normal brains, in which case we rather speak of habits or, as suggested above, "mini-addictions" (or "little-a addictions"). Lewis (2015) says the following about them: "one way to capture the combination of those habits is with the word 'personality'."

Seen this way, the following observations about addiction are equally useful for understanding "normal" human behavior (ibid.):

> Like other developmental outcomes, addiction isn't easy to reverse, because it rides on the restructuring of the brain. Like other developmental outcomes, it arises from neural plasticity, but its net effect is a reduction of further plasticity, at least for a while. Addiction is a habit, which, like many other habits, gets entrenched . . .

It should by now be clear that addictions (including "mini-addictions") are learned; in other words, they are based on memories. This suggests that they can be *un*learned, if only one knows how to do that.

Acute trauma, too, can have behavioral consequences based on memory. Such memories are often subject to dissociative amnesia and resist recall.[38] Traumas (and "mini-traumas") contribute to the formation of the personality, also of "normal" people. The feature they share with addiction is that they are based on memories.

To sum up, experiences that were once conscious (many of which took place early in life) underlie a large portion of the features that are constitutive of personality. One can become aware of those features (especially if they are in conflict with other features), without becoming aware of their underlying emotional charges; these are part of the underlying memories that are no longer consciously remembered.[39] Once activities have been automatized, the experiences that gave rise to them will not normally be recalled: their memory traces are *consolidated* and are no longer easily accessible to consciousness. These consolidated memory traces concern acquired emotional predictions, reactions that once gave rise to pleasure or unpleasure but may no longer do so.[40] Seen this way, adult human conscious behavior consists of choices between numerous often conflicting needs that resist modification.

Are such consolidated memory traces fixed for ever, or is there a way to modify them? In fact, recent research has shown that they can be modified; such memory traces can be differently *reconsolidated* (Solms 2021, p. 222):

> [R]econsolidation was rediscovered and named as such in 2000. If protein synthesis inhibitors are administered while a long-term trace is activated, the trace disappears. (Protein synthesis inhibitors prevent *new* long-term traces from being formed.) This applies . . . not only to fear memory. Long-term memories, in general, become unstable when they are in the activated state. That is how they are updated (and then consolidated afresh—i.e., reconsolidated).

Experiments in animals and subsequently in humans reveal that during a short while after the reactivation of memories their emotional significance can be permanently modified.[41] During this so-called *reconsolidation window*, which can last from minutes up to a maximum of a few hours,[42] such a change can be brought about by pharmacological means (such as propranolol) or through new competing learning. Condition for such a change is that the activated memory be confronted with what is called a *mismatch* or *prediction error*; that is to say: the activated memory is not accompanied by its expected outcome.[43]

Here is a short description of how memory reconsolidation relates to more common therapeutic methods in humans (Phelps and Schiller 2013, p. 199; emphases added):

> Studies examining the behavioral interference of emotional memories in humans have explored both conditioned aversive memories and appetitive memories. A common nonpharmacological technique to change conditioned emotional reactions is extinction training. Extinction involves recurrent presentations of the CS [*conditioned stimulus*] without aversive or appetitive outcomes, which leads to a gradual decrease in the CR [*conditioned response*]. Similar to acquisition, extinction is a learning process, but now the CS is associated with no aversive or appetitive outcome. Importantly, *there is abundant evidence that standard extinction training results in an additional memory trace representing an alternative for the CS* (e.g., safe). Because the initial aversive or appetitive memory trace still exists, the CR can return after extinction training in a number of circumstances . . . *However, if extinction training occurs during reconsolidation while the memory is still labile, it is possible that this new information will get incorporated into the original memory trace, thus updating the original emotional memory and changing its emotional significance*.

In this last case (i.e., when new information gets incorporated into the original memory trace), one speaks not of *extinction* but of *erasure* (See further Dunsmoor et al. (2015, pp. 54–56)). It is important to be aware of the difference between the two: *extinction* normally creates an additional memory trace; it only results in *erasure*—and therefore in a change in the original memory trace—if it is applied during the reconsolidation window.

What all this means is that many, if not all, of our automatized emotionally charged responses can in principle be modified, updated, in light of more recent experience, if only the underlying memories can be consciously activated. Such conscious reactivation can then be followed by reconsolidation. However, conscious access to those memories is a non-negotiable precondition. And this, as we will see, is a major stumbling block, to which we will return below.

4. Cessation of Thirst

The four noble truths do not only promise the cessation of suffering, but also the cessation of thirst, i.e., of desire. It turns out that, in terms of the theory presented so far, the cessation of desire is the automatic consequence of the process described above. Recall the "mini-addictions" that play an important role in personality formation. Addictions and mini-addictions are involved in the distinction between *wanting* and *liking*, a distinction that is now drawing the attention of psychologists. Berridge and Robinson (2016, p. 670) describe it as follows:

> Rewards are both 'liked' and 'wanted', and those two words seem almost interchangeable. However, the brain circuitry that mediates the psychological process of 'wanting' a particular reward is dissociable from circuitry that mediates the degree to which it is 'liked'. Incentive salience or 'wanting', a form of motivation, is generated by large and robust neural systems that include mesolimbic dopamine. By comparison, 'liking', or the actual pleasurable impact of reward consumption, is mediated by smaller and fragile neural systems, and is not dependent on dopamine. The incentive-sensitization theory posits the essence of drug addiction to be excessive amplification specifically of psychological 'wanting', especially triggered by cues, without necessarily an amplification of 'liking'. This is due to long-lasting changes in dopamine-related motivation systems of susceptible individuals, called neural sensitization. A quarter-century after its proposal, evidence has continued to grow in support of the incentive-sensitization theory. Further, its scope is now expanding to include diverse behavioral addictions and other psychopathologies.

Note that wanting is not limited to those who are addicts in a pathological sense; it also characterizes those who suffer from "mini-addictions", i.e., everyone else. There appears to be a direct connection between addiction—including "mini-addictions"—and wanting. If addictions and mini-addictions can indeed be resolved through memory reconsolidation the result will not only be reduced suffering (as discussed above), but also reduced wanting. If we replace the term *wanting* with *desire* or *thirst*, we end up in the second and third noble truths which, as you will recall, linked thirst to the origin of suffering, and explained the cessation of suffering in terms of the complete and passionless cessation of thirst.

5. The Path

Our reflections so far lead us to the conclusion that the successful erasure of all emotionally charged memories should bring about a state in which there is very little suffering and no desire. However, the question whether such generalized erasure is at all feasible remains unanswered. All depends on the conscious reactivation of all relevant memories, a crucial requirement. Can that be done? Are all the memories underlying personality formation accessible to consciousness? Do they leave traces that might be retrieved and activated?

The answer to these questions is far from simple. The retrieval of memories can be problematic. Dissociative amnesia, as we have seen, often prevents memory retrieval in the case of trauma. And the memories underlying habit formation, according to Solms, leave no retrievable images. This is what he says about it (Solms 2021, pp. 225–26):

> The goal of learning from experience is to shift as many long-term memories as possible from the declarative to the non-declarative state, for the reason that 'declarative' means 'capable of returning to consciousness'.

Moreover (p. 226):

> The most important fact about non-declarative memory is that it is non-declarative. It generates procedural *responses*, whereas declarative memory generates experienced *images*. This coincides with an anatomical distinction: declarative memories are cortical while non-declarative ones are subcortical. Subcortical memory traces cannot be retrieved in the form of images for the reason that they do not consist in cortical mappings of the sensory-motor end organs.

However, Solms then adds the following clarification (p. 226):

> non-declarative memories are only 'unconscious' in the *cognitive* sense. When an acquired emotional response is triggered you do feel something; you just don't know what the feeling is about—that is, where it came from.[44]

In other words, these memory traces *are* there and *can* be activated (=made conscious), even though the resulting memories will be 'non-declarative'.[45] This may not stand in the way

of memory reconsolidation, given that memory consolidation works primarily (or even exclusively?) on the emotional dimension of memory.

We may conclude that the memories that contribute to the formation of our personalities—or at least the emotionally significant ones—leave traces, even if many of those are of difficult access. We may add, at least tentatively, that all these memories are in principle open to reconsolidation.

How does one gain conscious access to the memory traces underlying so many of our needs, and how does one activate them? This, as we have seen, is the essential precondition for their erasure, i.e., for the annihilation of their emotional charge.

As a rule, memories are retrieved with the help of cues. Indeed, according to Nadel and Sederberg (2022, p. 17),

> one prominent theory of episodic memory formation and retrieval,[46] the temporal context model (TCM), posits that we form associations between the features of experience and the spatiotemporal context in which we experienced them . . . Consequently, the best cue for retrieving a memory is a recapitulation of the distributed patterns of neural firing (the 'context') prevailing at the time the memory was formed, providing an explanation for the extensive context effects observed in memory retrieval.

In what follows, we will assume that recapitulation of the pattern of neural firing also helps the retrieval of other, non-episodic, memories.

In the case of memories that give rise to mental or physical habits—our "mini-addictions"—those habits themselves (the "symptoms") are important cues, perhaps *the* most important cues. Mindful observation of mental and bodily behavior will shed light on the needs that find expression in them. Occasionally, this will even suffice to activate the underlying memory. Conscious awareness of what is going on in body and mind—a form of mindfulness practice—is, unsurprisingly, a first step toward the retrieval of hidden memories in many forms of psychotherapy (Ecker et al. 2012, pp. 9–10; Payne et al. 2015). It can, in principle, be used in connection with all "mini-addictions" that are constitutive of our personalities. However, all too often entrenched habits do *not* activate the underlying memories. Those habits, to be sure, are there in plain sight; their underlying emotionally charged memories are not. The persistence of many of those habits is due precisely to the fact that the underlying memories are not easily accessed.

Usually more is required than mere awareness of habits. To complicate the picture even further, networks of memories rather than single memories underlie "mini-addictions". Sets of cues may be required to bring those networks to light. But many of those other cues may be primarily connected with other, non-prioritized needs, and will therefore not be conscious. Add to this that there are engrams underlying memories, the so-called "silent engrams", that "exist in otherwise inaccessible states, in which natural retrieval cues . . . typically are not sufficient to induce . . . memory expression." Interestingly, such engrams can be reactivated by artificial means (such as direct photostimulation) (Frankland et al. 2019, pp. 1579–80).

Access to the underlying memories is clearly beset with obstacles. And the scientific literature does not, to my knowledge, contain hints as to how these obstacles might be overcome. The four noble truths yet maintain that the goal can be reached. In doing so, they suggest that all hidden relevant memories *can* be accessed. Without the support of scientific research, we now enter uncharted territory.

Recall at this point what was said in Section 2 about concentration, and about flow in particular. We found there that depth of concentration can vary and can go beyond its normal limits, as in states of flow. Keeping this in mind, look again at the longer version of the four noble truths cited in Section 1. It mentions *right absorption* as the last element of the path leading to the cessation of suffering. The theoretical approach adopted in the present article suggests that, in any given situation, the maximum depth of concentration is reached when a maximum of prioritized needs is suspended. We already know that the number of those prioritized needs may vary as a function of circumstances and of the persons

concerned.[47] But can this work the other way round? Can deep mental absorption, if somehow attained, expand the realm of prioritized needs? The mention of right absorption suggests that it can.

Mental absorption, as we have seen, suspends needs and in so doing reduces or even suppresses the mental contents that are associated with those needs. *Greater* depth of absorption implies that *more* associations with other mental contents are suppressed. This includes, in the case of deep absorption, associations with mental contents that are not normally accessible to consciousness (because the relevant needs are not then prioritized) (for details, see Bronkhorst 2022a). The implication is that deep absorption, unlike "normal" consciousness, *does* have access to what are usually unconscious mental contents. Moreover, mental absorption does not only suppress, it also focuses attention, and as such it *can* focus attention on some of those hitherto hidden mental contents (Bronkhorst 2017, pp. 10–11). This implies that in a state of deep absorption attention *can* be focused on so far hidden memories and retrieve them.[48]

Once there is access, the field is open for memory reconsolidation. Keep, however, in mind that possibility of access through mental absorption does not *automatically* lead to memory reconsolidation. Access (in the form of reactivation) is a necessary condition, but not a sufficient one. Another condition, as we saw, is *mismatch* or *prediction error*.

Seen this way, mental absorption is a step on the path that leads to the goal. It does not lead there all by itself. One more step is required, viz., memory reconsolidation. We have already discussed the details of this final step in Section 3, above.

This, then, is the path as we can reconstruct it from the four noble truths. Something essential is still missing. The reconstruction does not tell us how to reach the required depth of absorption.[49] The longer version of the four noble truths does specify the elements of the path, to be sure. They are right faith, right resolve, right speech, sight action, right living, right effort, right thought, right absorption. We used the last of these eight elements—right absorption—in our reconstruction, but not the other ones. And indeed, these elements are so general that it is difficult to extract precise information from them. They do, however, remind us that the process we have studied so far does not take place in a vacuum. Elaborate preliminary practices are required, and we may assume that they help the practitioner to reach the required depth of absorption. No doubt they also help to evoke the *mismatch* or *prediction error*, which, as we have seen, is an essential factor in allowing memory reconsolidation. Indeed, as long as one has not abandoned the idea that something remains that must be protected or defended (one's wallet, one's family, one's physical integrity), erasure of the relevant memories may not take place.

It should be clear by now that the four noble truths *can* be studied in a scientifically responsible manner. Differently put, there are at present no scientific reasons to doubt the veracity of the four noble truths.

6. Concluding Remarks

More than ten years ago, a philosopher named Owen Flanagan shared his thoughts about the possibility of reducing Buddhism to a form of secular Buddhism, or, as he called it, Buddhism naturalized (Flanagan 2011, p. xi):

> I thought this an opportune time to introduce my fellow philosophers, as well as the many scientific naturalists who like me are allergic to hocus pocus, to a suitably deflated secular Buddhism, what I call Buddhism naturalized. Buddhism, like Plato and Aristotle's philosophies, is a comprehensive philosophy. It contains a metaphysic, an epistemology, and an ethics—a way of conceiving the human predicament, human nature, and human flourishing—that is deep and not simply superstitious nonsense. Now some parts of Buddhism are superstitious nonsense, so there was also the prospect of asking this question: Is it possible to take an ancient comprehensive philosophy like Buddhism, subtract the hocus pocus, and have a worthwhile philosophy for twenty-first-century scientifically informed secular thinkers?

Among the beliefs he proposed to remove from Buddhism are the following (Flanagan 2011, p. 206):

> There are beliefs that many take to be essential to Buddhism, which are not acceptable to members of my tribe(s) [i.e., analytic philosophers and scientific naturalists]. We would say that they ought not to be acceptable to contemporary Buddhists either given the commitment to empiricism, the testing of beliefs against the world. These include the beliefs in immaterial spirits, rebirth, and karma (of the untamed variety)

The present article is far less ambitious than Flanagan's book. Even though it shares Flanagan's distaste for hocus pocus and superstitious nonsense, it does not try to naturalize Buddhism.[50] In fact, it does not try to do anything to Buddhism; it pursues a line of enquiry that is quite independent of what we or anyone else understand by Buddhism. And yet, it cannot be denied that the four noble truths are presented in the Buddhist scriptures as a concise description what Buddhism is all about.

What are the four noble truths from Flanagan's perspective? Do they fall in the category of hocus pocus and superstitious nonsense? Our preceding reflections strongly suggest that they do not. They turn out to be truth claims that make scientific sense in that they may be either in agreement or in disagreement with scientific theories that account for mental functioning.

Interestingly, Flanagan does not say that the four noble truths are hocus pocus or superstitious nonsense, yet he leaves them no place in his naturalized Buddhism. He feels the need to reinterpret them in such a way that they express the idea that virtue necessarily or typically causes happiness, or something of the kind. He is aware that this involves a certain amount of "interpretive mischief" (his expression) (Flanagan 2011, pp. 183–84), but does not answer the question why such interpretive mischief is called for. Does he believe that the Buddhism he is looking for must, to at least some extent, resemble Aristotelian philosophy, as he suggests? Is a naturalized Buddhism that makes unexpected claims not good enough, even if there is in principle nothing unscientific about those unexpected claims?

I repeat that the present article is not about Buddhism, naturalized or otherwise. However, I do hope that the preceding pages have shown that the four noble truths deserve serious attention and cannot be discarded for being in conflict with the scientific world view; they are not. There can be differences of opinion as to whether they are actually true or not. It should, however, be clear by now that the assumption that they are true does not contradict any known facts and is indeed supported by scientifically tenable hypotheses.

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Appendix A. A Chemical Shortcut?

In our reconstruction of the path, access to hidden memories turned out to be an important hurdle. We explored deep absorption as the method proposed in the four noble truths but had to admit that those truths do not tell us how the required depth of absorption can be reached.

However, recent research has shown that certain chemicals do precisely what deep absorption is expected to do: provide access to hidden memories. In an overview of the relevant literature, Healy (2021, p. 639) states:

> Classic psychedelics[51] . . . increase the vividness of autobiographical memories and frequently stimulate the recall and/or re-experiencing of autobiographical

> memories, often memories that are affectively intense (positively or negatively valenced) and that had been avoided and/or forgotten prior to the experience. . . . These findings are relevant to the understanding of psychological mechanisms of action of psychedelic-assisted psychotherapy.

Healy (2021, p. 641) also mentions "psychedelics' widely observed capacity to facilitate the reconsolidation of memories of developmentally critical traumatic events".[52] Unsurprisingly, psychedelics have been shown to be effective against addictions.[53]

This is not the place to raise the question whether known psychedelic drugs can reactivate *all* emotionally charged memories. It is for now enough to assume that an "ideal" psychedelic (which may or may not exist)[54] can provide full access to those memories that deep absorption provides access to in our proposed interpretation of the Buddhist noble truths. Would this mean that the goal presented in the four noble truths can now be reached simply by swallowing a pill?

Clearly not. Even if our ideal psychedelic were to work as specified, two further requirements would have to be fulfilled:

(1) Attention would have to be directed to all those memories, one by one.
(2) Erasure will not take place if no *mismatch* or *prediction error* is evoked, which means that the emotional dimension of memories will have to be replaced by complete equanimity; this is far from easy where objects of attachment (such as one's wallet, one's family, or one's physical integrity) are concerned.

In short, the ideal psychedelic will not, by itself, lead to the end of suffering of its user.

The second of these two points invites, at least in theory, a reflection on the use of reconsolidation blockers. The reconsolidation blocker propranolol has been used in humans (in "ordinary", i.e., non-psychedelic circumstances). An overview of the literature gives the following: "Cue-induced physiologic reactivity and declarative memory for emotional material was reduced in healthy individuals who reactivated a memory under propranolol compared to those who did it under placebo." (Pigeon et al. 2022, p. E120) We can limit our discussion to an "ideal" reconsolidation blocker (which may or may not exist). Such an ideal reconsolidation blocker would reduce or even remove the emotional charge from a memory (it would *erase* that memory). Note, however, that mismatch/prediction error would still be necessary.[55] This suggests that even the combined use of an ideal psychedelic and an ideal reconsolidation blocker would not lead to the goal in the absence of complete equanimity with respect to all one is attached to. And, of course, such combined use would still need close supervision from the side of their user, who would have to direct attention to all relevant memories. It is hard to say whether this would work in practice. Future research may shed light on this.

Notes

1 Mallinson and Singleton (2016, p. 191) erroneously state: "Bronkhorst has proposed that the Four Noble Truths were not originally part of the Buddhist doctrine of liberation, but were overlaid on to the earlier notion of *prajñā* (wisdom) 'by way of the Four Dhyānas [meditations]'." Their remark is based on a misreading of my text, which merely claims that the four noble truths were not part of liberating insight (Bronkhorst 1993, pp. 108–11).

2 More on secular Buddhism in Section 6, below.

3 For a critical assessment, see Faure (2012, 2017).

4 For references to the old Buddhist texts and secondary literature, here and in what follows, see Bronkhorst (2009, pp. 9–11).

5 We will pass over in silence the reference to rebirth: "thirst which leads from birth to birth". While there can be no doubt that the Buddha and his early followers believed in rebirth (see Bronkhorst 1998), this belief does not find support in modern science. Skipping this reference does not affect our reflections.

6 Elsewhere Russell sounded less optimistic: "So far as scientific evidence goes, the universe has crawled by slow stages to a somewhat pitiful result on this earth and is going to crawl by still more pitiful states to a condition of universal death. . . . if this is to be taken as evidence of purpose, I can only say that the purpose is one that does not appeal to me." (Quoted in Greene 2020, p. 17). And again: " . . . I have another vision . . . in this vision, sorrow is the ultimate truth . . . we draw our breath in pain . . . thought is the gateway to despair." (Quoted in Watson 2001, p. 291).

[7] However, one of the characters in Irving Yalom's *When Nietzsche Wept* doubts whether the Buddha is a paragon of mental health (Yalom 1992, p. 100).

[8] To quote Wittgenstein (1922, p. 88; *Tractatus Logico-Philosophicus* Section 6.43): "The world of the happy is quite another than that of the unhappy."

[9] Storr (2020, pp. 1–2). On p. 5 it adds: "The brain . . . turns the chaos and bleakness of reality into a simple, hopeful tale, and at the centre it places its star—wonderful, precious *me*—who it sets on a series of goals that become the plots of our lives." See further: "The truth is depressing. We are going to die, most likely after illness; all our friends will likewise die; we are tiny insignificant dots on a tiny planet. Perhaps with the advent of broad intelligence and foresight comes the need for . . . self-deception to keep depression and its consequent lethargy at bay. There needs to be a basic denial of our finitude and insignificance in the larger scene. It takes a certain amount of chutzpah just to get out of bed in the morning." (Hirstein 2006, p. 237; quoted Gottschall 2012, p. 175).

[10] Also note: "The idea that consciousness can't be scientifically studied because it's a subjective experience never made sense, because one's own subjective experience is all any scientist has ever had to work with." (Hossenfelder 2022, p. 189).

[11] Many theories of consciousness are referred to in Doerig et al. (2021).

[12] Solms (2019, 2020, 2021). Earlier work includes Solms (2013); Friston (2013); Solms and Friston (2018). Another recent publication that emphasises the importance of feeling in the study of consciousness is Damasio (2021), whose main thesis has been summed up as follows: "Only by establishing a scientific understanding of feeling can we begin to understand what it means to be conscious." (Gomez-Marin 2021). See further Seth (2021).

[13] For an exposition of the technical aspects of the theory, Solms's publications may be consulted (see preceding note). Here three features of the theory may be mentioned: (i) It has intuitive appeal: We all know from experience that much, probably most, of what we do does not need conscious supervision, and that consciousness comes in when something unexpected happens (such as someone jumping in front of our car). Consciousness guides us in unpredicted situations. (ii) The theory makes biological sense by emphasizing the survival value of consciousness. (iii) Pleasure and unpleasure are constituent elements of this theory.

[14] Solms argues this at length in his most recent book (Solms 2021).

[15] In a discussion with Solms (https://npsa-association.org/anil-seth-mark-solms-dialogue/ accessed on 1 December 2022), Anil Seth expressed some doubts about the necessarily conscious nature of feelings, but did not refer to research that might show the opposite (but see Smith and Lane 2016). Indeed, "emotional responses can be implicit in the sense that the bodily response component of emotion can occur without concomitant feeling states or awareness of such feeling states" (Lane et al. 2015, p. 4). Cognitive mental activities are not always conscious; see, e.g., Kihlstrom (1996); Dietrich (2004).

[16] Similarly, Damasio (2021, p. 133): "Conscious minds help organisms clearly identify what is required for their survival, and feel their way through the requirements."

[17] It can be called "dual-aspect monism", since it does not derive consciousness from neurophysiological processes, nor vice-versa. In fact, both supposedly derive from a common cause.

[18] Living systems do not diminish entropy: "It isn't true, as is sometimes stated, that life generates structures that . . . locally diminish entropy: it is simply a process that degrades and consumes the low entropy of food; it is a self-structured disordering, no more and no less than in the rest of the universe." (Rovelli 2018, p. 142).

[19] Cf. Earl (2014, p. 1): "Consciousness is associated with a flexible response mechanism . . . for decision-making, planning, and generally responding in nonautomatic ways." Kanai et al. (2019, p. 1): "a variety of cognitive functions associated with consciousness . . . contribute to non-reflexive behavior.".

[20] The use of the word Nirvana here comes from Freud's "Nirvana principle": "This Nirvana corresponds to a curious world where there are no prediction errors and the expected free energy is absolutely minimised, which—by construction—corresponds to a self-state with no uncertainty or entropy." (Solms and Friston 2018). The use of this word in these citations is ultimately based on an incorrect understanding of early Buddhism and should not be confused with its use in that religion.

[21] Human behavior is guided by feelings rather than biological imperatives: "Sexual behaviour is typically motivated by the pleasure it produces rather than the reproductive imperatives that attached biological 'reward' to procreative acts over evolutionary time. What I have in mind here is something analogous to what one observes in addicts, who are motivated to perform work in order to achieve desired feelings, even though the feelings themselves bestow no adaptive advantage upon the system in terms of its underlying design principles." (Solms 2021, p. 290).

[22] Solms takes care to point that out (Solms 2021, p. 192): "Needs cannot be combined and summated in any simple way. *Our multiple needs cannot be reduced to a single common denominator*; they must be evaluated on separate, approximately equal scales, so that each of them can be given its due. You cannot simply say that "3/10 of hunger plus 1/10 of thirst equals 4/20 of total need", and then try to minimise the total sum, because each need must be satisfied in its own right."

[23] "Each category of need—of which there is a great variety—has an affective quality of its own and each triggers action programmes which are predicted to return the organism to its viable bounds. These active states—i.e., intentional responses to the affective states—take the form of innate reflexes and instincts, which are gradually supplemented by learning from experience." (Solms 2021, pp. 302–3).

[24] "[T]he qualitatively felt aspect of hedonic value does not *have to* be registered by the self-organizing system until multiple such values must be differentially computed and prioritized in variable and novel contexts . . . " (Solms 2019, p. 11).

[25] "[F]elt needs are prioritised over unfelt ones. We are constantly beset by multiple needs. Vegetative functions like energy balance, respiratory control, digestion, thermoregulation and the like are going on constantly; and so are stereotyped behaviours of various kinds. You could not possibly feel all these things simultaneously, not least because you can only *do* one thing (or very few things) at a time. A selection must be made. This is done on a *contextual* basis. Priorities are determined by the *relative* strength of your needs (the size of the error signals) *in relation to* the range of opportunities afforded by your current circumstances." (Solms 2021, p. 99).

[26] *Yogasūtra* 2.15, along with the *Yogabhāṣya* thereon (tr. Woods 1914).

[27] The flip side is that temporary disregard for other needs can occasionally give rise to accidents (as when a driver causes an accident by concentrating on his phone).

[28] Below, Section 5. See also Mohr (2018).

[29] According to the Mahāparinibbāna Sutta, having eaten his last meal "the Lord was attacked by a severe sickness with bloody diarrhoea, and with sharp pains as if he were about to die. But he endured all this mindfully and clearly aware, and without complaint." (tr. Walshe 1987, p. 257; this translates Dīgha-Nikāya vol. II, pp. 127–28.) A closely similar passage occurs earlier in the same Sutta, where it is followed by the following remarks that are put in the mouth of the Buddha: "It is only when the Tathāgata withdraws his attention from outward signs, and by the cessation of certain feelings, enters into signless mental absorption (ceto-samādhi), that his body knows comfort (phāsutara/phāsukata)." (tr. Walshe 1987, pp. 244–45, modified; Dīgha-Nikāya vol. II, pp. 99–100).

[30] Note that "a state of flow may require effortful attention control even if it feels effortless" (Harris et al. 2017, p. 112).

[31] *Human, All Too Human* Section 71. T. S. Eliot puts it differently: "April is the cruellest month" (*The Waste Land*).

[32] See note 29.

[33] Fortunately so, according to William James (1890, vol. 1, chap. 4): "The more of the details of our daily life we can hand over to the effortless custody of automatism, the more our higher powers of mind will be set free for their own proper work. There is no more miserable human being than one in whom nothing is habitual but indecision, and for whom the lighting of every cigar, the drinking of every cup, the time of rising and going to bed every day, and the beginning of every bit of work, are subjects of express volitional deliberation."

[34] "The 'channel' functions of cortex *stabilize* affective 'states' . . . ; by extending feeling into perceptual images and thoughts . . . , they transform raw feeling into a different kind of consciousness." (Solms and Friston 2018). Affective states may be stabilized in childhood in a manner that is no longer useful, or may even be counterproductive, later in life.

[35] Does this help to explain the adverse effects that sometimes accompany meditation? See Lindahl et al. (2017); Goldberg et al. (2021).

[36] "We propose that many, if not most, psychopathologies develop via the gradual (or rapid—in the case of acute trauma) entrenchment of pathologic thoughts and behaviors, plus aberrant beliefs held at a high level, e.g., in the form of negative self-perception and/or fearful, pessimistic, and sometimes paranoid outlooks." (Carhart-Harris and Friston 2019, p. 321).

[37] Baldwin and Korn (2021) speak of little-t traumas. We might similarly speak of little-a addictions.

[38] For an example of unconscious memory, see the chapter "Uncovering secrets: the problem of traumatic memory" in Van der Kolk (2014, pp. 205–20).

[39] "[Innate reflexes and instincts are] supplemented through learning from experience. Learning requires consciousness, as we gradually improve confidence in our newly acquired predictions. But the ideal of all learning is to *automatise* these acquired predictions, too, to make them behave like reflexes and instincts." (Solms 2021, p. 225).

[40] Remember: ". . . memory traces . . . are not always experienced interoceptively, even when they exert exteroceptively observable effects." (Solms and Friston 2018).

[41] Cogan et al. (2019). Pigeon et al. (2022, p. E109): "Reconsolidation impairment is a robust, well-replicated phenomenon in humans." On the other hand, memories can also be more solidly consolidated. This seems to happen in sleep, one of whose functions appears to be to activate fragile new memory traces (as in dreams) and "consolidate them into more permanent forms of long-term storage, integrating key features of recent experience with existing remote and semantic memory networks" (Wamsley and Stickgold 2011, p. 2).

[42] Phelps and Hofmann (2019, p. 45). "[T]he reactivation period should be sufficiently long to retrieve the original memory but not too long to act as extinction" (Fattore et al. 2018, p. 434).

[43] There is an extensive literature about all this; see, e.g., Exton-McGuinness et al. (2015); Fernández et al. (2016); Elsey et al. (2018); Sinclair and Barense (2019).

[44] Elsewhere in his book, Solms (2021, p. 304) points out that "the transition from 'declarative' to 'non-declarative' memory systems . . . requires reduction of complexity in the predictive model, to facilitate generalisability."

[45] They are presumably part of "anoetic consciousness" and correspond to "procedural memory" (Taylor 2013, p. 785).

[46] Even though this passage only talks about episodic memory, I will assume in what follows that the same principle applies to all (or almost all) forms of memory.

[47] More needs may be prioritized in exceptional circumstances, as in traumatic experiences. And those who score high on *trait absorption* (measured by the Tellegen absorption scale; see Tellegen and Atkinson 1974; further Jamieson 2005) are likely to have more prioritized needs than others and may be able attain deeper states of concentration (called *state absorption*). (On the difference between trait absorption and state absorption, see Bronkhorst 2022b).

[48] In some cases, it may be appropriate to speak of state-dependent memory (wherein memories are difficult to recall unless the conditions at encoding and recall are similar); see Radulovic et al. (2018). Memories of overwhelming traumatic stress, for example, can be subject to dissociative amnesia. It is at least conceivable that overwhelming traumatic stress sometimes provokes a state of deep absorption (itself often looked upon as a state of dissociation), so that they are more easily recalled in a state of deep absorption.

[49] For a possible alternative path, see Appendix A.

[50] There have been more recent attempts to determine whether Buddhism, if properly interpreted, is true. Some (e.g., Wright 2017) maintain that it is, others (e.g., Thompson 2020) that it is not.

[51] '"Classic" psychedelic drugs' is a term used to refer to psychedelics that are agonists at the serotonin 2A (5-HT2A) receptor and share a similar phenomenological profile. Among the drugs it covers are: d-lysergic acid diethylamide (LSD); mescaline, the active chemical in a variety of psychoactive cacti, most notably peyote (*Lophophora williamsii*); psilocybin, a psychoactive alkaloid found in a number of mushroom genera, most notably *Psilocybe*; and *N*,*N*-dimethyltryptamine (DMT), the primary hallucinogenic chemical in the Amazonian brew ayahuasca, also known as yagé (Healy 2021, p. 639).

[52] Reference to Curran et al. (2018); Zhang and Stackman (2015). Also Fattore et al. (2018) explores the link between psychedelics and reconsolidation.

[53] For example, Frood (2012); Krebs and Johansen (2012); Johnson et al. (2014).

[54] It is not known whether or to what extent the "classic" psychedelics (see note 51, above) are "ideal".

[55] "Without this mismatch, the memory would not destabilize, and retrieval would not set the stage for reconsolidation, thus preventing propranolol from playing its role of reconsolidation impairment." (Pigeon et al. 2022, p. E120).

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