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How To Help People Float

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Abstract

This manuscript examines how to help more people learn to float because this skill is taking a much more central role in the latest drowning prevention advice in the UK. In 2017 BBC Radio Two show presenter, Simon Mayo, declared that he 'could not float.' Many persons in the UK identified with this claim. Despite having been an activity in many traditional swimming lessons floating is not a straight-forward skill for all to master. It requires a high degree of personal trust to have developed in the water. I discuss what learning to float fundamentally entails based on recent publications from the neuroscience of emotion and insights from my experience in the water with learners of all ages. I explore why very buoyant individuals can find floating as hard to perform as those who feel like sinkers. I suggest a few simple and reliable ways to gain deeper personal insight into how to help persons learn to float. In my view flotation is primarily based upon an internal state of emotional coherence in the water itself. Achieving this emotional state requires learners to explore calm 'stationary' being of existence in the water in pool settings.

Keywords: embodied flotation, drowning prevention, acceptance, emotional coherence, resilience, turning moment

Introduction

Learning how to float sustainably in water lays at the heart of aquatic survival and the prevention of drowning. Unfortunately, too many swimming programs have not acknowledged this as a central human requirement for learning to swim. A lack of focus on floating fails to take advantage of our natural prowess at developing a key aquatic competence. There is widespread and fearful disbelief that humans have any aquatic affinity which diminishes how much responsibility aquatic novices are expected to shoulder for overseeing their own actions and at the same time generates frustration that learners cannot acquire fundamental skills fast enough. The result is superficial systems based upon forced robotic performance rather than watering internal seeds of adaptable aquatic competence (aquatic resilience).

Setting out to span this inadvertent gap in aquatic resilience by trying to empower anyone who finds themselves suddenly immersed in cold open water the Royal National Lifeboat Institution (RNLI) ran a "Float first, swim later" campaign in 2016-17. During the campaign people who called themselves 'swimmers but not floaters' openly expressed concern about being incapable of floating in warm pools. The campaign demonstrated that clothing and shoes help flotation but those who have never felt themselves to be held up by the water before are less likely to hear and then believe this reassuring news. It is therefore vital to help people discover what is firmly their birth-right, that is, how to float.

I believe that one of the reasons for a lack of more widespread proficiency in flotation skill among the population is due to the limited definition of what it means to float. Floating is much more than the iconic picture of someone breathing face up serenely on their back which so often leads people to decide they ‘cannot float.’ There are myriad forms and interconnected modes of flotation that lead up to this point and support its maintenance so when learners try to copy the end goal they do not realise how dynamic this skill is or how it was learned.

Floating also gets brushed aside in favour of pre-directed movements to engender a sense of safety which strongly implies it is never safe to stop and be still in the water. Frank Sachs (1923) lamented that floating needed “a far more intelligent consideration than has generally been bestowed upon it hitherto” and “floating power is the first necessity of a swimmer” (p. 17).

For floating to become accepted today as playing a central role in aquatics there needs to be firm scientific backing of embodied practical insight into how and why the skill develops. Human flotation requires physical-emotional entrainment with the aquatic environment itself rather than intellectual exchange with other human beings so it will always feel verbally semi-inexplicable to us. Science finds, champions, and refreshes applicable knowledge to overcome such inbuilt barriers. Now we can explore a new understanding of floating by unravelling the key perspectives of the human body.

Floating from the Body’s Perspective

The human body usually floats in the top metre of the water column but not always at the surface. Due to variations in body shape and composition everyone has their own unique flotation signature. For us to learn how to take advantage of our own personal buoyancy, no matter how little it is, we need to be able to experiment with stopping moving in a calm state long enough to accept and embody the experience without any distraction. This allows us to discover, accept, and exploit how much natural support the water provides us and therefore how little energy we need to expend to rest comfortably at or near the surface and control breathing. If we do sink easily then it is even more crucial that we spend time in a calm state underwater without a distracting fight to reach air because we will need to be able to detect and strategize with subtler forces to help us.

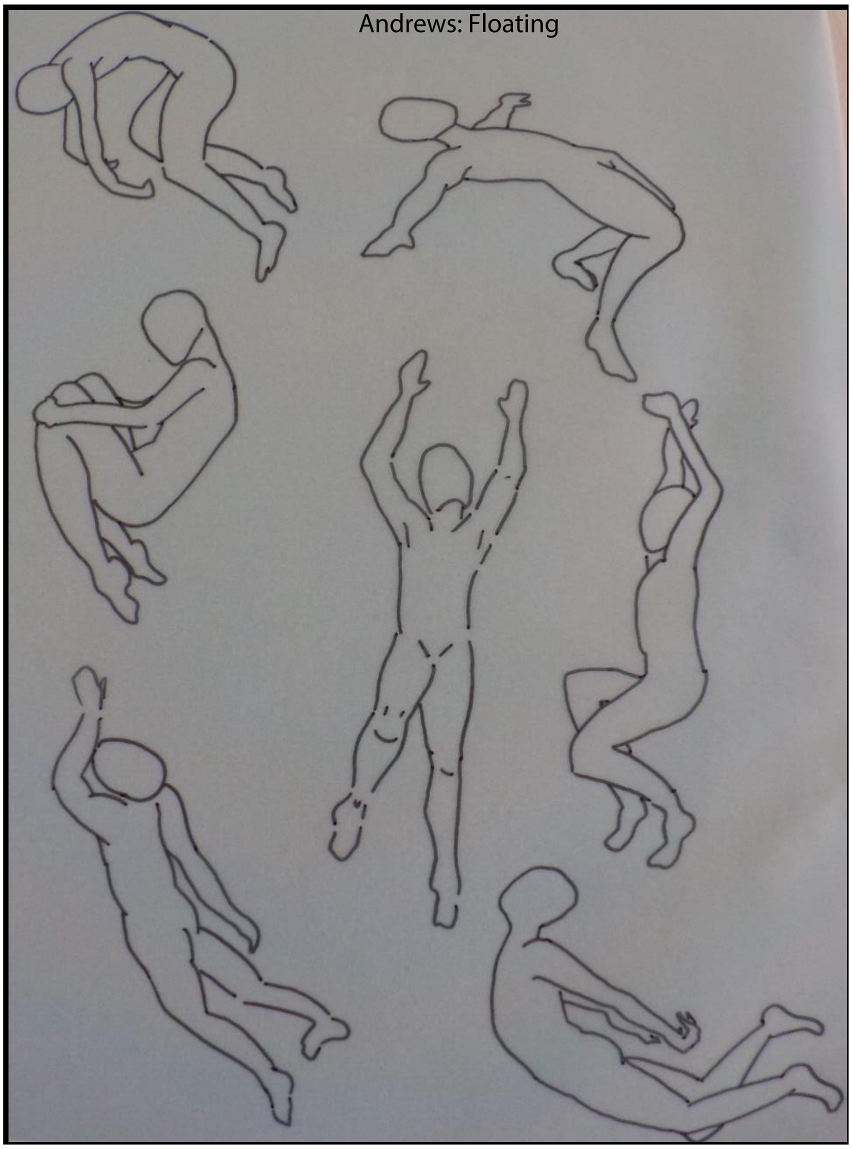

Figure 1. Floating positions (sketches by Scarlett Andrews)

Figure 1 shows sketches of what an accomplished 17-year-old floater felt were examples of calm stationary floats. They were drawn purely from memory without reference to images of other people floating. Only one of the examples shows a figure resting on the back at the surface. The person is still able to obtain air at the surface with minimal movement effort for each of these floating positions. Floating to this individual was illustrated in the sketches as feeling safe enough underwater to be able to disregard the effort required to reach for air. Limb patterns were not critical and were subconsciously led in free responses to the body's turning points.

Individuals still learning how to float in water often draw inaccurate images of themselves particularly when recalling body positions in relation to any surfaces because their memories contain preconceived notions, emotional incoherency, or are still under active construction (Dash, 2006). Embodied memories by contrast are intrinsically workable, having been constructed with sufficient sensory transduction from the environment to allow novel scenarios to be generated with increasing reliability. They form the core of aquatic resilience.

Figure 2 shows Isabel Quadrado at Oxford Brookes University producing her charcoal art installation inspired by the way our internal limits define how we encounter physical space. This resonated with me watching people gradually explore the range of movement that is available to them before and after they have accepted that water supports them near the surface and inside itself. Isabel quotes Einstein “Once we accept our limits, we go beyond them” This is clearly highly pertinent in the pool.

“SPACE”

Art by Isabel Quadrado

Oxford Brookes University 2018

ENCOUNTERING SPACE IS
ONE OF THE MOST ESSENTIAL EXPERIENCES

Figure 2. Image of “SPACE” art installation by Isabel Quadrado (2018) Fore: Nostalgia, Dharma, Liberty & Space, 1st MFA Fine Art Degree Show 2018, Oxford Brookes University, Reproduced with kind permission.

The young academic fields of the neuroscience of emotion and bio-robotics alongside neurophysiology and evolutionary psychology have discovered that we learn through autotelic trial and error about the physical world within our brain-body system rather than holding everything required inside specific parts of the brain in our head (Adolphs & Anderson, 2018; Barrett, 2017; Damasio, 2018; Sale 2016; Martius, 2012; Dunbar & Barrett, 2007; Kenrick, Griskevicius, Neuberg, & Schaller, 2010). This means that an absence of natural autotelic learning in water will prevent key aquatic memories from being embodied and stunt our resilience but the full implications of this still need to reach our learner pools. Evidence for this stunting effect can be seen in many adult learners who struggle to learn how to produce an effective flutter kick because they did not play with spontaneous movement in water as a child.

It is important to note at this point that encouraging someone to kick before they have experienced calm uplift of their body by the water whether they are a baby, child or adult can seriously hinder their acceptance of learning to float (Fonfé, 2014) Fast kicking sets a negative tone for their first experiences of being in water. The high prevalence of carers saying 'kick, kick, kick' to novice learners regardless of their age, or stage and whether they are safely supported or not reinforces this tone, engendering a fear of stopping still in the environment.

The caring but competitive side of human nature has led to the widespread uptake of this staccato phrase out of context and turned it into a damaging mantra. First attempts at kicking do emerge organically when individuals are physiologically ready. The labelling of kicking actions can aid understanding later when individuals are playing with movement for fun rather than for survival.

Identifying the Body's Underlying Demand for Stability

We humans, like all living creatures, are continually making subconscious homeostatic calculations from a cellular level in order to maintain a stable internal environment for our organismal survival. (Damasio, 2018; Kenrick et al., 2010; Lane, 2005; 2015; Oakes, 2012). These subconscious homeostatic calculations form the dynamic basis of heuristic decisions that we make (Damasio, 2018; Kahneman, 2011) and determine how we generate our experiences of time (Rovelli, 2018; Tso, Simon, Greenlowe, Puri, Mieda & Herzog 2017; Tomassini, 2018). When our faces are immersed in cooler-than-core-body-temperature-water our brain-body system has evolved to determine via sensory chemoreceptors that it must switch to more stringent rules for oxygen usage and energy expenditure (Lindholm & Lundgren, 2009; Speck & Bruce, 1978) sharply re-evaluating budgetary timescales and 'feeling' the degree of appropriateness (the likely safety) of our current emotional state. Forced floating practices by well-meaning individuals can be damaging (Freedman 2017) because they ignore how human proprioception forms (Tarakci, 2016; Naranjo, Cleworth, Allum & Carpenter, 2015; Sabbah, Gemmer, Bhatia, Manoff, Castro, Siegel, Jeffery & Berson, 2017). Without proprioception the body lacks the necessary kinaesthetic models used to balance, orient, and move.

Before novices even enter the pool hall, autonomic sensors can deliver subconscious warnings of potential dangers ahead, through sound, odours, or appearance of 'dirt.' With submergence in water the energy demand for homeostatic regulation increases through loss of heat conductance and increased resistance to movement (Corucci, Cheney, Giorgio-Serchi, Bongard, & Laschi, 2018; Childress, 1981). This cuts the amount of available energy left over for independent thoughts and self-directed actions and explains why immersion is often followed by an increase in appetite to replace the extra energy lost from an elevated rate of metabolism (Matsui, Ishikawa, Ito, Okamoto, Inoue, Lee, Fujikawa, Ichitani, Kawanaka & Soya 2012). When naïve in water the body wants to create a new working homeostatic baseline, an aquatic priming state of 'being safely at rest under stable aquatic conditions' upon which it can most accurately calculate how open we should be to doing aquatic skills. Numerous external and internal distractions prevent many learners from establishing this primal bottom line of hidden agency and going on to make use of its marshal.

Langendorfer and Bruya (1995) coined the phrase, aquatic readiness, to describe the development of natural human movement changes in water. In 2018 Damasio argued "feelings are the mental expressions of homeostasis" (p. 6). I have argued that we have ever-present access to sincere self-reflection from the metabolic 'voice' that lies at the centre of all aquatic readiness. As we grow from a pre-verbal to verbal state we can be actively encouraged to interrogate and respect its authority. If we allow other people to override or distract us from listening to this inner guardian before it is fully effective, having changed from negative shades of sensible fear to positive tones of wise respect, we give away our prize tool for learning how to float and make safe aquatic decisions alone.

Important Differences between Children and Adults Learning to Float

The human body-brain-system is made up of and takes advantage of myriad types of naturally occurring phenomena as a person grows sequentially from a foetus and develops new skills over their life time. Patterns of priming, pruning and reinforcing occur to suit our life needs in this distributed nervous system.

Adults who are keen to learn how to float can be easily assisted to overcome concerns about submerging their faces in a short time even if they were terrified but children can take many months to develop the willingness to try (Greene-Petersson, 2016). This means that adults can begin to learn how to float much more easily from under the water than from using buoyancy aids to stay at the surface.

Learning to float at the surface with the head out is impossible unless sitting and learning to swim with the head out is difficult, carrying with it the emotional vulnerability of what would happen if the head became submerged. The head is heavy and children who feel unable to submerge cannot learn how to float until they have steadily removed their own barriers to facial submergence. Children do this in their own good time in supportive atmospheres without any forcing being necessary. Children who learn to swim around at the surface first and the adults they may turn into also learn how to float only once they have accepted that their face / head needs to be in and supported by the water.

Children like to move but they also like changes of pace so floating is something that they can be inspired to experiment with unless they do not trust the water to hold them up. If lessons only facilitate a desire to move through the water, even if that travel is underwater, all learners will decide that it is dangerous to stop travelling and will not be able to build an accurate sense of their own personal flotation characteristics. There are many games that can be played with children and adults that gradually break down any mistaken belief that the water will not hold them up and that they can safely stop inside it (Andrews, 2012a; 2012b; 2013a; 2013b; 2014a; 2014b; 2016; 2017; 2018).

Figure 3. A snap shot of positive internal priming processes of an adult learner floater.

Figure 4. A snapshot of positive internal priming processes of a child learner floater.

The Negative Role of Competition and Enforced Excitement

Learning to float can be negatively impacted by a competitive atmosphere, but it emerges best from being at ease and relaxed. Humanity's fascination with all forms of elite technology and the outcome of pushing past feelings in the water leads many to expect and have a fight with water from the outset of their learning (Langendorfer, 2013; Stallman, 2014). Organisations focused on elite competition will always garner most of our collective resources and will continue to erode the interest of whole populations in learning floating skills until aquatic professionals recognise the problem and choose to inform learners directly about these negative effects.

The recent introduction by Swim England of mindful practices in UK swimming lessons, based upon positive research outcomes in primary school classrooms (Bethune, 2018), has been a huge step forward in swimming curricula because the multiplying power of internal attentional skills will finally be explored in mainstream settings. The devil is in the detail, of course: the emotional states of 'excitement' and 'mild anxiety' have been proven to be so effective as pupil 'stretching zones' (Ben-Shahar, 2008) on dry land in school classrooms; unfortunately, they are not optimal for anyone first learning to float in water or to build safe independent self-control inside it. This is because crucial wiring needs to form when the pupil is in a calm and introspective state.

The brain's fear control centre (i.e., amygdala) cannot tell the difference between excitement and anxiety because the same neural pathways are used and as already noted, the body is much more energetically conservative in water than it is on land. This means that being in a state of 'excitement' reduces sensory transduction for effective memory formation just as much as 'mild anxiety' does.

'Excitement' and 'mild anxiety' should therefore be reserved for those who are already competent at deep water flotation or limited to very short spells of self-directed experimentation if blocks to learning are to be avoided. This may not suit those who feel pressure to compel their pupils with a smile but the human body holds the rules in water and there is no need for learners to push themselves to progress. For learning how to float, the neuroplastic 'sweet spot' of arousal identified by Cozolino (2014) or the 'stretch zone' advocated by Ben-Shahar (2008) on dryland is instead being in a state of relaxed curiosity in the water.

Blocks to learning how to float in a normal pool.

Encountering Space, Feeling Exposed or Observed

As explained by Isabel Quadrado (2018) encountering space is one of the most essential experiences. For some aquatic learners there is a reflexive need to be in close proximity to solid surfaces which has been seen in experiments with flies and rodents (Adolphs & Anderson, 2018) and which is called thigmotaxis. Thigmotaxis and a heightened environmental sense of peri-personal space

(Taffou & Viaud-Delmon, 2014; Guterstam, Gentile & Ehrsson, 2013) can dominate individual's movements inside what their body considers to be the void of water. This compels them to feel strongly attached to the physical solidity of a reliable helper such as the floor, walls or a carer for support. Dash (2006) described typical patterns of this happening and the revealing example of where a learner could experience a greater 'weightlessness' in the deep end than the shallow end because their 'attachment to the floor' has become situationally irrelevant to their body.

Spatial triggers can also lead to sensations of anxiety about other people, too exposed when their helper is on poolside, too short when the water depth is causing too much uplift and too tall when they are learning how to stop floating in water that is not deep enough to stand up in without over-balancing or under-rotating.

Not being under control enough to stand even in very shallow water, due to a runaway sense of panic (i.e., internal distress), can kill. The only way to regain self-agency is to have the support of feeling safe with slow, calm, and comfortable experiences underwater in order to remove the emotional dysregulation and negative memories held in the body. Once the body has received sufficient positive feedback from the environment to make sense of where it is again, people can then begin to control their own actions. Being hurried stops this internal regulation from happening.

Enduring a Loud Metabolic Status

Over time everyone can learn to accept or appropriately respond to sensations of 'feeling cold,' 'feeling hungry,' feeling tired' (Oakes, 2012), or 'feeling too hot' caused by a real or perceived negative metabolic status. Novices can 'feel cold' in water that is 30^{o}C (86^{o} F) and warm up with competence. Learning with a loud (distracting) metabolic status whether it is being environmentally over-sensitive or not is tiring. People learning to float may look as though they are not using up much energy when they are, particularly in water below 28^{o}C (82^{o}F)

Feeling Invaded. Everyone can learn to accept the water invading their ears, eyes, nostrils, nose, sinuses, throat, and occasionally the lungs (before being ejected by a cough reflex). Also they can accept that waves can come from other people moving through the water but when some novices are first learning to float it can be very difficult for them to cope without the initial supportive aids of being in well-guarded, spacious, clean, clear, warm water, wearing comfortable swimwear, a nose clip, and some suitable goggles.

Feeling Assaulted and Triggering Reflexes. Other key triggers of uncomfortable distractions may be seeing signs of dirt, organisms, or experiencing smells, sounds, touch, pressure, and rolling which are readily amplified in water and transmitted through the body by ephapsis (secondary excitation) through unmyelinated neural tracks of the nervous system (Damasio, 2018; Shepherd, 2013; Allen, Frank, Schwarzkopf, Fardo, Winston, Hauser & Rees 2016; Coffield, Mayhew, Haviland-Jones & Walker-Andrews, 2014).

Mistake Making, Trauma, and Saying No to Trying. Fearful rigid atmospheres for isolated individuals lead to memorable distress and sometimes trauma (Mahler, 2017; Barrett, Gross, Christensen & Benvenuto, 2001; Van der Kolk, 2014; NAA, 2018). Traumatic events only generate intense fears similar to Post Traumatic Stress Disorder (PTSD) when the person affected has not been able to make complete sense of the event and resolve the meaning of their own negative response to it. This means that there is an opportunity for witnesses to help defuse the impact of trauma through honest, warm and empowering responses rather than with silence or judgments. Unresolved emotional dysregulation changes how the body responds in the face of challenges and can lead to future catastrophic losses of self-control in water. This means that trying to manage fear in water simply extends how long it will take to remove the fear later on. This is borne out by how much longer it takes for those who have doggedly tried to learn how to swim by pushing themselves out of their comfort zone for years rather than those who have been fearful on dry land for years but let their comfort zone expand naturally once in the water. This is because the body keeps a long tally of fearful events.

There is a persistent belief that some children refuse to do something apparently just because they enjoy holding power over their instructor. But everyone really wants to learn and succeed in water unless they feel hopeless. If they usually enjoy the water and then make a stand it is far safer to assume that they have found themselves lacking in readiness to try the activity in that form. Inadvertent pushing harms too and we should be pleased by push back against peer pressure. There are many ways to approach the learning of a skill in water.

Feeling Over-buoyant. Being able to safely stop floating frees people up to fully experience their flotation. Some learners who are very buoyant can feel unwilling to start floating because they do not know how to return to an upright position. This is because they are afraid of unknown outcomes or have previously struggled. Experiment 1 on Table 1 explores a sensation that they can feel. Feeling restricted by body fat when curling up to rotate beyond their central turning moment to move from the horizontal to a vertical position can frighten some who can get stuck at the tipping point. Others may feel rotationally unstable when they are vertical due to their centre of gravity and centre of buoyancy being so close together. Being unable to stand up from a float under control when perfectly buoyant is a common problem and can be tackled by removing the perception that floating is purely a surface water skill. Some people benefit from using the floor to sit on because it assuages thigmotaxis (Figure 3 & Figure 4) and lets them shuffle gradually deeper until they feel the spontaneous ride of gentle uplift to stand up by slowly following their face into the water to look down at their feet (Andrews 2018)

Learning to Float at the Surface. At the surface, reassuring forms of sensitive manual support that are gradually withdrawn at the pace of learners particularly with nervous adult learners and people with disabilities most reliably helps them start and stop floating under control, (Dash, 2006; Halliwick, 1949; Freedman, 2005; Fonfé, 2014). Patient, accepting and appropriate physical and moral support while a learner calmly experiments with the whole process of floating from beginning to end is what generates the most powerful positive outcomes. This means that instructor prowess is governed by how safe (nurtured) the learner feels in the water. Knowledgeable manual support is crucial to many learners and the denial of this need in group settings leads to individuals remaining at risk. When trust has been lost via poor manual support or an accidental slip it can take a long time and many positive experiences to return to the learner’s body.

Feeling Like a Sinker. Calm novices who sink readily usually learn to stand easily in the water but may hold inaccurate expectations of what the water can do for them, trying to float horizontally at the surface in shallow water by holding their feet up instead of letting them go to discover what really happens. In deeper water they can abandon a float too soon, even before sinking begins so they need to spend lots of time doing safely supported calm experiments with lots of different floating shapes inside the water, holding different amounts of air in their lungs, in different depths of water without the pressure of needing to fight to get air. Nose clips can free people up to fully experiment. Minimal sculling or arms extended behind the head and knees bent back under the body may be needed for some to maintain a back float.

Curling the body or knees up can lift the torso towards the surface and the presence of the floor, ledges, steps, rails, sides or a reliable supporter can help people discover and use myriad strategies. When less buoyant individuals struggle to feel how to float really well on their back at the surface but are rotationally water confident they can play with turning their view of the world upside down such as described in Experiment 2 on Table 1. This experiment allows them to experience a curious phenomenon of automatic perceptual flipping and to feel the greatest amount of possible uplift when on their back. It can bring greater confidence via a new perspective on the dynamics of floating.

Also having sufficient horizontal space to be able to discover the effect of slight travel uplift by light sculling or rotating up and down in the water column can really enhance a low buoyancy individual’s command of flotation. If they rely too much on this movement then once the available space is reduced they can feel stressed about maintaining a stationary float on the spot unless they have also embodied lots of vertical elements of flotation strategy.

Breathing out while floating reduces buoyancy and hinders embodiment. Blowing into the water when learning to float on the front also prevents learning about existing underwater in complete stillness because holding a calm breath lays at the heart of this life-saving skill. Later on experimenting underwater for fun with relaxed smiling, humming, open mouth, nasal / mouth blowing, blipping out bubbles, singing, coughing and swallowing normalises underwater qualia.

Vertical Floating. Everyone can benefit in co-operative safety from learning how to float standing upright in deep water and learn how to bob for air before they ever need to learn how to tread water (Dash, 2006). Water is an environment that permits movement in three dimensions. Calm flotations are governed by our intimate knowledge of our personal turning moments more than any of our limb movements. When we have triggered our mammalian diving reflex our limbs are systemically treated by the body as peripheral and the complex nets of arteries and veins (retia) that act as counter-current exchangers for heat, ions and gases in our torso gain greater circulatory importance (Lindholm & Lundgren, 2009) When we are floating upright in the water our upper chest can feel constricted because the pressure of the water has forced more blood upwards from the feet. Learning how to remain upright is a powerful skill that requires fine subconscious adjustments that are made in response to see-saw tipping caused by the heavy weight of our head. When completely at rest in calm water in a straight vertical float where we are looking can lead us to tip or remain balanced.

The Revelatory Nature of the Flotation State with Coherent Breathing. Everyone able to learn to float has the potential to benefit from experimenting in co-operative safety with long rhythmic breathing on their back in deep water in order to inhale slowly when they first feel their feet drop so that it causes their feet to rise again (Experiment 3 Table 1). This represents one of the key latter stages in embodying personal flotation because it requires calm patience and trust to wait for sensorial evidence of the small dynamic changes involved.

Water is a medium of delayed responses to actions so any such slow calm experiments will reveal far more detailed and positive information than rushed or forceful movements in choppy water. There are many inter-connected stages to floating before this which entail underwater experimentation, shipping control, building emotional coherency, loosening of extremities and safely following the spontaneous desire (curiosity) to begin experimenting with all forms of movement (Safe Enjoyable Aquatic Play). Such learning can occur automatically by practicing stillness (Andrews, 2013b; Dash, 2006; Halliwick, 2010).

Coherent breathing is a powerful way of developing meditative self-control (Kirk, Downar & Montague, 2011; Goleman & Davidson, 2017) and experiencing balance between the sympathetic and parasympathetic branches of the nervous system (Khalsa, Feinstein, Li, Feusner, Adolphs & Hurlemann, 2016; Elliot & Edmonson, 2005; Yackle, Schwartz, Kam, Sorokin, Huguenard, Feldman, Luo & Krasnow, 2017). Bradycardia (when heart rate drops below 60bpm) marks the onset of the mammalian dive reflex giving us a head start at

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achieving this highly adaptive cardiopulmonary state, readying us for optimal learning from our environment and removing subconscious tension. Those learners breathlessly fighting their way across the pool won't be able to sense what their body is doing nor discern how the water is responding to it. Coherent breathing allows us to gain interoceptive wisdom about the state of our emotions from the substantial collections of neurons in our heart, gut and head (Soosalu & Oka, 2012).

Over time with the right support everyone can learn that negative feelings in safe conditions are simply due to a lack of positive priming in the human body and a heightened sense of alert leading to a lack of self-control rather than any genuine lack of personal potential in water. But it is crucial for learners to be open to the idea that their negative beliefs and feelings can change and if they learn how to reframe them from within they will be able to cope with novel and challenging experiences. Everyone still needs to heed embodied rotational balance and thigmotaxic warnings by only doing what their body feels will be comfortable when learning or they cannot hope to recalibrate their emotional state for safely encountering and turning in aquatic space with minimal effort. Supportive group atmospheres lead to far greater success when doing this.

The Need for Co-operative Safety

As social mammals, we are hard-wired with a nervous system to learn about the world through the entrainment interface of a social engagement system with trusted others (Porges, 2001; Hasson, 2016; Zadbood, Chen, Leong, Norman & Hasson, 2017). Traumatised, shy, autistic, and other socially vulnerable people can therefore find it hard to generate enough trust in the water, accept its all-surrounding properties, or the close early support required during mistake making phases. A teenager's metabolic status for example can be negatively affected by real or perceived exposure to judgements by observers over their personal agency, adequacy and relative nakedness (Jackson-Nakasawa, 2015; Ionescu 2014; Leonte, Dragulin, Pricop, Becea, Popescu & Netolitzchi, 2014; Fonfé, 2014). Perceptions of available time can completely determine the outcomes of flotation attempts and if anyone senses a need to 'achieve to please' they will feel a subconscious burden of pressure. This performance pressure from observers is totally counter-productive, no matter how short the lesson, because the aim is to develop a positive priming embodiment of the nervous system via the learner and the water responding to one another.

Esesarte Pesqueira and her colleagues (2016) have researched how reciprocal learning flows between caregiver, child, and the water in playful aquatic settings with no need for explicit instruction or narrow demonstrations of fixed movement patterns. Francoise Freedman (2002-17) has witnessed first-hand such paired autotelic progressions flowing from pregnancy to toddler-hood while immersed in the aquatic culture of a rainforest tribe and alongside scientists like Michel Odent (1982) and Jean Liedloff (1980) refers to the natural sequence of these innate behavioural partnerships as primal and on a continuum. Ulrika

Faerch (2018), Andrea Andrews (2012b, 2013a,), Torill Hindmarch (2012, 2016), William Vogel (2005) and others have written about similar forms of subconscious, spontaneous and strangely innate reciprocity happening between all ages and their aides (socially vulnerable or not). It is as though modern swimming instruction has lost contact with these powerful natural engagement mechanisms by refusing to credit them. It is ironic that science has now advanced to the point where we can finally see when subconscious human action cannot be surpassed by direct intellectual instruction.

T**he Therapeutic Value of Water.** It has long been known that there are many positive mood changing mechanisms that can be taken advantage of in and around water (Nichols 2014). For example, it is not uncommon for non-swimming adults who suffer from depression or anxiety to have an intuitive sense that learning to swim will have a much wider impact upon how well they live their life. The role of ephapsis which is the secondary excitation of nerve bundles in the human body may help to explain why. Myelinated neurons communicate rapidly along the length of their "insulated" nerve fibres (axons) sending electro-chemical pulses quickly across synapses to the dendrites of other neurons. Other unmyelinated smaller neurons respond along their length less rapidly to the ion-based electro-chemical action potentials (preparing neurons for excitation or inhibition) because their axons are smaller and not insulated.

In addition to this direct communication ephaptic coupling between neighbouring neurons allows waves of action potentials to be synchronised and propagated rapidly at a distance between two points in brain tissue via local ion exchange and electromagnetic fields (Ormandy 2018). The precise role and neurophysiology of this phenomena, like the causes of epilepsy is difficult to explore but because water is a rich, somatic playground for subconsciously experiencing patterns and light skin pressure (Novak, Scanlan, McCaul, MacDonald & Clarke, 2012; Fritsch & Lopez-Schier, 2014; Bittel, 2017) like a wearable personal assistant, transmitting waves of stimuli all over the body, perhaps we should not be surprised at its extra capacity to subtly soothe or terrify.

Uri Hasson (2016) also illustrated how the rhythm of sound waves create shared narrative that can lead to emotional entrainment among individuals (Becker & Cole, 2016). This has implications for fear transmission among water-wary authorities, carers, and instructors as well as positive entrainment by those who feel relaxed in water. Rhythm, synchrony, shape constancy, music, laughter, warmth and enjoyable collective experiences in water may elevate learning rates and therapeutic impact (Levitin, 2008; Bernardi, Porta & Sleight, 2006). Work by Kirste, Nicola, Kronenberg, Walker, Liu & Kempermann (2013) suggested our hippocampal neurons may also need quiet to grow and organise themselves into effective networks. Profoundly deaf learners live in their own separate silent social sphere (Furth, 1973) but often embody aquatic physical skills in group lessons very quickly, being free of the cacophony of auditory over-stimulation that can slow up everyone else's deeper engagement with aquatic environments.

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Figure 5 identifies 12 common issues which hamper attempts at floating. When all of these negative emotional priming points for floating are fully understood in scientific terms it becomes clear how vulnerable struggling individuals or naive swimmers can be and also how to help.

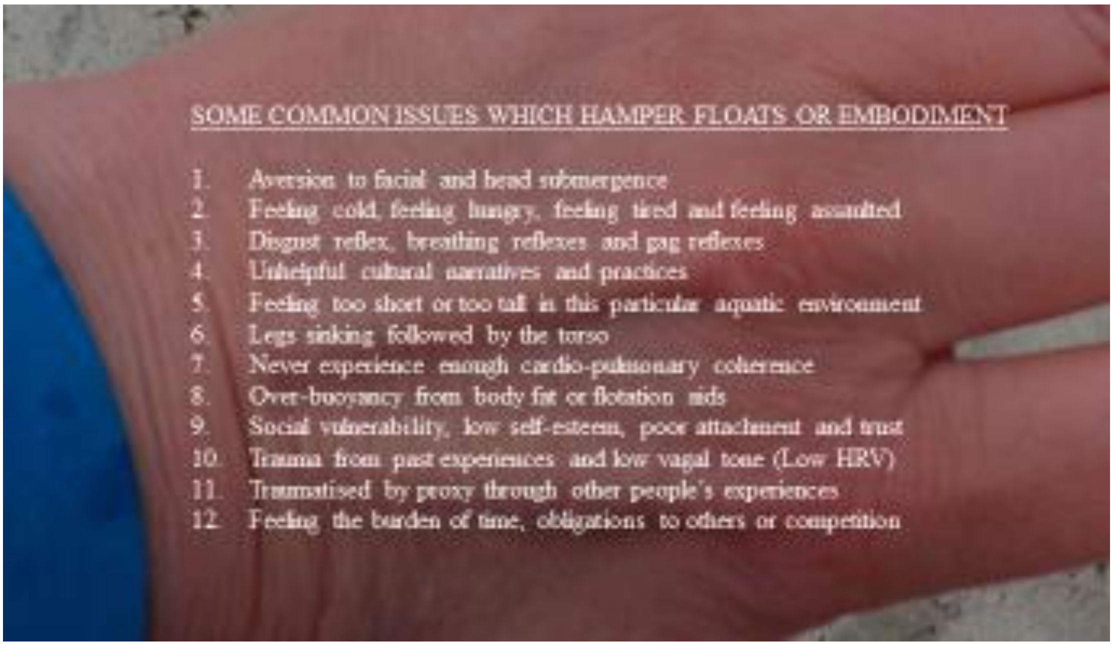

Figure 5. Some Common Issues Which Hamper Floats or Embodiment

FIGURE 6

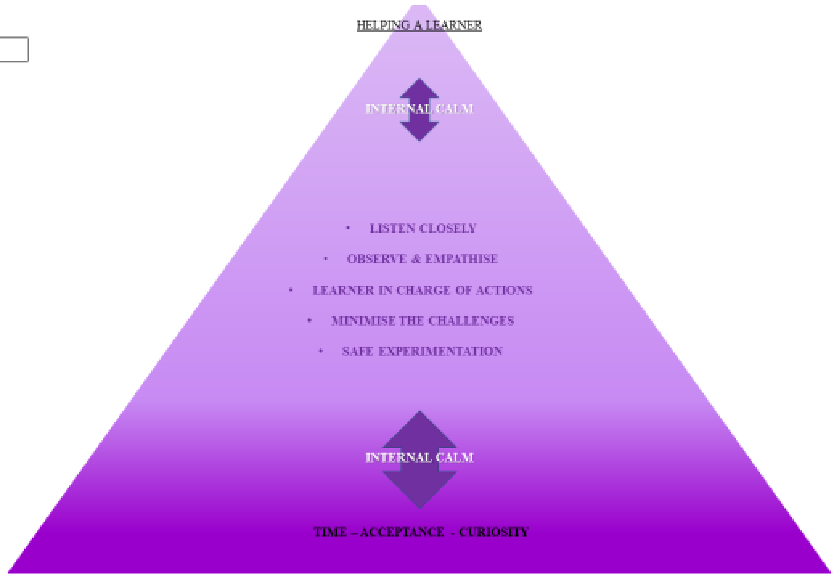

_**Figure 6.** Helping. How to Reveal a Newly Enabled Learner.

In order to help, it becomes very important to listen closely to what learners say, observe and empathise. As soon as learners feel in charge of their own actions they gain internal calm (Dash, 2006; Andrews, 2012a,b ; Faerch, 2018). Minimising the challenges they face by asking them to remain in their comfort zone and using your curiosity to expand your understanding of what may be affecting them will lead to successful learning.

Facilitating safe enjoyable aquatic experimentation with existing resources to help learners explore the slower facets of time, build self-acceptance and employ natural curiosity are key accelerators. Instructors who learn how the water works with their own body, explore experiment 4 on Table 1 and value how their learners feel about water will witness many more successful flotations.

Why it is Hard to Accept the Validity of Other People's Needs

The suite of internal adjustments that need to be made to learn to float are unique to each individual and their regulation cannot be shelved or rushed to suit others. We take different paths across the aquatic learning landscape and as illustrated below in Figure 7 this can make it difficult to 'see' what others perceive without choosing to use authentic curiosity, acceptance and time (elements of patience).

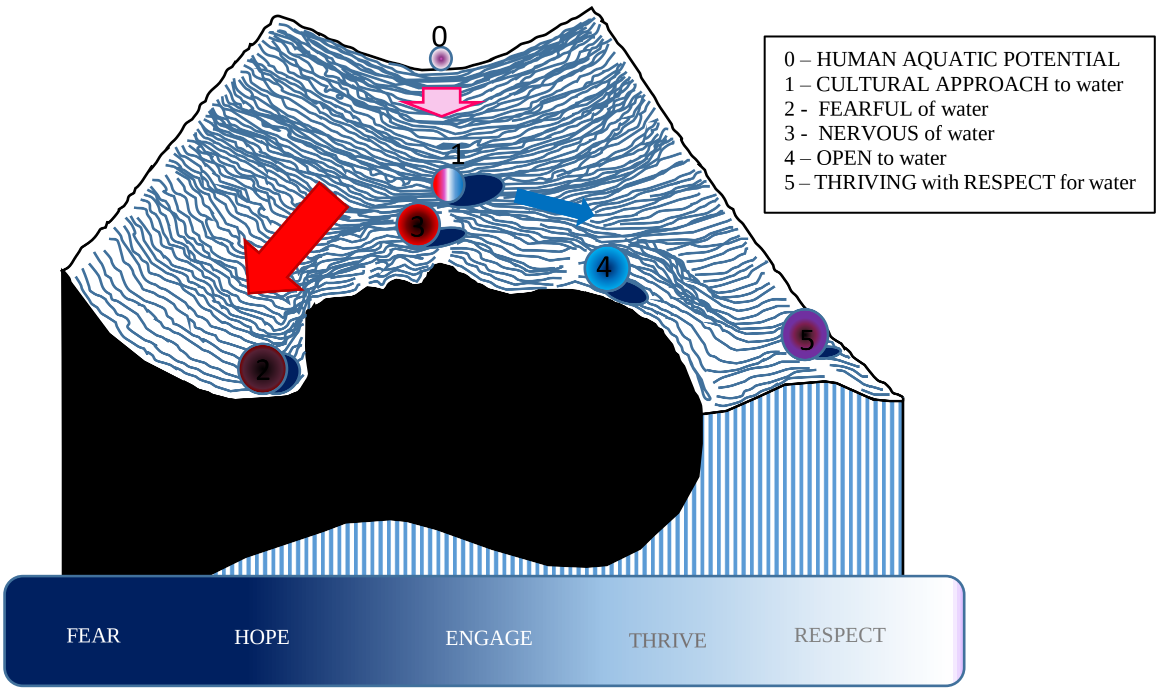

Figure 7. The Epi-Aquatic Landscape (A metaphorical model by Andrea Andrews based upon the Epigenetic Landscape of Waddington, 1940)

Experiment with Some Hard-Wired Sensations
In order to better empathise with learners who are struggling to learn to float instructors can reproduce some common confounding sensations by carrying out some simple experiential experiments in the pool from Table 1 below.

Table 1. How does it feel for some learners – Four safe experiments

(Only try them if you feel comfortable to do so)

<u>Experiment 1. Turtling – Moments of over-buoyancy and loss of embodiment it causes</u>.

(Learning how to stop turtling is a key vertical floating skill)

Lay on your back holding onto a lane rope and try to use it to increase your own buoyancy. This will result in your feet lifting up and your body wrapping around the rope so that you resemble an upturned turtle. Some persons can experience this 'over-buoyant' sensation when they are learning to recover their feet to a standing position from a back float. They start to rotate towards their natural tipping point and get stuck right at the crest of a turning moment. This is where they need to provide a little push of energy to overcome the inertia of a gravitational weight shift by using their arms or engaging their abdominal muscles and continuing to lean their head forward. Anticipatory fear of this 'stuck' sensation happening at the end of a float can stop some persons from feeling themselves floating. Practicing the skill without feeling any of the physical feedback in your body is pointless because it leaves no positive working memory of what will happen next time. It is possible to stand up from a float using gravity and minimal abdominal engagement with your unused arms resting by your side.

<u>Experiment 2. Turning the world upside down – playing with a proprioceptive master switch</u>.

(Some less buoyant persons can fully embody the sensation of a stable back float)

Lay on your back and pinch your nose shut so that you can lean right back and look at the underside of the water surface. After a while you may experience a complete flipping of your perception of which way is up particularly if you can see objects or persons moving in and out of the water surface. The suddenness of this perceptual flip suggests that it is being generated by the human body in a similar way to the false anticipatory sensation of catastrophically overbalancing forwards that can frighten persons who are learning to stand up from a front float. Nervous learners are vulnerable to generating these perceptual flips from very small movement stimuli resulting in a dramatic loss of balance and can rapidly develop a reluctance or inability to move expansively or with fluidity and they will avoid situations where there may be unpredictable changes in movement or pace.

Experiment 3. Breathing really is everything – learn how to breathe with coherence in a calm back float.

(Many say "I can swim but my breathing isn't right" until they have felt a sustainable float)

Anne was able to float calmly in the deep end on her back some days but not others. The reason for this was because she sometimes inadvertently held a tight chest from a stressful day with uneven or shallow breathing and gave up too soon by holding her breath when her legs began to sink down. As soon as she spent time slowing down her heart rate by breathing slowly and evenly she really noticed that her in-breath brought her legs up just as much as her out breaths led to her legs dropping down. This simple delayed response to our breathing and cardiac rhythm in the aquatic environment needs to be felt and embodied over time before persons are able to believe then trust that waiting for buoyancy changes is safe for them to do. Such crucial connections can only be made by coming to a calm stop. This is the basis of a coherent emotional state that provides room for persons to become adaptive and it is the core of a practical back float. Without it floating and swimming can feel emotionally exhausting, particularly in deep water.

Experiment 4. Playing with a light instructional touch to practice adding greater value – invisible support to enable autotelic learning.

(We must partner our pupils, it is their lesson)

Instructors can feel a pressure to demonstrate that they are adding value through immediate learner performance. Try to identify new occasions in your teaching sessions when learners will benefit most from not being interrupted or by being supported as invisibly as possible.

If you are not calmer than your pupils in deep water then you may inadvertently hinder them from learning how to embody a float.

Table 1. Four Pool Experiments to Understand Learner Experiences. (Sourced from unpublished notebooks of personal reflections on swimming teaching outcomes by Andrea Andrews 2005-2018)

Figures 8 & 9 are posters designed to help people visualise the differences between learning about water in their comfort zone and out of their comfort zone. They help people see why it is important to slow down when learning in water.

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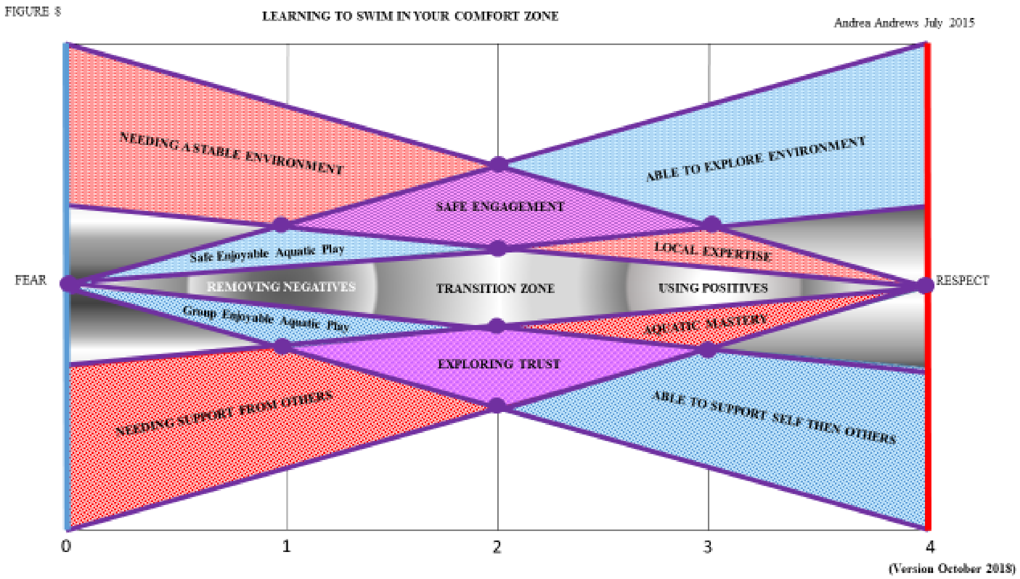

Figure 8. A Visualisation of Learning to Swim in Your Comfort Zone.

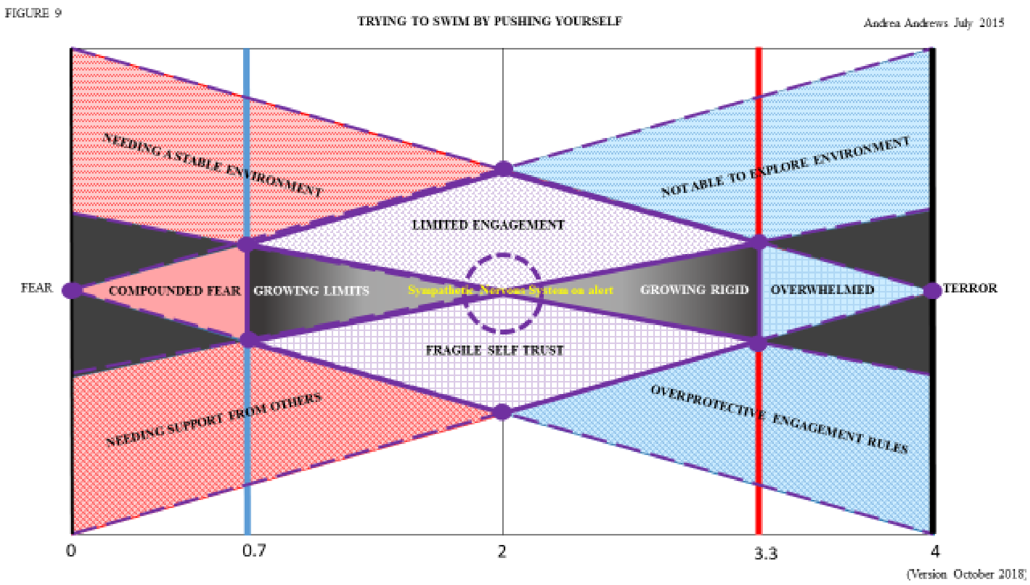

Figure 9. A Visualisation of Trying to Swim by Pushing Yourself

Conclusion

Floating is being able to sense what the water provides and calmly making up the deficit with low-energy strategies that we have embodied through patient coherence to own an intimate knowledge of our body's free turning moments. Flotation can and should be enjoyably explored as much underwater as it is at the surface if people are to succeed at lengthy self-support with resilience in times of duress and reach the point of coping in cold open water with a safe dynamic but relatively stationary surface float. The serious lack of both external and internal stillness opportunity in water for learners without unnecessary distraction in modern swimming lessons prevents them from learning how to float properly. Instructors can rectify this by embodying for themselves what happens underwater and assist learners as invisibly as possible to discover the power of being still in water.

All of the experiential research I have done shows that we have a habit of overlooking the ordinary needs that lead us to develop extraordinary adaptability in water because our logical thoughts first pass through an emotional filter (Davidson & Begley, 2012) shaped by our own pasts (Figure 7). We need to halt this negative cycle.

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