

Could more equal less when it comes to consciousness and pain?

November 20 2014, by Olivia Carter



Baby Joe (Joseph Christopher Wilson) at 1 day old did nothing but sleep, feed and cry. Author provided

Will we ever have a scientific measure of consciousness?

This was the essay topic I set my student a few months ago – only days before I went on maternity leave for the recent birth of my baby Joe (more on that later).

This is not an easy question to answer. The pursuit of such a measure remains a goal of many of the world's top scientists. Philosophers continue to debate whether such a measure is even theoretically possible. Meanwhile, ethicists and policy makers are busy considering how such a measure might inform decisions relating to animal welfare, abortion and end of life care.

The current debates generally focus around the question of whether consciousness is an "all-or-none" phenomenon or whether different degrees of consciousness can exist. In the case of the former, the goal is to find a single – measurable – sign that an individual is, or is not, conscious.

Conceptually, I think most people are comfortable with the idea that there may be a single point in time when consciousness is extinguished (either temporarily through anaesthesia or more permanently when we pass away). It is much harder, however, to imagine that a magical moment exists at which point consciousness emerges.

In an infant, is it the point at which the egg is fertilised? The moment the child leaves the womb, or some magical moment during the first few months of life? Similarly, in the case of animals it is hard to draw a line in the sand separating animals that do have conscious experience from those that don't. From a dog to a bird to a fish to a worm, there is no scientific consensus as to which organisms are conscious and which are not.

At the moment, the field appears to be moving towards a hybrid model in which it is possible to be more or less conscious (varying across a lifetime or between animal species) but that at some point the level becomes so minimal that it ceases to exist.

In such a model the ethical decisions relating to right to life and animal

welfare are not centred around identifying the point at which consciousness is so infinitesimally small that it no longer exists. Rather, the goal is to identify the point at which it is no longer sufficient to be considered worthy of the same status afforded to the healthy human adult. Indeed, it is already the case that many animals are considered to have brains that are too "simple" to generate painful [experiences](#) of sufficient consequence (if at all) to necessitate the use of anaesthesia during invasive scientific procedures involving these animals.

While philosophers and ethicists are left to consider what such a concept of "sufficiency" looks like, scientists are busy trying to find ways to measure this. The goal is to reliably quantify the degree/ level of consciousness within a person or animal. This is a ridiculously complex problem, to which there is currently no agreed solution (though as I have previously discussed some scientists believe they are getting closer).

Until recently, my thoughts were similarly focused on such scientific, philosophical and ethical issues associated with understanding how the brain generates a conscious experience. However, it was the recent birth of my son Joe that has caused me to take a fresh look at this question.

As mentioned above, I subscribe to the view shared by many others that there probably are different degrees of consciousness with infants having measurably less consciousness than an adult. The problem is that scientists typically consider this "amount" of consciousness on a single dimension. In this view the quality or intensity of the experience in question is generally expected to grow with increasing size and complexity of the brain. Accordingly, it is generally assumed that as healthy human adults we are both cursed and privileged to experience the greatest intensity of pleasure and pain. In comparison insects and fish are believed to either have considerably less (or possibly no) experience of pleasure or pain.

What if this view is wrong? What if the intensity of any given experience actually decreases as the number and complexity of possible sensations, thoughts and emotions increase. This would mean that the greatest intensity of experience could be maximal in the simplest brains.

If it is hard to imagine how this could be possible, then to illustrate the point consider consciousness to be equivalent to your favourite tropical fruit cocktail. As a brain develops, each new neural connection (driven either through biological hardwired processes or shaped through learning and experience) is equivalent to adding the juice of a different fruit. The variety and complexity of flavours will be greatest when the glass is full and contains juice from every fruit. In contrast, however, the strength and purity of the flavour will be at its highest levels with the initial drops of juice from the first fruit. The addition of each new variety of fruit juice will successively dilute the intensity of each of the individual flavours.

Could it be the same with conscious experiences? That the greater the variety or complexity of experiences that our brains are capable of supporting, the less intensely they are experienced? The answer to this question is that we simply don't know.

Returning to the recent birth of my son Joe, it is fair to say that during his first few days he did nothing but scream, feed and sleep. No doubt the complexity of his experience was far less than that of an adult. But it seems wrong to assume any feeling of pain was similarly reduced. In fact, if we consider crying as the most obvious behavioural sign of painful experience, it would be hard to argue that the intensity of a painful experience increases with human development.

My five-year-old daughter Susie recently asked me why her brother Max was allowed to cry more than her. It is true that we often get angry at her for crying if something does not go her way, while her brother is allowed

to howl with indignation if his cereal bowl is green instead of orange. I tried to explain that as a "big kid" you have to learn to control your emotions and that because Max is only two years old, it was harder for him to stop crying. I also pointed out that baby Joe cries all the time and we will never get angry at him because he is just a little baby.

Until recently I had assumed that the reason we adults cry less than babies is simply because we learn to control our behaviour. No doubt we do this, but we also learn other strategies to divert our attention away from pain or contextualise it as a necessary, or even desired pain. So could it be possible that our experience of pain is reducing as our brains increase in complexity?

As it stands, scientists are getting better at "decoding" brain activity such that we can now use brain imaging technologies to determine whether a person is listening to words, looking at faces or receiving a reward. In contrast, scientists are unable to determine whether this activity is resulting in a conscious experience – as apposed to being limited to unconscious processing of the words, faces or reward. At the moment scientists are directing the majority of their efforts to these interrelated goals of identifying whether a brain is experiencing something and, if so, what it is experiencing.

When it comes to informing ethical debates, however, it could be argued that the question of subjective intensity should be of equal importance. For any given person, we know that a loud noise or bright light will generate a stronger neural response (in the relevant brain region within an individual) than soft noise or dim light. But to my knowledge there is no previous or current research aimed at identifying a neural signature that codes the relative intensity of experience across individuals or species. Indeed, such a measure may never be found.

I should clarify that I am not trying to be alarmist, declaring that infants

and simple animals are likely to be experiencing the greatest levels of pain. I have no idea how much pain they experience. Indeed the main point is that this is currently something that nobody knows and it is therefore wrong to assume that it can be predicted based on other measures of brain complexity or size.

As the science of [consciousness](#) progresses, society will be faced by increasingly nuanced ethical considerations. Scientists need to go beyond asking whether *or not* a being is conscious. It is important that we also search for correlates of the content and intensity of that experience.

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