

NEW NERVE CELLS MAKE US WHO WE ARE

Jools and Lynda Topp, Gary and Alan Whetton. Twins. Their uncanny similarities fascinate us. Infant identical twins seem like cute little clones of one another. Genetically, that is exactly what they are. But if you have known twins, you may also know that as they get older they become less like one another – they develop their own individuality. So how do identical twins raised in identical environments become personally unique? A recent study asked just this question, but they used mice as their subjects, because genetically identical mice are much easier to come by than humans. The mice were fitted with microchips to track their movements and experiences, and were raised together in one big cage. During that time, their experiences were monitored. And so were their brains. But why?

For a long time we believed that the cells in our brains could never be replaced. This is unlike our skin, which makes new cells as a matter of course, or to repair a cut. This thinking changed in 1998 when it was found that the human brain is capable of making new nerve cells. But unlike new skin cells, new nerve cells are not made to replace old or injured ones. In fact, just what new nerve cells do has remained a mystery. New clues come from this recent study. The researchers hypothesized that maybe the new nerve cells were somehow related to experiences. More or more variety in our experiences might increase the number of new nerve cells, and new nerve cells could then change the brain's function to produce new behaviours. Researchers first looked at mice living in basic cages and compared those to mice living in cages with lots of things to explore. They found that the exploring mice had many more new nerve cells than the boring mice, which seems to support the theory.

But could differences in the numbers of new nerve cells also explain why identical twins who grow up in more or less the same environment nevertheless become unique individuals? In order for this to be true, the researchers would have to show that the production of new nerve cells was related to different individual experiences within the same environment. This is where the microchip tracking comes in. It showed that the pattern of activity – the experiences – of each mouse were unique even though they were genetically identical and living in the same cage. Much as twins growing up in the same household might play with different toys. And here's the kicker – the different experiences correlated with different numbers of new nerve cells. All up, this suggests that new nerve cells might be why living our lives makes us who we are.

REFERENCE: Freund J et al. (2013) "Emergence of individuality in genetically identical mice." *Science* 340: 757-759.