

### **Try It Yourself (page 52)**

We all experience conscious awareness, but the connections between this awareness and behaviour are complex. Consider the following examples:

- Do you breathe in or out when you hit a ball (for instance, in tennis, golf or baseball)?
- Have you ever walked or driven a familiar route and found that upon arrival at your destination you really didn't remember the trip? How would you explain your being able to get there without being aware en route?
- Have you ever accidentally cut yourself, but not felt pain until after you noticed the cut?
- When you get up from a chair and start to walk, do you start with your left foot or your right foot?

In all these cases, you seem to be performing behaviours which you are not consciously aware of. If we are not aware of such things, do you think that means that the mind is separate from the body? Why or why not? What is governing these behaviours? Which do you see as being your 'self', the part of you that is performing what seem to be automatic behaviours, or the part of you that is concentrating on other things while you perform these behaviours?

*Most of us perform behaviours that we are not consciously aware of. These behaviours tend to be ones that we have performed so often that we don't need to exert a lot of mental energy in their performance. This familiarity seems to be the key: since we know the actions so well, only part of our minds need to pay attention while the other parts of our minds are engaged in something that requires more attention. In some cases, it seems that our brains are only marginally involved. For example, an experienced driver hits the brake when a child darts into traffic before the brain actually registers "A child is running out in front of me." In a case such as this, the information activates the response in a reflexive manner; it's a body response more than a mind response. We still say "I hit the brake" implying that we can take credit for not running down the child. This, in turn, implies that we are identifying ourselves as both mind and body. Some people, however, do not identify themselves this way. In some cases, there are psychological disturbances which make people see their bodies as something foreign to themselves. In other cases, people may have physical problems that cannot be remedied, and they may identify themselves as apart from their bodies. What the 'mind' is and where it exists remain philosophical questions.*

### **Try It Yourself (page 59)**

Based on what we have discussed about the workings of the brain, consider the following science-fiction scenario: A mad scientist kidnaps you, and renders you unconscious. Then he takes your brain, and places it in a bowl that provides nutrients, and is connected to a computer to provide 'sensations'. When you awake, would you be able to tell your brain was no longer in your body? Why or why not? If the computer were providing all your 'sensations', would it matter to you that your physical body had been discarded? What would be the disadvantages of being a 'disconnected' brain? Can you think of any advantages?

*If a computer provided you with all your sensations, would that include the sensations of a body? In most cases in day-to-day life, we are aware of where our arms and legs are, what our fingers are doing, whether our heads ache, and so on. This is called kinaesthesia. If a computer provided us with these sensations, perhaps we would only know that we are immobilized and that we have a limited range of vision. Would it matter to us? Yes, to many of us, we might miss the abilities to explore and choose our own sensory experiences. Certainly yes if we knew we had to depend on someone else to make sure that we received nutrients and that the computer never crashed! But on the other hand, perhaps not. Perhaps it would be a relief not to have to worry about getting sick or hurt; perhaps we could experience love and sex without the concern about how our bodies looked or being rejected by another person. Weight gain and dieting might be relegated to the past. The advantages and disadvantages depend on what we value in life and how we identify ourselves.*

### **Try It Yourself (page 62)**

The notion of implanting electrodes has fascinated many people, including writers. (For example, Michael Crichton - himself trained as a doctor - wrote a science fiction novel entitled *The Terminal Man* in which a man with uncontrollable epilepsy was treated by the implantation of electrodes in the pleasure centre of his brain, with unexpected side effects.) The idea could also appeal in cases where there is no existing disorder: If technical and ethical constraints did not prevent it, would you be interested in having electrodes planted in a pleasure centre of your brain? What would you see as the advantages and disadvantages?

*On one hand, on a bad day in particular, it would certainly be nice to experience pleasure whenever we pressed a button to stimulate our pleasure centres. But on the other hand, we would always know that this was not a case of life giving us pleasure, but an electrical impulse. Does that matter? For some people, no. For some people, pleasure is its own reward, and they may indulge in a variety of artificial means to induce a 'high'. But for other people, pleasure is more valuable when it comes about through our own thoughts, the people we know and the events of life, and anything other than this seems intrinsically less valuable, perhaps even considered 'cheating'.*

*And by the way, in Michael Crichton's book, the Terminal Man's brain learned to have more epileptic seizures just so it could activate the electrodes and gain a shot of pleasure! Read Chapter 3, the Behaviourist Approach, to formulate some ideas as to how this could come about!*

### **Try It Yourself (page 65)**

A few years ago, researchers noted that when some people with temporal lobe epilepsy had a seizure, they also had what seemed to be a mystical or religious experience. The media quickly dubbed areas in the temporal lobe of the brain the 'God spot' and speculated that belief in a deity is a natural function of this area in the brain. More recently it has been demonstrated that mystical or religious experience is not correlated with any one localised spot, but is correlated with activity in several brain areas (Beauregard & Paquette 2006).

Researchers have sometimes tended to regard religious belief as 'simple' faith, but the reality is probably much more complex. Any belief system (whether belief in a deity, a political ideal, or a philosophical concept) involves many elements: knowledge and memory of concepts involved in the belief, understanding of the meaning of the concepts, the decision to accept certain concepts as truths, and application of the concepts to facets of the individual's life and of the world; it is reasonable to assume that there are also emotions that are associated with a faith or belief. Given this partial list of elements involved in religious belief, is it realistic to suppose that all aspects would reside in one small area of the brain?

Suppose for a moment that there is a 'God spot.' How would one account for atheism? What if a surgeon had to excise this area of the brain because an individual had a tumour there? Would the post-operative person now be an atheist? What about agnostics? Would their 'God spots' be considered to be malfunctioning?

*Given its complexity, it is no surprise that research suggests that religious belief involves the actions of several areas of the brain. If there were a single 'God spot', atheists might be regarded as having a major deficiency in that area of the brain. Alternatively, they might be regarded as having learned or chosen not to use that part of their brains. Similarly, the agnostic might be seen as having a somewhat less impaired 'God spot' than atheists and not being able to choose whether to use that part of the brain or not. A removal of the 'God spot', even to save an individual's life, would involve some serious ethical dilemmas. According to some belief systems, belief in a deity is necessary for admission to a blissful afterlife. Would the surgeon be tampering with the individual's chances at attaining heaven in removing the 'God spot'? Would this amount to a Faustian bargain, the exchange of one's soul for a longer life? But then again, removal of the 'God spot' would not remove memories of what one had been taught and what one had formerly believed. So perhaps the individual would continue with the habit of belief. Or perhaps he/she would be confused, trying to weigh what had been taught and believed with what one now felt. In this case, agnosticism might be the result.*

### **Try It Yourself (page 69)**

Clearly, chemical processes are vital to the regulation of the nervous system, yet we rarely think about our 'dopamine level' or how our neuropeptides are doing. But consider this everyday example: Caffeine is a chemical that many of us use regularly in tea, coffee, cola drinks and chocolate; we may even joke about not being able to get started in the morning without our caffeine jolt. And we're right in thinking that caffeine does increase our arousal: in moderation, it makes us more energetic, alert and attentive, as well as improving our mood. The basis for these effects is that caffeine increases the receptivity of dopamine receptors, which has been found to increase our arousal level (Lorist & Tops 2003). How would you explain the tension we feel when we ingest too much caffeine? And how would you expect your behaviour to change if you suddenly stopped using caffeine?

*The ingestion of too much caffeine would lead to over-arousal, a state in which we would be hyper-alert and active. This is part of a state of tension. If we suddenly stopped using caffeine, our behaviour would no longer be tense or even alert, and we might feel sluggish, lethargic and tired. These are, in fact, symptoms of caffeine withdrawal, along with headaches, problems in concentrating, and often, a grumpy mood. (Fortunately, these symptoms are not long-lasting!)*

**Try It Yourself (page 83)**

Are you left- or right-handed? Consider the types of skills that are associated with each hemisphere (e.g., language with the left hemisphere, musical ability with the right hemisphere). Do you see any relationship between your own dominant hemisphere and your relative abilities? (Remember, the preferred hand is associated with the opposite hemisphere.) Do you think that it's more likely for artists to be left-handed? Why or why not?

Consider further the popular idea that traditional schooling is primarily 'left hemisphere' with the right hemisphere virtually ignored. Do you think this is true? Does the right hemisphere learn little in school? Why or why not?

*It would seem reasonable that people whose right hemisphere is dominant (and are therefore left-handed) would be more creative since the right hemisphere is more closely associated with creativity than is the left hemisphere, and many notably creative artists such as Leonardo da Vinci and Michaelangelo are believed to have been left-handed. But in fact, there is no good evidence supporting this claim, and, as noted in the text for example, the left hemisphere is more active in professional musicians than the right hemisphere. So it seems that the answer to the roles of the two hemispheres is not a simple one. Research is ongoing to determine the relevant advantages and disadvantages to left and right hemispheric dominance. Because of the many connections between the left and right hemispheres (the corpus callosum being the major one), information to one hemisphere is transmitted to the other hemisphere almost instantaneously. That means that whatever the left hemisphere is taught in school, the right hemisphere also learns and vice versa. While it may be that formal education caters to verbal and mathematical skills centred mainly in the left hemisphere for most people, the role of the right hemisphere is important as well. Should schools also teach skills such as spatial, musical and arithmetical approximation that are located in the right hemisphere primarily? They already do! Whether such training should be increased is an individual judgement.*

**Try It Yourself (page 83)**

Does your dentist play music while he or she drills teeth? Why do you think this might be so? If being distracted can reduce our experience of pain, in what sense do you think pain is 'real'?

*Pain as a physiological response is real, but how much importance we put to it, what our expectations are of it, and how we cope with it are psychological responses. Distraction is often used to ameliorate pain, but it does so by changing our expectations and responses to it, not by decreasing the actual sensation. When we concentrate on music while undergoing a painful experience, we place less focus on the actual pain, and for many of us, this lessens the experience of pain.*

**Try It Yourself (page 90)**

Do you have any major stressors in your life? Illness? Money problems? Problems with family or at work? Other major life challenges? Even if you don't have a major source of stress, we all encounter stress in the form of "daily hassles" (Weiten & Lloyd 2003). Imagine your day starting like this: You oversleep and realize you will be late for class/work. You jump into the shower and find that there's no hot water. Toweling yourself off, you race to the refrigerator, pull out some milk and gulp it down, only to find that it's sour. You gather your clothes, and discover that you have no clean underwear. As you run out the door, you see your bus pulling away from the stop. And all this in less than an hour! What will the rest of the day bring? Stressors can take many forms, but daily hassles are perhaps the most common (as Buddhist doctrine states, 'life is suffering'!). What can you do to deal with these situations? Can you change them, or change your response? Meditation and relaxation techniques can reduce our stress response, and possibly change the way we perceive frustrating situations; regular exercise is also beneficial. Pursuing one of these options, or even seeing if there is a course in stress reduction available in your community, could provide major benefits in your life!

*Stress has become a major debilitating factor in our society, and information on coping with stress abounds. Yet we still have the problem. The reason for this is that people tend to read information about how to manage their stress, but they don't follow up on it! Stress management is similar to training for an athletic event: we need to train before the event so that when the event occurs, we are prepared to deal with it. As with athletic training, stress management training takes some effort, but the results can lead to an enriched life on a day-to-day basis, and perhaps even a saved life.*

**Try It Yourself (page 98)**

Our increasing understanding of genetics brings with it new dilemmas. For example, it is now possible to determine when an individual has the genes for a serious disorder, such as Huntington's disease (a fatal neurological disorder, which is due to a dominant gene, but is not expressed until the person is in their 40s). If you had the gene for Huntington's disease, would you want to know? Why or why not?

Once we understand how genes function, it will be tempting to try to *control* the process. Consider the implications of the movie *Gattaca*, which portrays a world where parents can select the genetic makeup of their children. Is such a scenario desirable? Would this ensure that a child would be exactly the person the parents desired? Would you want to be able to select the genetic makeup of your child? Would you want to *be* a child whose genetic makeup had been selected by your parents?

*Personal preferences dictate the answers to these questions. For some potential carriers of the Huntington's disease gene, knowing what will come is important so that they can prepare themselves and their affairs. For others, such knowledge would only decrease their enjoyment of life at the moment because of the distress at what is to come. Similarly, many parents find their greatest delight in raising a child to be the unexpectedness of what unfolds in that unique individual, and therefore, the possibility of 'designing' a child is not attractive. Other parents focus on wishing their children to have all the genetic advantages possible, and might therefore welcome the chance to specify what genes the child inherits. In any case, 'designing' a child to one's genetic preference is no guarantee of producing the child that one wants: such a design neglects the vital role of the environmental influences that play a large part in determining the child's personality, talents, and certainly behaviours. Chapter 3 will discuss this further.*

### **Try It Yourself (page 100)**

In the hectic modern world, we sometimes wish we could be in two places at once. This theme is explored in the movie *Multiplicity*, which focuses on a man who seeks to give himself some extra time by having himself cloned; not surprisingly, he runs into some difficulties. Suppose that scientists created a clone (genetic duplicate) of you. Would you expect them to be identical to you when grown? What does your response tell you about your own view of the nature/nurture issue? Given that even identical twins show some differences in both behavioural and physical characteristics, how would you feel about another individual who was identical to you in *every* respect?

*Even a clone of you will not be identical to you because that clone will not experience the same environmental influences that you have experienced and that played such a large part in determining who you are. Having a clone, then, would not really provide you with a replica of you. (For example, while it might be tempting to wish you had a clone to take a test for you, can you be sure that the clone studied as well as you would have?) For many people, the thought of an identical replica of themselves is not attractive since it would detract from their personal uniqueness and might make them feel that their own special identity has been diminished.*