Course C02

Introduction to Psychology

An Advanced Certificate in Companion Animal Psychology

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Course Sample

For Prospective Students

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Licensed Member

What is Psychology?

How many psychologists does it take to change a light bulb? Only one, but it has to *want* to change! Utter the word *psychologist* to most people and you see a glaze come over their eyes as they hold a mental picture of a mad, bearded professor locked away with his rats in some remote academic institution far removed from the hustle and bustle of real life. And given the sheer number of disciplines that today fall under the general heading of *psychology*, such as developmental, social, cultural, existential, physiological, cognitive, personality, psychometric, clinical, applied, industrial, evolutionary, psychiatry, structuralism, functionalism, behaviourism, humanism, biological, etc., perhaps this is hardly surprising! *Principles of Psychology*, written in 1890 by William James, was arguably the first great textbook on the subject where James describes psychology as the 'science of mental life'.

Today we have expanded this definition to the '**science of behaviour and mental processes'**. Behaviour is anything that an organism *does* that can be observed and measured, such as barking, sitting, blinking and laughing. What the organism *thinks* and how it *feels* as it behaves constitute the mental processes, and these cannot be observed or measured directly. These mental processes are necessarily private, personal and subjective, and account for our own unique interpretation of the world around us, as well as all our thoughts, beliefs, feelings and dreams. In a sense then, we are all *being psychologists* as we go about our daily lives observing then judging, interpreting and forming opinions on the behaviours of those around us, and even 'second-guessing' what *they* might be thinking and feeling. But this is not the scientific way.

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….. When I throw a ball into the air for my dog, she catches it and brings it back to me to throw again. This game is repeated by millions of owners and their dogs all over the world every day. And because it is so common and natural to us, it's easy to overlook the fact that within this tiny sequence of behaviour we can find nearly every psychological process at work that makes up the backbone of this course. Over the next few months I hope that you will discover that psychology offers us all an exciting Aladdin's cave of practical tools, information and insight. You will learn how to use these resources, not only to enrich your own life, but also the lives of the animals and people around you.

Unit 1: Learning

My Springer Spaniel, Maggie loves travelling in the car and her level of excitement can be measured on a scale of 0 to 10. From sitting quietly watching the scenery (0), on through excited panting (1 to 3), up into various intensities of squealing, leaping about and barking (4 to 8) and peaking at throwing herself around uncontrollably in an ecstatic frenzy (9 to 10). How she is when we first get into the car depends on what clothes I put on before leaving the house. If I put on my work clothes and shoes (which means no walk, straight to work), she's a 0 to 1. If I put on my work clothes, but wear my walking shoes (meaning short walk on the way to work), then she's a 3 to 4. However, when I put on my walking shoes and waterproofs (meaning long walk with lots of mud and water) she's a 5 before I've even started the engine.

Wearing / Route	Drive past T-junction	Turn into T-junction
Work clothes, work shoes	👍👍	👍👍👍👍👍
Work clothes, walking shoes	👍👍👍	👍👍👍👍👍👍👍
Waterproofs, walking shoes	👎	👍👍👍👍👍👍👍👍👍👍

Table 1. Maggie's level of excitement in relation to my combination of clothes

What she does next once we're on the road depends on what route I take *and* on what I'm wearing, as described earlier. I can either turn left at the T-junction into the road that I usually use to get to the South Downs for the walk, or I can drive straight on past the T-junction, which is the usual route to 'anywhere else'. Table 1 shows Maggie's level of excitement in relation to what combination of clothes I wear and the route I take.

These results should come as no surprise, except perhaps for the {*Waterproofs, walking shoes / Drive past T-junction*} combination, where instead of her level of excitement rising to correspond with what I'm wearing it actually *falls* to somewhere between deadly silence, where you could cut the atmosphere with a knife, and a half-hearted whimper!

Why should this be?

The answer is that I *never*, *Never*, ***NEVER*** drive past the T-junction wearing my waterproofs *and* walking shoes!

What is occurring here is a very important principle of learning called **negative punishment**. Don't be alarmed by the word 'punishment'. Negative punishment simply means '*to remove a reward that the individual is receiving at that moment, or anticipates receiving in the near future*'. It is an immensely useful and humane tool used by trainers and behaviourists to modify behaviour. In Maggie's case, her expectation of the walk had been unceremoniously removed because the combination of the predictors of 'walk' (clothes and route) no longer correlated with what had always happened in the past. And, of course these predictors of 'walk' demonstrate yet another very important mechanism of learning at work - **classical conditioning**.

Unit 2: Neuroanatomy

Anatomical terminology

One of the most difficult things to grasp for the aspiring anatomy student is the language. This is because, as a general rule (with lots of exceptions!), most anatomical terms are derived from Latin and most of the terms relating to diseases have their origins in ancient Greek. Hardly surprising when you realise that these languages were the mother tongues of most of the significant early anatomists. Another general rule is that anatomists both ancient and modern tend to name things according to what they look like, or where they are located in the body.

For example the term *dendrite* comes from the Greek *dendron*, which means 'branching figure or tree' (and it's also an exception to the 'Latin' or 'Greek' rule just stated above!). You should also know that anatomists are not the only people giving new names to body parts, the physiologists have been at it too. Physiologists are concerned with function, as opposed to structure which is the domain of the anatomists, and they tend to name things according to what they *do*. For example, the term *visual cortex* obviously relates to the part of the brain that decodes and processes visual information from the eyes. Now here's the fun part – anatomists had already named all the parts of the brain they could see long before anyone had any idea of how any of it worked. Physiologists have been gradually discovering *how* it works and adding new names to 'functional units' of brain that in many cases overlap several anatomical areas.

For example, the *basal ganglia* (derived from the Greek word meaning *knot*) is not a single structure in the anatomical sense, but a group of nuclei in different parts of the brain that are all functionally responsible for movement.

Don't get too bogged down with all this, but an understanding of how a brain part got it's name and why it may have more than one will help you get to grips with it all! To help you with this, when I introduce a new anatomical term, I'll also give the Latin [L] or Greek [G] derivative. For example:

> "The **Corpus Callosum** (corpus=body, callosum=hard [L]) is a large band of axons connecting the two cerebral hemispheres."

Anatomical directions

Anatomy is a highly descriptive science - it has to be - describing the 3 dimensional planes, positions and directions of objects in space. You are therefore inevitably going to come across the following directional terms.

Dorsal: toward or relatively near the top of the head, back of the neck, trunk or tail. On the limbs it means the upper or front surface below the wrist in the forelimb and below the hock in the hind limb. *Dorsum means back*.

Ventral: toward or relatively near the bottom of the head, front of the neck, trunk or tail. On the limbs it means the lower or back surface below the wrist in the forelimb and below the hock in the hind limb. *Ventrum means belly*.

Cranial: toward or relatively near the head. On the limbs it means the upper or front surface above the wrist in the forelimb and above the hock in the hind limb. *Cranium means head*…

Unit 3: Memory

Here are the stories of a couple of men and a bird:

> **He reads** a page of text in about 10 seconds and remembers everything he has ever read, recalling from memory specific details such as characters, what they said, what happened, and even the page where it happened, in some 9,600 books. Kim Peek is an autistic savant and was the inspiration behind the Oscar-winning film, Rain Man starring Dustin Hoffman.
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> **Clive Wearing** has one of the worst cases of memory loss, or amnesia in the world. He greets his wife joyously every time they meet, believing he has not seen her in years, even though she may have just left the room to get a cup of tea. Despite his type of amnesia, which gives him a memory span of about 7 seconds, Wearing, a musician, still knows how to play the piano and how to conduct a choir. Nonetheless, as soon as the music stops, Wearing forgets that he ever played. "It's like being dead . . . one long night with no thoughts, no dreams. There's no difference between day and night, I haven't been conscious in 20 years."
>
> **Memory is** important, but sometimes it can be essential, especially if an animal lives in a hostile climate. In the autumn in the Alpine forests there is a bird that will not survive the coming winter without a good memory. He's the nutcracker and he feeds on the seeds of pine cones that are abundant this time of year. He's an avian Einstein.

The study of human memory is about as old as experimental psychology itself and much of the memory research undertaken today involves humans and the use of linguistic materials. This is because for us, memory is very much a 'verbal thing' and just about everything we know and understand about the world around us we have learned, one way or another, through language. So, in this Unit we'll learn about memory from out own human perspective first, then we'll explore how this applies to other animals.

Ask a psychologist to define memory, and you'll get an answer along the lines of "*memory is the evidence that something previously learned has persisted over a period of time*". Reading Clive Wearing's story, we are what we remember; we are our memories! Memory allows us to instantaneously travel back in time by a single second or by a lifetime. We can remember how to drive a car, ride a bike, play tennis and work the remote control. We can also remember faces, places, textures, smells, sounds and routes, and by linking directly to our 'emotional systems', these memories can, in an instant, change how we **feel** – sad, happy, fearful, alert, sexy, tired, dirty, angry.

Storing information on a video tape or computer disk, where what we get back time after time is pretty much a facsimile of what we put there in the first place, is much more reliable than our own memories, which are far from perfect. One moment we can instantly recall in vivid detail an event that may have happened years before and yet, at the same time, be unable to remember the name of someone we were introduced to just a minute earlier. Our memories are 'tainted' as they are constructed by our past experiences and beliefs, so 2 individuals witnessing exactly the same event will each store their own version of it in a very personal way. Sometimes we even 'remember' things that never actually happened.

So, *where is* 'memory'? Unlike being able to point at the hard disk in your computer or at a video tape on the table and declare "*Ah, there it is!*", our memory is much more elusive. The most widely used model to describe how memory works is the **multi-store model** (also called the three-stage model or the three-box model) proposed by Richard Atkinson and Richard Shiffrin in 1968. According to this model, the 3 'stores' that together constitute 'memory' are distinguished from one another by 5 properties: …

Unit 4: Developmental Psychology

As you learned in Unit 2, the brain is made up of about 100 billion neurons all connected, or synapsed to each other to create one of the most complicated structures known to man in which there may be 1,000 trillion synapses! And these connections are anything but random and haphazard; in fact each one is incredibly precise. Many of these connections are made as the foetus develops in the womb, driven by the genetic programs of nature. However, many other synapses form only after birth and *must* be activated by external stimuli (vision, hearing, touch and so on) in order to develop and become fully functional. So, if the mature brain was a beautiful sculpture, it started life as a rough brick of clay and the hands of nurture moulded and sculptured it into a priceless masterpiece. And all this sculpting has a '*sell-by date'* – it *must* be complete within a relatively short timeframe of the animal's early life.

💻 In 1935 embryologist Hans Spemann won the Nobel Prize for his work on developing amphibian embryos. Spemann showed that when a section of early embryo was transplanted from one place to another it caused this tissue to take on the identity of the tissue over which it was implanted. He also found that this phenomenon only occurred if transplantation occurred within a well defined and narrow time frame of the embryo's early life, and once the transformation had occurred it could not subsequently be reversed by returning the tissue to its original location. The transplanted tissue had been irreversibly physically altered by the transplantation, and this could only occur during a **critical period** of the embryo's development.

💻 At around the same time zoologist Konrad Lorenz discovered a similar natural process in baby geese. When the goslings emerged from their eggs, they became socially attached to the first moving object they saw, following it around as though it was their mother. He called this **imprinting**, suggesting that the 'mother-image' was somehow etched permanently into the gosling's brains. And, like Spemann's embryos, imprinting would only happen within a specific time window – the first 2 days of life in the case of Lorenz's goslings, after which they would not imprint on anything and would likely perish as a result. Lorenz called this window the **critical period of social attachment**.

The work of Spemann and Lorenz stirred up enormous interest for developmental psychologists because of it's implications on early child development, and the search was on to better understand the mechanisms behind these 'critical periods'.

💻 in 1981 David Hubel and Torsten Wiesel received the Nobel Prize for their research on the development of the mammalian visual system.

Critical periods and sensitive periods

Actually, some of these periods are less critical than others, and it's useful to think of these ones as 'sensitive periods'. There is an important difference between a critical period and a sensitive period of development. For a specific stage of development: …

Unit 5(a): Sensation and Perception

Our brains live in an alien world of total darkness and silence. Bereft of sight, sound, smell, taste and touch. It feels no pain. There is no up, down or sideways, just complete nothingness…

Pause for a moment from what you're reading and look up – out the window, at the picture on the wall. Touch your face, sniff your hand. Somehow, all this sensory information gets from 'out there' to somewhere 'in here'. There are actually two distinct, but intimately linked processes going on here. **Sensation** is the process of gathering the physical energy of light, sound and so on, and transforming it into action potentials in neurons that convey it to the brain. **Perception** is the process of turning these signals into representations of the outside world in our minds.

Think about this – there is no way that any of us can ever know whether what we perceive in our minds is a true representation of what's really 'out there'. In the Wachowski brothers film '*The Matrix*', set sometime in the future, the principle character '*Neo*', played by Keanu Reeves, is rudely unplugged from the matrix and dumped back into the real world. Here, he discovers that Earth has long since perished and been turned into a sunless wasteland by an uprising of all the machines man created to help him. The human race has been destroyed, except for huge farms that grow millions of human foetuses that develop into adults, imprisoned in placenta-like life-support systems from which 'the machines' harvest the electricity they need to function. To keep the humans contented and quiet, their brains are plugged into '*the matrix*', a computer program created by 'the machines' to simulate the sensations and perceptions of a mundane, everyday life in 'the old world'. Beneath the action and the violence, the film explores the fascinating philosophical question of whether we'll ever be able to KNOW that the representation of the world we create in our minds is an accurate one. Indeed, how can we KNOW for sure that we're not all just plugged into some *matrix* that constructs *our world* for us?.

Unit 5(b): Communication & Language

To begin to comprehend language in other animals, a good place to start is an understanding of language in ourselves. Language is more than just talking, it's represented by sounds, symbols and gestures. It is the most tangible evidence that something is going on inside our heads. In fact '*accurate report*' is the standard tool used for obtaining the data in many psychology experiments. For example, putting someone into a state of hypnosis as we discussed in the section on pain above and asking: "*Now, how do you feel? On a scale of one to ten, where is your level of pain at this moment?*".

Unlike many other areas of psychology, such as learning, most of what we know about how language works has been discovered by studying humans, more specifically, humans with language deficits (*not* arising from deafness or paralysis of the vocal cords) called **aphasia**. There are several aspects of language that can fail on their own including speech, comprehension and naming objects. For example, aphasics might be able to speak, but lose the ability to read. Or perhaps read, but not speak. Read numbers, but not letters. They might be able to read, but not write, or vice versa. Or perhaps sing, but not speak. All this is a good indication that these abilities are handled by separate brain systems…

Unit 6: Intelligence, Consciousness and Emotions

Consciousness and emotions are bodily states that are prominent features of our daily lives and we all have an intuitive understanding of what they are. Yet they have proved difficult to objectively define and measure in scientific terms. The fact that consciousness and emotional *feelings* are subjective, and therefore elusive to scientific scrutiny, is the main reason why they have been largely rejected by behavioural psychologists as legitimate modalities for study, as we discussed in Unit 1, learning of this course.

In his book *Principles of Psychology* published in 1890, William James wrote that consciousness was as "awareness of oneself and the environment". James' definition remains the standard definition touted in many text books today and most people are comfortable with this explanation when they first come across it. On closer scrutiny, however there's a problem. We have to define what *awareness* and the *self* are. And it turns out that *awareness* is non other than consciousness, and the definition of the *self* is as elusive as that of consciousness!

As a first step to solving this puzzle, let's begin by teasing out what we know about some of the properties of consciousness and emotion.

- **Emotion**: An emotion consists of a **physiological state**, such as increased heart rate, sweating, dilated pupils and so on. It also has a conscious, **feeling state**, such as feeling fearful. The consequence of an emotion is generally some **behavioural response**, such as running away. The feeling also causes a change in the level of arousal, that affects how strongly the **memory** of the emotional event is laid down.
- **Consciousness**: Consciousness has different **levels**, such as awake, asleep, coma etc., where our degree of consciousness varies on a continuum from very conscious, through semi-conscious and on to unconscious. Consciousness also has **content**, what we are actually conscious of, such as being aware that we're frightened. Whether it's possible to be conscious without content is unknown, but it's conceivable in certain seizure or meditative states. Obviously, there's no content in unconsciousness, if there were it would be a state of consciousness. And of course, the content of consciousness is subject to the narrow focus of selective attention, as we discussed above.

Next, let's see what we can unravel about the concept of the *self*. In Unit 4, development, I described the stages of development in children. I stated that during the so-called *preoperational stage*, between 2 and 7 years old, children gradually develop the ability to see things from another's point of view, a **theory of mind**. They begin to appreciate that internal feelings akin to their own, such as 'sad', 'happy', 'angry' and so on, are experienced by others as well, and they begin to read this information from facial expressions – ''mum with a sad face means she feels sad'. In other words, they develop **empathy**.

Whether non-human animal possess a theory of mind is a matter of hot debate in scientific circles and ultimately unknowable because we can't ask them! fMRI studies in humans show that parts of the parietal and temporal lobes, the anterior cingulate and the insular cortex 'light up' when subjects are asked to think about themselves or others. Remember that we came across these latter structures in Unit 5, sensation and perception, when we discussed pain and its immediate emotional component. Again, in other species these experiments are unrepeatable because one cannot *ask* the animal to think specifically about anything!

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