Module: Psychological Foundations of Mental Health

Week 3
Introduction to emotion and emotional processing

Topic 2
Emotion processing: bottom-up effects of emotions on cognitive processes – Part 2 of 3

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Lecture transcript

Slide 2
We have already talked about how the presence of emotional, particularly threatening stimuli can disrupt our attention processing resources, so that we do worse at a concurrent task. But the presence of emotional stimuli can help in some circumstances to enhance learning too.

Parents often use rewards to motivate their children to learn. And at work, people are motivated to perform well by promotions and salary increases. Clearly, the use of rewards, an example of a positive motivational stimulus, can be effective, although note that this can be controversial too, given that there are suggestions that external rewards can dampen intrinsic motivation.

Slide 3
Experimentally, we can also see these effects of emotion on learning by using very simple associative learning tasks, where one cue is paired with another consistently across trials, so that the two become associated through the contingency.

Sui He and Humphreys developed an experiment where participants learned during the training phase to associate three types of shape, a triangle, square, and a circle, with a high, medium, or low monetary reward, respectively. Then, in a test phase, they completed a matching task, in which they were presented with shapes paired with either the same or different reward values that they had seen during the training phase.

In this test phase, they had to judge whether the shape value pairs matched what they had learned earlier. For correct match and non-matching judgements, participants gained extra rewards according to the value initially assigned to the shape.

What they found was that there was a beneficial learning effect for the high reward pairing compared to the medium reward and compared to the low reward. This suggests that by including a reward, learning was enhanced on the simple shape matching task.

Slide 4
What was really interesting about the set of experiments which this study was a part of was that in a variant of the task, where participants had to learn to associate the geometric shapes with the self, a friend, and a stranger, there was also a clear bias for the self-shape associations. That is, shapes that were paired with the self were much better learned than those for a friend and

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stranger, suggesting that self-associations can be as rewarding or at least salient than monetary rewards.

Slide 5
Another example by which the presence of emotional stimuli can affect learning is through the phenomenon called fear conditioning. During fear conditioning, the occurrence of an aversive or unpleasant stimulus can transfer some of the fear provoking effects to other neutral stimuli that are in the environment through association.

We came across fear conditioning earlier on in this module by the case of Little Albert. If you remember, Little Albert was recruited to a study conducted by John Watson, in which a loud noise was presented every time Little Albert encountered a small, furry creature, a mouse. Prior to the experiment, the investigators established that while the loud noise provoked crying in Little Albert, the mouse initially did not.

However, after being paired together, the mouse suddenly provoked crying and distress in Little Albert too. What had happened was that the mouse had become a conditioned threat stimulus, in the language of fear conditioning, having acquired the ability to provoke an unconditioned fear response similar to that of the loud noise, called an unconditioned stimulus. Thus, this little case study illustrates well how people can learn to fear particular objects by being paired with an emotional stimulus.

Slide 6
Fear conditioning has been demonstrated experimentally in the lab in many, many studies. Typically, these studies may pair a geometric shape, such as a small circle, with an electric shock, while a second geometric shape, such as a big circle, is never paired with a shock. As you can imagine, after the conditioning phase, during the test phase, even though the shapes appear without electric shock, people still show greater fear responses to the conditioned threat stimulus, in this example, the smaller of the two circles. So through association, individuals can learn to fear a previously neutral stimulus.

What is more is that individuals can generalise their fear. So sometimes, individuals show slightly elevated fear to the conditioned safe stimulus as well, in this example, the larger of the two circles. What happens if they are presented with intermediate sized circles such as these?

Slide 7
Lissac and colleagues investigated this and found a gradient of fear responses that could be related to the perceptual similarity of the shape to the original conditioned threat stimulus. In other words, there were continuous decreases in generalisation as the presented stimulus became less similar to the conditioned threat stimulus.

Coming back to the example of Little Albert, his fear to the mouse that was paired with the loud noise apparently generalised to all white, furry objects. Depending on many factors, including what the unconditioned stimulus was that generated the fear in the first place, the fear to the conditioned threat stimulus can be pretty resistant to change.

Normally, to reduce the fear in a process, called fear extinction, the individual has to experience the conditioned threat stimulus without the aversive unconditioned stimulus across many trials. And even then, there is a suggestion that the memory for the conditioned fear is not erased. It is simply inhibited. You will learn more about this process of fear extinction later on in the next topic.

Slide 8
As you may probably have guessed, fear conditioning is a nice model for how people acquire phobias, namely, that they experience an aversive incident and go on to fear cues that happen to have been present at the time and seemed to also predict the outcome. You can imagine this for people with water phobia. An accident in the bath can lead to fears of drowning, the unconditioned

stimulus, and therefore water, the now conditioned stimulus.

It is also plausible that this fear also generalises to other cues that were present, so for example, the bath tub and to other contexts involving water, so for example, swimming pools. This is an appealing account of many phobias. However, it is also quite a simplistic account. For one, not everyone who has a phobia can immediately recall a negative event that preceded it. Second, not everyone who has similar accidents in the bath subsequently develop phobias.

Slide 9
Addressing the first of these problems, Stanley Rachman proposed an expansion of the initial fear conditioning account of phobias to include other pathways by which individuals could acquire fear of neutral objects, without directly experiencing the aversive unconditioned stimulus and the conditioned threat stimulus themselves. These pathways involve vicarious and informational transmission of fears, which can occur in the absence of direct contact with the fear stimuli.

Slide 10
Vicarious learning, sometimes also referred to as observational learning or social referencing, is when people acquire fears by observing fearful responses to what was previously a neutral stimulus or situation in other people. One study illustrating this nicely showed that the offspring of rhesus monkeys were much more likely to acquire intense and persistent fear of snakes after watching their parents behave fearfully to a real model or even toy snake for a short period of time.

In humans, there are also strong suggestions that children model their levels of fear to novel stimuli based on their parents' responses. For example, in the famous visual cliff experiment, one-year-old infants only crawled across what looked like a drop in height, but was actually a piece of glass superimposed over patterns that resembled a change in depth cues, when the mother displayed facial expressions that were positive, such as joy, and much less likely to crawl across the piece of glass when the mother displayed fear or anger.

These data together with other studies suggest that many fears can be acquired through modelling their parents' responses. This can explain why many specific fears and phobias have an early age of onset.

Slide 11
Similarly, fears can be acquired through transmission of verbal information. Again illustrating this, a study allocated children aged between seven and nine to receive either negative or positive information about an unknown monster doll. Results showed that fear related beliefs about the monster doll changed significantly as a function of the emotional valence of verbal information.

Moreover, the authors demonstrated that fear beliefs only changed when the information was presented as a story, i.e. verbally, but not as a video. Also, fear beliefs only changed if information was presented by an adult, such as a teacher or an adult stranger, but not by a peer. This study has interesting implications for the transmission of fear from adults, such as parents, to children.

Slide 12
Another problem that we mentioned about using fear conditioning to explain phobias is that not everyone who has a nasty encounter, who is provided with negative information, or whose parents model fearful behaviour develops phobias. So somehow, the model of fear conditioning needs to take into account individual differences in how fear is acquired.

As mentioned earlier, fear conditioning, generalisation, and extinction, the capacity to reduce fear when the unconditioned stimulus no longer follows the conditioned stimulus, can be studied in the laboratory using simple experimental paradigms involving geometric shapes and electric shock. Using these paradigms and those with and without particular anxiety conditions shows that those with various anxiety conditions, including phobias, but also panic disorder, vary in the degree to

which they generalise fear to similar stimuli and contexts, and in how resistant they are to fear extinction.

In fact, a recent meta-analysis, pooling across studies to include 963 anxiety disorder patients and 1,222 control participants, showed that anxiety based differences were not in the initial acquisition of fear following fear conditioning, but much more in those later processes of generalisation and extinction. The suggestion is that disturbances in these processes maintain a state of fear that then affects avoidance behaviours. This is a vicious cycle, because the more individuals avoid the fear stimuli, the less natural extinction can occur, and so fear is maintained.

Slide 13
While associative learning mechanisms have been used to explain phobias, there are also convincing accounts of PTSD, Post-Traumatic Stress Disorder, where the cues present during a traumatic incident can provoke powerful sensory images through flashbacks that are like reliving the original trauma and instal extreme levels of fear and avoidance.

In contrast, individual differences in the ability to acquire positive associations with rewarding outcomes and neutral stimuli have been used to explain addictions, specifically drug addiction. Here, a neutral stimulus, for example, a cigarette, has acquired certain effective 'pleasant' qualities associated with the effects of an unconditioned stimulus, tobacco.