Module:
Psychological Foundations of Mental Health

Week 5
Psychological therapies: from behaviour modification to behaviour therapy

Topic 1
The first wave – behavioural psychotherapy – Part 3 of 3

Professor Richard Brown
Department of Psychology, King's College London

Lecture transcript

Slide 3
Having covered some of the basics of behavioural psychotherapy approaches, let's look at a couple of examples of their application. First, the treatment of dental fear or, in this case, fear of injections as part of dental treatment. Dental injection fear and fear of the dentist more generally is one of the most common fears.

A study of almost 2,000 Dutch adults, aged between 18 and 93 years, found that dental fear was the fourth most common fear, after fear of snakes, heights, and physical injury. Almost a quarter of Dutch adults reported dental fear.

A fear becomes a phobia when the fear has a more significant impact on the person and their life, such as avoiding the dentist and suffering poor dental health and even pain as a result. When considered at this level, dental phobia was the most common reported, with 3.7% meeting criteria for diagnosis.

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Here is a simple model. Dental fear, when present, can stop people attending the dentist for treatment. When they stop attending, dental problems can build up. Eventually, treatment becomes inevitable. Because of the need for more invasive treatment, the experience is more distressing, reinforcing the fear and making it even harder the next time. This is an example of a vicious cycle, which can maintain fear. It can develop into a major problem, adversely affecting the person's health.

The behavioural response to the fear, delayed visiting, is a form of avoidance. For some people, the avoidance takes the form of never visiting the dentist, rather than just delaying. Because of this problem, dental phobia and the fear of drilling and dental injections has long been a target of behaviourist approaches, such as systematic desensitisation, with dentists themselves trained to deliver the interventions to remove obstacles to treatment.

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Let's look briefly at a trial that used systematic desensitisation, along with other techniques, to reduce dental injection fear and improve the chance of successful dental treatment. This trial by

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Lisa Heaton and colleagues recruited people who were identified as having a significant fear of dental injections, leading to avoidance of required dental care.

Rather than seeing a psychologist, the intervention was delivered primarily via computer, an increasingly used technique that offers many potential economic and practical advantages. The programme followed a standardised, rather than individual, stimulus hierarchy, shown here. The stimuli were videos of a person going through various preliminary stages leading up to the moment before an actual injection.

As in the original methods of Wolpe, the research participants were first trained to relax and encouraged to use relaxation as they worked through the video. They could do this at their own pace over about a 30 minute period, recording their fear levels or distress as they did so at each step.

The computer only allowed them to move on if they reported their anxiety to be low enough. On-screen feedback was given, encouraging the person to move to the next step or to go back one, if they had moved too quickly through the hierarchy.

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The figure on the left shows what's called a consort diagram for the study. This is a standard way of reporting the flow of participants before the trial, as they were first screened, to make sure they met the criteria and after they'd been randomly allocated to receive the computerised treatment or a leaflet condition.

We see that over 250 people were initially screened and 84 eventually entered the trial. The rest either didn't meet the criteria for the trial or refused to take part. Participants were randomly allocated to receive either the active treatment or a simple leaflet condition containing information about the procedures of how to manage pain.

Most of the participants completed the treatment and were followed up to see what changes could be measured. Three different self-report measures of dental anxiety were used.

In the figure on the right, the white bars show what happened to the average response of those who were provided with the information leaflet, the control group. This showed a small but not significant reduction in dental fear on each of the measures. As expected, those who received the desensitisation treatment, shown by the black bars, showed a greater average reduction in self-reported fear.

Such self-report, however, is not the same as actual behaviour, in this case, reduction and avoidance. In this respect, the programme also did better. 34% of those who had had the programme went on to have a dental injection and treatment, compared to 17% of those who had had the leaflet. However, although encouraging, this difference was not statistically significant, due to the small sample size.

One point to note about this study was that the intervention was not purely behavioural. As well as the relaxation and graded exposure elements, the video also contained information on coping strategies to be used before and during the procedure. This means that the intervention is better considered as a combined behavioural and cognitive one.

This pragmatic approach is fairly typical of modern behavioural interventions. They continue with some of the tried and tested principles of behaviour therapy, but supplement them with additional non-behavioral features that add to the overall clinical value. We will come back to some of the cognitive approaches in the next topic.

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Here's one more example of a desensitisation approach from a single case study of a patient with cockroach phobia, carried out in Spain. The figure shows the change in the individual patient's ratings of fear and avoidance over the treatment period and after treatment had ended. The study was also an early attempt to explore potential use of mobile technology and virtual reality to treat phobias.

In this case, treatment involved the patient interacting with a mobile phone game involving animated cockroaches appearing on the phone screen. We see on the left the initial baseline fear of the patient to cockroaches, over the 14 days before treatment started. She then spent about one week playing the mobile game on a daily basis.

We see that her fear ratings dropped considerably, from 10 out of 10 at the start of the week to six by the end. Further improvement was noted after the second week. This was not only maintained when the patient was followed up later, but continued to improve over the coming year, until fear dropped to zero.

We also see in the graph below the ratings of avoidance tendency reported by the patient across the same period. We see a similar pattern of improvement, except this avoidance tendency was eliminated completely by the second session. This shows a common finding in many psychological treatments, namely that the rate of change of different outcome indicators can vary, sometimes called response desynchrony.

Another feature of this treatment involved the use of augmented reality between the first and the second week. This involved the patient viewing a live video of their hands, over which a virtual cockroach walked. The rating before and after this exposure session are shown highlighted with red circles. This produced an additional drop in fear across a single session and a considerable drop in avoidance.

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Before we end this topic, we are going to expand on something that we touched on in the examples Ann mentioned previously, namely avoidance behaviour. We will look at how avoidance learning was initially explained by behavioural theories, but then how increasingly, cognitive processes were required to match the evidence.

First, though, let's talk about a related behavioural concept, that of escape. In behavioural terms, escape is a response that distances us from an ongoing unpleasant or aversive event. When confronted with a dangerous situation, we typically experience fear and respond by taking ourselves from the danger as quickly as possible. This is a completely normal response and one shaped by evolution in all animals, many of which have their own species-specific reactions.

For early behaviourists, of course, the emotional experience would have been less important than the observable behavioural response. Whether animals experience fear as we do may be questioned, but they typically show the same physiological reactions and behave in a way that is consistent with fear.

Here's a simple example of escape, showing an escape response in ABC terms. The antecedent is the aversive stimulus, in this case, a snake that suddenly strikes out as we're walking through some long grass. The behaviour is running away. And the consequence is survival.

For humans, escaping from real danger, whether a flooded river or wild animals, has obvious survival value. However, survival is enhanced further if we learn how to avoid the danger in the first place, rather than escape whenever encountered. In this case, the behaviour, avoidance, can be seen as a response to a situation associated with danger, rather than actual danger.

For example, if we've learned that snakes are most likely to be found in long grass, then long grass can become the antecedent, in ABC terms. By avoiding the long grass, we continue to survive. We will never know whether there was a snake present, but this doesn't usually matter.

In behavioural terms, avoidance can be seen as either active or passive. If we find ourselves in long grass and leave straight away, this is active avoidance. We are doing something that prevents an aversive event that would happen if we did nothing. By leaving the grass, we avoid the encounter with a snake.

In contrast, in passive avoidance, we are avoiding the situation in which an encounter with a snake could happen. In other words, we see the long grass, and we do not enter it.

So while escape responses distance us from ongoing aversive events, avoidance, both active and passive, results in the omission of a future aversive event. Both escape and avoidance are central to our understanding of aspects of mental health.

Behaviour that reduces the risk of being bitten by a snake is obviously useful or adaptive if we live in a part of the world full of dangerous snakes lurking in the grass. However, it is less helpful in the UK and other parts of the world, where snakes and similar natural dangers are rare.

Here, avoidance of long grass will be seen as an example of maladaptive behaviour, in other words, a behaviour that, in avoiding a very unlikely future averse event, causes the person to adjust their actions and limit their opportunities. Maladaptive avoidance behaviour plays a central role in anxiety disorders, but also makes a contribution in other disorders, including depression

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How do we learn to avoid dangerous or potentially dangerous situations? Can we explain avoidance learning in simple classical or operant conditioning terms, in other words, by stimulus-stimulus association learning or processes based on reinforcement?

The first theories of avoidance learning were based on Pavlovian classical conditioning. In these explanations, we learn to associate a real aversive, unconditioned stimulus, the snake, in our previous example, with a previously neutral, unconditioned stimulus, grass. The unconditioned response is avoidance. By this pairing, the grass is thought to become an aversive Condition Stimulus or CS negative, leading to the conditioned response.

In a laboratory setting, a dog naturally lifts its leg if given a mild electric shock to its foot. The shock is the aversive unconditioned stimulus and the leg lift the unconditioned response. If a bell is paired with the shock, the bell can become an aversive, conditioned stimulus, and the leg lift becomes a conditioned response.

Although this is seen in practice, it is unclear whether the mechanisms are the same as other learning through classical conditioning. Critically, in conditioning a salivation response to a bell, the dog gets the food regardless of whether they respond. The outcome remains the same.

With a conditioned avoidance response, however, the exposure to the aversive outcome depends on whether or not the animal makes the defined response. This situation of response contingent outcomes seems to be more like an operant or instrumental conditioning, as we see here with a simple, three-part contingency. The antecedent is the bell. The response is the foot lift. And the outcome is no shock.

However, this poses the question, what is the reinforcer? For Watson and the early behaviourists, the reinforcer needed to be observable, just as much as the stimulus and the behaviour. In avoidance learning, however, the potential reinforcer is the omission of a pending aversive event, something that has not yet occurred.

This required a reconsideration of the nature of reinforcers in avoidance learning. While as humans, we can see the avoidance of future negative outcomes as reinforcing, a seeming ability to predict the future was not compatible with early behavioural models of the time. Some other, more acceptable intervening variable was required. The variable that was proposed was fear and led to what was termed two-process theory of avoidance learning.

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The two-process theory of avoidance learning is most closely attributed to the American psychologist Orval Mowrer and first published in 1947. While fear, as an internal and unobservable emotional state, was not assumed to be a necessary construct for early behaviourists, it provided a means to explain laboratory studies in animals and our human experience. It could be included in a behaviourist framework, if the emotional state was assumed to be a covert behaviour and a component of the total behavioural response, both observable and unobservable.

As the name of the model suggests, two-learning processes were proposed to explain avoidance learning. The first was a stage of Pavlovian stimulus-stimulus association, the pairing of neutral and aversive stimuli with an aversive outcome. In this way, the previously neutral stimulus acquired aversive properties. Through such pairings, a natural emotional response, fear, is also conditioned, not just a physical response.

In the second stage, operant processes take over to reinforce the behaviour. The reinforcer is reduction of fear itself, not by the non-delivery of the aversive outcome. Thus, an increase in avoidance behaviour to the antecedent, the conditioned fear stimulus, is negatively reinforced by the reduction in fear.

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This model was hugely influential, not just in terms of learning theory, but also how it impacted on behavioural approaches to treating anxiety. As with any good theory, it not only seemed to provide a satisfactory explanation for existing evidence, but also predicted novel findings.

Again, however, as with any theory, evidence accumulated that it found difficult to explain. We don't have time to go into these in detail, so we will just summarise them here. You will find more information, along with a fuller discussion of avoidance learning, in one of this week's key readings by Angelos Krypotos and colleagues.

In brief, here are a few of the most common criticisms. These do not say that the model is wrong and does not apply in some situations, only that it is not a full explanation, specifically, that the two processes are not always necessary to explain avoidance learning and the maintenance of avoidance behaviour.

The first criticism is that fear does not seem to be necessary for avoidance behaviour to continue, once established. If Pavlovian methods are used to decondition the fear response, the avoidance response does not necessarily stop as a result. For example, a dog that has learned to jump a barrier to avoid shock when they heard a buzzer will continue to jump, even after the shock apparatus is turned off.

Critically, the animal no longer shows a fear response to the previous aversive conditioned stimulus, either in terms of behaviour or physiological reaction. Despite this, it will still act to avoid what is now a seemingly neutral stimulus. In other words, avoidance responses can become habitual and no longer contingent on reinforcement for their maintenance.

A second criticism came from clinical studies based on applying the two-process model. The model suggested that desensitising fear by exposure would only be effective if terminating the aversive stimulus occurred when fear or distress had reduced to near zero. If exposure was terminated

early, while the person was still experiencing distress, the fear and urge to avoid would be reinforced.

In practise, however, research carried out here at the IoPPN by Jack Rachman and colleagues in the 1980s show that exposure was equally effective, regardless of whether it was terminated when distress levels were high or low.

Third, animals can learn to avoid a negative outcome even without an aversive stimulus. For example, when rats are given a shock at a fixed time interval, they learn to avoid the shock by moving into a different part of the cage. The absence of the conditioned stimulus makes the explanation of a first stage Pavlovian process problematic.

Similarly, in human avoidance behaviour, there is often no evidence of an initial conditioning stage. For life or death situations, the need to rely on Pavlovian processes for learning would seem to make little evolutionary sense. Even in non-life threatening situations, such as a fear of spiders or dogs, people can often not recall an early episode of ever being badly frightened, marking the start of a process of avoidance learning.

Other process are often suggested, such as observational learning, seeing someone else to be scared, or instructional learning, being told that dogs are scary and to avoid them. These are both examples of social learning that lies outside of the two-factor model.

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This brings us to the more cognitive explanations of avoidance behaviour, both in animals and humans. These focus on the role of information about the aversive stimulus or outcome, rather than the events themselves. Again, we will look at just a couple of examples here, with a fuller description available in your reading for the week, in the paper on avoidance learning.

The first piece of evidence comes from highly influential studies in the 1970s by two American psychologists, Robert Rescorla and Allan Wagner. They showed when a CS was inevitably followed by an aversive US, there was actually less learning, that is avoidance to the CS, than when there was an element of what they called surprise. In other words, the US sometimes occurred in the absence of the CS, and sometimes, the CS was not followed by the US.

This created an element of uncertainty or a prediction error in information about the probability of an aversive outcome. When there was no uncertainty, prediction error, there was reduced or no learning. It seems that such uncertainty is itself aversive. In human terms, people waiting for some possible bad news often report that the period of waiting and not knowing is worse than the eventual outcome, even if that outcome is a negative one.

While we might propose a range of explanations for this, research suggests that even rats prefer to know that something bad is going to happen, rather than wait without being sure. For example, in an experiment, rats were given a choice of staying in one of two compartments. In one, a light came on to signal a shock, from which it could not escape. In the second, the rat was shocked equally often, but without a warning. The rats chose to spend time in the box with the light.

The explanation comes from the informational value of the light or, more precisely, the informational value of the absence of the light. This absence of light could be considered a safety signal, reducing uncertainty and therefore fear.

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An extension of the idea of safety signals is that of safety behaviour, a concept that has become an influential one in understanding the maintenance of maladaptive avoidance or resistance to treatment using exposure therapy. Let's go back to our snake in the grass example. Sometimes, we can't avoid walking in the grass, even if we have been scared before.

In the same way, someone afraid of flying may have to do so occasionally. In such situations, it seems sensible to take measures that help us feel safe. Obviously, when we fly, there is almost no real uncertainty. The chance of the plane crashing is so small as to be almost immeasurable. Similarly, when we walk in a London park, we are unlikely to tread on a poisonous snake.

Nevertheless, mere probability is not enough to conquer fear. Remember, human beings are not rational. Because even a small chance of something happening is too much for some people, they will do things that seemingly reduce the uncertainty even more, with the aim of helping them feel safe. Walking through the grass, we may look carefully before we take every single step, so-called hypervigilance. We might make a noise to scare away the non-existent snake or carry a stick to beat it off in the very unlikely event that we see one.

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Let's look in a bit more detail at what is happening here. We are exposing ourselves to a situation that we find frightening, and, of course, nothing happens. The safety behaviour has, in our minds, reduced the uncertainty of the null accounts of an aversive event. The result is a temporary reduction in anxiety, but at a cost. We remain fearful and avoidant in the long term, relying on safety behaviours as a way to survive.

Many superstitious behaviours can also be considered safety behaviours. For example, we wear a lucky charm to stop us being struck by lightning. When another day goes by without being struck, our belief in the charm is strengthened. But it does not stop us being afraid of lightning.

We can become dependent on such behaviours. We come to associate them with relief from anxiety, and so they become reinforced. We learn that we are safe because of the safety behaviours. We learn that we are safe because of the safety behaviours, not because there is nothing to be afraid of in the first place. This is one mechanism that may maintain phobias.

In other cases, safety behaviours can themselves become problematic and ritualised. This is what happens in obsessive compulsive behaviours, such as repeated hand-washing or checking.

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So this brings us to the end of this week's first topic. Let's briefly summarise what we've covered. First, behavioural psychotherapy arose directly from the traditions of Pavlovian and operant conditioning and their later developments. In the US, operant methods developed with their emphasis on the three-stage contingency model and reinforcement, using methods of functional analysis and contingency management to manage challenging behaviour.

In the UK, Pavlovian principles were more influential, leading to the techniques of exposure hierarchies and systematic desensitisation. Extending earlier behavioural studies, the influence of observational social learning was recognised and incorporated into behaviorally based approaches.

We explored the nature of avoidance learning and its role in the maintenance of a learned maladaptive behavioural response to a threat. And finally, we've seen an evolution of behavioural therapies and methods to include cognition, such as outcome prediction and expectancy, in driving safety behaviour, cognitions that improve our theories but also guide the development of improved psychotherapeutic approaches.

This leads us into the development of cognitive therapy, the so-called second wave psychotherapies.