'New wave' analysis

Guest Editor BRYAN ROCHE *introduces a special feature on modern behaviour analysis.*

MODERN-day behaviour analysis is a far cry from the behaviourism popularised by John B. Watson earlier this century. Indeed, modern behaviour analysis even builds upon and extends the radical behaviourism of B.F. Skinner.

Recently, behaviour analysts worldwide have been breaking new ground in the application of behavioural concepts and theories to the empirical understanding of a diverse range of psychological phenomena. These phenomena have, until now, fallen outside the remit of behavioural psychology — for example, language, meaning, development, problem solving, art, mathematics, anxiety, social cognition, prejudice, spirituality, mysticism and self-awareness (see Barnes-Holmes *et al.*, this issue).

This special feature is intended to outline exciting new developments in behavioural psychology. These articles will not engage in the familiar old defence of behavioural psychology and its methods. Instead, they will look to the future in setting out the unique philosophy and methodology of modern-day behaviour-analytic psychology. They will also overview the more important conceptual and empirical advances that have spawned what has come to be known as the 'new wave' of behavioural psychology.

I should at this point, however, clarify the limits of what might be achieved here. In particular, the reader should beware of the question: Does this special feature provide anything of value to psychology?

Although reasonable, such a question presupposes some absolute goals of psychological analysis. It is likely, however, that the goals valued by the majority of readers of *The Psychologist* differ from those adopted by behavioural psychologists. For this reason, we should briefly consider the analytic goals of behavioural psychology and the view of psychological reality from which they arise.

Our view of the world

Every scientific discipline makes assumptions about the nature of reality and its subject matter. Such a view is often encapsulated in a 'root metaphor'. This represents the philosophical core of a discipline and, as such, is taken as axiomatic.

Behaviour analysis does not subscribe to the 'world-as-machine' root metaphor typical of the hard sciences and much of psychology (e.g. neuropsychology). Thus, behaviour analysts do not explain behaviour in terms of the workings of a mind-machine or representational systems. The concepts of encoding, storage and retrieval, for instance, are foreign to behavioural psychology because they are derived explicitly from the mind-as-machine metaphor.

Instead, behaviour analysts explain human activity in terms of the overall context in which it occurs. For instance, the three-term contingency sees action in terms of an antecedent to action, the action itself and the consequences of action.

Imagine, for example, a young girl in a supermarket who sees a sweet counter, throws a tantrum in demanding some sweets, and receives sweets from her parent. In this example, seeing the sweets is the antecedent, the tantrum is the action itself and the successful acquisition of the sweets is the consequence of the action.

The three terms of this contingency (antecedent–response–consequence) together form the analytic framework within which the behavioural psychologist operates (although there are varieties to this type of contingency; see Barnes-Holmes *et al.*, this issue).

In effect, context (i.e. antecedents and consequences) surrounds the psychological

events of interest to the behaviour analyst and provides the explanatory framework for the occurrence of action. The child throws tantrums in the supermarket because when she has done this on seeing sweets in the past, the parent has reinforced this action by delivering sweets.

Behaviour analysis, therefore, is best characterised by the world-view called 'contextualism', which has the 'act-in-context' as its root metaphor (Hayes & Brownstein, 1986).

The definition of context in behaviour analysis is extremely broad. Context can expand outward spatially to include all of the universe. Context can stretch backwards in time to incorporate the most distant antecedent (e.g. the phylogeny of the species) or forward in time to embrace the most delayed consequence for an individual (e.g. obtaining a pension).

The 'act' under analysis can be either private (e.g. mental arithmetic) or public (working out a mathematical problem in written form). It can vary from the smallest muscle twitch (e.g. an eye blink) to the most complex and extended behavioural sequence (e.g. following a degree course).

From a contextual point of view, psychological events do not occur in the mind-machine or any other static representational or storage system. Instead, psychological activity exists only as patterns of interactions (e.g. stimulus–response) stretched across space and time. Psychological events exist always in whole cloth, alive and in the present. The subject matter of behaviour analysis, therefore, is the *in vivo* and ever-changing act in context.

Contextualism as a world view also carries with it criteria of truth that differ from those of 'mechanism'. In the latter 'world-as-machine' view, truth is established on the basis of correspondences between statements and states of affairs in reality. In contrast, behaviour analysts operate according to a pragmatic truth criterion of whether behavioural statements work successfully in practice.

According to this view of truth, behavioural statements are true only so far as they move us closer to our pre-analytic goals of predicting and influencing (with sufficient scope and precision) the behaviour of individuals.

Consider, for instance, the behaviour of a child during tantrums. An applied behaviour analyst might begin by analysing the behavioural interactions between the child and its parents, peers and non-social environment, concluding that tantrums are maintained by profuse social attention that is delivered unwittingly by parents in reaction to each tantrum. Moreover, because the parents are exhausted from tending to the child, they rarely, if ever, provide attention when the child is behaving well.

This report of a simple reinforcement schedule may prove to be highly effective in identifying opportunities for behaviour change (i.e. increase social attention when the child is behaving well; decrease it during a tantrum). Nevertheless, the behaviour analyst will not be seduced by the idea that the tantrums were actually caused or maintained by social attention *in reality*.

Viewing the truth of the foregoing verbal formulation (the need to shift social attention) in terms of its effectiveness, rather than its accuracy as a description of reality, keeps the behaviour analyst focused firmly on the scientific goal of prediction and influence (in this case, to reduce the incidence of tantrums). Any reference to the discovery of absolute truths regarding behaviour would quickly sidetrack the behaviour analyst from the behaviour change agenda.

Thus, contextualistic behavioural analyses do not end with a discovery of any absolute 'truth', but with the production of verbal constructions that help us to achieve a particular goal or outcome (Hayes, 1993).

In this crucial way, the new wave of behavioural psychology differs radically from the mechanistic behaviourism popularised early this century by John B. Watson, Tolman, Hull and Guthrie. In effect, contextualism throws off the last vestiges of mechanism in behavioural science.

The problem with eclecticism

Can behaviour analysis contribute to other subdisciplines of psychology? The answer is — not directly. The various approaches to psychology differ in the very way in which they view the world, their subject matter and the goals of psychological analysis. For instance, narrative psychologists might take 'speech-acts' as their subject matter and seek 'shared understanding' as a research outcome. In contrast, behaviour analysts will view acts-in-context as the psychological events of interest and will value prediction of and influence over these events as their research goal.

Such fundamental differences make philosophical eclecticism impossible. Although eclecticism may sometimes be seductive at the level of methodology, it is always conceptually confused at the level of the root metaphor: the 'mind-as-machine' and 'act-in-context' metaphors do not mix.

Of course, research in one domain of psychology will raise important and fruitful questions within other areas of research. Nevertheless, the data generated by behavioural analyses cannot contribute *directly* to research in other fields.

Taking memory research as an example, the very terms in which such research is couched contravene the most fundamental tenets of a behavioural view of psychological reality. How could the concept of a memory-store, say, be 'contextualised' for the behaviour analyst without violating the concept's essential non-contextual nature?

In effect, behavioural analyses are necessarily conducted within the confines of a specialised philosophy and language.

Bearing the foregoing caveats in mind, the first article (Barnes-Holmes *et al.*) will outline the essence of the behaviour-analytic approach to psychology. The behaviour analyst's unique view of language and cognition is then laid out succinctly. Finally, Barnes-Holmes *et al.* review the basic tenets of relational frame theory as a powerful behaviour-analytic tool for analysing a whole host of language and cognitive phenomena.

The second article (Hayes & Toarmino) shows how intellectual developments in modern behaviour analysis have done the groundwork for new forms of psychotherapy based on the behavioural tradition. It further explains why clinical behaviour analysis shares many features with more experiential, humanistic or relationship-oriented approaches to therapy. The authors also briefly outline acceptance and commitment therapy as an exemplar of the clinical behavioural approach.

This special feature on the new wave of behavioural psychology comes at a very exciting time in the evolution of behaviour analysis. I believe that the conceptual and empirical advances outlined in the following articles will give behaviour analysis a major role in the study of human psychology in the new millennium.

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DERMO T BARNES -HOLMES , SIMON DYMOND , BRYAN ROCHE *and* IAN GREY *argue that behaviour-analytic research is moving from rats to humans and from simple to complex phenomena.*

BEHAVIOUR analysis constitutes a unique approach to the study of psychological events. To appreciate any form of behaviour-analytic research one must first understand its approach to science. Without doing so, the procedures, data and theoretical constructs of the discipline may appear somewhat opaque, abstruse or even irrelevant to the mainstream psychologist. The purpose of this article is to outline the behaviour-analytic approach and to show how it is currently being applied to the analysis of human language and cognition.

The basic approach

Behaviour analysts aim to predict and influence the interactions that occur between individuals and their environments. To achieve these goals, behavioural researchers start with systematic observations of individual–environment interactions. Placing a child in an open play area, and recording each activity at 10-second intervals, represents just one example.

After sufficient observation, patterns of activity will emerge. Thus it becomes possible to predict, for instance, how much time the child will devote to a particular activity, or what activity will likely follow another.

However, prediction alone is not enough. The behaviour analyst, even the basic researcher, is driven by the need to conduct analyses that can be used to treat behavioural problems in applied settings. So he or she must also seek to identify how the individual's interaction with the environment may be influenced or controlled by events that, at least in principle, can be *manipulated directly*.

For example, how will our child's pattern of activity change if particular consequences follow certain activities but not others, and what will happen if the child is deprived of access to a particular activity before entering the play area? So, for instance, what would happen if the child was allowed to play with a favourite toy for five minutes only after sitting quietly for two minutes? And what would happen if the child was stopped from playing with the toy for various periods of time before the experiment?

These are exactly the sorts of experimental analyses that behaviour analysts have conducted over the years. However, they have not simply listed the behavioural effects thus obtained. Over time, generally applicable ways of talking about these interactions and the variables that influenced them have become abstracted as 'behavioural principles'.

For example, when a particular consequence is delivered contingent on a particular activity, and that activity then increases as a result, this pattern of behavioural change constitutes the well-known principle of reinforcement.

Knowledge of this and other behavioural principles can easily be used in applied settings to treat behavioural problems (see Martin & Pear, 1988). So, one could treat an undesirable activity simply by reinforcing a second activity that is incompatible with the first. For example, to reduce self-injurious behaviour in a child (e.g. facial nipping), one might reinforce playing with a toy as a means of occupying the hands, also encouraging appropriate toy play.

As an aside, the need to develop behavioural principles that can be readily used in applied settings is one of the main reasons why behavioural researchers favour single-participant methodology. If basic researchers worked primarily with group designs and statistical methods of data analysis, the knowledge thus obtained would likely have less immediate relevance for the applied behaviour analyst seeking an effective intervention for the behavioural problem of an individual client (see Sidman, 1960). Furthermore, a number of behaviour analysts have started to develop principles and methodologies, derived from single-participant research, for analysing and influencing group behaviour (see Biglan, 1994).

The non-behaviour analyst might well ask at this point, 'How do you know if a particular principle is a true or good one?' To answer this question, we must again draw on the goals of prediction and influence. That is, a particular principle is considered good or true only if its use

helps both basic and applied researchers to predict and influence the behaviour of individual organisms, be they rats, pigeons, young children, undergraduates, or even the research activity of the behavioural scientist using that very same principle (Barnes & Roche, 1997*a*).

Behavioural principles are not an end in themselves, however. They are analytic tools developed to study complex human behaviour. When a basic or applied researcher conducts a functional analysis, he or she uses these tools with a single individual. Gradually, however, behavioural researchers may abstract a generally applicable way of talking about a range of behavioural interactions in terms of sets of behavioural principles that are interrelated. When this occurs, a behavioural theory has emerged.

An example of such a theory is relational frame theory (RFT), insofar as it attempts to explain certain key features of human language and cognition by drawing on a set of interrelated behavioural principles (see Hayes & Toarmino, this issue).

The relationship between behavioural principles and behavioural theories parallels the relationship between behavioural observations and behavioural principles. In both cases, the shift is from the specific to the general. Behaviour analysts thus aim to increase the scope of their analyses while also maintaining precision.

RFT, for example, attempts to encompass a wide range of language and cognitive phenomena with only a handful of interrelated principles. It also aims to increase the level of prediction and influence over these phenomena. As with behavioural principles, any theory constructed from them is true only insofar as it proves useful for prediction and influence.

Undoubtedly, behavioural theories are quite different from the types of theories one usually finds in non-behavioural psychology. Behavioural theories are not hypothetical or mediational, and they are not tested using the 'Popperian method' of predictive verification. A behavioural theory is used to shed light on the nature of psychological events; the events are not used to shed light on the theory (Hayes, 1996).

In short, behaviour analysis constitutes a theoretical approach to psychological inquiry that many non-behavioural psychologists would find unfamiliar (those readers who have some knowledge of grounded theory may find the inductive nature of behaviour analysis somewhat more familiar).

Creating a new research agenda

One of the common criticisms of behaviour analysis is that the basic principles it has identified, largely with rats and pigeons, cannot handle the richness and complexity of human language and cognition. We find ourselves partly in agreement with this criticism.

The traditional focus on non-humans was based on the idea that the principles of behaviour thus identified would be generally applicable to humans. This continuity assumption served its purpose well in the early days of behavioural psychology. Indeed, most of the techniques used in applied behaviour analysis are derived, in large part, from basic research with non-humans.

We believe, however, that we have come to the end of the road with the continuity assumption. We take the view that what is needed now is an extensive and coherent programme of basic research into human behaviour in its own right.

This does not mean that we will have to abandon our approach to psychology or even our basic principles. The richness and complexity of human language and cognition may yield to the basic principles identified with rats and pigeons; but only empirical research, not assumptions, will resolve this issue. This is precisely the view adopted by the new wave of behavioural psychology.

We will now outline some of the core issues that have arisen from this new behavioural research agenda.

Analysing language and cognition

Over the best part of the last three decades, an increasing number of behaviour analysts have been developing experimental procedures that generate complex and 'novel' human behaviour under laboratory conditions. This research has opened up exciting new vistas of research for the behavioural analysis of human language and cognition.

Many readers will be aware of the well-established behavioural principle of Pavlovian or respondent conditioning. A dog, for example, will become excited when it hears the sound of its owner's car engine, because on previous occasions hearing this sound has been followed by the actual arrival of the owner. The same dog may show fear, however, if the owner shouts in an angry tone, because such shouting has previously been followed by punishment.

Furthermore, we can train a dog to get excited when it hears a specific word, such as 'cookie', by consistently giving the dog some food after saying 'cookie'. In this way we can attach important psychological functions (e.g. the expectation of food) to

Dog takes the biscuit, or is it a cookie?

previously neutral events (e.g. saying 'cookie').

Something interesting happens when we reverse this order of events, however. Imagine that every time we feed a dog with a biscuit we say, 'cookie' just *after* he has finished eating. When we have done this several times, will the dog become excited (anticipating a meal) if we say 'cookie' without showing him a biscuit? The answer is no.

A large body of research has shown that animals do not readily learn about neutral events, such as words, that *follow* important ones such as food being given (see Hall, 1996). Animals can only easily learn about events that *predict* the onset of something that is psychologically important.

For verbally able humans it is a quite different story. Imagine, for instance, that we repeated the above experiment in the following way with a young child. Each time we give the child a cookie we say 'cookie' just after the child finishes eating. What would happen if one day we shouted 'cookie' when the child was in a nearby room?

Most likely, the child would come running to us expecting to get a cookie. In effect, the sound of the word would make the child think of cookies, even though the word 'cookie' had never predicted the delivery of an actual cookie.

This is entirely consistent with a large body of experimental evidence that has shown that humans, unlike animals, have a strong tendency to relate a neutral event to an important event, even though the former has always followed the latter.

Respondent conditioning, therefore, is often radically different for verbally able humans than for all other animals. When the word 'cookie' predicts the delivery of an actual cookie, both humans and non-humans can quickly learn to become excited. Only for the human, however, do the word 'cookie' and the actual cookie enter into a *bi-directional* stimulus relation wherein each can equally stand for the other.

For the 'new wave' behaviour analyst, this bi-directionality is deemed to be one of the most important defining features of human language and cognition.

Another important feature of human language and cognition, from the new wave perspective, involves the emergence of complex networks of related events. Imagine, for example, a young girl who eats a cookie. Afterwards she is told, 'You have just eaten a cookie, and another word for cookie is biscuit.' From now on, whenever she hears the word 'biscuit' she will probably think of the word 'cookie', and actual cookies as well.

So, simply hearing the word 'biscuit' can make the girl think of an actual cookie, even though the word has never been directly associated with a real cookie. When this occurs, we say that an *equivalence relation* has been established between actual cookies, the word 'cookie' and the word 'biscuit'. Numerous studies have demonstrated this basic effect, and have also shown that it is possible to teach even young children large and complex relational networks (e.g. Smeets *et al.*, 1997).

The construction of relational networks, such as equivalence relations, between words and events seems to underlie many facets of human language and cognition. Mathematics, for example, is the result of thousands of years of developing and refining increasingly complex and abstract relational networks.

The logical statement 'If A = B and B = C, then A = C' represents just one very simple relational network that tells me the value for C based on the value for A (i.e. A and C participate in a 'derived transitive relation'). With this simple network, if I weigh A and find it be 1kg, I now know that both B and C each weighs 1kg without having to weigh them.

Relational networks are also exciting because they appear to parallel many natural language phenomena, including, for example, naming. For instance, if a young child is trained to point to the written word 'chocolate' when presented with real chocolate, the child may subsequently point to chocolate when shown the written word without further training. (Spontaneously reversing the trained relation in this way is referred to as symmetry.)

Furthermore, if a child is taught to say 'chocolate' in the presence of both real chocolate and of the written word 'chocolate', the child may relate real chocolate to the written word without being explicitly taught to do so. (This derived relation between real object and written word is an example of an equivalence relation.)

Thus, symmetrical and equivalence relations among written words, spoken words, pictures and objects are commonplace in naming activity (Hayes *et al.*, 1996).

How is relational responding established?

We should be clear at this point that the description of language and cognition in terms of relational networks does not, on its own, constitute a behaviour-analytic explanation of these important human phenomena. In order to *explain* language and cognition (e.g. derived relations between real objects and written words), we use RFT (Hayes & Hayes, 1989). This theory seeks to explain the generative nature of language in terms of already established behavioural principles. Let us examine this behavioural theory in greater detail.

We have long known that organisms can respond to the formal relations between stimuli. For example, many species can respond to the 'dimmest' of several illuminated stimuli (Reese, 1968). Such non-arbitrary relations are based on the formal properties of the stimuli — that is, one of them really is the dimmest. However, humans can also respond to relations that are controlled, not by the formal properties of the stimuli, but by specific contextual cues.

Contextual control for relational responding becomes established during

The w ord 'cookie' and the actual cookie enter into a bi-directional stimulus relation wher ein each can equally stand for the other

early language training interactions. Children are often presented with objects and asked to repeat their names. This can be described as: see object A, then hear name B, and say name B. Children are also taught to identify objects when they hear the appropriate name. This may be described as: hear name B, then point to object A.

Initially, each object–word and word–object relation is explicitly trained using reinforcement (e.g. praise). However, when a child has been exposed to enough of this relational training, derived relational responding may emerge.

Suppose, for example, that a child with this history of naming is taught: 'This is your shirt.' Contextual cues (such as the word 'is', and the context of the social interaction more generally) predict that if this object is a 'shirt' (object A – name B), a 'shirt' is this object (name B – object A). Consequently, the child may now identify the shirt when asked 'Where is your shirt?' in the absence of reinforcement for doing so. This derived relation between a name and an object constitutes part of a 'relational frame'.

Thus, deriving relations is not genuinely novel, but is a type of *generalised operant behaviour* (i.e. unreinforced behaviour that occurs because it is functionally similar to other behaviours that *have* been reinforced). In other words, RFT suggests that a history of reinforcement establishes a controlling function for a contextual cue (e.g. learning that the word 'is' links two equivalent elements). Thus, apparently novel or previously unreinforced relational responses may occur.

So, to begin with, both elements of a relation are explicitly trained across multiple exemplars (e.g. 'A is B' and 'B is A' are both reinforced; 'C is D' and 'D is C' are both reinforced, and so on). Only then can this history of reinforcement generalise so that a derived relation emerges without explicit reinforcement (e.g. if 'X is Y' is reinforced, then 'Y is X' is derived).

In effect, a well-established principle of behaviour analysis, that of the generalised operant, has been used by RFT to explain one of the key generative features of human language (for detailed treatments of this issue, see Barnes, 1994; Barnes-Holmes & Barnes-Holmes, in press).

Other types of stimulus relations that permeate human language may also be explained in terms of generalised operant behaviour. Imagine, for instance, a young child who is taught to respond to a range of questions such as 'Which cup has more milk?' or 'Which box has more toys?'

A child that learns that a car ferry is a type of boat may also learn to transfer any existing anxieties about boats

Given sufficient exposure to such questions and appropriate reinforcement for answering them correctly, the relational response (e.g. between two cups) will come under the control of cues other than the actual relative quantities (e.g. the word 'more').

When this learning occurs, the relational response can be arbitrarily applied to other events, even when the formal properties of the related events are not connected with the relation in question. For instance, a five-pence piece is worth *more than* a two-pence piece, even though the former is smaller than the latter.

This 'relative quantity' relation provides yet another example of the way in which RFT explains advanced language and cognitive phenomena (e.g. a child's understanding of financial value) in terms of a history of reinforcement that is generalised to novel events.

RFT has also drawn together the principles of respondent control (or Pavlovian conditioning) and generalised operant behaviour to explain spontaneous and apparently uncontrolled human anxiety (see also Hayes & Toarmino, this issue).

For illustrative purposes, imagine a young child who hears that she is going on a 'boat', and subsequently experiences a terrible bout of sea sickness (i.e. the word 'boat' becomes aversive via Pavlovian conditioning).

The child may then learn at school that a 'car ferry' is a type of boat. Later, on hearing that she is going on a car ferry, the child may show signs of anxiety despite having never been on one. This effect is based on the acquired aversiveness of 'boat' and the derived relation between 'boat' and 'car ferry'.

Several authors have combined behavioural principles in accordance with RFT (e.g. respondent conditioning and generalised operant behaviour) to account for a wide range of complex psychological phenomena that have hitherto fallen outside the purview of behaviour analysis, such as anxiety (Friman *et al.*, 1998), depression

(Hayes & Wilson, 1993), rule following (Barnes *et al.*, in press), prejudice (Watt *et al.*, 1991), self-awareness (Dymond & Barnes, 1995), self-concept (Barnes *et al.*, 1996), sexual arousal (Barnes & Roche, 1997*b*; Roche & Barnes, 1997, 1998) and spirituality and mysticism (Barnes & Roche 1997*a*; Hayes, 1984). The interested reader is referred to a forthcoming book devoted entirely to RFT (Hayes & Barnes-Holmes, in press) for a review of this and related research.

Conclusion

Relational frame research is still at a very early stage. Behaviour analysts have just begun to study human behaviour in its own right, and thus we are still laying the groundwork for the wealth of research that must follow. We need many more procedures, a rich conceptual framework and a great deal more data before we can present an adequate behaviour-analytic treatment of prejudice, sexuality, religiosity, problem solving, co-operation, interpersonal relations and the like.

A more complete analysis of such phenomena may be a long way off, but at least we have started to move towards the goals of prediction and influence in the realm of human language and cognition.

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The rise of clinical beha viour anal ysis

STEVEN HAYES *and* DOSHEEN TOARMINO *show how a behavioural framework is leading to new verbal psychotherapies.*

BEHAVIOUR therapy has always had within it two quite different traditions (Hayes *et al.*, 1995). One sprang from stimulus–response learning theory and neo-behaviourism, and was predominantly associationistic, mediational and mechanistic. It became the dominant stream of influence in behaviour therapy for adult outpatient problems.

For example,Wolpe believed that pairing a relaxation response with an anxiety-provoking stimulus would 'reciprocally inhibit'anxiety (Wolpe, 1958). Such a model appeals to a mediational process (reciprocal inhibition). It is established by association, and it is inherently mechanistic because overall functioning is explained by the arrangements of elementary parts and forces.

The other tradition, applied behaviour analysis, sprang from operant psychology and was predominantly functional, developmental and contextualistic. This became the dominant strand of behaviour therapy for children and institutionalised clients. Today, applied behaviour analysis is a major approach to the treatment of, for example, people with developmental disabilities.

For instance, Lovaas devised a successful treatment for autism by emphasising the gradual learned acquisition of naturalistically functional behaviour in these children. Such a model is obviously functional and developmental, but it is also contextualistic in that the meaning of given actions is understood by examining the context in which the child's actions occur (Lovaas, 1987; McEachin *et al.*, 1993).

Operant approaches (including rewards for desired actions) were, and are, also sometimes used in adult outpatient settings, in the form of a wide variety of direct contingency and self-control programmes.

What did not occur until recently, however, was the development of innovative verbal psychotherapies entirely based on a behaviour-analytic framework. The present article explains why this transition has occurred and gives a brief example of this type of clinical behaviour analysis.

Because of the unusual features of the behaviour-analytic tradition, psychotherapists outside of it may be surprised to see how the major philosophical and theoretical features of modern behaviour analysis combine when they are applied to more traditional clinical areas. Most of the major approaches to clinical behaviour analysis look distinctly more humanistic, existential, or relationship-oriented than traditional behaviour therapy (for an example other than the one given here, see Kohlenberg *et al.*, 1993).

The modern approach

Behaviour analysis studies organisms interacting in and with a historical and current situational context. The aims are to predict and influence these interactions, and to derive principles adequate to that task that are both precise and broad in scope.

This approach differs notably from other more mechanistic forms of behaviourism that viewed 'behaviour' in a more object-like fashion, for example, as muscle movements and glandular secretions (e.g. Watson, 1924).

In contrast, modern behaviour analysis is based on a form of pragmatism that has been termed 'functional contextualism' (Biglan & Hayes, 1996). The core analytic unit of contextualism is the ongoing act-in-context (see Roche, this issue). There are various forms of contextualism (Hayes *et al.*, 1993; Rosnow & Georgoudi, 1992); functional contextualism is unique in its emphasis on behavioural influence as a goal.

The empirical approach that comes from this philosophical stance emphasises three things. First, behaviour is understood in terms of function (its history and past outcomes), not of its form or location. Function is how a 'whole event'is organised. Behavioural units can be of any size, from tapping a computer key to writing this very article, depending only on the purpose of the analysis.

Second, a behavioural function is a product of a particular historical and situational context. So all concepts, units and principles used to understand an event have to be sensitive to the role of that context.

Third, only those features that help to achieve the unified goal of prediction-and-influence are emphasised.

The combination of these features led to the development of a wide variety of direct contingency principles (e.g. schedules of reinforcement). In line with the field's pragmatic strategy, these principles were quickly applied to a wide variety of problems. They were not, however, of equal relevance to all populations.

Applied behaviour analysts worked more with children and institutionalised clients than with outpatient adults, primarily because directly manipulating environmental contingencies (such as contingencies of reinforcement to shape behaviour) is easier in controlled environments.

In contrast, adult psychotherapy often deals in less well-controlled settings with material that is heavily based on verbal processes — especially those concerning private events such as cognitions, emotions, bodily sensations and the like.

Private events

The path that has opened behaviour analysis to the analysis of thoughts, feelings and other private events (and thus to the development of clinical behaviour analysis) began in 1945. While behaviourism emerged partly based on the rejection of introspective methods (Boring, 1950), in the middle part of the century behaviour analysis broke with that approach.

Skinner (1945) legitimised the study of thoughts and feelings in behaviour analysis in an interesting fashion. He argued that just as the behaviour of others is to be understood contextually, so too the behaviour of the scientist should be approached in that fashion. The validity of any scientific observation, he argued, is not to be found in public agreement but rather in the contextual features controlling the observation.

This position, which essentially examines science itself from a behavioural perspective, had the surprising effect of throwing overboard the earlier behavioural prohibition against a scientific analysis of private experience.

In Watson's hands, introspection was to be avoided. But in Skinner's hands, direct observations of thinking, imagining, feeling, remembering, sensing and other private events could be as scientifically valid as observations of public events, if the contingencies controlling the observation had maximised the importance of the observed events *per se*.

For example: a dancer might detect and complain of a slight muscle pull, given an extensive history of discriminating between subtle bodily feelings; while a child might complain of a stomach ache because of a mathematics test that the child would rather avoid. The former observation is of a private feeling, but it is also objective and scientifically valid; the latter is private, but is subjective and invalid scientifically. The issue is not privacy, but the nature of the contingencies leading to the observation.

Thus, behaviour analysis 'does not insist upon truth by agreement and can therefore consider events taking place in the private world within the skin. It does not call these events unobservable.' (Skinner, 1974, p.16.)

Unfortunately, the full impact of this dramatic philosophical change in the behavioural tradition was not felt in the area of empirical work. This was primarily because Skinner (e.g. 1957, 1974) argued that studying private events could not lead to new information about the regulation of overt behaviour.

The reasoning was simple: private events and overt behaviour are controlled by the same direct set of contingencies. Therefore the study of the former, while legitimate, will not add to our understanding of the latter.

For example, a person who has been robbed in a dark alley may fear and avoid dark places. 'Being afraid' is considered to be a private emotional event, while 'avoiding' is overt behaviour; but the contingencies controlling both appear to be the same (in this example, the aversive effects of the robbery).

Thus, while one can study private events, there is seemingly no need to do so to understand more public forms of behaviour.

The new behavioural thinking

In the 1980s, this reasoning began to be undermined in behaviour analysis with the advent of a host of experimental phenomena showing the unexpected impact of verbal behaviour (e.g. verbal rules) on the operation of direct contingencies (see Hayes, 1989).

For example, accurately describing contingencies produced behaviour in accord with both the contingencies and the verbal rule. But when the contingencies changed, the behaviour tended not to change. In contrast, learning by trial and error generally produced behaviour more sensitive to such changes (Hayes *et al.*, 1986). Such findings as these began to open the field to new thinking.

An even greater impact was then produced by the growing literature on derived stimulus relations. In human beings, relationships between stimuli are often derived, not taught directly (see Barnes-Holmes *et al.*, this issue). For example, a child taught to say 'dog' given the word D–O–G, and to point to actual dogs given that same written word, will now probably be able to say 'dog' when seeing an actual dog. Even 16-month-old babies show such derived stimulus relations (Lipkens *et al.*, 1993), but they seem to be absent in non-humans (e.g. Lipkens *et al.*, 1988).

Different researchers took different specific theoretical approaches to derived stimulus relations. But their mere bi-directionality, regardless of how it was

A dancer might detect and complain of a slight muscle pull, given an extensive history of discriminating between subtle bodily feelings

analysed, produced a major change in behaviour-analytic thinking about human language, and with it, the analysis of thoughts, feelings and other private events. Bi-directionality refers to the finding that relations learned in one direction will be derived in the other direction without specific training. These then combine with other stimulus relations to form relational networks (see Barnes-Holmes *et al.*, this issue).

For example, all clinicians know that many psychotherapy clients tend to avoid painful memories and to restrict or regulate how they talk about such memories. If verbal behaviour is strictly a uni-directional process (e.g. as in the usual examples of classical (respondent) or operant conditioning), this does not make sense.

Consider a classical conditioning account of self-reports in non-humans. It is not difficult to train an animal to 'report' that it was shocked. One has only to arrange for reinforcement for one response following shock, and for another following no shock. But since the 'report' follows the event, it does not elicit the same reactions as that event, any more than food powder sounds like bells to Pavlov's dogs. Thus, while the shock is aversive, the report of it is not.

The situation is different for a human being, simply because the report and the event are bi-directionally related. Reporting sexual abuse can produce some of the same emotional reactions as the abuse itself, and is often difficult (Hayes & Gifford, 1997). The bi-directionality of language and cognition also means that reporting an event can change the reactions produced by that event, the apparent mechanism behind the well-established effects of insight-oriented or experiential psychotherapies.

The bi-directionality of human language invalidated Skinner's view that private events and overt behaviour had to be synchronised since the same direct contingencies produced both. When private events are expressed verbally, a new, indirect influence on behaviour is introduced.

It matters how one verbally constructs a private event and relates it to contextual and behavioural features in the present, because this construction links that event to one's entire verbal history. Much of our socialisation occurs in the form of verbal rules and constructions. Thus, verbally constructing an event one way or another can bring to bear very different sets of reactions.

Consider an example. A woman is raped as a teenager. Years later, she feels very uncomfortable in an intimate situation with a man she believes she loves. She feels disgusted, and thinks 'perhaps I do not love him after all'. She begins to avoid situations that might lead to sex with her boyfriend, and their relationship dissolves.

If you 'love' someone, you are told to act differently

What is at issue here is the role of 'disgust', and the thought 'perhaps I do not love him after all'in the course of this relationship. The verbal community gives a good many instructions about what to do in various situations, and they are usually presented using the language of thoughts and feelings.

If you 'love'someone, you are told to act differently from when you do not. As a result, when a person is asking for advice about a conflicted intimate relationship, it is common to ask 'do you really love this person?', as if this report is crucial in determining the proper course of action.

The sexually abused person we are describing constructed the understandable (and virtually unavoidable) sense of upset in intimate situations, caused by a past history of abuse, as disgust and a lack of love.

The response implications of this verbal activity are great. The bi-directionality of human language means that this construction may alter the behavioural functions of the boyfriend (e.g. how 'lovable' he is), and may tie this situation to social rules of appropriate conduct (e.g. 'do not stay with someone you do not really love').

Acceptance and commitment therapy

We are ready now to supply a brief example of clinical behaviour analysis. This will show how these philosophical and theoretical features combine in actual clinical practice to guide verbal psychotherapeutic interventions.

There are several good examples of clinical behaviour analysis, including dialectical behaviour therapy (DBT; Linehan, 1993, 1994), integrative couples therapy (ICT; Koerner *et al.*, 1994), and functional analytic psychotherapy (FAP; Kohlenberg & Tsai, 1991). In this article, however, we will focus on acceptance and commitment therapy (ACT; said as one word, not initials).

EXAMPLE 1 A Metaphor

Therapist: *Suppose I had you hooked up to the best polygraph machine that's ever been built. This is a perfect machine, the most sensitive ever made. When you are all wired up to it there is no way you can be aroused or anxious without my knowing it. So you have a very simple task here: all you have to do is stay relaxed.*

But I want to give you an incentive to do so, so I'm going to hold a pistol against your head. If you just stay relaxed, I won't blow your brains out, but if you get nervous I'm going to have to kill you. So just relaaax …

What do you think would happen?

ACT is a psychotherapy approach that is consciously based on modern behaviour analysis (e.g. Hayes *et al.*, in press). Controlled research has shown that ACT produces positive clinical outcomes across the range of disorders seen in general practice, including mood, anxiety and personality disorders (Strosahl *et al.*, 1998).

A core assumption in ACT is that psychopathology often occurs when verbal functions dominate. People unnecessarily begin to avoid private events and to take their own thoughts too literally, owing to the bi-directional transfer of stimulus functions. For example, the person with the rape history mentioned earlier will probably want to 'feel better.' She will make efforts to reduce anxiety, sadness or unpleasant memories. She may take thoughts such as 'I am worthless' quite literally. All of this is due to the effect of language.

The ability to make and keep commitments to behaviour change then goes down, because the sources of behavioural regulation are dominated by conventional verbal patterns, not by what is actually workable in the situation. To return to our example, when the person reaches out to her lover, she will feel and think negative things, which in turn will engage verbal rules about how to escape or avoid unpleasantness.

Unfortunately, many of the means that are readily available to do this — for example, withdrawal from intimate social relationships — cause other problems. Following rules that specify how to avoid certain thoughts is also likely to be counter-productive, because these verbal rules (e.g. 'don't think about X') contain the very thoughts that they are supposedly designed to eliminate. Thus, avenues that could ultimately change these feelings, based on new experiences, are closed off in the very effort to bring about that change.

Acceptance and commitment therapy attempts to step around the traps laid by human language, and to make these traps more visible. The usual course of ACT covers six stages.

Creative hopelessness At the beginning, the client's efforts to change the situation are explored. Most clients are 'stuck' when they come in. As this sense is explored and validated, it becomes clearer that what clients 'think they need to do' is exactly what they have done. Thus a real solution must lie outside what seems reasonable. This stage essentially tries to extinguish traditional, verbally guided problem solving to generate more innovative behaviour.

Control is the problem In stage two, the ACT therapist tries to identify the functional purpose of these previous change efforts. Usually, the underlying purpose is focused on private events: the person wants to feel better. The therapist emphasises the danger of deliberate efforts to control the world of private events.

A brief metaphor that captures some of the quality of this phase of ACT is given in Example 1. This little metaphor describes quite well what many clients are already doing. The result in real life is as predictable as the result in this metaphor. The verbal rule that specifies that emotional change is necessary also specifies negative consequences for a failure to do so; and the natural response to imminent negative consequences is anxiety, not relaxation.

You are not your thoughts and feelings In this next stage, ACT uses experiential exercises and metaphors to help the client distinguish between the person who is aware of private events and the events known. This sense of 'I' is important because it seems timeless or even spiritual, and provides a basis from which acceptance of undesirable emotions or thoughts is possible without personal threat.

A detailed analysis of this step is beyond the scope of this article (see Hayes, 1984 for a behavioural analysis of this issue). But in thumbnail form, a sense of distinction between an observer and the observed tends to reduce the dominance of the literal functions of language (the bi-directional transfer of the behavioural effects of referents to those of the words themselves). A sense of self-as-observer helps the client notice thinking as an ongoing behaviour process, rather than simply viewing the world as structured by language.

Let go of the struggle In this phase, clients are taught emotional willingness and 'cognitive deliteralisation' skills. Emotional willingness refers to the person's openness to emotional experience, both positive and negative; cognitive literalisation refers to the ability to experience thinking as an active ongoing process of relating events, rather than simply dealing with the world as structured by thought.

A wide variety of techniques are used. For example, ACT therapists ask clients, at least temporarily, to adopt a particular verbal style in therapy, saying 'I am having the thought that I can't go to the mall' as opposed to simply stating, 'I can't go to the mall.'

In essence, these skills allow clients to expose themselves to previously avoided situations, thoughts, feelings, bodily sensations or memories. A wide range of emotionally evocative exercises are used to help the client open up to this previously avoided material.

Values Having stripped away most of the behaviourally useless effects of language (emotional avoidance, taking thought literally), the ACT therapist turns to domains where language is more useful. The person's values are explored in depth: in each of several areas, what values does the person want to make manifest? This brings literal language into play where it is helpful — in constructing verbal goals and purposefully working toward these goals.

Commitment and behaviour change The overt steps that need to be taken to move in a valued direction are then explored, and homework exercises reveal the key steps to the client. In each individual case, situations are analysed into values, goals, action and barriers.

That is, the clinical situation is resolved explicitly for the client into: 1) what values you intend to make manifest, 2) what concrete, achievable events are on that path, 3) what you could do now to produce those achievements, and 4) what stands in the way of engaging in these actions.

In essence, the first several stages of ACT are all about working on number 4 while the last stages focus on 1–3. This final stage is essentially indistinguishable from traditional behaviour therapy, and involves overt behaviour change.

What is important to notice in this brief introduction to ACT concepts is that each of these stages flow from a contemporary behavioural account of language. Their form, however, is not always obviously 'behavioural' in a traditional sense. This same mixture is dominant in the other major varieties of clinical behaviour analysis (e.g. DBT, ICT and FAP).

Irony

Clinical behaviour analysis provides a new approach to traditional clinical areas. Paradoxically, although it is philosophically and theoretically behavioural, its technical features resemble some non-behavioural approaches.

For example, ACT is recognisably a form of behaviour therapy, but the contextual nature of behaviour analysis produces components that are experiential, paradoxical and metaphorical. This mixing comes as a natural result of the underlying changes in a behaviour-analytic view of language.

It is ironic, but behaviour analysis may help to provide some of the basic science and empirical-theoretical development for clinical traditions that have not counted behaviour analysis as an ally.

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