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Control theory and psychopathology: An integrative approach

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Perceptual control theory (PCT; Powers, 1973) is presented and adapted as a framework to understand the causes, maintenance, and treatment of psychological disorders. PCT provides dynamic, working models based on the principle that goal-directed activity arises from a hierarchy of negative feedback loops that control perception through control of the environment. The theory proposes that psychological distress arises from the unresolved conflict between goals. The present paper integrates PCT, control theory, and self-regulatory approaches to psychopathology and psychotherapy and recent empirical findings, particularly in the field of cognitive therapy. The approach aims to offer fresh insights into the role of goal conflict, automatic processes, imagery, perceptual distortion, and loss of control in psychological disorders. Implications for psychological therapy are discussed, including an integration of the existing work on the assessment of control profiles and the use of assertive versus yielding modes of control.

The principle of control theory has been in operation since the 1930s, and has been applied to diverse areas including mathematics, economics, and medicine (Carver & Scheier, 1982). It was first applied to psychology in the 1948 book, *Cybernetics* (Wiener, 1948), although perceptual control theory (PCT; Powers, 1973) has provided probably the most wide-ranging account of control theory for human behaviour. The current paper begins with a description of PCT, then moves on to show how control theory has been used to explain the causes and maintenance of psychological disorders. The insights of many theorists (e.g. Baumeister, Heatherton, & Tice, 1994; Bowlby, 1969, 1973; Carver & Scheier, 1982, 1998; Hamilton, Greenberg, Pyszczynski, & Cather, 1993; McNab, 1993; Pitman, 1987; Powers, 1973; Shapiro, Schwartz, & Astin, 1996; Wells & Matthews, 1994)

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are integrated into an account which proposes that excessive, unresolved conflict between control systems lies at the heart of psychopathology.

Perceptual control theory

PCT (Powers, 1973) has been summarized elsewhere (see Carver & Scheier, 1982; Cziko, 1995). Thus, the current description serves to highlight the most salient features (see Table 1 for a summary). At the heart of a control approach is the negative feedback loop (see Fig. 1). The *input function* of the system is the sensing of the present environment, which will be prone to disturbances. The *comparator* detects any discrepancy in the environment as it deviates from an internal *reference value* (e.g. body temperature; standard of performance), which is based on innate predispositions and/or on past perceptual experience. Behaviour (the *output function*) is performed to reduce the discrepancy. Thus, behaviour occurs to maintain a specific perception of the environment. An example of a simple control system within the human body is the homeostatic process of maintaining a fixed body temperature through automatic behaviours, such as shivering and sweating. According to PCT, many observations of changes in behaviour can be explained through the operation of control systems. For example, the increased rate of lever pressing by a laboratory rat to receive food occurs for the same reasons as the body triggers heat output when its temperature drops; the response is elicited to restore the input function (hunger level) to the internal reference value.

According to Powers (1973), control systems are organized in a hierarchy (See Fig. 2 for a clinical example). High order negative feedback loops achieve control of the environment by manipulating the reference values of lower order feedback loops to lead to behaviour which results in changes in perception that match with the reference value. For example, a person who raises the target temperature of a thermostat when s/he gets cold and lowers it when s/he gets hot would represent a two-level hierarchy (person and thermostat). In the human mind, the highest level of the hierarchy is regarded as the *system concept* which approximates to the self-ideal, such as being a responsible, capable, or likable person. The individual will try to behave in a way that fulfils their higher order goals. For example, an individual with social phobia may possess a goal to appear intelligent to others, and to avoid looking stupid. This system concept specifies principles, such as 'hide signs of anxiety', which, in turn, specify programmes of behaviour, such as those which could conceal any trembling of the hands. From here down, the levels become more concrete, right down to the low levels of sensation and intensity of stimuli, which in this example would be involved in the moment-to-moment adjustments of muscle tension to reduce trembling.

Two important implications follow from the existence of control system hierarchies. First, it suggests that what we regard as abstract principles, beliefs, and attitudes are not simply verbal evaluations based on logic, but that they are the reports of the functioning

Table 1. Definition of terms used in perceptual control theory (PCT) (adapted from Powers, 1973)

Term	Definition
Negative feedback loop	A homeostatic system whereby a disturbance acting on any variable in the feedback loop gives rise to an effect at the point of disturbance which opposes the effect of the disturbance.
Input function	The sensing of the present environment.
Reference value	The internal standard or goal which is based on genetic predisposition and/or past experience.
Comparator	The element which computes the discrepancy between the input function and the reference value.
Output function	Behaviour which serves to reduce the discrepancy between the input function and the reference value.
Intrinsic error	A discrepancy which occurs when important variables deviate from intrinsic reference values, triggering reorganization.
Control (system) hierarchy	Negative feedback loops are organized from those controlling low order perceptions up to those controlling higher order goals. The higher order reference values are constructed from organizations of the reference values from the level below.
Conflict	The state when two control systems attempt to control the same quantity with respect to two different reference values. Internal conflict is an inevitable consequence of learning to adapt to the world, but unresolved excessive conflict is disruptive, distressing, and damaging to the individual.
Reorganization	In order to resolve the conflict between control systems and avoid intrinsic error, reference values are altered, leading to a change in output function.
Arbitrary control	The attempt to make behaviour conform to one set of goals without regard to other goals (control systems) that may already be controlling that behaviour. This may be carried out by others (interpersonal control), or by the self.
Anti-goal (avoidance goal)	A positive feedback loop which acts to increase, rather than decrease, the discrepancy between the input function and reference value.

of high order levels of control systems which are directly controlling the environment to affect the perceptual experience of the individual. Higher order principles set the reference values for lower order levels in order to direct behaviour that leads to perceptions that are consistent with the principle. For instance, if an individual

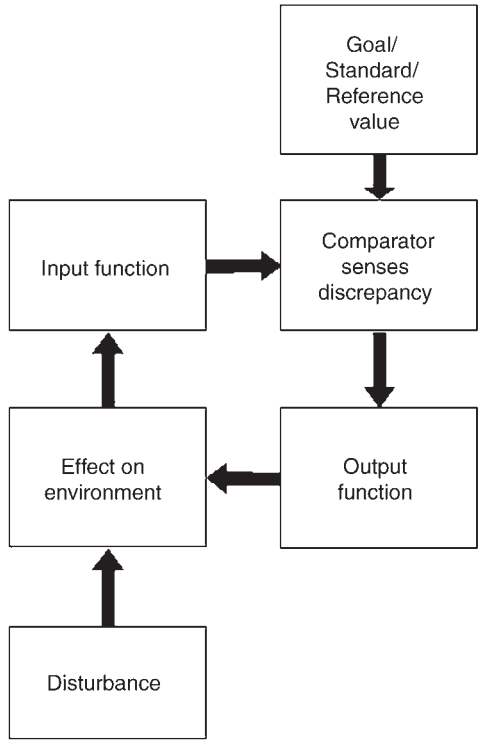

Figure 1. A negative feedback loop acts to reduce the discrepancy between a reference value/goal/standard and current perception in the face of disturbances from the environment.

possesses the principle that s/he must follow through their commitments, they must perceive themselves to carry out actions that fulfil this principle, such as returning favours for friends and caring for relatives (Carver & Scheier, 1982). This perspective may help to explain why people appear to seek information that confirms their pre-existing beliefs, and defend against information which does not (e.g. Evans, Over, & Maktelow, 1993; Swann, 1990); this is part of the function of a control system.

Second, because the higher order levels of a control system merely set the reference values for the lower order levels which, in turn, manipulate the environment, the higher order levels are not required to be accessed 'on-line' to command the behaviour of lower order levels. This approach accounts for the widespread observation that individuals can carry out behaviours consistent with their higher order goals without current awareness of them (Bandura, 1999; Mansell, 2000; Nisbett & Wilson, 1977). In practice, awareness is often focused on the programme level of the hierarchy, as it is here that decisions are made about which sequence of behaviour to engage in (Carver & Scheier, 1982). Thus, often we are not aware of our moment-to-moment behaviour, or of our overarching motives.

Although some change in behaviour can be explained as the normal functioning of control systems, true learning in PCT requires reorganization of the control system

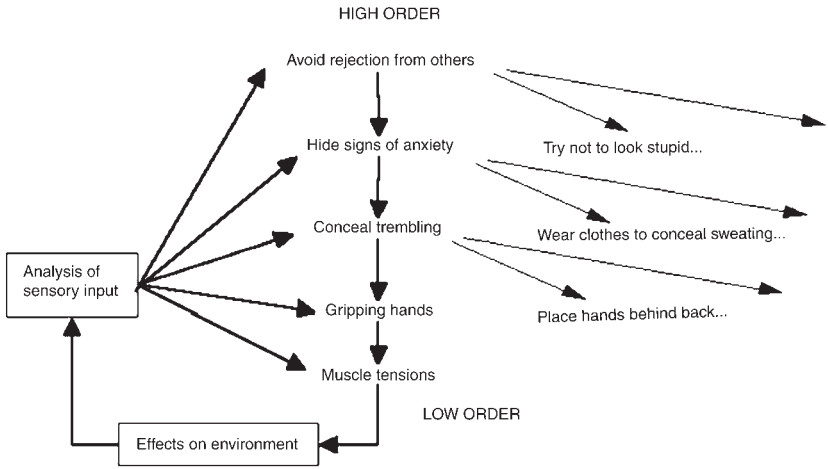

Figure 2. A clinical example of a control system hierarchy. High order levels do not control the environment directly, but via their effect on reference values at lower levels.

hierarchy. Reorganization is triggered by an increase in 'intrinsic error', which is presumed to occur when certain important variables deviate from intrinsic reference states. One example might be when physiological arousal reaches disturbing levels, as typically occurs when highly threatening situations need to be addressed by the switch to a new goal, entailing change in behaviour. The reorganization itself alters behaviour, but it does not alter a specific behaviour. Rather, it changes the reference values of a control system, owing to changes in the way it is derived from lower order signals, and behaviour is elicited until perception reaches the new reference value. The reference values, which eventually generate behaviour that reduces intrinsic error, stop the process of reorganization and, therefore, that behaviour will persist (Powers, 1973). This will occur even if one fails at the task at hand, as long as the responses return the intrinsic error to zero. The simplest way to reorganize is to escape the situation altogether, which can provide temporary reduction in intrinsic error. The PCT approach to learning has clear implications for how dysfunctional behaviours, such as escape and avoidance, can develop.

According to the theory, a control hierarchy can adopt four different modes. Each of these modes are familiar to psychologists. In the *automatic* mode, lower order levels operate without reference to higher order levels, and no reorganization occurs. Carrying out (but not learning) automatic behaviours, such as walking and running, fit this example. In the *control* mode, a higher level receives input and provides output to a lower level. In this mode, behaviour is controlled and requires effort, but learning can occur because lower order perceptions are monitored and reference values are changed through reorganization, as described above. In this way, automatic processes can be changed by periodic reorganization (Mansell, 2000). In the *passive observation* mode, the higher level system receives input but provides no output. In this configuration, the system can acquire new reference values which it can already control without acting.

Simple associative learning may occur in this mode. Last, and most clinically interesting, is the *imagination* mode, in which higher levels are unconnected to low order levels. They receive feedback as though perception is occurring, without receiving information from the environment. This allows the individual to simulate consequences of behaviour without the risk of engaging the environment. This is particularly useful when the individual must decide between two conflicting courses of action. It is likely that the lower down the hierarchy imagery occurs, the more accurate the simulation is, but imagination is carried out at the expense of present-time perception. That is, the more vividly one imagines a situation, the more likely it is to trigger behaviour to control the environment. The implications for the role of imagery in the maintenance and treatment of psychological disorders are discussed below.

Conflict and control in psychopathology

Conflict

A range of applications of control systems theory to psychopathology exist, from general implications to specific models of disorders. Indeed, the final chapter of Wiener's original book (Wiener, 1948), suggested that control systems theory could be used to explain the symptoms of psychopathology, including malignant worry and mental breakdown. Some of the most valuable and ambitious insights come from Powers (1973), who regards conflict between control systems as a key cause of psychopathology.

> A person is said to be 'in conflict' when he [*sic*] wants two incompatible goals to be realized at once (. . .) Unresolved conflict leads to anxiety, depression, hostility, unrealistic fantasies, and even delusions and hallucinations. In fact, as I have come to realize what inner conflict means in terms of this feedback model, I have become more and more convinced that conflict *itself*, not any particular kind of conflict, represents the most serious kind of malfunction to the brain short of physical damage, and the most common even among 'normal' people (p. 253).

Recognizing the adverse consequences of conflict is not new. McReynolds (1990) describes examples of inner conflict dating from the works of Homer and the early books of the Bible, and Pavlov (1941) demonstrated that approach–avoidance conflicts are a powerful stressor that cause confusion and anxiety in animals. Many psychological approaches have proposed the coexistence of several conflicting, relatively autonomous, higher order systems, which often go by different names, such as *goals* (Pervin, 1989), *schemata* (Beck, 1976; Horowitz, 1988), and *protospecialists* (Minsky, 1987). In particular, one of the most prominent conflicts in human nature cited by many theorists (e.g. Beck, Emery, & Greenberg, 1985; Bowlby, 1969; Freud, 1930; Shapiro & Astin, 1998) appears to be the balance between independence and relatedness to others (see Guisinger & Blatt, 1994, for a review). For example, the developing child must balance its need for autonomy with its need for security and belonging. Too much autonomy can leave the individual isolated and vulnerable, yet excessive closeness to the caregiver can interfere with learning to function independently.

According to PCT, conflict occurs when two control systems attempt to control the same quantity, but with respect to two different reference values. It is as though two different air conditioning systems were operating in the same room, one set at 20°C and the other at 30°C. When the temperature drops to well below 30°C, one system triggers a change in temperature, only to be counteracted by the other. In practice, the temperature would be continually fluctuating in the 'dead zone' between the two temperatures, within which no absolute control of temperature can be maintained. Powers (1973) provides the example in human behaviour of a man who wants both to appear strong and confident to his superiors, yet is dependent on their feedback. He may start to ask for help with a problem, yet as he does so, he is concerned that he appears weak and may be ridiculed, and so puts on a confident facade and says that he is actually fine and does not need any help. His behaviour, therefore, fluctuates between the two states, and both goals are interrupted.

Arbitrary control

Powers explains that the main cause for unresolved internal conflict is what he calls *arbitrary control*. It is defined as the 'attempt to make behaviour conform to one set of goals without regard to other goals (and control systems) that may already be controlling that behaviour – that *must* already exist, since the behaviour exists . . . ' (Powers, 1973, p. 259). Arbitrary control may occur between, or within, individuals. 'Arbitrary control of the behaviour of one person to suit the goals of another person ignores the goals that are already governing the behaviour of the other person, and inevitably creates conflict . . . ' (p. 260). Unfortunately, controlling someone else's behaviour without using some form of arbitrary control is impossible. It requires the individual to know all the control system hierarchies of the other person. Not only is this computationally impossible, but the process of learning about them disturbs the system itself. For instance, if in the example above, the man's boss asks him directly if he needs help, John is likely to say 'no' for fear of being manipulated to appear weak. Furthermore, for feedback from other people to be useful, it requires that the individual is currently aware of their own motives, in order to be able to report them. Otherwise, the other person can only observe and infer the nature of another person's control system. Even once a person knows another's motives, trying to control their behaviour can trigger reorganization of that person's control hierarchy, which, in turn, invalidates their map of it. So what is the answer? Powers suggests that 'the only practical way [is that] each system controls its *own* perceptions, avoiding behaviours that disturb what matters to other such systems, helping other systems correct their errors in return for similar favors' (p. 262). Powers sees mutual cooperation as the key to preventing long-term conflict, and the approach has parallels with effective therapy, which is discussed below. Within an individual, arbitrary control involves the control of one's behaviour without reference to the reasons or higher order goals influencing the behaviour. It may manifest itself as avoidance, thought and emotion suppression, self-blame and self-harm; behaviours which are highly associated with psychopathology.

Anti-goals

One possible shortcoming of Power's (1973) account is that he does not distinguish between pursuit goals and avoidance goals. It is hard to imagine that the conflict between two entirely pleasurable goals would be a source of psychological distress. However, if at least one of these goals was instead an aversive outcome to be avoided, the result would be more severe. According to self-regulation theory (Carver & Scheier, 1998), not all control systems are negative feedback loops that serve to reduce discrepancies between perception and a reference value. There are also positive feedback loops which create movement away from a reference value. In practice, they function to avoid aversive outcomes, rather than to pursue pleasurable outcomes.

The problem with positive feedback loops is that they are unstable; they push an individual away from a perception, but provide no goal for the individual to head towards. Presumably, the instability of an anti-goal will contribute to distress. A prominent example in psychopathology is the fear system. It can be regarded as an evolutionarily prepared brain system designed to avoid danger, which also learns from experience as new threats are encountered in the environment (Bowlby, 1969; Gray, 1982; LeDoux, 1998). A problematic conflict emerges if the reference value of a negative feedback loop matches with the reference value of a positive feedback loop, leading to the well-known example of approach–avoidance conflict (Pavlov, 1941). Often in psychological disorders, a pleasurable goal, such as food or sex, is also the aversive outcome to be avoided. In eating disorders, food is seen as threatening because of its effects on weight and shape, and in certain cases of obsessive-compulsive disorder (OCD), sex or sexual thoughts are threatening because they are regarded as immoral. But as food and sex are primary human needs, with their own control systems attempting to trigger behaviour to reach certain intrinsic reference values, the conflict will inevitably continue until the control system directing the anti-goal is suitably reorganized. The resolution may only be temporary, leading to oscillations between approach and avoidance behaviour, such as the bingeing and purging that are observed in bulimia nervosa. Because positive feedback loops are unstable, they tend to be stabilized by further negative feedback loops. For example, Carver and Scheier (1998) review evidence (e.g. Higgins & Tykocinski, 1992) that individuals whose lives are dominated by the pursuit of views of themselves as they 'ought' to be, seem to be particularly motivated by the avoidance of an undesired element of the self. Also, according to the cognitive approach, anxious individuals are particularly motivated to avoid catastrophic outcomes, and to seek particular sources of safety (Beck *et al.*, 1985; Salkovskis, 1991).

Evidence for excessive, unresolved conflict in psychopathology

Considering the range of theoretical accounts of conflict, the evidence base is relatively sparse. Nevertheless, a range of convergent evidence supports the view. Maybe one of the clearest indications is that excessive conflict is implicit in one of the necessary

diagnostic criteria for the majority of psychological disorders (DSM-IV; American Psychiatric Association, 1994): 'the [symptoms] interfere significantly with the person's normal routine, occupational (academic) functioning, or social activities or relationships'. In other words, the symptoms of the disorder are conflicting with the rewarding goals and/or essential needs in the person's life. Further, a range of studies exploring goal-oriented approaches to personality have shown that conflict between goals is associated with increased distress and negative affect (see Emmons, King, & Sheldon, 1993, for a review). Finally, recent cognitive approaches to psychological therapy have explored the degree of conflict between goals (e.g. Lauterbach, 1990). Computer programs have been developed which assess conflict in biologically important domains, such as attachment and social status, and which can be targeted during treatment (Michalak & Grawe, 1999). Further research will be required, however, to firmly establish the degree of importance of internal conflict in psychopathology. It should be noted that it is inevitable that learning to adapt to a world of opposing values and beliefs will entail a temporary conflict within all individuals, and that it is excessive, unresolved conflict which characterizes psychological disorders.

An integrative framework for psychopathology

The above account of control theory provides a basis from which to develop a useful framework for understanding psychopathology. So far, the account presented here has suggested an explanation for the following features: (a) why individuals are motivated to seek information and behave in accordance with their goals and beliefs; (b) why behaviour can often be automatic; (c) why excessive, unresolved conflict is counterproductive; (d) why the arbitrary control of behaviour can be counter-productive; (e) why avoidance goals (anti-goals) are particularly problematic. In the following section, the paper will elaborate on the specific processes which can produce conflict, describe the symptoms of conflict, how conflict is maintained, and how it can escalate (see Table 2 for a summary). Throughout, an attempt will be made to integrate suggestions from different control theorists, to use clinical examples, and to highlight points of convergence between the theory and evidence generated by the cognitive approach to psychological disorders.

Causes of conflict

There appears to be no one simple cause of psychological conflict, and thus a range of contributory causes will be described. First, the ways in which arbitrary control can contribute to conflict in psychopathology are discussed. This is followed by a consideration of low tolerance of uncertainty, high standards and rigidity, lag-time and intermittent feedback, the side effects of one's behaviour, maladaptive strategies to achieve one's goals, and a range of external causes including interpersonal control, trauma, and changes in the environment.

Table 2. Overview of the role of excessive conflict between control systems in psychopathology

Internal causes of conflict	Arbitrary control; low tolerance of uncertainty; high standards and rigidity; lag-time and intermittent feedback; behaviour and the side effects of behaviour; maladaptive methods to achieve goals.
External causes of conflict	Interpersonal control; major negative (traumatic) and positive life events; new information; change in environment and self.
Symptoms of conflict	(a) Emotion: for example, fear, sadness, and guilt. (b) Perception: perceptual distortion, imagery, and hallucinations. (c) Cognition: intrusive impulses and thoughts; misinterpretation, distorted reasoning; self-deception and delusion. (d) Behaviour: arbitrary control; indecision; compromise behaviour; displacement activity. (e) Physical effects. (f) Involuntary reactions and loss of self-control. (g) Lack of control over environment.
Processes which maintain conflict	Misattribution; distorted reasoning; displacement behaviours; limited awareness of higher and lower levels of control hierarchy; selective processing of confirmatory information; fear of change.
The process of therapy	Create safe, accepting, therapeutic environment of low interpersonal control; explore higher and lower levels of control hierarchies; engage 'de-centred' mode; encourage the reduction of the arbitrary control of behaviour and the processing of disconfirmatory information; problem solving; promote open-ended and shared approach goals.

Arbitrary control

Power's (1973) book generates the strong conclusion that attempts to control one's behaviour without reconsidering the goals and beliefs that motivate that behaviour are counterproductive and lead to conflict. Many examples of behaviour in psychological disorders can be regarded as arbitrary control. In the behavioural literature, the avoidance of situations which provoke distress has long been implicated as maintaining psychopathological conditions, such as phobias (e.g. Mowrer, 1939). Examples of arbitrary control in the cognitive literature include thought suppression, self-punishment, worry, suppression of emotion, safety-seeking behaviours, and mood repair. A recent review (Purdon, 1999) concluded that attempts at suppressing thoughts lead to negative effects on the frequency of those thoughts and/or distress across a range of disorders including OCD, post-traumatic stress disorder (PTSD), and depression.

Moreover, the author concluded that it is the goal of trying to control thoughts because of their threatening consequences which leads to the most counterproductive effects of thought suppression. A self-report scale (Thought Control Questionnaire, TCQ) has been developed to assess the strategies that people use to control their thoughts (Wells & Davies, 1994). In particular, convergent evidence across non-clinical populations and several patient groups suggests that people who punish themselves for their behaviour, or choose to worry about something else as a strategy for controlling their thoughts, show increased levels of psychopathology (Amir, Cashman, & Foa, 1997; Reynolds & Wells, 1999; Warda & Bryant, 1998; Wells & Davies, 1994).

Safety behaviours (Salkovskis, 1991) are defined as actions carried out in order to prevent or reduce the likelihood of a feared catastrophe occurring. For example, a patient with social phobia may clasp her hands together for fear that she will appear to tremble, which will be regarded as a sign of weakness by others (Clark & Wells, 1995). They could be regarded as a form of arbitrary control. In PCT terms, the patient experiences a conflict between the standard of social performance which she aims to achieve, and the strict standard which she believes other people hold for her behaviour. In this example, these standards are formed from a hierarchy of concepts which reach down to the low order reference values of trembling and blushing. During a social situation in which she is highly motivated to perform well, she perceives her feelings of trembling which are aversive, and thus she elicits a response to reduce the perception of trembling. In doing so, she is unable to modify the reference value and learn whether her feelings of trembling are a genuine component of the standards she believes others have set for her (i.e. to show no signs of anxiety), or, indeed, to question whether the standards she aims to achieve are too high. Clinical interviews and empirical studies have revealed a range of safety behaviours associated with the anxiety disorders (Clark & Wells, 1995; Salkovskis, Clark, & Gelder, 1996), and have shown that they are counterproductive (Alden & Bieling, 1998). Furthermore, experimental evidence has shown that identifying and reducing safety behaviours decreases anxiety and perceived threat (Morgan & Raffle, 1999; Salkovskis, Clark, Hackmann, Wells, & Gelder, 1999; Wells *et al.* 1995).

One safety-seeking behaviour that may have broad effects on therapy is the need to prevent oneself from making mistakes; learning inevitably requires making errors and so the desire to hide or prevent these mistakes can undermine effective change. The fact that safety-seeking goals serve to take people away from an aversive state raises the interesting possibility that certain behaviours may appear to be motivated by the pursuit of a particular goal, but in fact are just one of many methods used to avoid an anti-goal. Thus, achieving an approach goal of this kind will not lead to a sense of achievement, but of temporary relief from danger. Also, as the approach goal is only a form of arbitrary control that does not address underlying causes, the individual will still have to re-confront their feared outcome when the conflicted control system is activated again. Such a pattern seems to reflect dysfunctional perfectionism, which is seen to be motivated by a fear of failure (Antony & Swinson, 1998; Shafran, Cooper, & Fairburn, 2002). Considerable

evidence suggests that perfectionism is associated with a range of psychopathology, especially eating disorders, and can impede the successful treatment of depression (see Shafran & Mansell, 2001, for a review). Finally, repairing negative mood can be regarded as a form of arbitrary control because the key cause of the negative affect remains unaddressed. This can lead into a cycle of brief attempts at a task, followed by negative affect and mood repair, which manifests itself as procrastination (Baumeister *et al.*, 1994), another common feature of perfectionism (Antony & Swinson, 1998).

Low tolerance of ambiguity/uncertainty

The degree of distress that psychological conflict causes may be a function of how well the individual can tolerate the ambiguous nature of the conflict situation. Lauterbach (1990) has demonstrated that the effect of goal conflict on mood is moderated by an individual's tolerance of ambiguity. People who score high on items such as, 'There is a right and wrong to nearly everything', and 'If I were a research worker, I would hate the idea that my work is never really finished', were more likely to be distressed by conflict in their goals. Within the cognitive literature, a low tolerance of uncertainty and ambiguity has been shown to be associated with high levels of worry. In non-clinical participants, the association exists even when anxiety and depression levels are accounted for (Dugas, Freeston, & Ladouceur, 1997), and when other beliefs about worry and avoidance strategies are explained (Lachance, Ladouceur, & Dugas, 1999). Patients with generalized anxiety disorder (GAD) who are characterized by worry, have a lower tolerance of uncertainty relative to other anxiety disorders (Ladouceur *et al.*, 1995, cited in Dugas *et al.*, 1997). Although conflict itself has not been directly assessed in these studies, it is accepted that worry and GAD are characterized by the existence of many fears of different catastrophic events (Beck *et al.*, 1985), which would entail multiple avoidance–avoidance conflicts.

High standards and rigidity

Clearly, possessing high standards for one's goals will increase the chances of conflict with one's own goals, and those of other people. Nevertheless, it appears to be the rigidity of the adherence to these standards that increases risk of psychopathology (see Shafran & Mansell, 2001, for a review). A range of studies by Kirschenbaum and colleagues (Kirschenbaum, Humphrey, & Malett, 1981; Kirschenbaum, Malett, Humphrey, & Tomarken, 1982; Kirschenbaum, Tomarken, & Ordman, 1982) suggest that the optimum way to work out a strategy to achieve one's goals is to have moderately specific plans, and that having no plans, or plans that are too specific, is less effective. The drawbacks of having highly rigid plans are that they take more time to work out, and that they will be more likely to conflict with other goals, leading to reduced freedom of choice and more experiences of failure and frustration. In a similar vein, Hamilton *et al.* (1993) review evidence that behavioural flexibility, made possible by the existence of a range of subplans to achieve higher order goals, is associated with reduced levels of distress.

Lag-time and intermittent feedback

When there is a delay between a system's behaviour and its intended outcome, the system needs to take account of this delay otherwise the behaviour may change again before the outcome is experienced (Carver & Scheier, 1998). For example, an individual with social phobia may need to endure a range of ambiguous social cues from others before receiving a positive response. However, if s/he is expecting a positive response sooner, this may lead him/her to withdraw from the situation for fear of humiliation, thus inducing an approach–avoidance conflict in his/her behaviour. Also, there are likely to be processing constraints, meaning that individuals cannot modify their behaviour continually; they alter it intermittently. For this reason, behaviour which comes into conflict with another system may not be adjusted immediately, thereby prolonging the conflict.

Behaviour and side effects of behaviour as sources of conflict

Conflict may arise not only because two systems attempt to control the same reference value, as described by Powers (1973), but also because the output function (i.e. behaviour), or even the unintended side effects of the output function, conflict with the reference value or output function of a second control system. For instance, Levenson (1999) cites the example of a motorist who witnesses another driver who nearly puts his life at risk through dangerous driving. In response, his face flushes, he screams loudly at the offending vehicle, and shoves his foot down on the accelerator. This automatic reaction is likely to conflict both with his own values about good standards of behaviour and with his current behaviour. In addition to automatic responses, prolonged intentional goals can have negative side effects. For example, eating disorders can be associated with a restriction of food intake to the extent that the physical effects on the body prevent them from engaging in a range of normal activities.

Use of maladaptive means to achieve goals

People may pick up maladaptive strategies for achieving their goals from a range of sources (for a comprehensive review, see Baumeister *et al.*, 1994). For example, they may use strategies that have worked for other people and apply them to themselves, even when they are not suitable. They may also use strategies that were successful in certain contexts and overgeneralize them to other situations.

External causes

Two main external causes of conflict are arbitrary control by others, and trauma. A range of evidence indicates that individuals with psychological disorders often perceive that what happens to them is under the control of others. Following a meta-analysis of the association between locus of control and depression, Presson and Benassi (1996) concluded that perceived low internal control, and perceived control by chance and powerful others, were both independently associated with depressive symptomology. The measure of 'socially-prescribed perfectionism' is also associated with increased

psychopathology in eating disorders, depression, social phobia, and suicide attempts (Shafran & Mansell, 2001). This scale refers to the degree to which individuals attempt to reach the standards that they perceive to be set for them by others. In particular, a longitudinal study (Jenkins, 1996) has shown that women who define themselves in socially prescribed (rather than self-oriented) terms reported more career goal indecision and conflict between roles. Individuals who allow themselves to be controlled by others without reference to their own personal goals can become the node of conflict between individuals who have contradictory goals and values.

Certain kinds of traumatic experience involve repeated and predictable abuse or torture (Type I trauma; Terr, 1991) and, therefore, provide extreme examples of interpersonal control. Often, the trauma which triggers PTSD is a single unpredicted event (Type II trauma; Terr, 1991) such as a natural disaster, a serious accident, or a violent or sexual assault. Horowitz (1975) developed a model of trauma which implicates the conflict between control systems in the alternating symptoms of avoidance, and intrusions in PTSD. It is also possible that unpredictable positive events have the propensity to generate conflict. For example, an individual who possesses strong beliefs about the acceptability of sexual behaviour would experience conflict after an intense sexual encounter. Indeed, Horowitz and Wilner (1976) found that intrusions followed the presentation of not only threatening, but also erotic and dysphoric material.

Other triggers

Three other factors are notable because they may help trigger conflict: (a) new information, (b) change in one's environment, (c) change in self. First, certain control systems will conflict only in the context of particular learned information about the world. The information may concern cultural rules which dictate either life or death, or one's relative position in the social hierarchy; religious beliefs, values of intelligence, appearance, and financial status are examples. For example, in OCD, the conflict between an individual's blasphemous thoughts and their belief that they are being judged by God as sinful, occur in the context of religious beliefs that the individual possesses. Indeed, in PTSD, evidence is emerging that the intrusive images and thoughts can be triggered by the acquisition of new information long after the traumatic event (Ehlers & Clark, 2000; Davey, de Jong, & Tallis, 1993). Second, changing environment can expose the individual to new information of this kind, but, in particular, it can also disrupt the ability to achieve goals. For example, Millar, Tesser, and Millar (1988) explain how moving to college interrupts shared activities with others, leading to increased depression and intrusions about the individual who had shared the activities. Third, during our lives we will experience changes in ourselves and our control systems under the influence of hormone levels, physical damage, and the process of ageing. Furthermore, as we age, we may find that we have less time to achieve the goals we have planned, leading to increased urgency, and conflict with other concurrent activity (Carver & Scheier, 1998).

Symptoms of conflict

The consequences of psychological conflict can be divided into several categories: (a) emotion, (b) perception (low order in a control hierarchy), (c) cognition (high order in a control hierarchy), (d) behaviour, and (e) physical effects. As these symptoms become elevated, the individual experiences difficulties in controlling (f) their own behaviour, and (g) their environment.

Emotion

Emotional reactions are thought to each form a cluster of physiological, behavioural, and cognitive reactions that have a functional role with respect to the individual's roles and goals (see Power & Dalgleish, 1997, for a review). They would not necessarily be associated with unresolved conflict. However, control theory would suggest that, owing to the existence of several conflicting control systems in one individual, an emotion can result from one's own thoughts, feelings, or behaviour. For example, in some patients with OCD who fear they may be dangerous to others, one control system displays fearful reactions towards the output of another (e.g. an impulse to stab someone), and safety behaviours are carried out to prevent a catastrophic outcome, even if that outcome may be extremely unlikely.

Perceptual distortion, imagery and hallucinations

PCT theory proposes that the vital lower order reference values of a control system hierarchy have developed to direct behaviour to lead to a match with external perceptual experience. Internalized rehearsal of imagery can act as a surrogate for the real world and be used in planning behaviour. Recent accounts of the role of imagery in cognition support such a view (Damasio, 1994; Marks, 1999). During conflict, a high-order system can reach its reference value by affecting the input function (sensory experience) of lower order perceptual systems; this could lead to the kind of perceptual distortions and hallucinations which affect behaviour (McNab, 1993; Powers, 1973). Indeed, one cognitive theory (Morrison, Haddock, & Tarrier, 1995) proposes that the experience of auditory hallucinations in psychosis provides a method whereby an individual reduces the conflict caused by cognitive dissonance, through attributing the responsibility of their disturbing thoughts to an external source other than the self. Indeed, there is evidence that hallucinators have a characteristic style of thought control, involving punishment and reappraisal, that may increase the likelihood of external attribution (Morrison, Wells, & Nothard, 2000).

McNab (1993) has cited several case examples of a range of highly idiosyncratic perceptual distortions in phobics. In addition, evidence is accumulating that patients experience uncontrollable, recurring, distorted visual images during anxious situations (see Martin & Williams, 1990; Holmes & Hackmann, 2004, for a review). Patients with panic disorder (Ottaviani & Beck, 1987); social phobia (Hackmann, Surway, & Clark, 1998); and hypochondriasis (Wells & Hackmann, 1993) have reported images which encapsulate their catastrophic fear, and trigger behaviour to eliminate the image.

For example, one patient with social phobia had recurring images of himself red-faced, dripping with sweat, which provoked enormous distress (Hackmann *et al.*, 1998). In PTSD, perceptual experience can be distorted to the extent that the patient 'relives' the traumatic experience as flashbacks in response to triggers that had been present preceding, or during, the trauma (Ehlers & Clark, 2000). A recent study suggests that a similar process may be occurring in social phobia following social trauma (Hackmann, Clark, & McManus, 2000). Finally, perceptual distortion of body image is highly characteristic of anorexia nervosa (American Psychiatric Association, 1994; Bruch, 1962). Thus, the evidence of perceptual distortion in psychopathology is consistent with the control theory account.

High level cognition

With increased conflict between control systems comes increased interruption of the flow of behaviour by intrusive impulses and thoughts. More serious complications may occur if one's experiences develop higher order interpretations; indeed this is the central tenet of cognitive therapy. The individual may misinterpret their experience or, more seriously, show problematic biases in their reasoning, and some may develop apparently delusional beliefs. These three levels of cognition will be discussed separately.

A consequence of being unaware of the conflict between high order levels of a control system is that the behavioural, perceptual, and physiological effects of the conflict may receive an alternative explanation which could be threatening. In the control system terms developed earlier, the perceptions caused by conflict may match with aversive reference values for a control system which activates the fear response of increased physiological arousal, escape, and search for immediate safety. Several studies in social psychology indicate that physiological arousal can be misattributed in ways that exaggerate other kinds of emotional responses (Schacter & Singer, 1962; see Reisenzein, 1983, for a review). Within the clinical field, empirical evidence suggests that bodily sensations can be misinterpreted to lead to panic attacks (see Clark, 1996, for a review), or more long-term worry about health in hypochondriasis (Salkovskis & Clark, 1993). Other internal reactions can also be misinterpreted. For example, individuals with OCD who experience uncontrollable thoughts and impulses involving danger to others perceive that they will be responsible for harm to others (Salkovskis, 1985; Salkovskis *et al.*, 2000). Furthermore, evidence suggests that auditory hallucinations are experienced as more distressing when the source of the voice is interpreted as being powerful and able to control them (Birchwood & Chadwick, 1997; Soppitt & Birchwood, 1997). Thus, according to the modern control system approach developed here, both internal conflict, and the catastrophic interpretations of the consequences of conflict, can cause psychopathology, and, indeed, the balance of causation is likely to differ between individuals.

Powers (1973) suggests that unresolved conflict can cause compromises in one's use of logic. Similarly, cognitive behaviour therapy typically involves the search for 'thinking

errors' and 'misinterpretations' (Beck, 1976). Indeed formal tests indicate that most people engage in faulty reasoning (e.g. see Piattelli-Palmarini, 1994), with specific patterns observed in individuals with psychological disorders. For example, within the anxiety disorders, Arntz, Rauner, and van den Hout (1995) found that anxious patients engage in '*ex consequentia*' reasoning. In a printed task, they allow their estimates of danger to be influenced by their anxious state, whereas controls used external information. De Jong, Weertman, Horselenberg, and van den Hout (1997) showed that spider-phobic women were characterized by a general tendency to confirm rather than falsify prior beliefs irrespective of whether they concerned phobic or neutral material. Within the psychotic spectrum, the existence of delusions has been associated with a bias to gather less data before coming to a conclusion when engaging in reasoning (see Garety & Freeman, 1999, for a review) and delusions themselves form a cluster of beliefs in ideas such as telepathy, conspiracy, and the supernatural which would be regarded as irrational, yet they are on a continuum with normal beliefs (Peters, Joseph, & Garety, 1999; Van Os *et al.*, 1999; Verdoux *et al.*, 1998).

While the PCT account suggests that stress caused by conflict is the cause of distorted reasoning, cognitive therapy suggests that distorted reasoning is the cause of distress. With evidence on both sides, it may be more productive to suggest a reciprocal relationship between the two (De Jong *et al.*, 1997). Indeed, where compromising our logic in some circumstances can provide a short-term solution, when later applied to other circumstances it can prove dysfunctional. For example, belief in an obscure cult may appear illogical to many observers, yet for the believer, the religion provides security, although only under the strict rules of the cult.

As an extreme, conflict can be temporarily resolved through self-deception and even delusion (Donlon & Blacker, 1975; Powers, 1973; Frank, 1993). The individual may loosen their rules of logic and allow perceptual scenarios within their imagination to lead to the construction of a fantasy. It may have some constructive effects on behaviour, but the problem is that the resolution is only in the mind and may be regularly challenged by the environment. The further an individual deceives themselves, the more they will be in conflict with information from their external environment, which they need to distort to maintain the illusion. This process has received little experimental research.

Behaviour

When faced with conflict from more than one control system, the behaviour of an individual may manifest itself in several different ways. The individual may oscillate between different behaviours (indecision); their behaviour may include elements that address both systems at once (compromise behaviour); or their behaviour is compromised so that the individual can only approximate to their goals (displacement behaviour). The conflicted individual has already been described as indecisive; they oscillate between different goals, both in imagination and in behaviour, without seeing them to their end point. Notably, anxiety disorders such as GAD and OCD are

characterized by problems in decision making. Although the relationship between internal conflict and indecision has not been investigated on these disorders, two studies have shown an association between indecision and internal conflict in a non-clinical population (Jenkins, 1996; Van Hook & Higgins, 1988).

Compromise behaviour is regarded by control system theorists as a temporary resolution to conflict, as the individual responds in a way that includes output functions of both the conflicted control systems (Bowlby, 1969). Many incidences of human behaviour could possibly be classified in this way. One example is the 'Freudian slip', during which one's current utterance is disrupted by unconscious 'wishes' entering consciousness, leading to the substitution of an innocuous word with a less socially acceptable (often sexual) term. There is a history of observations that an individual's behaviour and their current conscious interpretation can be contradictory (Beck *et al.*, 1985; Freud & Breuer, 1955; Parkinson, 1999; Rachman & Hodgson, 1974; Teasdale & Barnard, 1993). The specific phobia is one example where the patient may declare that they are not afraid or that their fear is irrational, despite acting on their fears and attempting to escape the situation. One way to resolve this paradox is to suggest that the individual's behaviour and verbal statements are at that time under the influence of two independent conflicting systems (Mansell, 2000), one responsible for avoiding danger; the other responsible for protecting one's sense of self or public appearance.

An alternative behavioural reaction to conflict is for a new output function to develop. This enables the organism to control its environment and to reach a perception which is an approximation of the target reference value of a conflicted control system. This idea of displacement activity has been adopted by control system theorists, but has a long history in animal behaviour (see McFarland, 1985). For example, Bowlby (1969) suggests that what the psychoanalytic tradition describes as symbolic behaviour (such as thumb sucking) is often a displaced attachment response focused on the self, or on inanimate objects. Displacement activity could include a diverse range of activity including obsessive dieting, exercise, checking, and cleaning (Pitman, 1987). While the existence of displacement behaviours is not itself dysfunctional, they will become dysfunctional if pursued to the exclusion of other more important goals. Perhaps the key feature that makes the displacement behaviour dysfunctional is lack of awareness; if the individual is not aware that their displacement activity is a substitute for another conflicted goal then they will continue the displacement activity as a goal in its own right, and even escalate their attempts or raise their standards to reach it, despite its lack of effectiveness.

Physical effects

A considerable body of evidence for the link between conflict, physiological processes, and disease has been reviewed elsewhere (e.g. Emmons *et al.*, 1993; Friedman & Booth-Kewley, 1987).

Involuntary reactions and loss of self-control

The *Diagnostic and statistical manual of mental disorders* (DSM-IV; American Psychiatric Association, 1994) describes dysfunctions in self-control as at the heart of many psychological disorders including substance dependence, the anxiety disorders, dissociative-identity disorder, eating disorders, personality disorders, and impulse control disorders (Shapiro & Astin, 1998). Empirical studies have also reported concerns about loss of self-control in several disorders including panic disorder (Ottaviani & Beck, 1987); spider phobia (Thorpe & Salkovskis, 1995); GAD (Cartwright-Hatton & Wells, 1997); and PTSD (Card, 1987). Mineka and Kelly (1989) review a range of evidence that fear of losing self-control is implicated in anxiety disorders. But what causes the sensation of loss of self-control that becomes feared? The control theory approach would appear to suggest a simple answer (see Fig. 3). Control systems can operate automatically, without voluntary control. Therefore, when two control systems are in conflict, one of these systems is being resisted through conscious attempts, yet the control system does not yield to attempts at suppression, and the individual will get the sense that the reactions being caused by this system are involuntary. Presumably, the further a control system becomes dissociated from the rest of an individual's control hierarchy, the more its behaviour will be perceived as involuntary and/or out of control. The initial response of a control system will be triggered by a change in perception at a certain level in the control system hierarchy, but there are several processes which may also enhance loss of control shortly after an initial response (for a comprehensive review, see Baumeister *et al.*, 1994). First, certain behaviours such as drinking alcohol, sexual activity, and eating, have the effect of reducing self-focus, thereby interfering with attempts to suppress the behaviour. Second, certain behaviours act as triggers for a

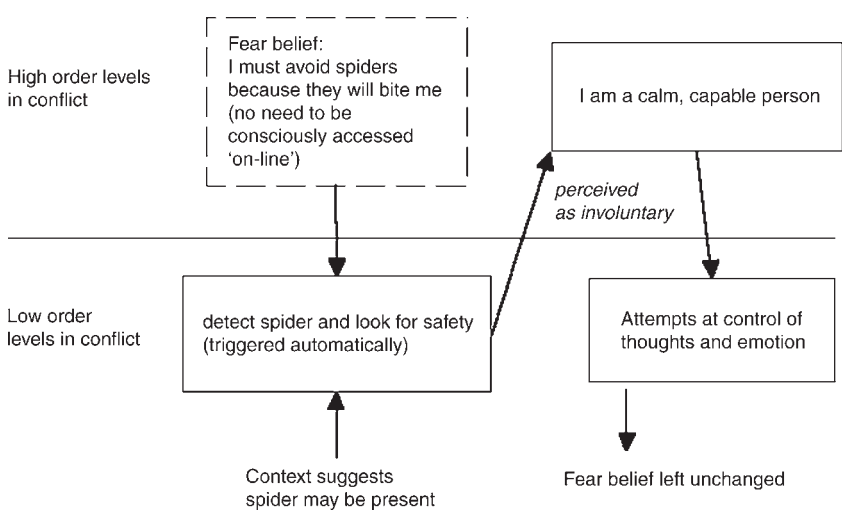

Figure 3. Involuntary reactions may be conceptualized as the simultaneous awareness of a high order level of one control system and the effects of the automatic operation of a second, conflicting control system.

fixed action sequence, such as getting food out of the fridge which leads to preparation and eating. Third, certain behaviours which appear to be out of control may actually be motivated by attempts to reduce negative affect and excessive self-awareness (i.e. these negative states match with anti-goals for a control system which trigger avoidance behaviour). Fourth, individuals will make no attempt to control their behaviour if they perceive they have no ability to control it, for example, if they view their behaviour to be caused by a genetic disease (such as alcoholism), or they believe that a minor transgression is as bad as a full loss of control ('zero-tolerance' beliefs).

Lack of control of the environment

According to Powers (1973), when two control systems are in conflict, the individual remains in a 'dead zone' with respect to the shared reference value, within which control cannot be exercised. Thus, the individual may be more prone to experience anxiety on future threatening occasions if their attempts to reach safety require responses that affect perceptual experience in the uncontrolled domain. Various theoretical perspectives have suggested that lack of control over the environment is associated with psychopathology (see Shapiro & Astin, 1998, for a review), although it should be noted that the belief in a powerful benevolent other who can prevent a negative outcome (e.g. a parent, an authority figure, or God) can act as a protective factor in the face of a perceived lack of one's own control over the environment (Shapiro & Astin, 1998). An assessment of the empirical studies of the role of control in anxiety has concluded that lacking perceived, actual, or potential control over aversive events substantially increases the amount of anxiety/fear produced by these events (Mineka & Kelly, 1989). It has been suggested that where the perceived likelihood of a negative outcome in the face of lack of control reaches certainty (i.e. hopelessness), then the individual experiences depression (Alloy, Kelly, Mineka, & Clements, 1990; Mineka & Kelly, 1989).

Maintenance factors

The key issue with respect to treatment is to discover the features that maintain and prolong psychopathology. There is now convicing evidence that a small number of psychological processes maintain a wide range of psychological disorders (Harvey, Watkins, Mansell, & Shafran, 2004). Within the framework described here, maintenance factors are seen as those psychological processes that prolong internal conflict within psychopathology. Many of the symptoms of conflict themselves may serve to maintain it, namely by misattributing the effects of conflict to other causes, compromising one's use of logic, and developing displacement behaviours. Further processes are described below.

Awareness

Several theorists have proposed that limited awareness maintains psychopathology (Carver & Scheier, 1998; Goldstein, 1990; Powers, 1973). Much of the time, people's

awareness is seen to be directed to the programme level of the hierarchy because this is the point at which most decision making takes place (Carver & Scheier, 1998). There are several consequences for the maintenance of conflict. Without access to one's higher order motives, perceptions that occur through the automatic activation of lower order systems may appear to be involuntary, even though they are functionally related to higher order goals of which they are not aware (Mansell, 2000). Consequently, they are more likely to try to control their involutary behaviour using arbitrary control, which proves to be counterproductive. Second, restricted awareness means that individuals who are continually pursuing a goal to an extremely high standard will consequently be unaware of the effect of their behaviour on their own well-being and on that of others. Third, if the patient cannot identify the rewarding goals that are being blocked by their psychological problems, they may be less motivated to change their behaviour.

Several writers suggest that individual differences in the general tendency to focus on certain levels of the control hierarchy lead to differences in psychopathology (Baumeister *et al.*, 1994; Carver & Scheier, 1998; Hamilton *et al.*, 1993). Individuals who focus on high level, and therefore, long-term goals, are more likely to suffer from depression because they will accomplish their goals less frequently, and view their inability to achieve their goals as a reflection of themselves rather than a short-term feature of their context. On the other hand, people who focus on the lower levels are likely to be more impulsive in their behaviour. Finally, another group of individuals oscillates uncontrollably between a high-level focus, which creates negative affect as they fail to achieve their long-term goals, and therefore flip to a low-level focus to escape the excessive negative affect this entails (e.g. by bingeing or taking drugs). Healthy individuals are able to flexibly move their awareness up and down the hierarchy to address both long-term and short-term goals (Baumeister *et al.*, 1994; Carver & Scheier, 1998; Hamilton *et al.*, 1993).

Selective processing of confirmatory information

The function of a control system is to elicit behaviour that reaches a desired reference value, which is specified at lower, more concrete, levels in the hierarchy. Thus, individuals will selectively process information that confirms their higher order beliefs and tend to ignore information that contradicts them. This bias occurs at the level of attention to specific environmental stimuli, and at a higher level where individuals are motivated to interpret information that confirms their pre-existing beliefs. A range of evidence supports the view that individuals with psychological disorders selectively attend to, and process information that confirms their pre-existing beliefs (see Clark, 1999; Dalgleish & Watts, 1990, for reviews).

Attention focused on the self (Carver & Scheier, 1982; Duval & Wicklund, 1972) can be particularly difficult, and leads to at least three problematic effects. First, it represents selective attention away from information from the environment, which may disconfirm the individual's dysfunctional beliefs. Second, it may disrupt performance because this often relies on attention being focused on the environment. Third, discrepancies

between current perceptions of the self and internal standards (reference values) become more salient, and the individual modifies their behaviour to reach the standard. This can be useful for moderating one's behaviour, but often the individual becomes more aware of their inability to reach the desired standard, and begins to engage in safety-seeking strategies to prevent the catastrophic consequences of substandard performance. Therefore, individuals continue to believe that they need to reach a certain high standard of performance, and that failing to reach it may lead to a catastrophic outcome. The notion of self-focused attention has been widely elaborated and researched in the fields of social psychology and psychopathology (Barlow, 1988; Hope, Gansler, & Heimberg, 1989; Ingram, 1990; Nolen-Hoeksema, 1996; Pyszczynski, Greenberg, Hamilton, & Nix, 1991; Wells & Matthews, 1994), leading to findings which are consistent with the above account. For example, socially anxious individuals focus attention on the perceived discrepancy between their current perception and their desired standards, which may lead them to underestimate their performance, and become more anxious at the possibility of being rejected or criticized by others (see Clark, 2000, for a review).

Fear of change

Fear of change will block any attempt to modify one's beliefs and goals. Several factors lead to fear of change. The first is when there is a significant discrepancy between the desired self after change, and the current self. As discussed earlier, setting excessively high standards increases the likelihood that the individual will fail to reach them and experience further negative affect. The second is the interdependence of one's beliefs and goals. Certain beliefs which contribute to psychopathology may nevertheless support other more functional beliefs. An example is the self-serving illusion, which nevertheless fosters a functional level of self-esteem. Also, as an individual engages in a behaviour for longer and longer, they begin to invest more of their time and resources in that project. The long-term stringent dieting of anorexia nervosa is one prominent example. To reorganize behaviour at that point becomes an arduous task because of the huge changes it entails to the patient's life, and will be strongly resisted. Third, people may fear that if they change themselves then they will lose the social contacts with people who know them as they currently are; for example, people of a low socio-economic group may fear being rejected by their peers if they become successful.

The escalation of conflict

The control theory approach has the advantage of being able to explain how psychopathology can develop through internal processes. There are psychological processes which contribute to conflict, and psychological processes responsible for its maintenance. A physical metaphor for such a process is the ratchet; one can move up a notch easily, but to move back down requires a larger change in experience. An alternative term for the phenomenon is *hysteresis* (Carver & Scheier, 1998). Figure 4 provides an

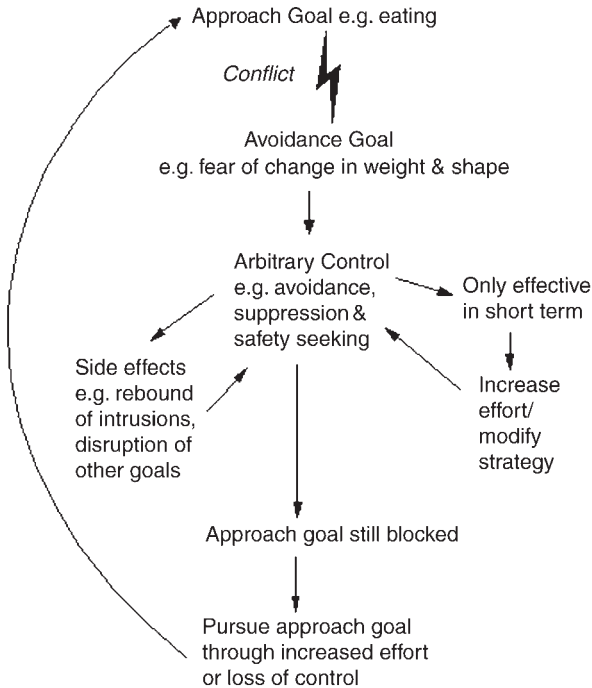

Figure 4. A simplified diagram to illustrate how the arbitrary control of behaviour can lead to an escalation of psychological conflict.

overview of how psychopathology can evolve based on the idea developed in this integrative review.

(1) Conflict is a normal consequence of pursuing many different goals. However, several factors contribute to excessive conflict, as described above.

(2) Where the reference value of an approach goal, the consequences of pursuing a goal, or the consequences of failing to reach an approach goal, match with an anti-goal, the individual engages in arbitrary control of their behaviour.

(3) Arbitrary control creates three problems. First, it does not address the causes of conflict. Second, it may lead to side effects, which can be the cause of further conflict. Third, it only has short-term beneficial effects. Thus, people may try harder in the mistaken belief that it is a useful strategy, leading to increased conflict.

(4) Escalating conflict is maintained by a range of psychological factors such as selective attention, and lack of awareness of higher and lower levels of the control hierarchy. A successful treatment depends on reversing the above processes.

The process of therapy

A control systems approach should provide an explanation for how psychological therapy works and also provide new recommendations. Indeed, earlier papers (e.g. Goldstein, 1990; Hamilton *et al.*, 1993) have discussed the implications of control

theory for psychological therapy. The following section aims to complement earlier papers by focusing on explanatory clinical examples, and on further evidence. Control theory would recommend that the effective therapist makes minimal attempts at directly controlling the client's behaviour. Instead, the therapist creates an environment which is accepting of the client's responses, and provides the security for the patient to experience aversive emotions and disturbing perceptions without attempting to control them arbitrarily, but rather allowing them to generate and test novel behaviours. The therapist should create an environment where goals for change are motivating and yet realistic, and in which one's emotions, errors and mistakes are accepted as part of the learning process.

Several specific features of cognitive behaviour therapy can also be interpreted according to this perspective. At the heart of cognitive therapy is the suggestion that problematic beliefs can be modified by allowing the patient to access evidence that might disconfirm them. However, evidence cannot simply be provided verbally to the patient by the therapist for several reasons, which makes sense when a control systems theory perspective is taken. In particular, the patient must fully attend to and process the information and, therefore, prevent the arbitrary control of their perception by selective attention, safety behaviours, and avoidance; that is, they must engage in full emotional processing (Rachman, 1980). According to control theory, their awareness of both higher and lower levels of their control system hierarchies is particularly important.

Awareness of high order goals and beliefs

The patient must be able to access their problematic beliefs in order to process information which might disconfirm them. An important role of the therapist is to allow the client to flexibly explore their control system hierarchy, thus focusing on awareness of those levels which are not accessed (Carver & Scheier, 1998; Goldstein, 1990). Safran and Segal (1996) provide detailed examples of how awareness can be manipulated by facilitating 'de-centreing'. In the de-centred state the individual appears to be simultaneously aware of two conflicting beliefs so that new information can be used to resolve the conflict between them. Several other theorists have recommend that a de-centred or 'mindful' state of awareness facilitates reduction in psychological distress, although their theoretical basis differs (e.g. Wells & Matthews, 1996; Teasdale & Barnard, 1993).

Safran and Segal (1996) cite an example of a patient who has difficulty accessing a higher order belief. The patient states an apparently unquestioning belief about reality (e.g. 'My friend's mother who I am staying with sees me as an inconvenience'). Through the therapist inquiring about evidence for this notion, the patient is able to access the experiences, thoughts, and feelings surrounding this belief, which uncover the higher order belief that she must be independent and in control. In this example, the patient was able to access an early experience related to this belief; she had a painful memory of wanting to stay with her parents after the break-up of a disastrous marriage, but they refused. This memory highlighted the conflict between a desire for independence and

yet also a dependence on others. The patient can now see the arbitrariness of the rule of absolute independence she has set for herself and is beginning to use the information to resolve the conflict between these beliefs.

Awareness of lower order reference values

If certain lower order reference values induce fear reactions and distress then they would need to be accessed to modify them. However, a range of evidence suggests that individuals with psychological disorders find it difficult to voluntarily access lower order reference values. Depressed patients consistently process information at a generalized (higher), rather than a specific (lower), level (for a review, see Williams, 1996). Worry has also been regarded as abstract thinking which interferes with the activation of threat schema and imagery (Borkovec & Inz, 1990). A range of evidence suggests that exposure (in either imagination or in real life) to the perceptual stimuli that engage behaviour and physiological arousal are effective in treating anxiety disorders (for a review, see Hackmann, 1998). For example, in a study of individuals experiencing trauma, those without PTSD reported more images than thoughts at the time of trauma, and experienced less distressing intrusions following traumatic events (Reynolds & Brewin, 1998). An experimental study (Butler, Wells, & Dewick, 1995) has confirmed that engaging in imaginal re-exposure after viewing a traumatic film reduced the frequency of intrusive images after 3 days. Hackmann proposes that allowing individuals to experience their disturbing imagery (i.e. to access lower order reference values) can allow a change in higher order meaning as the image transforms, often as the individual realizes that their imagery is a distorted memory of the past, rather than a present depiction of a threatening reality.

One study has directly compared the role of facilitating awareness of low-level perceptual information in reducing negative self perceptions after a speech (Harvey, Clark, Ehlers & Rapee, 2000). Following a speech to a video camera, students made ratings of their performance on traits such as awkwardness and looking anxious. Half of the participants then viewed the video and re-rated themselves. The other half were asked to go through the traits they had rated and specify exactly how they would view these traits if they were viewing a stranger. Then they watched the video and re-rated the traits. Both groups improved their ratings after watching the video, but the increase was greater in the preparation group. One explanation for these results is that attending to the low order perceptions that specified their global ratings of themselves allowed them to find out that their observable behaviour did not in fact match their perceived appearance (reference value). This finding is highly consistent with the hierarchical nature of beliefs as described by control theory.

Techniques

A practical strategy that the therapist can employ to encourage the patient to flexibly move up and down their control hierarchies is to ask *how* and *why* questions (Goldstein, 1990). To answer a *why* question, one needs to access higher order goals, and to answer

how questions, one must describe the lower order levels of the control hierarchy that allow one to reach the goal. Thus, higher level goals are identified and analysed in terms of the specific perceptions and behaviours that are associated with them, and then the higher order levels can be re-specified in more effective ways. Thus, the individual may generate new ways to view important higher order goals, and new methods to achieve them. This process is consistent with the process of problem solving (e.g. D'Zurilla, 1986), and with the process of reinterpretation in cognitive therapy (e.g. Beck, 1976). Carver and Scheier (1982) also discuss the importance of 'bootstrapping', which involves learning a strategy in one domain and then applying the technique to solve problems in another area. Authors in other fields have noted that the process of thought appears to use metaphors based on experience with the outside environment (Minsky, 1987; Jaynes, 1976). A clinical example of the use of metaphor is given by Beck *et al.* (1985) of a patient who was unable to write for 3 years, because when she started to write she was plagued by thoughts that her earlier writing talent had gone forever. The therapist used the analogy of writing being like pumping water: when a pump has not been used for 3 years, rust and dirt accumulate; you have to pump water through it for a while until the dirty water runs through. The analogy helped explain to the patient that at the start of writing after a long gap, quantity is more important than quality, and one is able to evaluate one's writing after a certain amount of time and practice.

Developing open-ended and shared approach goals

The development of new goals is an inevitable part of development. For this reason also, there is always the potential for our goals to conflict with one another. As well as promoting strategies for reducing conflict, therapy needs to allow the continual and satisfying process of generating new open-ended approach goals (Carver & Scheier, 1998). One important way to promote this is to facilitate the development of shared goals with other individuals. Indeed, the need to form attachments and share goals and beliefs with others appears to be a fundamental human need (Baumeister & Leary, 1995).

A range of theorists have elaborated on the kind of adaptive mutual cooperation which can bypass conflict between, and within, individuals. Different authors have termed the process *interdependent control* (Shapiro & Astin, 1998), *non-zero sum games* (Wright, 2000), *transactive memory* (Wegner, 1986), *mutual cooperation* (Jolly, 1999), *collaborative partnership* (Rollnick & Miller, 1995), and the *hedonic mode* (Chance, 1980; Trower & Gilbert, 1989). Although these accounts differ slightly, they each share the view that adaptive development involves cooperation between individuals in the pursuit of shared goals in the context of mutual trust and affiliation. Individuals can openly promote the benefits that they can provide for the group without the threat of rejection. It contrasts with the *agonic mode* (Chance, 1980; Trower & Gilbert, 1989), in which dominant individuals control the behaviour of others through threats, and subordinate individuals elicit submissive gestures to appease them, thereby preventing punishment.

Thus, the therapist should both provide a model for the patient to encourage trust and affiliation, and encourage the development of new approach goals with the patient, many of which will involve other people. The control theory approach may indicate why this can often be an energy- and time-consuming process. No two individuals will possess the same control hierarchies, even if they make a verbal agreement that they share a goal with one another. Therefore, misunderstandings can occur. In order to be confident that we fully share a goal with someone else, we need to explore each other's control hierarchies (i.e. observe one another's verbal and non-verbal behaviour and infer the lower order perceptions that make up each person's higher order goals). This will arise only after sufficient exchange of information, and may be blocked by selective attention to confirmatory information (e.g. 'this person's appearance indicates that s/he is dangerous'), and arbitrary control (e.g. punishment, threat, escape). Although not developed with control theory in mind, the technique of motivational interviewing (Miller, 1983; Rollnick & Miller, 1995) provides a suitable method to promote trust that is consistent with the theory presented here. It places emphasis on enhancing intrinsic motivation for change, rather than extrinsic motivation as emphasized by the standard behavioural approach. It also pays close attention to the meaning of non-verbal behaviours, and it emphasizes that the therapist should limit attempts to directly control the behaviour of the patient.

Existing work on concepts of control: A possible integration

There is a diverse scientific literature on the concept of control within psychology, and many authors have attempted to assess the dimensions of control and their consequences for mental and physical health (for a review, see Shapiro *et al.*, 1996). It would appear necessary to resolve much of this literature with respect to the model presented here in order to justify its scientific contribution.

The existing evidence suggests that people with psychological disorders report an impairment in their control over areas of their life that relate to their specific concerns. For example, as stated earlier, patients with panic disorder report a fear of loss of control over their behaviour. Moreover, in a group of patients with a variety of psychological disorders, it was found that individuals made more statements regarding loss of control, or a fear of loss of control, than those regarding having control, or a belief that they could gain control (Shapiro, Bates, Greensang, & Carrere, 1991). Moreover, there is a general pattern for patients who report low perceived control, or an external locus of control, with respect to their illness to have an increased rate of disease, as assessed by a variety of objective measures (Shapiro *et al.*, 1996). Such findings clearly suggest that issues of control are important to address in therapy.

Many diverse and conflicting measures of control have been developed within the literature, including locus of control (Levenson, 1972), desire for control (Burger, 1985), and self-efficacy (Bandura, 1999). Therefore, many authors have pressed for a multi-faceted approach to assessing control (Carver & Scheier, 1998; Rosenbaum, 1993;

Rotter, 1990). To address some of these concerns, Shapiro (1994) has developed a multidimensional measure of control that assesses overall sense of control, motivation for control, mode of control (assertive vs. yielding), and agency of control (self vs. other). Overall sense of control is the patients' report of how much control they have over a certain domain of their life, such as an illness, or their career. The motivation for control refers to the patient's desire for control over this area of their life. The mode of control refers to the patient's interpersonal approach. Interestingly, both asserting oneself or yielding control can be either positive or negative in nature. For example, one can attempt to assert control and yet become frustrated and self-blaming if one does not succeed. Alternatively, one can both assert control and succeed in achieving control. On the other hand, one can yield to the extent that one becomes a passive recipient to other people, or one can yield in order to accept and accommodate the limitations of one's own situation. Agent of control refers to whether the patient perceives that the self or the other is perceived as the primary source of control. As stated above, it is worth noting that sometimes feeling under the control of a benevolent, capable other (e.g. owing to religious beliefs) can lead to a positive sense of control (Shapiro, 1989).

When comparing the above approach to the model presented here, several parallels and predictions emerge. The current model would suggest that a desire for control would typically be motivated by either an approach goal, or an avoidance goal. In particular, people who fear the consequences of loss of control, as many patients do, would be motivated by an avoidance goal (anti-goal), and their attempts at control could be conceptualized as a safety behaviour. In this model, there would be at least two different ways that a strong desire for control could prove to be dysfunctional. Both are through the use of arbitrary control, and yet they would differ in their *mode* of control, as defined by Shapiro (1994). First, the patient may try to control the situation themself by asserting themself in a counterproductive way. For example, the patient with OCD who is afraid of contamination may assert themself and insist to their family that they wash themselves every time they return to the house. In the second alternative, the patient may yield to their family and not insist that they wash every day, yet make attempts to instigate arbitrary control of their own situation through behaviours that do not involve assertiveness. For example, s/he may wash themself repetitively or avoid getting too close to their family members. Thus, while the patient may appear to yield to others, they have not yielded to their own demands for control over a feared outcome. It is possible that there would be a third type of patient who might genuinely show a particularly low desire for control, and, as a consequence, would become manipulated by the arbitrary control of other people regardless of their own needs. However, the theory would predict that even this patient would experience a desire for control eventually, as the arbitrary control by others would lead to them into aversive situations or mean that their goals (reference values) were not reached. Thus, there is a reasonable argument for the dysfunctional role of arbitrary control even when accounting for the useful conceptualization of control provided by Shapiro. Also, while the patient may

yield to the control of others in an interpersonal sense, they may continue to struggle to gain control in an unassertive way if their fear beliefs (avoidance goals) are not modified.

The above analysis has important implications for therapy. It suggests that while two people may share the same concern, or the same disorder, their methods of trying to avoid a feared outcome (e.g. contamination; going 'mad') are likely to differ depending on their 'control profile', and in particular on their modes of interpersonal control. Thus, the therapist needs to make a matching between the individual's profile and their clinical technique (Shapiro, 1994; Shapiro *et al.*, 1996). It remains to be assessed whether it is preferable to encourage the patient to attempt to use a new mode of control (switch from yielding to asserting or vice versa), or to use the same mode of control but in a positive, rather than a negative, way. It may be more advisable to make the individual aware of both the positive modes of control, which they can add to their repertoire of behaviours. Role playing these behaviours in relevant situations would help the patient draw on them. An alternative approach would be to suggest that the feared outcome (avoidance goal) is primary, and if the therapist can help the patient explore their beliefs (and maybe reappraise their feared outcome as less threatening), then the individual will reduce their desire for control, whether it be through an assertive, or a yielding, mode. The patient may have to experiment with dropping their attempts to control the situation and observe the outcome. This technique is a behavioural experiment and a core, effective feature of cognitive therapy (Bennett-Levy *et al.*, 2004). Relinquishing control over symptoms and identifying future goals is also a core tenet of Acceptance Commitment Therapy (Hayes, Strosahl, & Wilson, 1999). Nevertheless, even through the process of these therapies, the therapist would still need to be aware of either exerting too much control over the yielding passive patient, or yielding too easily to the assertive overcontrolling patient, which might have the effect of perpetuating the interpersonal cycles that they engage in outside the session, causing their problems to persist. The therapist and client may need to work together in order to detect these attempts at arbitrary control by either party, through asking the kinds of questions that increase their awareness of higher and lower order goals, as described earlier. As control theory suggests, it is only by understanding the causes of one's behaviour in more detail that the counterproductive methods of control may be reduced, and new methods tested.

Further theoretical and empirical considerations

The present review was designed to explain how control theory can provide a framework for understanding many of the symptoms of psychological disorders and to account for recent findings, especially in the cognitive field. Nevertheless, it should also be directly empirically testable in itself. In particular, the approach would predict that (a) many behaviours are carried out automatically, yet are serving higher order goals which can be consciously accessed when prompted appropriately; (b) consciously held beliefs affect behaviour through their links to lower order perceptual goals (such as avoiding aversive internal states and imagery); (c) psychopathology is associated with

increased psychological conflict. Both phenomenological and experimental studies could be carried out to test these hypotheses within specific disorders. In principle, the control theory approach provides a model-building framework on the basis of which detailed formulation of case histories could be developed, tested for predictive power, and of course, used for treatment.

Within the domain of cognitive therapy, it has been argued that to lead to sufficient change in therapy, it is not sufficient to rely on the information that is transmitted in a 'propositional' form such as language (Power & Dalgleish, 1997; Teasdale & Barnard, 1993). Beliefs must change at the implicational or schematic level because it is these levels that direct behaviour and perception. The very nature of the control system hierarchy is at the implicational level of meaning. Indeed, a hierarchy of goals is seen to be involved at the schematic level of organization (Power & Dalgleish, 1997). How the propositional level of meaning relates to PCT is yet to be investigated. The relevance of the control theory approach to other forms of treatment, including reality therapy, existential therapy and rational emotive therapy, has been discussed elsewhere (Goldstein, 1990; Hamilton *et al.*, 1993).

In the long term, control theory may have the potential to be integrated with the many other perspectives on psychological disorders. Mansell (2003) describes the role of cultural factors in contributing to psychopathology through increasing the conflict between goals within an individual. In addition, perceptual control theory lends itself well to a biological approach (Powers, 1973; Pitman, 1987) where it has implications for neuroanatomy, neuropharmacology, and genetics. For example, Pitman has suggested that Gray's behavioural inhibition system may be responsible for detecting mismatch in the environment which triggers change in behaviour; this function is seen to be moderated in specific ways by the balance of neurotransmitters such as dopamine, serotonin, and norepinephrine. Certain areas of psychopathology, such as psychosis, somatization, dissociative disorders, and personality disorders have not been covered in detail here; however, Power's initial approach suggests that PCT can provide a constructive framework for understanding them. Several long-standing psychological perspectives also remain to be integrated, including the large base of literature on learning theory in animals and humans. Finally, the PCT approach to personality has not been discussed here; although it would seem to converge closely with goal-oriented and social-cognitive theories (Pervin, 1989; Mischel & Shoda, 1999), yet also have the potential for integration with biological approaches.

Summary

Control theory proposes that behaviour can be explained as the attempt of an individual to maintain certain specific perceptions of their internal and external environment. PCT (Powers, 1973) and, more recently, theories of self-regulation of behaviour (e.g. Baumeister *et al.*, 1994; Carver & Scheier, 1998), provide very useful frameworks to explain how self-regulation can become maladaptive in psychological disorders. An overview of these approaches has led to the conclusion that excessive, unresolved

conflict between control systems (hierarchies of goals) is a prominent cause of psychopathology. Conflict occurs because a satisfying life seems to require the continual generation of new open-ended goals, but the conflict is prolonged and made more extreme by particular counterproductive psychological processes.

Two key causes of severe conflict are arbitrary control and the existence of anti-goals. Arbitrary control is the attempt to control one's behaviour or perception without questioning the reasons for that behaviour. The behaviour is often a product of one's own goals which are operating automatically. Anti-goals are the perceptions which we are motivated to avoid, and they are particularly problematic because they can lead to extreme emotions such as fear, and they elicit behaviour that draws the individual away from certain experiences and towards safety, rather than towards a positive goal.

To understand the role of conflict in psychopathology, it is useful to divide psychological processes into the causes of conflict, the symptoms of conflict, and the maintenance of conflict. Several of these processes are common to the cognitive approach to psychological disorders, which has led to research which provides evidence consistent with control theory, although more evidence is required. Other processes are more directly related to those discussed in other disciplines, including animal behaviour, attachment theory, and psychoanalysis.

Therapy for psychological disorders based on control theory would incorporate methods of testing maladaptive beliefs, as suggested by cognitive therapy, but it would also pay close attention to methods of accessing those beliefs and goals that are not currently in awareness, and those low order perceptions that are not currently being experienced. Like cognitive therapy, patients are encouraged to learn their own techniques for dealing with conflicting goals and beliefs. Control theory also suggests that it is vital to attend to interpersonal processes, as these affect the delicate balance between the positive effects of mutual cooperation, and the negative effects of arbitrary control. The ultimate aim of therapy is to reduce psychological conflict so that the patient can develop a succession of open-ended goals for life, many of which will involve cooperation with other people.

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