

## 15 Reinforcement sensitivity in the workplace: BIS/BAS in business

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Personality theorists usually get ever more adventurous as they set out empirically to test their ever more sophisticated theories. Most naturally begin in the laboratory, sometimes even the animal house, testing fundamental (biological and behavioural) tenets of the theory, which develops and changes as it is tested. However, demands both for ecological validity and applicability mean they soon find themselves testing theoretical assumptions on 'real people in real settings'. These settings are most frequently the clinic, the classroom and the office/factory.

Any inspection of work of the trait theorists like Eysenck, Cattell and latterly Costa and McCrae shows how they usually first became interested in the *clinical* applications of their work, then the *educational* applications and finally the *occupational* and organizational applications. Perhaps because Eysenck was at the Institute of Psychiatry (though neither a trained nor practising clinician) he took a great deal of interest in clinical issues with all three dimensions (i.e., Extraversion, Neuroticism and Psychoticism) having obvious clinical implications. Being both a trained clinician and a student of Eysenck, it is no surprise that Jeffrey Gray too, chose to test many of his ideas first on rats and then on patients.

Raymond Cattell, of the three, seemed more interested in the educational sphere, both because of his educational training but also because of his work on intelligence. Similarly Hans Eysenck was always interested in learning theory and intelligence and always took an active interest in how both personality *and* intelligence predicted educational behaviours and outcomes. Indeed, following Burt, the *British Journal of Educational Psychology* from the 1950s to the 1970s published many papers by Eysenck and Cattell on personality trait processes in educational settings (Cattell 1967; Eysenck and Cookson 1969).

However, the world of work seemed of less interest as a place to test the theories. In a review of Eysenck's personality theory and organizational

psychology, Furnham (1997) pointed out that even an amazingly productive renaissance man such as Hans Eysenck had done comparatively little work testing his theory in organizational settings. This was less true of Cattell, who published various papers on the personality profile of people in different organizations, as well as many works on motivation of all sorts. Even Costa and McCrae have let others test their theories in work settings rather than do it themselves (Judge, Heller and Mount 2002).

Early work based on either the Eysenckian orthogonal, three-factor model or the Cattellian oblique, sixteen-factor model found that there are fairly consistent patterns across jobs. Eysenck (1967) noted that whereas introversion-extraversion varied accordingly to the particular job (i.e., sales: high; research-and-development: low), neuroticism was consistent in that all successful people tend to be stable. Extraverts do badly at monotonous, detailed, routine tasks and best in people-oriented, varied tasks. Introverts are less prone to distraction. Further, there is significant evidence that Eysenck's three factors predict negative job outcomes like accidents and absenteeism. Unstable extraverts make mistakes; unstable introverts are prone to psychological and physical illnesses (Furnham 1999, 2005).

The work inspired by Cattell's theory has also shown small but consistent, significant and logical correlations between personality factors and such things as absenteeism, entrepreneurship, performance and turnover (Furnham 1994). However, in their manual Cattell, Eber and Tatsuoka (1970) have elaborate equations showing how his sixteen factors need to be specifically weighted and combined to predict such things as the performance of retail and wholesale sales staff. Many results show that the neuroticism factors (C = Emotional Stability, Q4 Tension; O = Apprehensive) are negatively related to job performance.

It may be of some surprise to many to learn that while Jeffrey Gray was at the Institute of Psychiatry following Hans Eysenck, he started and directed a very successful Organisational Consultancy (Psychology at Work Ltd). Despite this, his incredible CV shows very, very little evidence of him taking any interest in the world of work, save perhaps a small number of papers with the editor of this volume (Corr and Gray 1995a, 1995b, 1995c, 1996). However, there is now an active and ongoing research effort, inspired by Gray's theory, to test it in the workplace. This chapter will both review this work and offer some ideas that follow from it. It should be acknowledged that many ideas are based on Gray's early formulation of his theory. Certain features have changed (see McNaughton and Corr 2004; McNaughton and Corr, chapter 2).

## Two approaches

There seems to be a very important difference in the research effort of two groups bent on the same purpose. First, there are personality theorists who wander into the 'real world' in an attempt to test their theories. Secondly, there are organizational psychologists who notice dramatic, stable and important individual differences at work and search out the personality literature in an attempt to find a theory and a measure to explain them.

The basic tenet of 'classic personality theory' approach is to measure personality as the independent variable and to see how it relates to some work-related behaviour (like accidents, motivation, pay, satisfaction, productivity). The approach has been piecemeal and there is very little evidence of a concerted, systematic and programmatic research effort, which is perhaps not that unusual. The selection of work-related variables is somewhat opportunistic, because researchers are usually unable to get measures of the precise behaviour they are interested in. Essentially, studies such as these are nearly always seen by personality researchers simply as supporting evidence for their ideas. The office or factory simply replace the laboratory and provide ecologically valid evidence.

On the other hand, researchers in organizational psychology are usually interested in examining personality correlates of specific work behaviours which might help them select, appraise, promote or train individuals. This research tradition has a number of limitations. First, the choice of personality theories and tests has been arbitrary and uniformed. Personality tests have been favoured mainly because they have been commercially exploited rather than because they are reliable and valid. Secondly, statistical analyses have been simple and naïve. As a rule, simple correlations have been computed rather than partial correlations, or even more preferably multivariate statistics to prevent type II errors (finding more significant differences than actually occur). Given that both independent and dependent variables are multifactorial, it is essential that sufficiently robust and sensitive multivariate statistics are used to analyse results. Thirdly, studies in this area are frequently exploratory and atheoretical rather than based on a sound theory or programmatic research endeavour. As a result, interesting results are rarely followed up and the theoretical implications rarely exploited. Fourthly, researchers often ignore possible organizational and societal factors that either directly or indirectly affect the dependent variable; that is, work-related behaviours are rarely solely under the control of the individual and may be moderated by powerful organizational factors which need to be taken into account.

BIS/BAS theory has neither infiltrated trait psychology in a big way nor organizational psychology, though this pattern may be changing (Campbell *et al.* 2003). This may mean that neither approach is fully informing the other and the concept has fallen through the cracks from a business perspective.

### Measuring the construct

One reason why Gray's theories may have failed to attract much attention is not that they did not appear self-evidently very relevant to the world of work, but rather that they seemed difficult to measure. For most organizational psychologists personality is always an independent variable and some aspect of work behaviour (i.e., productivity, accidents) the dependent variable. What they favour is a simple, robust and valid measure of the personality construct in question. However, it was well over a decade before researchers developed measures of the BIS/BAS concepts. Torrubia and Tobena (1984) devised a 'susceptibility to punishment' scale which showed predictable and satisfactory correlations with Eysenck's measure. Wilson, Barrett and Gray (1989) were less successful, however. They devised a five-dimension measure – approach, active avoidance, passive avoidance, extinction and fight-flight – which, although they showed satisfactory internal consistency, did not correlate with the Eysenckian dimensions as hypothesized (Jackson 2002a, 2003). Later, Carver and White (1994) developed these BIS/BAS scales which have attracted a reasonable amount of interest and research (Johnson, Turner and Iwala 2003) and Jackson developed the JAMS (Jackson's Appetitive Motivation Scale; Jackson and Smillie 2004; Smillie and Jackson 2005) and a more general measure of functional and dysfunctional learning known as the Learning Styles Profiler (LSP) (Jackson 2005).

Whilst the various measures have been used in subsequent papers on the SPSRQ (Torrubia *et al.* 2001), it is not until comparatively recently that good psychometric housekeeping, on all available scales, has taken place. Thus, Caseras, Ávila and Torrubia (2003) compared eight anxiety and impulsivity questionnaires. Indeed, they noted that 'Contrary to most personality models, Gray's model has no standard way to assess the personality dimensions that arise from the theory' (p. 999). Similarly O'Connor, Colder and Hawke (2004) looked at the dimensional structure of SPSRQ but concluded that 'further improvements in this self-report measure should be considered on future research' (p. 985).

Thus, over thirty years on we still do not have a proven psychometrically robust and valid measure of the concept. This never seemed to

concern Gray himself, but it may, rightly or wrongly, be a major explanation for ignorance of the theory and research in organizational psychology. New measures such as the JAMS and LSP have some potential to correct this problem.

### Applications to organizational psychology

Over fifteen years ago Furnham (1992) recognized the potential application of Gray's theory to work settings. The practical application of Gray's theory to occupational settings is appealingly obvious, particularly with respect to motivation. It may seem apparent that it would be a waste of time to try to motivate an extravert (high on BAS) with threats of dire punishment (such as sacking, no pay rise), and it would prove equally unsuccessful to attempt to entice an introvert (high on BIS) with promise of pay and benefits. However, it should be noted that the theory clearly stipulates that, because introverts have some BAS activity and extraverts some BIS activity, everyone is sensitive to *both* reward and punishment but to varying degrees. The stronger the reward or the punishment, the less differentiating its effect. To exact the highest level of performance from individuals, motivators must encourage the BAS extravert with potential rewards and prompt the BIS introvert with judicious use of punitive threats. Further, they need to get the optimal reward-punishment right for their particular employees. Thus, BAS extraverted organizations, like those involved in selling, could best motivate and satisfy their staff by providing regular, but varied, rewards. Equally, a primarily BIS introverted organization, as in many bureaucracies, can best shape or motivate staff by the suggestion of imposed sanctions.

The degree of neuroticism heightens an individual's sensitivity to reward or punishment. The introvert, sensitive to punishment, who displays high neuroticism becomes, and indeed is, more sensitive to both reward and punishment, with the greatest increase being toward punishment; that is, the neurotic introvert becomes more concerned with reward but is even more anxious about punishment than the low neurotic introvert. As neuroticism increases, the extravert (sensitive to reward) becomes more sensitive to both reward and punishment, with high increases in reward sensitivity. Although extraverts and introverts increase in sensitivity to reward and punishment as neuroticism increases, each has the highest increase of sensitivity to that trait commonly attributed to extraversion or introversion.

Thus, an extraverted neurotic, being highly sensitive to reward, is less socializable in terms of legal and organizational norms and more likely to become maladaptive or difficult. Given moderate levels of extraversion,

high (neurotic) individuals are usually more responsive to control techniques than low (stable) individuals. Whether reward or punishment is the controlling factor, the oversocialized individual will respond readily and may tend to become overcontrolled, while undersocialized individuals may show little or no response to control measures. Consequently, the low neuroticism (stable) individual may necessitate the use of rigid control and severe disciplinary measures (Wakefield 1979).

According to Gray's *Reinforcement Sensitivity Theory* (RST), once the BAS has been activated it should produce motor activity, overall motivation and feelings of desire, elation and hope: optimistic, reward-sensitive, motivated behaviour. On the other hand, BIS arouses anxiety (avoidance) and inhibition (the latter theory suggests avoidance tendencies are inhibited). Whilst a cursory glance over the literature suggests that high BAS but low BIS levels may be beneficial for work, this is clearly an oversimplification. Thus, studies have shown, as predicted, that whilst BIS is clearly a vulnerability factor of anxiety and depression, so BAS may be related to drug and alcohol abuse. Thus, the impulsive BAS individual may be particularly prone to accidents, mishaps and mistakes while the anxiety-sensitive BIS related to absenteeism, perfectionism and difficult task avoidance. However, there are adaptive levels of both BIS and BAS where they can be beneficial. Indeed, Perkins and Corr (2005) argued anxiety at work can be good in situations that require caution, self-discipline and anticipation of threat. They found that (only) for cognitively able individuals, worrying was positively correlated with performance but as ability declined, the relationship disappeared.

Clearly, different jobs call for different abilities and temperaments. Optimistic, fun-seeking, reward-sensitive drive associated with high BAS levels is clearly an asset in jobs associated with the service sector, sales and entertainment, even the military. Equally, it is possible to see situations where moderate BIS scores may be useful in research or safety-related occupations.

### **Personality in the prediction of work performance**

There is now increasing consensus that psychometrically assessed personality traits are useful in predicting both job performance (Barrick, Stewart and Piotrowski 2002; De Fruyt and Salgado 2003; Hough and Furnham 2003; Tett, Jackson, Rothstein and Reddon 1994) and other organizational criteria, such as job satisfaction and absenteeism (Ones, Viswesvaran and Schmidt 2003). Within the Psychoticism-Extraversion-Neuroticism framework of personality (PEN) (Eysenck 1967), meta-analyses provide evidence that extraversion can predict job performance

(e.g., De Fruyt and Salgado 2003), and there is some evidence that psychoticism may interact with intelligence to predict creative achievement (Eysenck 1994). However, neuroticism is often associated with poor work outcomes (Judge and Ilies 2002) and undesirable work outcomes, including burnout and emotional exhaustion (Wright and Cropanzano 1998; Wright and Staw 1999). Gray's RST theory tends to shift neuroticism away from pathology, as BIS is seen to be adaptive.

Outside of Eysenck's personality framework, the Big Five model of personality has gained pre-eminence in applied work, particularly in America. Conscientiousness (low psychoticism) is generally predictive of success across a range of work-related criteria and specific occupations (Barrick and Mount 1991), in team performance (Neuman and Wright 1999) and in leadership (Judge, Bono, Ilies and Gerhardt 2002). For example, using meta-analysis, Judge *et al.* (2002) report that conscientiousness correlates on average .28 with leadership and is generally the best personality predictor. Together with high mental ability, it seems that conscientious people are often seen as ideal employees. Mount and Barrick (1998, p. 856) state:

there are now two dispositional predictors in our field whose validity generalizes: general mental ability and conscientiousness. Thus no matter what job you are selecting for, if you want employees who will turn out to be good performers, you should hire those who work smart and work harder.

Reviewers of the literature now agree that there are three stable individual difference factors that consistently account for between one-quarter and one-third of the variance with respect to a wide variety of work-related behaviours and over a wide variety of job types: they are intelligence, stability (i.e., low neuroticism) and conscientiousness.

Various meta-analyses seem to suggest that three individual difference factors are consistently predictive of job outcomes across a variety of jobs. They are intelligence, neuroticism and conscientiousness. Intelligence is more important in complex jobs which require analysis and new learning. Stability is important because it is seriously implicated in stress reactions at work, which are associated with absenteeism, poor productivity and low job satisfaction. Equally, conscientiousness is related to achievement-orientation, diligence, dutifulness and adhering to the work ethic. It is, however, doubtful whether these factors work in isolation; that is, there is, very probably, an interaction effect. Thus, there may be an adaptive value of worrying about task-related things. Whilst studies and meta-analyses consistently highlight the same factors as predictive of work success there remains less evidence on the nature of the process that explains how the relationship works.

### What are the implications of this basic work-related finding for RST?

Some researchers suggest conscientiousness as the opposite of impulsivity based on the following reasoning. Conscientiousness is about being organized, reliable, thorough, dependable and efficient. Those who score low on conscientiousness and its sub-scales are described as being hasty, impulsive, careless, impatient, immature and distractible. From this perspective, it follows that low impulsiveness (or high conscientiousness) will generally predict higher performance in the workplace.

From a theoretical perspective, such ideas are potentially in conflict with RST. If *high* conscientiousness is in part *low* impulsivity, and both of these are similar to *low* BAS, and they all predict high work performance, then the conclusion is that people *low in reward sensitivity* are likely to be the high work performers. This seems wrong, since many studies in organizational psychology argue that motivation of workers by rewards is fundamental to business success (Eisenberger *et al.* 1991; Furnham 2005). In short, the organizational literature such as it is strongly suggests that reward-oriented people (i.e., high BAS) will tend to be better performers in the workplace.

What however is missing is a careful mapping of BIS and BAS onto the Big Five at both the domain (superfactor) and facet (primary factor) level. Gray mapped his BIS/BAS onto the Eysenck PEN system and not the Big Five model. Further, there are multiple measures of both the BIS/BAS concepts and the Big Five. Within the Big Five as measured by the NEO-PI-R, impulsiveness (NS) is a facet of neuroticism, as is anxiety (NI). Overall, the neuroticism total score is negatively correlated with all the facets of conscientiousness (Costa and McCrae 1992). However, within the Eysenckian PEN system, with the move from the EPI to the EPQ, the impulsivity items moved from neuroticism to psychoticism (Rocklin and Revelle 1981). For Gray (1981) BAS was a mixture of high N (Neuroticism), E (Extraversion) and P (Psychotism). The question is: what maps onto low Neuroticism, high Conscientiousness (and probably high Openness as a proxy for intelligence)?

If the problems for BAS (assuming a negative correlation between BAS and conscientiousness) in the prediction of workplace performance were not enough, then these are compounded by BIS. According to RST, BIS equates to anxiety which is a major primary scale of neuroticism. In general, neuroticism is associated with poor work performance in some reviews (Judge and Ilies 2002) and has also be linked to undesirable work outcomes, including burnout and emotional exhaustion (Wright and Cropanzano 1998; Wright and Staw 1999). It should be pointed out that

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### **Future of RST in the prediction of workplace behaviour**

Whereas personality research is to do with the study of the causes of individual differences in affect, cognition, behaviour and experiences,

RST is much more limited in that it represents more essential types of learning and reflects our instincts to engage in reward or punishment avoidant behaviour. If RST is to be useful in the prediction of work performance then we need to integrate RST with the social-cognitive basis of behaviour. This kind of integration provides a broader model which might have the potential to explain the complex goal-oriented behaviour which we can observe in the workplace.

The social-cognitive perspective conceptualizes personality as the outcome of idiographic, contextually sensitive cognitive processes. Good examples of this perspective are provided by Bandura (1999) who advocates self-efficacy and VandeWalle (1997) who proposes goal orientation as situationally specific cognitive predictors of behaviour. Until recently, the RST viewpoint has not taken account of the socio-cognitive viewpoint.

We attempt to achieve theoretical integration between RST and the socio-cultural perspective first by focusing on Cloninger's split of personality into temperament and character (e.g., Cloninger, Svrakic and Przybeck 1993) in which temperament refers to stable and instinctive causes of behaviour and character refers to socio-cognitive causes of behaviour. Secondly, we believe the increasingly predominant approach and avoidance motivation model of personality provides the best conceptual lens to bring all these different research threads together. Approach and avoidance has been advocated by many researchers since James, but most recently by Gable, Reis and Elliot (2003) and Jackson (2005; in press). Approach and avoidance motivation differ as a function of valence, such that approach motivation occurs when behaviour is instigated by the possibility of reward and positive outcomes, whereas avoidance motivation occurs by a desire to avoid punishment and negative outcomes (Elliot 1999).

Figure 15.1 provides a simple introduction to our proposed biosocial model of personality in which socio-cognitive character variables are seen as cognitive expressions of temperaments or instincts. Temperament is a distal predictor of personality mediated by more proximal social-cognitive components. Thus, a mouth-watering slice of pizza may evoke an immediate instinctive, biologically-based desire to approach (a temperament-based approach motivation), yet a dieter might modify these instincts by means of socio-cognitive goals (such as a goal to 'look good') such that the pizza is not in fact eaten.

### **Approach and avoidance in temperament**

There are several biological models of personality such as the one proposed by Zuckerman, but RST (Gray 1982, 1987; Gray and

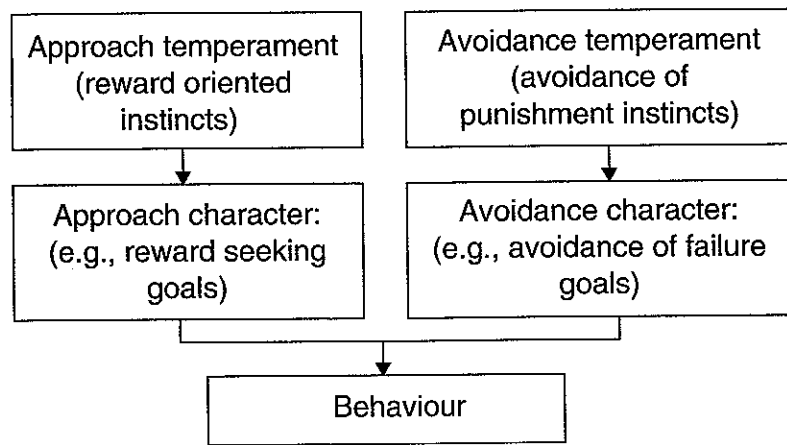


Figure 15.1 A simple introduction to the biosocial model of personality in which sociocognitive character variables are seen as cognitive expressions of temperaments or instincts

McNaughton 2000) is well developed, formulated around principles of approach and avoidance and recognized as a likely cause of personality (e.g., Gray 1982; Matthews and Gilliland 1999) with resultant psychometric implications (Jackson 2002a, 2002b, 2003, 2005; Jackson and Smillie 2004). According to the model, the Behavioural Activation System (BAS) activates approach behaviour when reward cues are detected and the Behavioural Inhibition System (BIS) activates avoidance behaviour when aversive and fear-provoking stimuli are detected (e.g., snakes, blood). It should be pointed out that whereas this was true of the original Gray (1982) model, it is not strictly true in the revised Gray and McNaughton (2000) model. In the revision, BIS is more associated with goal conflict than simple avoidance behaviour. Gray's model seeks to explain the whole of personality from a physiological perspective and leaves no room for alternative more cognitive-based explanations (Matthews and Gilliland 1999). We believe more can be achieved if we limit the broadness of RST by restricting its activity to just the temperament component of personality. Alternative and similar concepts for temperament include biological, non-conscious procedurally learnt, non-controlled or instinctive (see Cloninger, Svrakic and Przybeck 1993; Elliot and Thrash 2002) as shown in Figure 15.1.

Cloninger and colleagues (e.g., Cloninger, Svrakic and Przybeck 1993) developed a broad biosocial model in which processes similar to RST are located in the subcortical part of the brain, yet we know BIS has frontal lobe connections. They argue that cortical or conscious processes of the brain relate to character. Alternative concepts for character include conscious, social, learnt, controlled, agentic doing, self-regulated,

self-aware, voluntary or cognitive. According to Cloninger's model, perceptual memory processes relating to temperament operate independently of conceptual processes related to character and research supports the disassociation of these processes in the central nervous system (Roediger, Rajaram and Srinivas 1990).

Cloninger's model attempts integration of biology and social-cognitive constructs. It brings into personality psychology well established principles that procedural learning (data-driven habit and skill learning) is different to propositional learning (concept-driven learning) and based on different parts of the brain. Nevertheless, the model has serious limitations: (1) the model has a very clinical orientation; (2) Cloninger's choice of character variables seems to have little a priori theoretical basis and instead is based on observation and factor analysis (Cloninger *et al.* 1993); (3) Cloninger's model is in fact completely trait-oriented and fails to utilize well-known socio-cognitive models; (4) Cloninger fails to capitalize on approach and avoidance as a unifying theme; (5) temperament and character are not seen as joint systems; (6) character should mainly be explainable as shared environment effects as opposed to additive genetic effects, yet Gillespie, Cloninger, Heath and Martin (2003) find additive genetic components with no shared environment effects. Other researchers have also developed conscious components of personality. For example, Newman and Wallace's (1993) term 'response modulation' describes sensory sampling of the world and 'self-regulation' as the modification of BAS and BIS outputs.

### **Proximal and distal pathways and redefinition of character**

Approach and avoidance temperament may be considered distal predictors of behaviour, and character or conscious scales as proximal mediators of the distal scales. Proximal character components are therefore cognitive expressions of distal temperament. Our use of structural equation modelling (SEM) terms is deliberate since SEM provides both a theoretical perspective as well as an applied investigative methodology, in which the prediction of actual behaviour is expressly built into the personality model. This aim extends and develops initial exploratory work by Elliot and Thrash (2002), Humphreys and Revelle (1984) and Jackson and Francis (2004) who advocate models of approach and avoidance pathways with instinctive and situational components. Further support is derived from research into the functional and dysfunctional basis of learning (Jackson 2005). Revelle's recent work conceptualizes personality as the organization of affect,

behaviour, cognition and goals using a classification system similar to that developed in this project (Ortony, Norman and Revelle 2005).

Moreover, since we disagree with Cloninger's definition of character, we draw upon a general socio-cultural model of behaviour prediction recently described in the applied literature. Chen, Gully, Whiteman and Kilcullen (2000) propose and validate a socio-cognitive applied model which suggests that academic performance can be predicted from goals (Locke and Latham 1990), general self-efficacy, specific self-efficacy for a particular situation (Bandura 1999), goal orientation (learning and performance, as described by Vandewalle 1997), state anxiety and ability. Their model was not tested outside of the limited educational domain and we seek to generalize the model to the workplace.

The basis for the proposed biosocial model of personality is mainly derived from Bandura 1999; Chen *et al.* 2000; Cloninger, Svrakic and Przybeck 1993; Elliot and Thrash 2002; Humphreys and Revelle 1984; and Ortony, Norman and Revelle 2005. Figure 15.2 describes the

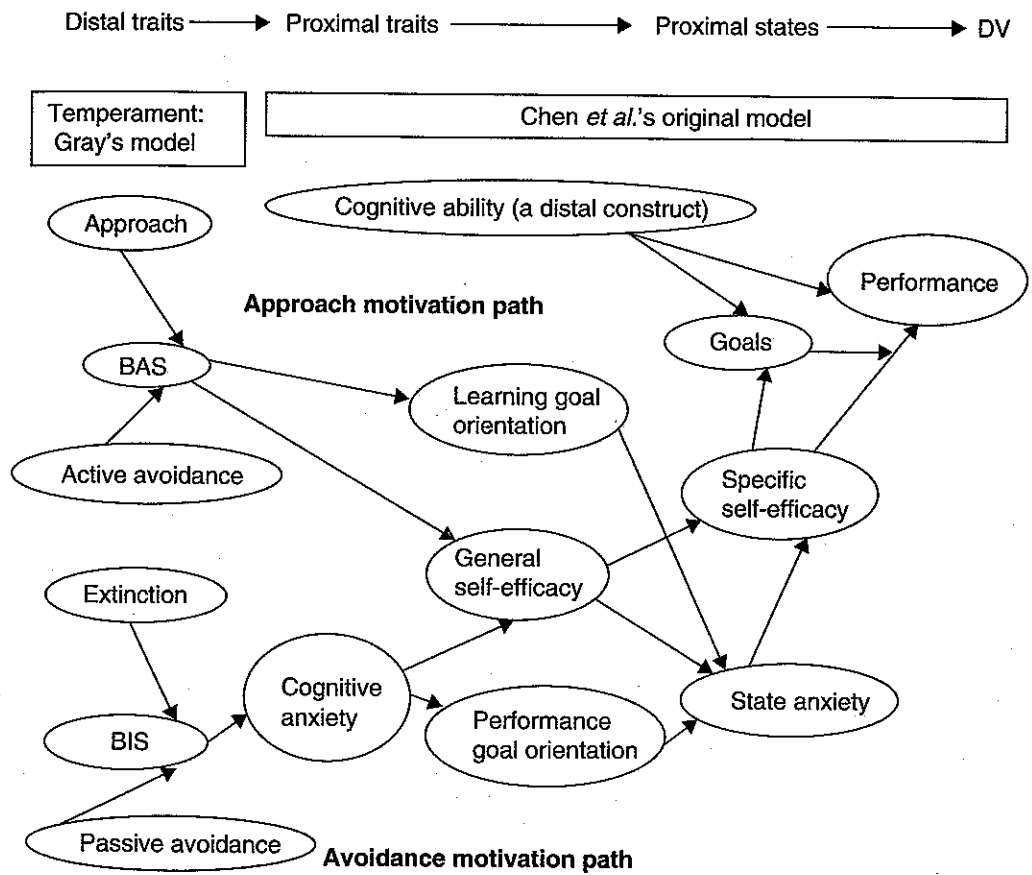


Figure 15.2 Hypothesized general biosocial model in the prediction of performance

proposed generic biosocial model and includes precursors of BAS and BIS (Wilson, Gray and Barrett 1990; Jackson 2002a, 2003). For simplicity, our model excludes Gray and McNaughton's (2002) Fight-Flight-Freeze System. We recognize, however, that this model may be less relevant to the old 1982 model than the recently revised model by Gray and McNaughton (2000).

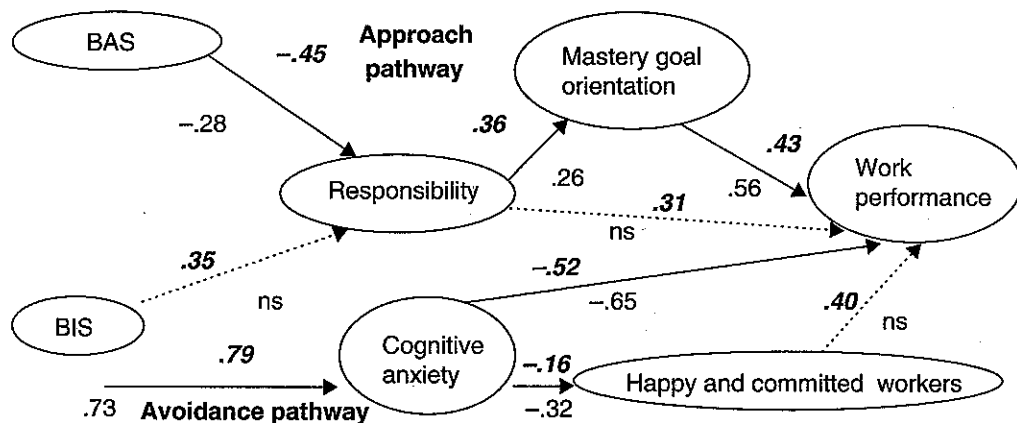
In short, our integrated model that will be useful in the prediction of work performance achieves the following novel outcomes:

- (1) A marriage between RST as championed by Gray and the social-cognitive theory such that social cognitions are seen as proximal mediators of distal biological constructs.
- (2) Relegation of RST to temperament to allow the social-cognitive perspective room to flourish.
- (3) Relegation of social-cognitive theory to character to allow RST room to flourish.
- (4) The opportunity to integrate social and cognitive models along the lines suggested by Chen *et al.* (2000), such as self-efficacy, learning and performance orientation, as well as other models such as social learning, locus of control and attributional style, etc. This will have the effect of unifying the biological and social-cognitive approaches to trait personality within a single theory of wide-ranging application.
- (5) The opportunity to test for redundancy in various overlapping social-cognitive models. Chen *et al.*'s (2000) model may be over-complex since more recent research suggests commonality between many of the negative emotion scales (Judge, Erez, Bono and Thoreson 2002) and overlap in scales representing each pathway (Gable, Reis and Elliot 2003). Jackson's pilot work (see below) also suggests usefulness of a simple model.
- (6) The opportunity to view social-cognitions as constructs providing direction to instinctive energy of RST behaviour as proposed by Revelle's laboratory (Humphreys and Revelle 1984; Revelle 1993, 1995).
- (7) The opportunity to determine if interactions between activation and avoidance pathways are found at either the distal RST or the proximal social-cognitive perspective (Jackson and Francis 2004; Ortony, Norman and Revelle 2005).
- (8) The opportunity to explore some of the properties of temperament and character within a single model that may allow us to understand how to conduct better interventions when improvements in behaviour are needed.

**Biosocial model and performance at work**

The best known applied model of personality is the five-factor model (the 'Big Five') which is thought to predict job performance as a result of the stable and consistent behaviours that personality traits are thought to represent. However, such models can be criticized as tautological and failing to address primary motivations. Meta-analysis on the predictiveness of work performance by the Big Five suggests that its validity is relatively low (Hurtz and Donovan 2000), although much better if theory-driven (Hogan and Holland 2004). Our proposed biosocial model hopefully predicts work performance in a non-circular, theoretical and valid way that identifies ways of improving behaviour. It is worth noting that even small positive changes in validity can dramatically improve selection success. Jackson (2001) provided solitary evidence that BAS positively predicts sales performance and Smillie, Yeo, Furnham and Jackson (2006) showed that a scale highly related to BIS can predict sales performance when within person changes across time are taken into account. We therefore identify a gap in the literature relating biosocial constructs to work performance.

Figure 15.3 shows separate results of two self-report cross-sectional surveys using blue collar workers (N=70) and part-time employed



Standardized beta weights in italics and bold above the arrows represent blue collar workers (N=70; AGFI = .92, GFI = .96, CFI = .94; RMSEA = .09); standardized beta weights below the line represent students reporting on part-time work activities (N = 282, AGFI = .90, GFI = .95, CFI = .93; RMSEA = .07). Disturbances and error variances omitted for clarity. All paths significant unless labelled ns.

Figure 15.3 Two pilot studies providing evidence in favour of the biosocial approach

students ( $N = 282$ ). BAS (temperament) is mediated by responsibility and goal mastery (character) in prediction of work performance. BIS (temperament) is mediated by cognitive anxiety (character) in prediction of work performance and worker happiness. Note replicability across models and identifiable approach and avoidance pathways. In both studies, multiple regression showed no Big Five scale of personality was a significant predictor of work performance. Results emphasize (a) superiority of biosocial approach over traditional models, (b) project feasibility and (c) how cognitive interventions (e.g., training) should focus on character.

### **Significance of the proposed integration of RST with the sociocognitive model**

The Big Five model of personality has become the dominant framework for understanding trait personality. Whilst many consider the Big Five to provide an adequate taxonomy of personality, it also has many problems (e.g., Block 1995) and ultimately personality traits are known to show useful but relatively low validity. Some argue that models such as the Big Five simply reflect the underlying actions of BIS and BAS (Jackson 2002a; Smits and Boeck 2006). In contrast, socio-cognitive models offer more situational and contextually sensitive explanation (e.g., Matthews, Schwan, Campbell, Saklofske and Mohamed 2000). Whilst social and cognitive theorists claim their models are predictive of behaviour, they fail to account for stability and heredity of personality.

Our proposed integration of RST with the socio-cognitive perspective provides a significant and innovative opportunity to integrate trait and socio-cognitive approaches to personality by developing a general, theoretical and testable model of wide applicability and appeal to personality researchers and practitioners. This project rests on logical extensions from, and integration of, the work of many earlier researchers (e.g., Chen *et al.* 2000; Cloninger, Svrakic and Przybeck 1993; Elliot and Thrash 2002; Gray and McNaughton 2000; Humphreys and Revelle 1984; Revelle 1993, 1995). Our proposed model offers a possible opportunity to unify an area of psychology that has long suffered from the deleterious effects of schism, yet from the safety of knowing that recent research and replicated pilot studies fully support our approach. We hope our biosocial model will lead to improved validity compared to existing personality models, and provide insight into how interventions might be possible (e.g., deficiencies in character could be expected to be more amenable to cognitive interventions). Thus, the biosocial model has the promise of revolutionizing the study of personality and its applications. Additionally,

our application to the workplace addresses the significant problems of selection, motivation and training of staff.

Jackson (2005, in press) has developed this line of thinking away from RST and more towards a general model of learning in personality. This model is based on the learning characteristics of the biologically-based scale of sensation seeking. Jackson argues and demonstrates that cognitive control of sensation seeking leads to functional learning and positive behavioural outcomes whereas lack of cognitive control of sensation seeking leads to dysfunctional learning and negative behavioural outcomes. The model is applied to organizational, educational and clinical areas.

### Conclusion

Gray's BIS/BAS theory is not only interesting and important, it is also fecund in the sense that it suggests many applied implications. In this chapter we have noted one serious omission in the application of the theory, notably behaviour at work. It is not difficult to see how the theory may be applied but up to now two factors may have prevented this. The first factor is the development and perhaps even commercialization of a simple but valid measure of the construct. The second factor is whether the organization is able and willing to provide performance data which may be matched up with employees' BIS/BAS scores. However, our work and tentative theory development in this area suggests that Gray's theory is particularly useful for understanding and then predicting behaviour in the workplace.

We must acknowledge that Gray's theory developed and changed in his lifetime: compare Gray (1982) with Gray and McNaughton (2000). McNaughton and Corr (2004) have helpfully pointed to five fundamental and critical changes between the latter and former theory. They are: first, a distinction between fear and anxiety with the former moving an animal (and presumably a human) *away* from danger but the latter *toward* danger. Secondly, there are clear categorical and neuroanatomical distinctions between panic, phobia, anxiety and obsession. Thirdly, anxiety is generated by concurrent and equivalent activation of the fear and approach system. Next, BIS is being distributed among a number of neural structures; finally, the functions of the septo-hippocampal system are distributed across functions of anxiety and memory. It is clearly the first difference which affects our tentative theory the most and could indeed lead to opposite predictions (see Jackson, submitted).

At this stage, however, our ideas are still forming (see Jackson 2005; in press). We have come up with at least a useful heuristic. What,

however, we are certain of is that RST theory has not up to now been, but can and indeed should be, applied to behaviour at work. Managers talk of 'carrot and stick' organizations meaning those that attempt to shape behaviour by a judicious mix of punishments and rewards. Organizational psychology textbooks are full of advice on how to motivate individuals. Though it is difficult to translate the fundamentally important pharmacological and neuroanatomical work of Gray and his colleagues to the world of work, it is a goal worth pursuing. It may indeed enrich and enliven both areas of research.

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