

Executive Dysfunction in people with anger problems.

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DECLARATION

I hereby declare that this thesis has been composed by myself and that the work is my own.

Suzanne Clark

31/07/1998.

ABSTRACT

Anger is a normal emotion and yet it is implicated in many psychiatric disorders, violence and physical ill- health. Theories of anger, co-morbidity and treatments of anger are reviewed. The regulation of anger may be one aspect of higher level cognitive functions such as decision making, planning and flexibility, that are known collectively as executive functions. Executive dysfunction is characterised by perseveration, difficulties generating strategies, problem solving deficits and impulse control problems. The aim of this study is to explore the possibility of executive function deficits in people with anger problems. Subjects were recruited from a waiting list for people referred to an outpatient clinical psychology department for psychological treatment of anger or anxiety. There were three groups: people referred for anger problems, people referred for anxiety problems and a control group who do not have psychological problems. Participation in the study required the person to attend for one session during which time neuropsychological assessments and emotional inventories were completed. The study is cross- sectional and employed both between-subject and within-subject comparisons and correlational analysis. Data was analysed using MANOVA procedures and correlational analysis to compare differences between and within groups on a variety of measures. Results are discussed in relation to the aetiology of anger and treatment implications.

1. INTRODUCTION

1.1 Anger

Anger is involved in many psychiatric disorders and has adverse effects on physical health but has no formal classification (Novaco and Welsh 1989). It is also often implicated in violence yet it is a normal emotional state with physiological, cognitive and behavioural aspects. Anger has previously been referred to as ‘ the misunderstood emotion’ (Thomas 1990) and it is a relatively neglected topic in the clinical literature.

1.1.1. Theory

Early theories

Early theories, from the psychoanalytic school of thought, frequently mentioned anger. Traditional psychoanalytic theory viewed depression as anger turned inwards (Thomas 1990). Likierman (1987) proposed that the function of anger appears to be that of opposing and attacking destructiveness. Mature, positive anger may be an active response to deal with a threatening situation. Parental anger may attempt to curb a child’s destructive urges. Similarly, anger demonstrated by social groups may be functional within society. Anger in its pathological form does not represent a destructive source but its’ failure to function positively due to complications. One type, primitive anger, spills easily into violence; objects are all good or all bad and control is not yet exerted. Another type, psychotic anger, occurs when something someone has been denying is pointed out to them, a challenge to omnipotence.

Theories of emotion

The James-Lange Theory of Emotion proposed that the important facet of emotion was autonomic arousal (James 1890). Physiological responses were perceived and subjectively interpreted according to circumstances (I am frightened because I run away). Canon (1927) criticised this and proposed that the integration

of emotional expression is controlled by the thalamus which sends relevant excitation patterns to the cortex at the same time as the hypothalamus controls behaviour. Schacter and Singer (1962) proposed a Cognitive Theory of Emotion. They suggested that autonomic arousal is only the raw material for an emotion which is then shaped into a specific emotional experience by an attribution process so an emotion depends on a person's interpretation of the situation (Gleitman 1986). Research was completed to test this; epinephrine was administered to increase arousal then subjects were given different explanations about the effects of the injection. Finally subjects were directed to a room with a euphoric or angry environment. By doing this the authors were manipulating cognitive state. Results indicated that if subjects did not know the physiological effects of epinephrine they were more likely to perceive themselves to be euphoric or angry than those who knew the physiological effects of the injection. It seems likely a combination of autonomic arousal and cognitive attributions are involved in emotion.

Cognitive, behavioural and social theories of anger

Skinnerian behaviourists would argue that emotions such as anger are learned responses to environmental stimuli (Thomas 1990). By contrast, a humanistic approach would see affect as an orientating system that provides people with adaptive information. Anger might alert one to violation of one's rights. The consequence of this insight is growth promoting change within the individual. Bandura (1973) in his social learning theory proposed that any state of emotional arousal would increase the probability of anger when the context predisposed to anger. Beck (1976) recognised anger as a distinct emotion, different from aggressive behaviour and discussed this in terms of provocation and threat appraisal. The strength of the angry response is determined by cognitive factors such as value judgements, self-esteem and expectations which are all regarded as enduring dispositions (Smedslund 1993). Beck described anger as an appraisal of an attack on or violation of one's domain which is unjustified. This theory is consistent with naturalistic studies which identify that the most common triggers for anger are interpersonal.

The basic thesis of Berkowitz's (1982) reformulated frustration aggression hypothesis was that the occurrence of aggression presupposes the existence of frustration and the existence of frustration always leads to some form of aggression.

Berkowitz later placed anger 'centre stage' within this formulation. According to Berkowitz, frustration leads to anger which acts as a drive and heightens the chance of aggressive behaviour i.e. anger is a mediator for aggression. Averill (1982) takes a social constructionist approach. He researched people's experience of anger, the object of their anger (animate or inanimate) and the triggers for anger. Anger was found to have a large social component i.e. it was most often directed at another person who is perceived to have caused offence. He formed a theory of anger as a socially constituted syndrome: a social role governed by social rules. Averill emphasised that anger can have positive functions within interpersonal relationships and may function to uphold accepted standards of conduct within society (Kemp and Strongman 1995).

Novaco (1983) has studied anger extensively. His definition of anger is that it is an emotional state characterised by

- physiological aspects e.g. activation of the cardiovascular system
- cognitive labelling e.g. antagonistic thought patterns
- aggressive behaviour

Novaco views anger as an affective stress reaction. That is, anger arousal is one kind of response that occurs in conjunction with exposure to environmental demands. Routine exposure to environmental demands in the absence of commensurate coping resources induces stress reactions that represent impairments to psychological functioning and physical health. Novaco proposed that anger is a normal emotion with multiple functions: both adaptive and maladaptive. For example, anger energises behaviour, cues coping and communicates sentiment. However, anger also disrupts information processing and may instigate aggressive behaviour. Novaco's (1993) anger arousal model identifies three components of the anger syndrome: external circumstances, internal processes and behavioural reactions. During the assessment of anger, consideration should be given to external circumstances which provoke anger. (See section 1.1.10 for more detail on assessment of anger). Two basic cognitive processes are thought to influence anger arousal; appraisal and expectation. Appraisal is the interpretation of present and past events and the person's own judgement about their ability to cope with demand. Expectation refers to the expectation a person has concerning future events. Ruminations or antagonistic self-statements may well inflame anger. Physiological factors also influence the occurrence of anger. Tension may prime anger reactions, so may the ingestion of stimulants. Finally, the person's behavioural reaction is crucial as anger may be inferred from our behaviour. Novaco proposed that the factors which cause anger are

transactionally related. Environmental circumstances, cognitions, arousal and behaviour operate in a reciprocally causal manner. Novaco (1983) developed the Stress Inoculation approach which aims to prevent anger from occurring when it is maladaptive by regulating anger arousal and teaching coping skills. Further detail on the treatment of anger using Novaco's approach, among others, can be found in Section 1.1.11.

In a further paper, Novaco (1994) emphasised the role of cognitive mediation in anger arousal. Cognitive mediation is an automatic and intrinsic part of the perceptual process. The selection of what receives attention and functions as a provocation is very much influenced by cognitive dispositions such as schemata. Schemata may act to help people process information faster but they may lead to biases in judgement. Cognitive processing that is predisposed toward anger can be viewed in terms of five information processing biases.

- Attentional cueing- the arousal of anger may direct our attention to aggressive cues.
- Perceptual matching- the more someone has been exposed to aggressive stimuli, the more readily s/he will perceive aggression.
- Attribution error- the tendency for people to over attribute the behaviour of others to dispositional rather than situational causes.
- False consensus- the tendency to assume that a larger proportion of others behave as oneself than is actually the case.
- Anchoring effects- the tendency for one's initial judgement to become resistant to change even when subsequent information dictates revision.

Novaco has been at the forefront of contemporary research work on anger, building and refining theories to aid our understanding of it. However, much of his work focuses on the psychological processes involved in anger e.g. cognitive mediation and there is no consideration given to the underlying neuropsychological functions which may be involved.

Firth (1993) developed the cognitive aspects of Novaco's model further. He argued that both the situation and emotions will be significant in selecting the schema. He proposed that mood will behave like a distorting spectacle. Successful management would therefore require the client to take on board the effect of different moods on schema that drive behaviour.

Kassinove and Sukhodolsky (1995) defined anger as a negative, phenomenological feeling state associated with specific cognitive and perceptual distortions, subjective labelling, physiological changes and behaviour. They propose anger is a more cognitively complex feeling than aggression and it has a large social component. For example, by 2- 3 years of age most children have developed the verbal resources to communicate their anger. Kassinove and Sukhodolsky outline a Social Constructivist perspective to anger. This assumes that emotions are responses of the whole person and cannot be defined in terms of subclasses of response (e.g. physiological). The rules that govern the organisation of anger are social in origin. Emotions serve a function within the social system therefore the anger role exists because it fulfills some purpose for the client. Their evidence for this approach is firstly, there is no such thing as a typical anger episode and secondly, people usually become angry with those they are involved intimately with.

Edmondson and Conger (1996) proposed a Multidimensional Associationistic framework for understanding anger. This emphasises the importance of labelling an emotion as anger under certain stimulus conditions e.g. when a person's behaviour is motivated to eliminate a source of goal interference. They conceptualised anger as a system with experiential, physiological, cognitive and behavioural components which are all triggered automatically and simultaneously. That is, it is assumed that anger responses are associative in nature, anger responses in one domain are automatically associated with anger responses in other domains through biology and experience. Treatment would therefore attempt to break these associations e.g. lowering physiological arousal to lower anger intensity. The authors make no mention of Novaco's model although their own model does not appear radically different. Both have identified the four main components of the anger experience and emphasised the interaction of these components.

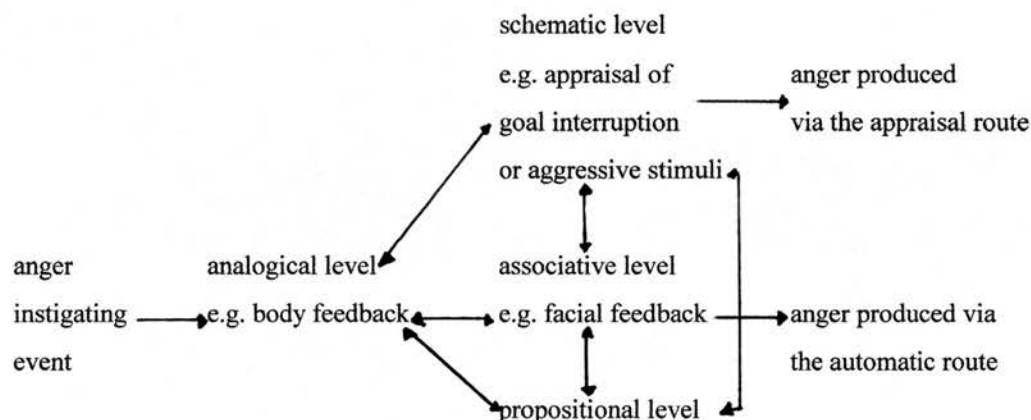
Power and Dalgleish (1997) also highlighted the role of cognitive processes such as appraisal and interpretation as integral parts of the anger experience. Based on Averill's work (1982) they generated a list of the roles and norms relating to anger. For example, it is acceptable to become angry at intentional wrongdoing but it is less acceptable to become angry at events which cannot be influenced or people who cannot be held responsible for their actions. Power and Dalgleish also suggested that several factors contribute to anger:

- its appropriateness varies within and across cultures

- physiological arousal: if people can attribute increased physiological arousal to another factor such as exercise then there would be no major increase in anger related behaviour
- facial expression and posture were also thought to be important: an aggressive appearance may enhance an individual's experience of anger.

These authors reviewed previous theories of anger then went on to propose the SPAARS (Schematic Propositional Associationistic and Analogical Representation Systems) model of emotion. Anger can be conceptualised within this model and the multi- levels of appraisal proposed may account for variations in experience and expression of anger. For example, someone who is harassed at work may be more likely to get angry whether or not the instigating event was appraised as due to avoidable, i.e. the anger is automatic. Alternatively, there may be occasions when people appraise their goal as being thwarted by a recognisable agent and become angry but then realise anger is inappropriate and therefore suppress their anger i.e. the appraisal route.

FIG1.1. The SPAARS model, a schematic diagram illustrating the routes to anger:



Within this construct, anger serves as the building block of other emotional states such as annoyance or hatred.

These theoretical models enhance our understanding of anger which is widely considered to be a complicated emotion. However, their focus is primarily the cognitive, behavioural and social manifestations of anger. Very little research has

considered the neuropsychological factors involved in the regulation of anger. Power and Dalgleish used the example of someone suppressing anger when it is inappropriate. Is this regulation of anger due to thought processes alone or is there some cognitive function involved? It would seem that development of further theories is limited without a clear understanding of the role of neuropsychological functions, such as inhibition of automatic responses, in the regulation of anger.

1.1.2. Instrumental Anger

Instrumental anger is seen as distinct from other forms of anger. Howells (1989) highlighted that instrumental anger is motivated by the rewards potentially achieved in the environment. Instrumental anger is not characterised by emotional arousal. For example, someone who is robbing a bank is behaving aggressively for financial reward and so emotional arousal is not the motivating factor. Treatment of instrumental anger would focus on changing environmental contingencies.

Both Power and Dalgleish (1997) and Novaco (1994) made reference to anger with an extrinsic motivation: when anger is used to exert control, gain attention and maintain fear.

1.1.3. Definitions of anger

Anger is an emotion which is neither necessary nor sufficient for aggression. It is influenced by the social context and has adaptive functions (Novaco and Welsh 1989). Anger is a mood state and it is closely associated with fear. Indeed it can be defined as an affective state experienced as the motivation to act in ways that warn, intimidate or attack those who are perceived as challenging or threatening (Kennedy 1992). Smedslund (1993) detailed some of the problems of definitions of anger. Behavioural measures of anger e.g. aggression do not define anger since a person may be angry without displaying aggressive behaviour. Verbal report measures cannot solely define anger as the person may be lying. Physiological measures cannot be used to define anger since they are only signs of arousal. Traditionally a cluster of correlating symptoms may validate a construct e.g. anger. There is nothing common

to all instances of anger but the instances are more or less prototypical. Smedslund reviewed the literature and concluded the term anger is used to refer to two situations:

- A general frustration anger which occurs when goals have been thwarted.
- The disrespect anger which occurs if there has been perceived disrespect.

Edmondson and Conger (1996) concluded that anger is an emotion labelled according to the stimulus conditions and has experiential, physiological, cognitive and behavioural components.

To summarise, there is a general consensus that anger is an emotion with physiological, cognitive and behavioural features. However, it is not particularly easy to define as its' presentation is often idiosyncratic.

1.1.4. When anger becomes a disorder

Novaco (1994) considers anger a normal emotion which becomes a problem if it is too intense, too long lasting or interferes with life by causing personal distress or socially unacceptable behaviour. Power and Dalgleish (1997) identify clearly that anger becomes a disorder:

- if individuals become angry at events in a way most of society would regard as inappropriate
- if anger is directed at inappropriate agents
- if anger, although an appropriate reaction, is excessive in intensity
- if anger is extrinsically motivated

Overt anger can lead to negative evaluations by others, a negative self concept, low self esteem, interpersonal and family conflict, verbal and physical assault, property destruction and maladjustment (Kassinove and Sukhodolsky 1995).

1.1.5 Anger as a symptom of other disorders

No classification exists for an anger disorder in the Diagnostic and Statistical Manual of Mental Disorders (D.S.M IV) yet it is often seen clinically. Anger and rage are common emotions in those who have been abused (Crowder 1995). Anger and rage can become a 'catch all' emotion for male victims. Because it is a powerful and active emotion, expressing anger may feel more acceptable than displaying more

vulnerable emotions. Self-harm is a common way for women to express anger particularly if the anger is chronic and has built up over a prolonged history of abuse (Fitzharding 1997).

Anger may also be present in people with affective disorders and psychotic disorders (Fava, Anderson and Rosenbaum 1990). For the most part, anorexics find it difficult or impossible to be angry. Anger is disavowed yet anger may subsume the anorectics profound refusal to eat (Garner and Garfinkel 1985). Psychological components play a large role in withdrawal for those with addictions or substance abuse and anger may be one of a number of emotions present (McMurrin 1994).

Worden (1983) identified anger as a normal manifestation of grief. He proposed that the anger comes from two sources. Firstly anger comes from a sense of frustration that there was nothing one could do to prevent the death. Secondly, the anger comes from a kind of regressive experience that occurs after the loss of someone close. This anger may not be directed at the deceased but may be displaced onto other agents or, most destructively, turned inward and experienced as depression. Sometimes in therapy to resolve grief it is necessary to work through these ambivalent and angry feelings.

Chronic pain patients often express a great deal of anger by the time they see a psychologist. Feelings of anger may be one of the principal foci of therapy (Holzman and Turk 1986). In Post Traumatic Stress Disorder, anger and rage feelings may be experienced in the context of externally controlled outcomes e.g. blaming another person for the incident. This implies it was within their control and so they 'let down' the victim by not preventing the incident. Within PTSD, causal attributions constitute one aspect of stimulus appraisal that may help to account for some variations in PTSD symptoms as well as specific emotional states such as rage, anger, guilt and shame (Joseph, Williams and Yule 1997).

To summarise, although there is no diagnostic criteria for anger as a disorder itself, it is often seen clinically as a symptom of other disorders or psychological problems.

1.1.6. The link between anger and anxiety

Deffenbacher, Demm and Brandon (1986) compared people who scored high and low in self-reported anger tests. Their results indicated that high anger subjects were significantly more anxious than low anger subjects. Deffenbacher suggests that anger and anxiety co-vary. Both anger and anxiety are a form of physiological arousal, the 'fight or flight' response. Intuitively therefore it is not surprising to identify a link. Sharkin and Gelso (1991) noted that anger discomfort was highly correlated with trait anxiety. Perhaps anxious people are uncomfortable with anger or perhaps anxious people experience more anger.

Both Fava, Anderson and Rosenbaum (1990) and Gould, Ball, Kaspi, Otto, Pollack, Shekhar and Fava (1996) studied anger attacks. These are defined as sudden spells of anger that are uncharacteristic of the individual, out of proportion to the trigger and accompanied by many physiological symptoms such as a racing heart, hot flushes, chest pains and dizziness. Fava et. al. described four cases where the key feature is the presence of short duration anger attacks accompanied by physiological symptoms of panic without fearful cognitions. They proposed these ego-dystonic anger attacks are a variant of panic attacks. The physiological arousal is the same and benzodiazepines helped reduce the incidence of anger attacks. Their second proposition was that anger attacks were an atypical presentation of depression. Evidence for this was the high levels of hostility shown by many depressed clients. In a subsequent study Gould et. al. (1996) recruited fifty subjects and completed interviews and self report assessments with them. Their results indicated that anger attacks were occurring in clients with major depression and in about one third of clients with panic attacks. Interpersonal difficulties were also common in this client group and the authors noted personality traits consistent with DSM IV axis II disorders.

To summarise, there is research evidence of a link between anger and anxiety. Inclusion of an anxious group in this study will enable this link to be explored and provide a ready made control group of people who have high levels of tension but not anger behaviour. See Methods section 2.2.3 for more details.

1.1.7. Anger and health

Anger is increasingly implicated as a predictor of physical health problems. Anger and hostility are thought to play a role in chronic heart disease, hypertension and cardiovascular diseases. Begley (1994) suggested that substantial chronic anger may wear down the body by over taxing its system. Chronic anger's frequent flooding of the body with adrenaline places the body almost continuously on alert therefore straining its response capacity and reducing its ability to adapt as new stressors appear. Begley conducted a postal questionnaire attempting to explore the relationship of suppressed and expressed anger with somatic complaints. Results suggested that suppression of anger was more predictive of health complaints than expression of anger.

Hall and Davidson (1996) proposed models to explain the link between anger, hostility and development of chronic heart disease (C.H.D.). The psychophysiological reactivity model holds that hostile individuals are prone to enhanced physiological reactivity to stressors. According to this model these more extreme cardiovascular and neuroendocrine responses to stress over time initiate the development of C.H.D. The psychosocial vulnerability model holds that increased frequency of interpersonal stressors and decreased social support both contribute to the development of C.H.D. The transactional model extends these suggesting that exaggerated cardiovascular and endocrine reactions to daily stressors plus increased frequency of interpersonal factors creates pathological physiological responses. Hall and Davidson (1996) completed a study to determine if there was a relationship between hostile style and misperception of another's aggression. Their results indicated that subject's own hostility correlated with their perception of the interviewer's aggressiveness. Therefore, hostile schema have a role in perception of aggression in others which can lead to escalating anger which appears to be linked to health complaints.

1.1.8. Anger, aggression and violence

Howells (1989) proposed that anger is implicated in many crimes of violence including rape, murder and abuse. Because anger has such a formative role in aggression it is a large issue in a forensic context in assessment of risk of

re-offending (Novaco 1994), risk of violence (McGovern 1996) and in treatment (Towl 1993). Interestingly, McDougall and Boddis (1991) completed a study to identify the emotions associated with violent or angry behaviour in an offender population. Their results indicated that subjects who appeared to have high anger ratings actually had significant aggression and aggressive thought rumination scores but lower tension ratings. They proposed that subjects rehearsed events which upset them which created tension and the aggressive behaviour then reduced the tension. That is, the aggressive behaviour was a maladaptive method of dealing with the tension caused by angry feelings. Kennedy (1992) describes that alcohol can have a disinhibiting effect in situations of anger which can lead to violence. The relationship between anger and alcohol is not yet clear although it seems likely that alcohol acts as a disinhibitor. If this is the case, it implies that somehow people can inhibit an angry response (if this is not upset by alcohol). This process of inhibition is likely to be a cognitive function. Clearly an unexplored area are the cognitive functions involved in anger regulation. Levey and Howells (1991) proposed that often the more aggressive clients are seen in a forensic setting. In this setting anger or aggression may be functional, motivational or defensive. Anger was found to be the strongest predictor of physical aggression in profiles of psychiatric clients (McGovern 1996). It is important to draw a distinction between anger and aggression. Anger is an emotion, aggression is overt behaviour (Glick and Roose 1993).

“The relationship of anger to aggressive behaviour is that it is a significant activator of and has a mutually influenced relationship with aggression, but it is neither necessary nor sufficient for aggression to occur”¹

Novaco (1994) argues that implicit in the cognitive labelling of anger is an inclination to act in an antagonistic or confrontative manner to the source of the provocation.

Greene, Colen and Johnson (1994) explored the relationship between psychopathology and the self report of anger in interpersonal violence offenders. Subjects were forty men referred by the courts for anger management after arrest for spouse battery. Results indicated that these offenders showed some degree of depression, anxiety and although there was no single homogenous abuser profile, anger expression was associated with personality types.

¹ P.33 Novaco (1994)

Dura (1997) proposes that anger and aggression may be a significant problem for people with a learning disability. They hypothesised that aggressive behaviour is a form of communication. Sixty seven learning disabled adults were studied. Results indicated that aggression and expressive verbal ability were significantly inversely correlated (i.e. aggression increased as verbal ability decreased), as were aggression and mental illness symptom level. In this population, aggression may be an attempt to communicate or it may be reflective of an underlying mental illness.

To summarise, it appears that the role of anger in aggression or violence is as a mediator. However, it may also be functional (to retain control or to communicate) or it may be a symptom of another problem.

1.1.9. The context of anger

The aim of this section is to consider some of the variables which may be involved in anger specifically, the context and triggers of anger.

Tangney, Wagner, Fletcher and Gramzow (1992) explored the relationship of shame and guilt to anger, hostility and aggression. Results of their research indicated that shame proneness was consistently positively correlated with anger arousal, irritability and indirect expressions of hostility. However, it is important to note that this study was correlational not causal. It is possible that once angered an individual becomes ashamed of the anger (rather than shame leading to anger). Thomas (1995) explored the shame response further. He proposed that three stages occur. Initially the individual is rejected by another, they feel shame which is proportional in intensity to the rejection. With this comes a physiological response such as nausea or pain. The third stage is anger. Thomas hypothesised that the anger is a reaction to the pain that one endures consequent to the rejection. He recommends that if anger/ violence occurs, events prior to the outburst should be reviewed for a shame response. Baumeister, Smart and Boden (1996) propose that high self- esteem is linked with violence. Unrealistically positive or inflated views of self that are dependent on external validation will be especially vulnerable to encountering threats to the ego. Such threats may elicit anger. People with high self-esteem in situations of threatened egotism may be more likely to anger. These studies all indicate the importance of the interpersonal context in understanding anger, particularly threats to self from others or by way of a shame response.

Zwemer and Deffenbacher (1984) studied the relationship of irrational beliefs to general anger and anxiety. A student sample were given self-report scales to complete. Results indicated that personal perfectionism, anxious overconcern and catastrophising were highly associated with extreme levels of anger and anxiety. That is, there was considerable overlap between beliefs predictive of general anger or anxiety. Given the previous links between anger and anxiety noted in section 1.1.6., it is clear these emotions are closely related. Mizes, Morgan and Buder (1990) researched this idea further and completed a study to examine the relationship between cognitions and anger. They hypothesised that anger would be more likely when irrational beliefs were prominent and they expected specific beliefs to be associated with anger e.g. catastrophising. Their results indicated that irrational cognitions were correlated with anger. Anger was related to; excessive anticipation of circumstances turning out poorly; assigning blame and seeing emotions as uncontrollable. These two studies highlight the importance of beliefs as part of the anger context.

However, it appears that beliefs can have a mediating role between the experience of anger and whether or not it is expressed. Kremer and Stephens (1983) looked at information processing between perception and expression of anger. They hypothesised that when mitigating information is presented immediately after provocation, subsequent retaliation by the victim is reduced. Research completed with students found results consistent with this. To summarise, there is some indication that a shame reaction and distorted belief system may be implicated in the anger context. The fact that information can be presented after provocation and affect behaviour may have implications for treatment of those prone to anger outbursts.

Mabel (1994) wanted to look at which particular circumstances provoke anger. To do this, a large number of anger provocative circumstances were gathered from staff, students, hospital out patients, psychiatric patients etc. Three hundred and sixty circumstances that provoke anger were identified and listed in a questionnaire. This questionnaire was then given to many different people- staff, students, the army, social services. Ten factors were extracted which account for most anger provoking situations. These are:

- Interruption of goal directed behaviour when time is important.
- Being degraded personally or treated unfairly and feeling powerless to do anything about it.
- Someone being prejudiced, unfair or unkind whether or not the victim is present.

- Being the object of dishonesty, broken promises or being disappointed by self or others.
- Personal authority, property or feeling being disregarded by others.
- Being ignored or treated badly by a significant other.
- Experiencing harm due to being negligent towards self.
- People demonstrating by their behaviour that they do not care .
- Being verbally or physically assaulted.
- Being a helpless victim.

Given the large number of people involved in this study it is reasonable to conclude that the factors identified appear to be fairly common triggers for anger experienced in the general population.

Novaco (1993) emphasised the importance of viewing anger contextually. He proposed that distal events may contribute to anger arousal. For example, the physical and social environmental conditions such as noise pollution, traffic and competition may potentiate anger by increasing arousal and activating antagonistic cognitions. Negative mood after long distance commuting may transfer to another domain e.g. at home in the evening. The circumstances that produce anger are affected by anger and the consequences that anger produces will affect subsequent anger. This interaction means that anger reactions and anger coping styles may dynamically transform home and work settings in less than optimal ways. Novaco emphasises the importance, when assessing anger, of distal circumstances and contextual surrounds.

To summarise, shame, ego-threat, irrational beliefs and more distal cues such as environmental stress may be part of the wider context of the anger experience.

1.1.10. The assessment of anger

Goldstein and Keller (1987) proposed several areas that should be explored in the assessment of anger outbursts. Firstly the therapist should consider how the person interpreted external stimuli and whether or not this heightened arousal. Then the therapist should consider if there was any malcommunication. After this a functional analysis of the behaviour should be completed to identify what is maintaining the behaviour and any potential social skills deficiencies should also be explored. The therapist should ask clients what they do in various anger provoking

situations and then what they should do. This would help identify whether it is a knowledge or a skills deficit. Howells (1989) suggested that triggering events, cognitive processes, physiological arousal and behavioural reactions within the anger sequence should be identified. Kassinove and Sukhodolsky (1995) suggested that one of the reasons anger is so under researched is due to the difficulties assessing it. They proposed that this is because anger is not just behaviour but also an emotion, possibly unobservable therefore an epiphenomenon and not welcomed by science.

There are a wide number of variables that need to be assessed in anger problems using a variety of methodologies such as self- report, self- monitoring, rating scales, role play and observation. Different anger measures assess different dimensions of the anger response e.g. anger experience, anger physiology. Qualitative information can be gathered from an initial interview with detail from previous records added. Significant others' observations can provide information about how the angry person behaves in certain situations, the intensity of their anger and so on. Role play may be helpful in revealing antagonistic thoughts which the angry person experiences. An anger diary should cover situations that provoke anger, when and where anger occurs, thoughts, feelings and behaviour. This can provide a situational analysis of the circumstances that provoke anger. Anger does cause specific physiological changes such as increased heart rate and blood pressure: these can also be measured. Various self- report measures exist; mood check lists, hostility inventories, the State and Trait Anger Expression Inventory (Spielberger 1988) and Novaco's Provocation Inventory (Novaco 1994). Specific details of the assessments used in this research will be covered in more detail in Section 2.4.

Novaco (1983 ,1994) has studied anger assessment and treatment most extensively. He proposes that a functional analysis of the anger behaviour should be completed. Anger may have positive functions; for example, it energises behaviour, it is expressive and it potentiates a sense of control. However anger also disrupts information processing and task performance and it may instigate aggression. From this assessment the aim is to help clients maximise the positive functions and minimise negative functions of anger. The dimensions of the anger reactions should also be assessed; the frequency, intensity, duration and mode of expression. The setting, people involved and triggers should also be noted. The cognitive domain should also be explored:

“the arousal and maintenance of anger is a function of our perceptions and the way in which we process information”²

Cognitive biases may be present: selective abstraction for example. Rumination can maintain arousal by rehearsal of antagonistic cognitions. Finally the consequences of the anger should be explored: the effects on performance, relationships and health.

Deffenbacher, Oetting, Lynch and Morris (1996) identified some problems with the assessment of anger. None of the scales describe a positive, assertive, problem oriented form of anger expression. They completed research with students and identified other forms of anger expression and subsequently proposed that tailoring treatment to an individuals specific pattern of anger expression may make it most effective.

Some difficulties exist in assessing anger, self- report is limited although multi- modal methods of assessment of the anger repertoire are most likely to provide the most accurate information. The majority of authors propose an assessment of physiological, cognitive and behavioural aspects of anger combined with triggers and consequences of the anger.

1.1.11. The treatment of anger

Although this research is not evaluating any treatment of anger problems, some review of the treatment literature is helpful for two reasons:

- the majority of research papers published on anger relate to the area of treatment
- as will be shown, treatment focuses purely on cognitive behavioural aspects of anger and little effort is made to identify and treat underlying executive function difficulties such as problem solving skills deficits.

Systematic desensitization was an early treatment of anger which focused on the semantic and physiological responses to anger inducing scenes (Evans, Hearn and Saklofske 1973). Results indicated that systematic desensitization reduced arousal and perceived anger in response to the stimuli.

² P. 35, Novaco (1994)

Levey and Howells (1991) suggest that research on the treatment of anger and aggression lags behind other conditions such as anxiety because people with anger problems are often low status and poor therapeutic prospects. Nevertheless, various strategies for the treatment of anger problems have been developed.

Morrison and Sandowicz (1994) emphasised the importance of social skills to counter the anger repertoire. For example, people with anger problems may not know appropriate skills to use or they may not apply those skills or the skills may be interrupted by interfering problems e.g. a learning disability. These authors propose social skills are taught using modelling, role-play and performance feedback. The social skills training should consist of:

- self- instructional techniques such as preparing for provocation and coping with arousal
- self- evaluation of how well the individual handled the situation
- relaxation training, including calm breathing techniques
- negotiation skills to ensure effective communication that is direct, rational and focused.

Deffenbacher, Oetting, Huff, Cornell and Dallager (1996) proposed that anger is often associated with poor interpersonal problem solving. They proposed two models of treatment. The first model- Cognitive Relaxation Coping Skills (CRCS) consists of: education, relaxation, cued relaxation and cognitive restructuring. The second model- Interpersonal Social Skills Training (ISST) aims to change communication patterns by looking at effective and ineffective ways of dealing with anger. Communication skills are then rehearsed. These treatments were compared using a group of students who had high ratings of anger. Students were randomly assigned to groups which met for one hour a week over eight weeks. Results indicated that both treatment groups reported significantly less anger than the control group. In the short term the CRCS group reported significantly less anger and less physiological arousal than did the ISST group. After five weeks, ISST and CRCS groups both reported less trait anger, less intense anger, less anger suppression and the CRCS group reported more anger control. It therefore seems that the best effects would be achieved if the training packages were combined.

Treatment for anger problems has often built on anxiety management and indeed some form of relaxation seems to be an essential aspect of an effective

treatment package (Edmondson and Conger 1996). The rationale for relaxation treatment is based on reciprocal inhibition theory. By associating relaxation with arousing stimuli such as arousal will be inhibited. Meichenbaum's Self-Instructional Training (1972) has been used in anger. The goal of these cognitive treatments is to modify cognition so that the individual will manage the anger experience better and that the anger intensity level will not be so great as to interfere with adaptive behaviour.

Edmondson and Conger (1996) criticised these assumptions. They argued that anger and anxiety are different emotions. Anxiety often has very specific triggers. By contrast, therapy for anger prone people needs to help them develop general anger regulation skills that can be applied in a variety of situations.

Novaco's Stress Inoculation Therapy (1983) proposes that after a full assessment, treatment should aim to impart anger control skills of three types. The aim is to prevent anger occurring when it is maladaptive, to enable the client to regulate arousal when it occurs and to provide the performance skills needed to manage the provocation experience. The cognitive preparation phase would educate clients about the functions of anger. Clients keep a diary to identify their personal patterns of anger e.g. triggers. The skill acquisition phase aims to promote cognitive arousal reduction and behavioural coping skills. A basic goal is to promote flexibility in thinking. The client is encouraged to challenge antagonistic thoughts and use distancing to establish more moderate alternative self statements and re-attribute blame. The client is taught relaxation and breathing skills. Communication, assertiveness and problem solving skills are all practised. The application training phase uses role play and imaginal anger provoking situations. A hierarchy of anger situations that the client is likely to encounter in real life is constructed and coping with these situations is rehearsed: imaginally and in vivo. Tulloch (1990) also emphasised the cognitive approaches to treatment. These cognitive approaches share the assumption that faulty cognitions may lie at the heart of the problem. Therefore some form of cognitive restructuring such as Beck's Cognitive Therapy is necessary. Tulloch questions whether chronic anger develops due to a self-schemata of threat to self. He proposes that future developments should identify which treatment components are most effective with which clients.

Some recent anger management treatment has focused on group work. Towl (1993) detailed groupwork with female prisoners. The treatment explores anger and aggressive behaviour, introduces cognitive techniques and the use of calming self-statements. Role play is used to practise these skills and rehearse strategies to handle criticism. Towl (1993) details the three stages of the group. The first stage is the general exploration of anger. The second stage is the individual examination of personal experiences of anger. The third stage is selection and practise of anger control methods. Towl identifies common cognitive distortions which should be addressed and emphasises the importance of modelling calm in the group.

McDougall and Boddis (1991) developed a two session group intervention for anger and aggression. There were two aspects to this treatment. The first involved clients generating a list of positive or negative consequences of anger. Often the negative consequences outweigh the positive consequences. The second component of the group was training in relaxation techniques. Results indicated that this brief course was as effective as a longer cognitive behaviour therapy anger control course.

Finally, in certain settings such as a forensic setting, it may be necessary to take a systemic approach to treating anger (Levey and Howells 1991). The high level of client motivation and cooperation required for anger management may not always be found in a forensic setting or anger problems may be complicated by mental illness. Instead of doing individual anger management treatment it may be necessary to work within the system. Staff training would educate staff about the anger management model and procedures on how to calm aggressive people could be taught. For example, modelling calm, empathic listening, reassurance and helping the aggressive person save face. Staff can then help clients avoid possible triggers to anger and decrease confrontations. Alternatively, environmental restructuring may reduce the number of anger outbursts. An increase in activity programmes; differential reinforcement of other behaviour or a ward policy which reinforces staff-client interaction may reduce the frequency of anger outbursts. Reducing aggressive incidents is a pre-requisite for effective psycho-social long term treatment.

This section has reviewed treatments of anger. Relaxation, social skills training, problem solving and cognitive restructuring have all been used to treat anger. Although effective at times, these approaches are not always successful in dealing with people who have entrenched anger problems, for example a forensic population. If these people had neuropsychological deficits contributing to the anger,

this may go some way to explaining why these treatments are not always successful and may help to indicate treatments for the future which takes account of these deficits.

1.2.12 Summary of anger literature review

To conclude, anger has no diagnostic classification in DSM IV but it is often seen in a clinical context. To date the majority of theories on anger have incorporated cognitive, behavioural and social aspects to a greater or lesser extent. However, few have postulated as to the cognitive functions involved in the regulation of anger. Indeed, although research has explored the common social contexts of anger outbursts, no attempt has been made to explore the neurocognitive context. Neuropsychological features of anger are not included in attempts to define it or assess it. Finally, if people with anger problems had neuropsychological deficits this may indicate more appropriately tailored treatments to help ease their difficulties.

1.2. EXECUTIVE FUNCTION

The aim of this section is to review the biological basis of the anger emotion and, more importantly, the neuropsychological functions which may be involved in the regulation of anger.

1.2.1 The neurology of emotion

Emotions have many different functions. They elicit autonomic and endocrine responses. Emotions are motivating and serve to communicate, so have a social role. Emotions may also affect cognitive processing and facilitate the storage of memories. Rolls (1990) identified three anatomical structures implicated in emotion:

- the hypothalamus, part of the limbic system thought to be involved in reinforcement
- the amygdala, another subcortical structure which appears to be involved in learning and response to faces
- the orbitofrontal cortex, thought to be involved in emotion

1.2.2 The neurology of anger and aggression

The anatomical structures highlighted above are those identified as having a role in anger and aggression. Weiger and Bear (1988) considered the neurological basis of emotion in man and identified the hypothalamus, the amygdala and the frontal cortex. Animal studies have shown that ablation of the hypothalamus can create rage outbursts in cats. The amygdala links sensory input and hypothalamic activation. This area is implicated in aggressive behaviour sometimes seen after temporal lobe epilepsy. The frontal neocortex is extensively connected to the subcortical structures implicated in aggression and acts as a higher level control. Luria identified that in humans an orbital lesion can create an increase in impulsive or inappropriate activity. In patients with orbito frontal lesions, trivial stimuli may lead to outbursts of anger which quickly pass.

Glick and Roose (1993) also proposed that the hypothalamus, the limbic system and the prefrontal cortex network is implicated in anger and aggression. Lesions in the frontal neocortex involving orbital regions are associated with

impulsivity and rage outbursts. Sachdev, Smith, Matheson, Last and Blumberg (1992) proposed that the neural basis of rage and aggression is in the amygdala, hypothalamus and other components of the limbic- subcortical mesencephalic continuum. To support this they detailed two cases of people who had extreme anger outbursts. The first person had had a traumatic brain injury (tbi). A later post mortem showed damage to the frontal lobe, brain stem, hippocampus, amygdala and thalamus. The second person had uncontrollable limbic system epilepsy. During psychosurgery to reduce his aggressiveness, his amygdala and hippocampus were removed. The surgery reduced his aggressiveness.

Petty, Bonner, Mouratoglou and Silverman (1996) proposed that the caudate nucleus may be associated with disinhibition and irritability. Lesions in the caudate nucleus have the effect of disconnecting frontal cortex from subcortical structures. In addition to these neurological structures, hormones such as testosterone are likely to have a role in anger or aggression (Carlson 1986).

Similar but not identical neurological structures are implicated in anxiety. Gray (1990) proposed that the hippocampus, the septal area, the thalamus, the locus coeruleus, the raphe nuclei and certain regions of the neocortex are all involved in the generation of anxious behaviour. These authors suggested there may be emotional systems within the brain such as a fight/ flight system.

To summarise, several different authors have proposed the same neural substrates; subcortical structures and the frontal lobe, as having a role in the emotion of anger.

1.2.3 The frontal lobes

These structures are particularly relevant to this research because the capacities subsumed by executive functions have been linked to the prefrontal region throughout the history of neuroscience (Tranel, Anderson and Benton 1994).

“the frontal lobes are the most evolutionary advanced organ of the body. Here lies the seat of the highest human functions of thought, intellect, creativity, self control and social interaction”³

³ P.244 David (1992)

The role of the frontal lobe in higher cognition was established with the emergence of phrenology. In 1868 John Harlow's presentation of Phineus Gage provided the early impetus for research (Duffy and Campbell 1994, Damasio, Grabowski, Frank, Galaburda and Damasio 1994). Further detail on their anatomy and functions was facilitated by two world wars that resulted in large cohorts of patients with focal frontal injuries. Technological advances with scanning techniques have provided yet more information.

The prefrontal cortex is histologically heterogeneous and has extensive connections with multiple cortical, subcortical and brain stem sites. The 'prefrontal' cortex refers to its location anterior to the premotor gyrus. Prefrontal cortex is unique in that it is the sole cortical area receiving highly processed sensory information from all modalities. The granular prefrontal cortex has rich connections with the limbic system. Limbic connections contribute emotional and motivational relevance to incoming sensory information. Brainstem input to the prefrontal cortex modulates the level of arousal for the entire cortex, providing a matrix for complex behaviour. Neurotransmitter systems such as dopaminergic and serotonergic systems are also linked to the frontal cortex, as is the cerebellum. The intricate and extensive connectivity of the pre-frontal cortex establishes an anatomic basis for ongoing goal directed behaviour (Duffy and Campbell 1994).

Stuss, Gow and Hetherington (1992) described the various frontal lobe connections in terms of three main systems:

- the primarily cortical limbic lobe
- a subcortical system that includes a limbic midbrain region
- a peripheral viscerosendocrine system related to mood and motivation

A 'frontal lobe' syndrome may present itself as: altered mood; apathy; depression; restlessness; euphoria; decrease in initiative; lack of judgement; diminished foresight; disinhibition; social withdrawal; impulsivity; irritability; confabulation; personality change; problems inhibiting automatic responses and temper outbursts (Stuss et. al. 1992, Malloy, Bihle, Duffy and Cimino 1993). However, "*the frontal lobes constitute approximately one third of the brain therefore localising a disturbance to this region is rather like a person directing a visitor to an address marked Europe*"⁴

⁴ P.244 David (1992)

1.2.4 Executive functions

It is widely accepted that the labelling of a syndrome in terms of its brain localisation is unhelpful. The capacities subsumed by the term executive function are related to some regions outside the frontal lobes (Tranel, Anderson and Benton 1994).

Vygotsky (1962) defined executive functions as
*“ awareness of the activity of the mind- the consciousness of being conscious ”*⁵

Luria (1973) made reference to the brain as a ‘self regulating system’. It is this regulatory feature of executive function that is relevant to this research. Luria (1973) proposed that certain parts of the brain play an essential role in the regulation of the state of activation that arises as a result of some task. When this system was not functioning properly patients appeared to lose their intention and other purposeful activity was disturbed. He supported this theory by describing clinical cases of patients unable to inhibit imitative or well learned stereotypical tendencies in favour of more complex novel responses. Crucially then, executive function is the inhibition and regulation of behaviour. Furster (1980) proposed that executive function is the formation of novel complex behaviour with a unifying purpose or goal. There are three subordinate functions: anticipation, provisional memory and control of interference. For example, one function would be to ensure the individual does not pay attention to irrelevant external stimuli or respond to impulses for immediate gratification which may abort the complex behaviour before it is completed. Duffy and Campbell (1994) described executive function as the metacognitive functions necessary to produce context appropriate goal oriented behaviour including motivation, planning, self regulation and self monitoring. Stuss, Esken and Foster (1994) proposed executive functions are attention; visual scanning; sequencing and fluency. However, executive functions also draw on many other cognitive components including memory, perception and language.

Lezak’s definition of executive functions (Lezak 1995) includes: perceptual organisation; processing two or more events at a time; monitoring and changing

⁵ P.91, Vygotsky (1962)

behavioural input; abstract thinking and mental flexibility. She divided these into four components.

- Volition/ goal formulation- requires a person to conceptualise the future.
- Planning- identifying and organising steps needed to carry out intention
- Purposive Action- translating a plan into action. The person must initiate, maintain, alter and stop complex sequences of behaviour.
- Effective Performance- this requires the person to self- monitor and self correct.

Tranel et. al. (1994) thoroughly reviewed literature on executive functions: the concept, their definition, their development, their anatomical basis and their measurement. They provide a similar definition to Lezak and concluded that executive functions denote higher order cognitive and behavioural capacities. These functions exist at the most supraordinate level of human cognition, they are difficult to quantify and are closely linked to personality and consciousness. Most recently Spreen and Strauss (1998) described executive function as a multi dimensional construct including processes such as initiation, generation of ideas, cognitive flexibility, decision making, regulation and self perception that are necessary for effective appropriate behaviour.

1.2.5. Development of executive functions

Executive capacities mature from three to twelve years although there is evidence of them in the first few years of life and myelination of neural connections may take up to twenty years of age (Tranel et. al. 1994). Executive functions may be particularly vulnerable following early brain insult. Any cerebral insults interfere with the future development of the immature brain and the child may not have had the opportunity to develop executive functions (Garth, Anderson and Wrennall 1997). Children who sustain frontal lobe injury congenitally or in childhood demonstrate classic executive dysfunction in later years. They may show deficits in planning, sustained attention, judgement, problem solving, rigidity and irritability (Grattan and Eslinger 1991). Available evidence indicates consistently that early damage to frontal regions produces a marked disruption of socialisation. The person consistently manifests a failure to develop age appropriate skills particularly as they reach adulthood and the complexity of social demands increases.

1.2.6. Theoretical models of executive functions

Duffy and Campbell (1994) summarised three models of executive architecture.

- Working Memory- this model proposes the executive role is to weigh up priorities, develop an appropriate plan of action therefore enabling the individual to guide behaviour on the basis of previous experience as well as environmental stimuli.
- Mediation of Cross Temporal Contingencies- the executive system integrates sensory information and motor acts into complex and purposeful behavioural sequences. The fundamental functions would be: to provide a template for provisional short term memory; to develop response strategies and to suppress stimuli that might disrupt the enactment of the prioritised behavioural strategy.
- Modulation of Large Scale Neurocognitive Networks- widespread connections mean the prefrontal lobes and other areas assume an organising role in behaviour by appropriately activating, inhibiting and integrating widely distributed systems. This explains why lesions anywhere within the extended neuronal network would produce similar functional deficits.

Baddeley, Della Sala, Gray, Papagno and Spinnler (1995) proposed the term executive function should be applied to a theoretical model. Their working memory model comprises an attentional control system (central executive) which coordinates the operation of two slave systems- the phonological loop which is assumed to be a mechanism for the retention of speech- based material and the visuo-spatial scratchpad which constructs and perceives visual images. The central executive is thought to act as a general attentional resource and to be involved in reasoning, decision-making, calculation, comprehension and retention of information. On some levels this theoretical model of the central executive fits with what we know of executive function, e.g. one of the clearest indicators of executive dysfunction is impaired attention.

1.2.7. Definitions of executive dysfunction

Pribram and Luria (1973) suggested impaired attention, mental inflexibility and a marked disturbance of complex forms of behaviour e.g. problems inhibiting automatic responses would be expected with executive dysfunction. Specific problem

solving impairments were also observed. In particular, a lack of analysing what was required in certain tasks automatically led to unsuccessful planless attempts on the part of the patient. The second characteristic of impaired problem solving was the patients inability to make goal directed choices from a number of reasonable alternatives

Furster (1980) identified executive dysfunction as the patients inability to construct a purposive temporal sequence incorporating both the plan and the action. Milner (1982) referred to executive dysfunction as impairments in regulation of behaviour. She suggested that in such cases, the individual is able to carry out actions that make up the sequence of behaviour but the overall temporal organisation is lost with the result that some actions may be performed in the wrong order. Weiger and Bear (1988) said problem solving deficits and impulse control problems are common.

Furster (1989) later proposed that executive dysfunction is a lowering of general awareness, sensory neglect, concentration problems and distractibility. He considered planning deficits to be a core feature of executive function disturbance. Combined with this, patients are unable to suppress disruptive influences of irrelevant material. He also mentioned disorders of affect and emotion as disturbances of executive function, such as apathy or irritability.

Stuss, Esken and Foster (1994) proposed that executive dysfunction includes: deficits in initiation, impairments in organisational ability, deficits in planning, monitoring and changing reponse set. There may also be impaired social judgement. Tranel et. al. (1994) proposed executive dysfunction was an impaired capacity to monitor and adapt one's behaviour and an inability to consider future consequences including evaluate future risk. Lezak (1995) considers executive dysfunction to be problems in starting, altering and stopping behaviour; reduced self awareness; mental inflexibility; perseveration and impulsivity. Most recently Garth, Anderson and Wrennall (1997) have described executive function as perseveration; difficulties generating strategies; failure to utilise feedback and difficulties coping with complex tasks.

1.2.8 Measurement of executive function

Lezak (1995) emphasises the great problems that occur in trying to assess executive functions partly because they are hard to define. Firstly, they are difficult to tap onto without also simultaneously mapping onto some memory or language function. Secondly, the highly structured nature of formal neuropsychological assessment settings often hides the planning problems because there is a superimposed structure. For example, the examiner may help the person to focus on the task.

Equally problematic, many clients deny any disability; therefore qualitative information from observation and relative report may be necessary to pinpoint specific problems (Yarnell and Rossie 1990). Problems reaching a consensus of what exactly executive function is have been compounded by heterogenous presentations and test performance of patients with executive dysfunction. For example, Shallice and Burgess (1991) described three cases of patients who appear unimpaired on traditional executive tests yet clearly had problems in daily life. Interestingly these difficulties were identified using more complex multi- task tests. This will be discussed later in relation to the results. No neuropsychological measure has been found to be sensitive and specific to executive dysfunction. Tranel, Anderson and Benton (1994) propose that the practise of mixing functional disturbances and anatomical syndromes may be a major reason for the apparent lack of sensitivity and specificity of many neuropsychological procedures.

“If the use of neuropsychological techniques were circumscribed to the measurement and characterisation of cognitive behavioural capacities, the procedures may in fact be capable of yielding consistent results with respect to sensitivity and specificity of detecting executive function disturbances”⁶

⁶ P134 Tranel et. al. (1994)

Cripe (1996) reviewed the ecological validity of neuropsychological testing. He points out that executive functions are not just concerned with what gets done but also how things get done. Therefore, executive functions are process and outcome orientated and very difficult to operationalise. Cripe proposes a more fundamental problem to the measurement of executive function:

“ the test scores are reductionistic symbolic representations of real events and as real events become more complex, interactive and dynamic, the reductionistic symbols become a poorer representation of the reality”⁷

He likens the problems of measuring executive functions to accurate measurement of a merry-go-round, i.e. measurement becomes very difficult when multiple objects are moving and interacting. Since executive functions are very complex (metacognitive) dynamic processes, their observation is particularly limited by symbolic reductions (single test scores). This is why executive functions often elude test scores.

Executive function assessment could be improved by using a complex evaluation process that incorporates objective quantitative as well as objective qualitative methods of observation. This would involve observation, relative interview and a battery of tests. Multiple methods of data collection would improve assessment validity.

To ensure the reliability and validity of executive function measurement, firstly, multiple measures should be used and, secondly, results should be interpreted according to the functions they were designed to assess and not anatomical structure.

⁷ P.189. Cripe (1996)

1.2.9 The role of executive functions in psychological problems

Executive function impairment has been implicated in virtually all psychological problems.

Table 1.1 Executive dysfunctions implicated in psychological problems, from David (1992).

Problem	Possible executive function impairment
Personality Disorders	lack of concern for others
Obsessions	rigidity and perseveration
Delusions	jumping to conclusions
Depression	psychomotor slowing
Mania	disinhibition
ADHD	poor impulse control
Schizophrenia	poor judgement, poor insight, lack of self care

Executive dysfunction has also been implicated in cerebro vascular accident (c.v.a.), dementia, Multiple Sclerosis, Human immunodeficiency virus (H.I.V.), Parkinson's disease and Huntingtons disease (Stuss, Gow and Hetherington 1992, Duffy and Campbell 1994). Kopelman, Guinan and Lewis (1995) proposed that certain negative symptoms in schizophrenia are related to "frontal lobe dysfunction" as well as confabulation and delusions.

Any person sustaining traumatic brain injury is vulnerable to executive function impairment. This is particularly the case after acceleration- deceleration head injury, common after road traffic accidents and assaults, when the brain matter is subject to diffuse damage after axonal tearing (Rose and Johnson 1996). These executive impairments may present as: personality change; impaired capacity for control and regulation of complex behaviour; and aggression and anger (DiCesare 1990). Garth, Anderson and Wrennall (1997) gave a thorough description of executive functions and the nature of deficits expected after traumatic brain injury. These included problems planning, problem solving, reasoning, utilising feedback and coping with complex tasks.

1.2.10 Anger, aggression, traumatic brain injury and executive dysfunction

Lewis (1990) noted that trauma to the central nervous system is extremely common especially among aggressive offenders. Blake, Pincus and Buckner(1995) completed thorough neurological and psychological assessment of thirty one individuals awaiting trial or sentence for murder. Results indicated that almost all of them had evidence of neurological abnormality including frontal and temporal lobe abnormalities, combined with psychiatric diagnosis. They proposed that the neurological abnormalities combine with the psychiatric condition and long histories of abuse to form the matrix of violent behaviour. Hall (1993) detailed the increased time spent exploring executive dysfunction as a precursor to violence in criminal and civil court cases.

Grattan and Eslinger (1991) identified that children who have sustained traumatic brain injury (tbi) often have executive function impairments which include interpersonal problems and irritability. Stuss et. al. (1992) made a clear link between executive dysfunction (such as impulsive behaviour or impairments in socially appropriate behaviour) and anger outbursts so frequently seen in people who have sustained t.b.i. Duffy and Campbell (1994) proposed slightly different manifestations of executive dysfunctions. The first, dysexecutive syndrome is characterised by perseveration, mental inflexibility, impairments with reasoning and problem solving. The second, the disinhibition syndrome is characterised by poor impulse control, explosive anger outbursts and a lack of interpersonal sensitivity.

Similarly, Miller (1994) proposed three main types of anger and aggression observed after t.b.i. The first is episodic dyscontrol- intermittent rage attacks which appear unprovoked and poorly organised. Miller attributes these to physiological disturbance in the temporal lobe/ limbic system area. The second type is anger and aggression due to executive dysfunction. That is, the patient no longer has the same control and regulation of his behaviour which leads to a lower threshold for anger outbursts. These outbursts are likely to take the form of shouting and throwing objects. Miller's third group are people who have perhaps always been impulsive and aggressive and this may pre-date the injury. That is, executive deficits may characterise the thought and behaviour of individuals most likely to incur a t.b.i. in the first place.

1.2.11. The neuropsychology of anger and how executive functions have a role.

Very little literature exists exploring the neuropsychology of anger. Although there is literature on anger and impulse control problems after t.b.i., no research appears to exist on the presence of executive function deficits in people with anger problems.

Two studies are worthy of note. Giancola and Zeichner (1994) completed a laboratory based study to explore the link between performance on neuropsychological tests and physical aggression in young men. They excluded people with a history of t.b.i. or psychiatric problems. Subjects were asked to complete two neuropsychological tests (the Self Ordered Pointing Task and the Conditional Association Task). These tasks were made competitive and electric shocks were received from and administered to a fictitious 'opponent'. Aggression was defined as the shock intensity and duration administered by the participants. They found that subjects who performed poorly on one test were more aggressive than subjects who performed well. They concluded that the external provoking conditions combined with diminished behavioural inhibition may lead to aggressive behaviour. The ethics of this experiment were somewhat dubious; prior to the experiment starting subjects' pain thresholds were assessed yet it is not clear why this was relevant or necessary for the study. The authors also tried to link neuropsychological tests to specific neurological areas, rather than functions. There was no evidence that the tests used mapped onto behavioural inhibition. More recently Harmon- Jones and Allen (1998) used E.E.G. readings to explore anterior hemispheric asymmetry for motivation and affect. They hypothesised that increased anger would be related to increased left anterior activity. However, the authors used children as subjects taking E.E.G. readings first and then completing anger and aggression ratings. The conclusions that can be drawn from this study are therefore limited given that for many children the anterior region of the cortex will not have fully developed and so may appear not to be functioning. There was also no attempt to control for confounding variables such as pre and peri natal birth trauma or other psychological problems that have neuropsychological implications. The results indicated that dispositional anger correlated positively with anterior left cortical activity. They proposed that individuals with high dispositional anger have increased approach motivation and decreased withdrawal motivation. These conclusions seem premature given the methodological limitations of the study. It is of note that at no stage was functioning including approach or withdrawal motivation explored.

Therefore, arguably the two research studies referred to above exploring anger, aggressive behaviour and neuropsychological function are flawed and so few conclusions can be made.

The present study is intended to explore the possibility of executive function impairments in people with anger problems. Anger is a normal emotion, yet for some people it becomes a clinical problem. Is it possible that these individuals have coexisting executive function deficits which mean their ability to regulate and control their behaviour is impaired? They may be impulsive and have poor problem solving or interpersonal skills which makes them even more likely to end up in situations that trigger anger. Is executive dysfunction a mediator which means when these people are exposed to an anger provoking event, anger outbursts are more likely because behavioural regulation and problem solving skills are impaired?

1.3 Aims and hypotheses of proposed study

From the above discussion it is evident that neuropsychological functions, particularly executive functions, may have a role in the regulation of anger. An increased understanding of the possible role of executive function impairments in individuals with anger problems may help clarify the neuropsychological component of anger regulation and possibly aid in the establishment of more specific treatment/rehabilitation for these impairments.

Therefore, the purpose of the current study is to investigate the possibility of executive function deficits in people who have anger problems.

Anger and anxiety are both forms of arousal. Section 1.1.6 identifies the link between anger and anxiety. There is an optimum level of arousal for functioning beyond which arousal may actually impair functioning (Lezak 1995). In order to clearly link executive function impairments with anger and not just arousal per se, a control group of people with anxiety problems has been included. Therefore, the study will also explore whether people with anxiety problems have similar executive function deficits. In addition, a further control group who do not report any psychological problems are included.

It is hypothesised that the anxious control group will not be significantly different from a healthy control group on measures of executive function and thus any differences observed in the anger group will be due to executive function impairments rather than the effects of arousal.

Experimental hypothesis

Anger patients will display specific impairments on executive function tasks relative to both anxious and healthy control groups.

2. METHOD

2.1 Design

The present study is cross-sectional and was conducted to explore the possibility of executive function impairments in people with anger problems. The study employed both between-subject and within-subjects comparisons and correlations.

This study was approved by Forth Valley Health Board Ethics of Research Committee.

2.2. Subjects

2.2.1 Selection Criteria

In order to reduce the risk of major confounding variables, any subject with a significant history of addiction (drug or alcohol), psychosis or neurological problems (traumatic brain injury or C.N.S. disease) was excluded from the study. All subjects were between 18 and 70 years of age. In all cases informed consent to take part in the study was obtained from the subjects themselves.

2.2.2 Anger Group

Subjects for this group were recruited from a waiting list at the Department of Clinical Psychology, Bellsdyke Hospital. The specific criteria for selection was a G.P. referral for treatment or management of anger problems. A total of 21 subjects met the inclusion criteria. One subject was very aggressive at the initial session and so it was decided not to proceed with the neuropsychological assessments with him. The final anger group composed of 20 patients all of whom reported problems managing anger.

2.2.3 Anxious Group

Subjects for this group were recruited from a waiting list at the Department of Clinical Psychology, Bellsdyke Hospital. The specific criteria for selection was a referral for psychological treatment of anxiety problems. Generalised anxiety and panic disorder were included. However, anyone with a more complicated anxiety based problem such as Obsessive Compulsive Disorder or P.T.S.D. were not included. In addition several subjects were recruited after being invited to take part in the study by the psychologist they were seeing. The final anxiety group consisted of 19 patients.

2.2.4. Control Group

This group consisted of 20 healthy subjects who were not reporting psychological problems. They were recruited mainly from ad hoc contacts which included acquaintances of the author, University students and members of a local social club. It was originally intended to recruit a matched control group from a G.P's list. However, due to the length of time taken to recruit experimental group subjects, it was not possible to match and recruit potential control group subjects thereafter. Instead subjects were recruited throughout the duration of data collection. All those who were invited to participate agreed to take part and no subject was excluded on the basis of the criteria outlined in section 2.2.1.

2.3. Procedure

Subjects on the waiting list who fulfilled criteria for inclusion in the study were invited to attend for a routine initial assessment. If at the initial assessment it became clear that anger or anxiety were not the main presenting problem, the patient was not included in the study and individual arrangements were made for that patient to see another therapist. If the subject was suitable for inclusion in the study, they were invited to attend for one extra session during which time neuropsychological assessments and emotional inventories were completed.

Subjects were given information about the study and signed a consent form (See Appendix). Demographic variables were recorded for each subject which included age, sex, postcode, duration of education and occupation. Postcodes were

recorded in order to obtain a Deprivation Category for each subject (Carstairs and Morris 1991) which ranged from 1 (affluent) to 7 (deprived) whilst social class was derived from a subjects occupation using the Office of Population Censuses and Surveys (1991) “Classification of Occupations”.

Each subject was asked to complete the assessments in a single testing session which lasted approximately 60 minutes. No interview required more than one testing session and the assessments were administered in the same order for all subjects which was as follows:

- The State Trait Anger Expression Inventory
- Hospital Anxiety and Depression Scale
- The Brief Novaco Provocation Inventory
- Michigan Alcohol Screening Test
- The Temporal Judgement subtest of the Behavioural Assessment of the Dysexecutive Syndrome (B.A.D.S.)
- The Rule Shift Card subtest of the BADS
- The Six Elements subtest of the BADS
- The National Adult Reading Test
- The Controlled Oral Word Association Test
- The Stroop Test
- Story Recall
- The Trails Test

The assessments administered are detailed in section 2.4.

2.4 Materials

The assessments administered fall into two main types: neuropsychological assessments and emotional inventories.

2.4.1. Neuropsychological / Executive Function Assessments

The National Adult Reading Test (N.A.R.T.)- Nelson (1982)

This is an assessment which gives an indication of premorbid mental ability. The NART list comprises fifty phonetically irregular words which the subject has to read aloud. The assumption is that only people who have had prior familiarity with the words will be able to read them therefore indicating higher verbal intelligence.

NART intelligence correlates significantly with education, social class, Wechsler Adult Intelligence Scale IQ and it is highly reliable (Lezak 1995).

Controlled Oral Word Association Test- Benton and Hamsher (1989)

An important component of executive functions is the generation of responses appropriate to a given set of stimulus conditions (Tranel, Anderson and Benton 1994). Measures of verbal fluency provide a means of evaluating the ability to produce responses which comply with a set of constraints. This assessment requires the subjects to say as many words as possible that begin with a certain letter (C,F or L) in three one minute trials but excluding proper nouns, numbers and the same word with a different suffix. The score which is the sum of all acceptable words produced in three trials is adjusted for age, sex and education. This assessment has been shown to be a sensitive indicator of brain dysfunction (Lezak 1995). The fluency test is timed so that focused attention and rapid response generation are necessary for adequate performance. In addition, fluency tests are sensitive to perseverative tendencies due to the requirement for continuous variation of responses within a set and so assess spontaneous flexibility (Spreen and Strauss 1998).

The Stroop Test- Stroop (1935)/ Trenerry et al (1989)

This test places demand on cognitive flexibility by requiring the inhibition of an over learned or habitual response in favour of a novel response (Tranel, Anderson and Benton 1994). It is also a test of selective attention and is thought to be sensitive to subtle cognitive impairments and deficits in executive functioning (Lezak 1995). The subject is presented with a sheet with a series of one hundred and twelve colour names printed in different colour of inks. The first part of the test requires the subject to read aloud the word. The second part requires the subject to name the colour of the ink used to print the words, not the actual word. However, due to time constraints only the second part of this test was completed i.e. subjects named aloud the colour of the ink used to print the words. The subject was given 120 seconds to name as many as possible.

Coughlans and Hollows (1985) Story Recall

This assessment provides a measure of both immediate and delayed memory. If a subject is impaired on this assessment, this suggests a general memory impairment may be contributing to their problems rather than executive function deficits specifically. This test is reasonably quick to administer. The examiner reads a short story and the subject is asked to recall any details s/he can remember at both

immediate and delayed trials. The delayed trial was completed twenty minutes after the initial presentation of the story.

The Trails Test- Army Battery (1944)

This assessment measures various skills such as visual search, sustained attention and cognitive shifting (Tranel, Anderson and Benton 1994). This test is highly vulnerable to the effects of brain injury (Lezak 1995). Part A of the Trails Test requires the patient to join numbers on a page in the correct order. Part B involves joining numbers and letters in the correct order, alternating between the two e.g. from 1 to A to 2 to B to 3 to C etc. Scores are determined by the amount of time taken to complete each part.

The Behavioural Assessment of the Dysexecutive Syndrome- Wilson, Alderman, Emslie and Evans (1996) / Wilson, Evans, Emslie, Alderman and Burgess (1998)

- **Temporal Judgement Subtest**

This subtest is one of a number of tests which make up the BADS assessment materials recently designed to tap onto executive function deficits specifically. This test comprises four short questions concerning commonplace events which take from a few seconds to several years. Subjects are assured that they are not expected to know the exact answer to the four questions but that they should make a sensible guess. Inter- rater reliability is high and the test has been shown to significantly differentiate dysexecutive syndrome patients from normal controls. Indeed, it is one of the most reliable and valid subtests of this battery (Wilson et. al. 1996).

- **The Rule Shift Cards Test**

Subjects are given a booklet of various playing cards. In the first part of the test, subjects are asked to say 'Yes' to a red card and 'No' to a black card. This rule is typed on a card and left in front of them during the test to reduce any memory constraints. Cards are turned over one at a time. The time taken and number of errors are recorded. In the second part of the test, subjects are asked to respond 'Yes' if the card that has just been turned over is the same colour as the last card, otherwise 'No'. Again time taken and number of errors are measured. This test assesses the subjects ability to shift set from one rule to another. Inter- rater reliability is high and the assessment significantly differentiates dysexecutive syndrome patients from normal controls (Wilson et. al. 1996).

- **The Six Elements Task**

The aim of this task is to assess the subjects ability to carry out six open ended tasks in ten minutes. There are two dictation tasks, two arithmetic tasks and two picture naming tasks to attempt. For the dictation task the subject is asked to describe a memorable event or a good holiday. For the arithmetic task the subject has to write down the answers to some arithmetic questions that are presented on cards. The third type of task requires the subject to write down the names of some pictures presented in stimulus booklets. The subject is required to attempt at least something from each of the six subtasks within a ten minute period. The subject is told that there is one rule which they should obey and that is that they should not move on to the second part of a task immediately after they have attempted the first part of the same task. For example, after attempting arithmetic part A, the subject should move on to picture naming or a dictation task rather than arithmetic part B. The number of tasks attempted, the number of rules broken and the maximum amount of time spent on any one task are all used to calculate a profile score for this subtest. This test makes demands on a person's ability to plan, organise and monitor behaviour because there are multiple tasks and the subject has to initiate responses and change set. Again this subtest differentiates a dysexecutive syndrome group from a control group (Wilson et. al. 1996).

2.4.2 Emotional Inventories

The following assessments measure psychological distress.

The Hospital Anxiety and Depression Inventory(H.A.D.) - Zigmond and Snaith (1983)

The HAD, which was designed as a brief screening test for the presence of anxiety or depression in a non- psychiatric group, was used to assess the levels of anxiety and depression in the study participants. The scale consists of two subscales covering anxiety and depression. Each have seven items that are rated on a four point scale. Scores on each subscale are totaled. A score of 8- 10 indicates a ' borderline' level and any score over 11 indicates clinical caseness.

The State Trait Anger Expression Inventory (S.T.A.X.I.)- Spielberger (1988)

This assessment measures different components of anger. It is a self- report scale with forty four items which are rated on a four point Likert type scale; various subscales exist within this which are calculated by summing certain items. 'State

anger' is defined as an emotional state marked by subjective feelings of anger that vary over time. 'Trait anger' is defined as the disposition to perceive a wide range of situations as annoying and to respond to such situations with more anger. Individuals high in trait anger experience state anger more often and with greater intensity (Spielberger 1988). In addition, anger expression has three major components. 'Anger out' is a rating of the amount of anger expressed towards other people or the environment. 'Anger in' is a rating of the amount of suppressed anger. 'Anger control' is a rating of the amount a person attempts to control their anger. The STAXI scales have high reliability and validity.

The Brief Novaco Provocation Inventory - Papps and O'Carroll (1998)

This assessment was developed from Novaco's (1975/88) Provocation Inventory (NPI) which is an eighty item self report inventory of hypothetical anger inducing situations. These situations are rated on a five point scale. The NPI was designed to gauge the range and intensity of anger responses and provides information about the types of situations most likely to arouse anger and the overall magnitude of a respondents proneness to provocation (Novaco 1994). Papps and O'Carroll (1998) adapted this scale by reducing the number of items in it to fifteen and so creating a shortened version (See appendix).

The Michigan Alcohol Screening Test- Selzer (1971)

This assessment was devised to provide a quickly administered quantifiable interview instrument to detect alcoholism. Subjects are required to give a Yes or No response. A score of three or less was considered non- alcoholic, four points was borderline and five plus points was considered an alcoholic response. This assessment was included in this test battery to measure alcohol intake which may be a confounding variable when exploring anger and cognitive function.

2.5 Data analysis

2.5.1 Subject Confidentiality

To maintain subject confidentiality each subject was assigned an identification number which was entered into the computer. Subjects' names were removed from all interview schedules once the data had been collected.

2.5.2. Data Analysis

Data was entered onto a spreadsheet and analysed using a Statistical Package for the Social Sciences (SPSS) for Windows version 8.0. There were no missing variables. Initial analysis explored differences between groups using one- way Analysis of Variance for parametric variables. Chi Square and non parametric Analysis of Variance (Kruskal Wallis) were used to explore differences between means on categorical or non parametric demographic variables.

Independent variables of interest were analysed using one way Analysis of Variance and post hoc Scheffe tests. Significance levels were pre-set at the 0.05 level. To reduce the risk of Type 1 error, the number of comparisons was limited by using Multivariate Analysis of Variance (MANOVA) to compare differences between groups on several meaningful variables e.g. all the anger variables were compared together. Again post hoc Scheffe tests were completed, pre- set at the 0.05 level. Most of the anger measure variables and the neuropsychological variables were explored using MANOVA. Significant differences between groups were then explored further by using Multiple Analysis of Covariance to explore the contribution of specific potential confounder variables.

Finally, within group correlations provided information on the relationship between anger variables and executive function measures.

3. RESULTS

3.1. Demographic characteristics

The demographic characteristics of the three groups are presented in Table 3.1.1.

Table 3.1.1. Demographic Information

M-means, SD- standard deviation, NS- not significant

specific variable	Healthy Controls n=20	Anger Group n=20	Anxiety Group n=19	Statistic	Significance level
one way Anova AGE M(SD)	32.60 (13.51)	36.05 (11.73)	41.57 (11.78)	F=2.60	p=0.083 NS
one way Anova YEARS EDUC M(SD)	16.85 (2.27)	12.20 (1.60)	13.10 (2.38)	F= 27.23	p<0.001
one way Anova NART ERR. M(SD)	10.75 (6.67)	20.75 (6.41)	15.63 (7.77)	F= 10.311	p<0.001
one way Anova NART IQ M(SD)	118.90 (5.52)	110.45 (5.22)	114.84 (6.50)	F=10.758	p<0.001
Pearsons Chi Square SEX M/F	10/10	16/04	09/10	$\chi^2 = 5.70$	p=0.058 NS
Kruskal Wallis Test CLASSIFIC OCCUP (Mean rank) No's in each class	(20.15)	(40.1)	(29.74)	$\chi^2 = 13.80$	p=0.001
1	6	4	1		
2	7	3	0		
3	2	1	0		
4	0	1	0		
5	0	0	3		
6	1	3	6		
7	4	3	2		
8	0	2	4		
9	0	2	4		
Kruskal Wallis Test DEPRIV. CAT. (Mean rank) No's in each class	(19.58)	(36.08)	(34.58)	$\chi^2 = 11.76$	p=0.003
1	11	1	0		
2	3	4	5		
3	1	5	2		
4	3	4	10		
5	1	5	3		
6	0	0	0		
7	1	0	0		



The parametric data were analysed using Analysis of Variance for independent groups (two tailed). The anger and control groups did not differ significantly in terms of age ($F=2.6$, $df=2$, $p=0.083$) however there was a significant difference between the groups in years of education ($F=27.23$, $df=2$, $p<0.001$). Post hoc Scheffe tests indicated that the healthy controls were significantly better educated than the anger and the anxiety groups.

Table 3.1.1. also shows that there were overall significant differences between the groups on levels of intellectual functioning ($F=5.747$, $df=4$, $p<0.001$). For Nart Errors, there was a significant difference between groups ($F=10.311$, $df=2$, $p<0.001$). Post hoc Scheffe Tests indicated that there was a significant difference between the anger group and the healthy control group. For estimated IQ there was a significant difference between groups ($F=10.75$, $df=2$, $p<0.001$). Post hoc Scheffe tests indicated that there was a significant difference between the healthy control group and the anger group.

Chi Square analysis was used to explore categorical data. No significant gender differences were found between the groups although this result approaches significance ($\chi^2=5.70$, $df=2$, $p=0.058$).

Non-parametric tests, the Kruskal Wallis Test was used to analyse significant differences between groups on occupational status and deprivation category. There were significant differences between groups on both occupational status ($\chi^2=13.80$, $df=2$, $p=0.001$) and deprivation category ($\chi^2=11.76$, $df=2$, $p=0.003$). Specific differences between two groups were explored using Mann-Whitney Tests. There was a significant difference between the healthy control group and the anger group on occupation ($z=-3.746$, $p=0.000$) but no significant difference between the anger group and the anxiety group ($z=-1.849$, $p=0.70$) or between the healthy control group and the anxiety group ($z=-1.721$, $p=0.85$) on occupation. For deprivation category, there was a significant difference between the anger group and the healthy control group ($z=-3.131$, $p=0.002$) and between the anxiety group and the healthy control group ($z=-2.778$, $p=0.006$) but the anger and anxiety groups did not differ significantly from each other ($z=-0.277$, $p=0.792$).

The results indicate that the three groups are well matched on age and gender. However, the healthy control group differs significantly from the other two groups on

education and deprivation category. That is, the healthy control group are more educated and less deprived than the other two groups. The healthy control group also differs significantly from the anger group on intellectual functioning and occupational classification. It is of note that the anger group and the anxiety control group are well matched and do not differ significantly from each other on any demographic variable.

3.2 Univariate analysis of between group differences on emotional inventories and intellectual function

To assess whether there were any significant differences between the anger and control groups on measures of mood, provocation, alcohol consumption and intellectual functioning a selection of one- way Analysis of Variance were completed. The results are shown in Table 3.2.1.

Table 3.2.1: Between group comparisons on measures of anger

Table 3.2.1: *Between group comparisons of measures of mood, provocation, alcohol consumption and intellectual functioning.*

M- means, SD- standard deviation, NS- not significant.

Variable	Healthy control n=20	Anger group n=20	Anxiety group n=19	Statistic	Significance level
Anxiety M(SD)	5.95 (2.78)	12.10(4.02)	10.42(3.65)	F= 16.24	p<0.001
Depression M (SD)	1.80 (1.50)	7.80 (5.32)	4.78 (2.95)	F=13.63	p<0.001
MAST alcohol M(SD)	2.70 (2.84)	7.00 (9.31)	1.84 (2.16)	F= 4.74	p=0.016
BNPI provocation M (SD)	63.10 (11.73)	67.50 (17.37)	65.68 (10.75)	F= 0.524	p=0.595 NS
Estimated IQ M(SD)	118.90 (5.52)	110.45 (5.22)	114.84 (6.50)	F= 10.758	p<0.001

Table 3.2.1. indicates that there were significant differences between groups on levels of anxiety (F= 16.24, df= 2, p<0.001) and depression (F= 13.63, df= 2, p<0.001). Post hoc Scheffe tests indicate that the anger and anxious groups were significantly more anxious than the healthy controls. Interestingly, post hoc Scheffe tests indicated that the anger group were significantly more depressed than the anxious group who were significantly more depressed than the healthy control group. The groups did not differ significantly on levels of provocation (F= 0.524, df= 2, p=0.595). There were significant between group differences on alcohol consumption (F= 4.47, df= 2, p=0.016). Post hoc Scheffe tests indicated that the anger group were drinking significantly more than the anxious group. Finally, as previously highlighted, there were significant differences between groups in terms of estimated IQ (F= 10.75, df= 2, p<0.001). Post hoc Scheffe tests indicated that the healthy control group were estimated to be significantly more intelligent than the anger group.

3.3 Multivariate analysis of between group differences on anger measures and neuropsychological functioning

To assess whether there were any significant differences between groups on measures of anger, Multivariate Analysis of Variance (MANOVA) was used. Results are shown in Table 3.3.1.

Table 3.3.1: Between group comparisons on measures of anger
M-mean, SD- standard deviation, NS- not significant

Variable	Healthy controls n=20	Anger group n=20	Anxiety group n=19	Statistic	Significance level
Overall MANOVA Wilks Lambda				F= 5.391	p<0.001
State Anger M(SD)	10.05 (0.22)	11.40 (2.89)	10.31 (0.82)	F= 3.321	p=0.043
Trait Anger M(SD)	16.55 (3.12)	27.30 (7.66)	17.68 (4.55)	F= 23.18	p<0.001
Trait AngerT M(SD)	5.60 (2.06)	11.15 (3.96)	5.36 (1.57)	F= 28.04	p<0.001
Trait Anger R M(SD)	8.05 (1.84)	10.55 (3.17)	9.84 (3.65)	F=3.73	p=0.03
Anger In M(SD)	15.80 (3.81)	18.75 (4.83)	15.94 (3.48)	F= 3.269	p=0.045
Anger Out M(SD)	13.60 (4.17)	21.20 (4.87)	13.57 (2.73)	F= 23.389	p<0.001
Anger Control M(SD)	23.45 (5.52)	16.0 (5.33)	24.15 (4.71)	F =14.89	p<0.001

Table 3.3.1. shows that the differences between the groups on all measures of anger were significant (F= 5.391, df= 14, p<0.001). Some of the univariate comparisons between the groups were significant. For state anger (F= 3.321, df= 2, p= 0.043) there appeared to be a significant difference between groups. However, post hoc Scheffe tests indicated that no one group differed significantly from any other group. For trait anger (F= 23.18, df= 2, p<0.001) there was a significant difference between groups. Post hoc Scheffe tests indicated that the anger group had significantly more trait anger than the anxious or healthy control group. There was also a significant difference between groups on trait anger temperament (F= 28.04, df= 2, p<0.001). Post hoc Scheffe tests indicated the anger group had significantly greater trait anger temperament than the anxious or healthy control group.

Similarly for trait anger reaction there was a significant difference between groups ($F= 3.73$, $df=2$, $p=0.03$). Post hoc Scheffe tests indicated that the anger group had significantly greater anger reaction than the healthy control group (but there was no significant difference with the anxious group). For anger in/ suppressed anger there was a significant difference between groups ($F= 3.269$, $df= 2$, $p= 0.045$) but post hoc Scheffe tests indicated no one mean differed significantly from any other. For anger out/ expressed anger there was a significant difference between groups ($F= 23.38$, $df=2$, $p<0.001$). Post hoc Scheffe tests indicated that the anger group expressed significantly more anger than the anxious or the healthy control groups. Finally for anger control, there was a significant difference between groups ($F= 14.89$, $df=2$, $p<0.001$). Post hoc Scheffe tests indicated the anger group controlled their anger significantly less than the anxious or healthy control groups.

To assess whether there were any significant differences between groups on BADS measures of Executive Function, MANOVA was used. Results are shown in Table 3.3.2.

Table 3.3.2: *Between group comparisons on Executive Function Measures, specifically BADS subtests.*

M- means, SD- standard deviation, NS- not significant

Variable	Control group n=20	Anger group n=20	Anxious group n=19	Univariate	Significance level
Overall MANOVA Wilks Lambda				F= 3.628	p=0.003
Temporal Judgement M(SD)	2.20 (0.95)	2.35 (0.81)	2.47 (1.02)	F= 0.424	p= 0.657 NS
Rule shift M(SD)	3.65 (0.48)	2.90 (1.41)	3.47 (0.84)	F= 3.118	p=0.052 NS
Six Elements M(SD)	3.75 (0.63)	2.90 (1.07)	3.57 (0.85)	F= 6.59	p= 0.003

Table 3.3.2. shows that there were significant differences between groups on Executive Function measures ($F= 3.628$, $df= 6$, $p= 0.003$). For the temporal judgement subtest there was no significant difference between groups ($F= 0.424$, $df= 2$, $p= 0.657$). Similarly, for the rule shift subtest, although it approached significance no one group differed significantly from any other ($F= 3.118$, $df= 2$, $p= 0.052$). However, there was a significant difference between groups on the six elements subtest ($F= 6.59$, $df=2$, $p=0.003$). Post hoc Scheffe tests indicated that the anger group was significantly different from the other two groups on performance of this test.

To assess whether there were any significant differences between groups on measures of Executive Function, specifically the Stroop Test and the Controlled Oral Word Association Test, MANOVA was used. Results are shown in Table 3.3.3.

Table 3.3.3. Between group comparisons on measures of Executive Function, the Stroop Test and the Controlled Oral Word Association Test.

M- mean, SD- standard deviation, NS- not significant

Variable	Control group n=20	Anger group n= 20	Anxiety group n=19	Univariate	Significance level
Overall MANOVA Wilks Lambda				F= 5.249	p=0.001
Stroop Test M(SD)	103.05 (20.91)	86.10 (28.70)	99.36 (15.03)	F= 3.16	p=0.05
Controlled Oral Word Assoc. M(SD)	44.95 (12.82)	28.65 (11.64)	34.00 (10.02)	F= 10.28	p<0.001

Table 3.3.3 shows that there was a significant difference between groups on Executive Function measures ($F= 5.249$, $df= 4$, $p= 0.001$). For the Stroop test there was a significant difference between groups ($F= 3.16$, $df= 2$, $p=0.05$). However, post hoc Scheffe test indicated that no one group differed significantly from any other group. For the Controlled Oral Word Association test there was a significant difference between groups ($F= 10.28$, $df= 2$, $p<0.001$). Post hoc Scheffe tests indicated that the anger group and anxiety group were significantly poorer at this test than the healthy control group. It seems likely this result will be explained by the differences in education level as highlighted in Table 3.1.1.

To assess whether there were any significant differences between the groups on the Trails Test measure, MANOVA was used to explore differences between means on the relevant variables. Results are shown in Table 3.3.4.

Table 3.3.4: Between group comparisons on measures of Executive Function, the Trails Test.

M- means, SD- standard deviation, NS- not significant

Variable	Control group n=20	Anger group n=20	Anxiety group n=19	Univariate	Significance level
Overall MANOVA Wilks Lambda				F= 2.486	p=0.027
Trails A speed M(SD)	26.60 (7.20)	34.80 (16.65)	33.26 (12.73)	F= 2.311	p= 0.109 NS
TrailsB speed M(SD)	54.75 (18.16)	81.80 (34.52)	71.94 (24.45)	F= 5.286	p=0.008
TrailsB errors M(SD)	0.75 (1.68)	4.85 (6.65)	2.84 (4.40)	F= 3.782	p=0.029
Trails B-A M(SD)	28.15 (17.4)	47.0 (28.89)	38.68 (20.26)	F= 3.31	p=0.044

Table 3.3.4. shows that there were overall significant differences between the groups on the Trails Test measures ($F= 2.486$, $df=6$, $p=0.027$). For Trails A speed there was no significant difference between groups ($F=2.311$, $df=2$, $p=0.109$). For Trails B speed there was a significant difference between groups ($F= 5.286$, $df= 2$, $p= 0.008$). Post hoc testing revealed the anger group was significantly different from the healthy control group. For Trails B errors, again there was a significant difference between the groups ($F= 3.782$, $df= 2$, $p=0.029$). Post hoc Scheffe tests revealed the anger group differed significantly from the healthy control group. Finally on Trails B-A there was a significant difference between groups ($F=3.31$, $df= 2$, $p=0.044$). Post hoc Scheffe tests indicated that the anger group was significantly different from the healthy control group. It is possible that this result is explained by the differences in education and intellectual levels as highlighted in Table 3.1.1.

A measure of memory was also included in this study to identify if any differences were due to general cognitive impairment rather than just executive function deficits. Differences between the groups on measures of memory were explored using MANOVA. The results are shown in Table 3.3.5.

Table 3.3.5: *Between group comparisons on measures of memory.*

M- means, SD- standard deviation, NS- not significant

Variable	Control group n=20	Anger group n=20	Anxiety group n=19	Univariate	Significance level
Overall MANOVA Wilks Lambda				F= 2.655	P=0.037
Immediate Memory M(SD)	37.15 (10.01)	27.25 (11.93)	32.05 (10.65)	F= 4.122	p= 0.021
Delayed Memory M(SD)	37.10 (10.34)	24.90 (13.58)	30.68 (10.48)	F= 5.55	p= 0.006

Table 3.3.5. shows that there were overall significant differences between the groups on memory function ($F= 2.655$, $df= 4$, $p= 0.037$). For Immediate Memory there was a significant difference between groups ($F= 4.122$, $df= 2$, $p= 0.021$). Post hoc Scheffe tests indicated that the anger group was significantly different from the healthy control group. For Delayed Memory there was a significant difference between groups ($F= 5.55$, $df= 2$, $p=0.006$). Post hoc Scheffe tests indicated that the anger group differed significantly from the healthy control group on measures of memory function.

3.4 Further analysis of between group differences

It seems likely that some of the between group differences which emerged, specifically on Verbal Fluency, Trails Test and memory function have been due to the differences between the groups in terms of education levels and intellectual function. This is demonstrated by the high correlations between IQ, education levels and performance on certain neuropsychological measures. See table 3.4.1.

Table 3.4.1 Pearsons correlation of education and estimated IQ with neuropsychological measures across all groups.

n=59

two tailed test

*- indicates significance at the 0.05 level

** - indicates significance at the 0.01 level

Variables	Years Education	Estimated IQ
Stroop	0.126	0.262*
Verbal Fluency	0.477**	0.650**
Immediate Memory	0.426**	0.587**
Delayed Memory	0.425**	0.602**
Rule Shift	0.249	0.293*
Six Elements	0.211	0.317
Temporal Judgement	-0.044	-0.041
Trails B speed	-0.329*	-0.430**
Trails B errors	-0.276*	-0.309*

As Table 3.4.1. indicates performance on verbal fluency, the Trails tests and story recall are affected by education and intelligence levels. Generally, the better educated and more intelligent, the better the subjects performance on neuropsychological tests, although this does not hold for the Trails test. Given the high correlations, it is reasonable to conclude that some of the between group differences which emerged on these variables are due to the different education and intellectual levels between groups. It has already been identified that the healthy control group are not well matched to the experimental sample. The following analysis will therefore focus only on the anger and anxiety groups.

Table 3.4.2. lists variables where there is a significant difference between the anger and the anxious groups. These differences cannot be explained by demographic variables or intellectual function.

Table 3.4.2. Significant and Non-significant Differences between the anger and anxiety groups (groups 2 and 3).

Non- Significant Differences between groups 2 and 3.	Significant Differences between groups 2 and 3.
age	alcohol
education	depression
gender	Trait anger
occupation	Trait anger temperament
deprivation category	anger out (expressed anger)
provocation rating	anger control
anxiety	six elements
estimated IQ or Nart errors	
State anger	
Trait anger reaction	
anger in (suppressed anger)	
temporal judgement	
rule shift	
Stroop	
verbal fluency	
any Trails tests (A, B, B-A, B errors)	
Immediate or delayed memory	

Given that the anger group was selected specifically for having anger problems, the following analysis will focus on the effects of alcohol and depression on the six elements test performance.

Are the significant differences between the anxiety and the anger groups on the six elements measure explained by differences in alcohol consumption or depressed mood? If depression or alcohol are confounding variables on the six elements test performance, scores should correlate.

Table 3.4.3. Pearson's correlation showing the relationship between six elements test performance, alcohol and depression on data from the anger and anxiety groups.

n=39

two tailed test

*- indicates significance at the 0.05 level

Measure	MAST (alcohol rating)	Depression
Six elements	-0.062 NS	-0.366*

As can be seen, the modified six elements test is negatively correlated with depression. This is significant at the 0.05 level. The more depressed someone is, the worse their performance on the six elements. Alcohol, although a potential confounder, is not correlated with six elements test performance. Depression is correlated with test performance on the six elements therefore to control for the effects of depression, a Multivariate Analysis of Covariance was carried out using the six elements test as the dependent measure and depression as the co- variate. The results of this analysis are shown in Table 3.4.4.

Table 3.4.4. Between group comparisons of measures of six elements while controlling for the effects of depression.

Measure	Anger group n=20	Anxiety group n=20	Statistic	Significance
Six elements (estimated mean)	2.978	3.497	F=3.424	p=0.072

When the effects of depression are controlled for there is no longer a significant difference between the two groups on performance of six elements (F= 3.424, df= 1, p= 0.072). Although it is of note that this is approaching significance.

To fully explore all the significant differences between groups on significant anger and executive function measures, only the anxiety and anger groups were included to exclude any confounding effects of demographic variables . Depression was controlled for, see Table 3.4.5.

Table 3.4.5: *Between groups (anger group and anxiety group) comparisons of measures of six elements and anger while controlling for the effects of depression.*

Measures	Anger group n=20	Anxiety group n=20	Degrees Freedom	Statistic	Significance
Overall MANOVA			df=5	F= 8.776	p<0.001
six elements (estimated mean)	2.97	3.49	df=1	F=3.424	p=0.072
anger control (estimated mean)	15.96	24.19	df=1	F=22.37	p<0.001
anger out (estimated mean)	21.05	13.72	df=1	F=28.87	p<0.001
Trait anger (estimated mean)	26.8	18.2	df=1	F=16.31	p<0.001
Trait anger temprament (estimated mean)	10.87	5.65	df=1	F=26.62	p<0.001

This Multivariate Analysis of Covariance has replicated the results of the Table 3.4.4 analysis. There is a significant difference between groups when depression is controlled for ($F= 8.776$, $df=5$, $p<0.001$). However this significant difference applies to the anger measures not the executive function: six elements measure.

It appears that the significant difference between matched groups on the six elements executive function measure was an artifact of depression. However, one could speculate that if this was so, then significant differences would also have been expected between matched groups on other executive function measures which depression may have affected. For example, one would expect psychomotor slowing on the Trails test performance of the depressed group yet there was no evidence of this. This will be discussed further in the next section.

Pearson's correlations were completed to determine whether any of the anger measures correlated with any of the neuropsychological measures in the anger group. See Table 3.4.6.

Table 3.4.6 Pearson's correlation of anger measures with executive function measures within the anger group.

n=20

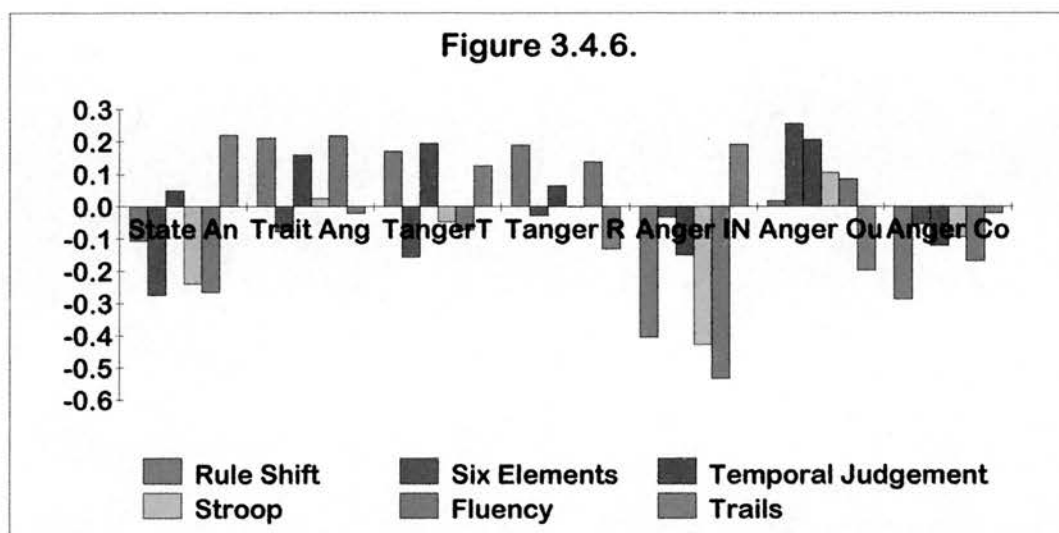
two tailed test

*- indicates significance at the 0.05 level.

Measures	State anger	Trait anger	TangerT	TangerR	Anger In	Anger out	Anger control
Rule shift	-0.106	0.212	0.172	0.19	-0.405	0.018	-0.287
Six elements	-0.275	-0.079	-0.157	-0.029	-0.033	0.256	-0.055
Temporal Judgement	0.049	0.16	0.195	0.064	-0.151	0.207	-0.121
Stroop	-0.24	0.025	-0.048	-0.001	-0.427	0.105	-0.095
Fluency	-0.266	0.22	-0.072	0.138	-0.533*	0.085	-0.169
Trails B errors	0.433	0.245	0.266	0.191	0.347	0.149	0.022
Trails	0.221	-0.021	0.126	-0.132	0.192	-0.198	-0.02

There is only one significant correlation. The lack of correlations between the neuropsychological measures and the anger measures (within the anger group) goes against the main hypothesis. However, this table shows that many of the correlations, although not significant, are negative i.e. as anger increases executive function performance decreases.

Figure 3.4.6. shows the correlations between test performance on the neuropsychological measures and the anger measures within the anger group



To summarise, there has been little evidence to support the hypothesis that people with anger problems will perform less well on neuropsychological measures, specifically tests of executive function. Any significant results could be explained by depression. However, some results which approach significance and evidence of a correlational relationship between some anger measures and some executive function measures allows the speculation to remain of a link between anger problems and executive dysfunction.

4. DISCUSSION

As the preceding analysis has indicated, specific results are worthy of further discussion.

4.1 Summary of Main Findings

The groups in this study were well matched on age and gender. However there were significant differences between groups on length of education, occupational status, deprivation category and estimated intellect. The healthy control group was generally more intelligent, more educated and less deprived than the other two groups. It therefore was a poor match to the experimental groups on demographic variables. However, fortunately there were no significant differences between the anxious and anger groups on demographic variables so useful conclusions could be drawn from these between group comparisons.

Interestingly, the anger group demonstrated various symptoms of psychopathology. Both the anger and anxious groups were significantly more anxious than the healthy controls. The anger group were also significantly more depressed than the anxious group who were significantly more depressed than the healthy controls. Finally, the anger group consumed significantly more alcohol than the anxious group. It appeared that people with anger problems had co- morbid anxiety, depression and alcohol problems.

As expected there were significant differences between groups on measures of anger (which serves to indicate the reliability of the assessment measures used). The anger group had significantly more trait anger i.e. they more frequently experienced angry feelings than the other two groups. Spielberger (1988) defines trait anger temperament as a persons readiness to express angry feelings and trait anger reaction as a persons sensitivity to criticism. For both trait anger temperament and trait anger reaction the anger group scored significantly higher than the other two groups. The anger group also expressed significantly more anger and exercised less anger control than the other two groups.

The results of the analysis of between group differences on neuropsychological measures are interesting. Some of the neuropsychological assessments did not show any between group differences. These were: the Temporal Judgement and Ruleshift Card Sort subtests of the BADS and the Trails A speed test. However the Rule Shift subtest between group difference was approaching significance. The Rule Shift test is known to be a reliable indicator of executive dysfunction and is particularly sensitive to perseveration (Wilson et. al. 1998). It is possible that some but not all of the anger group were impaired on performance of this test hence a result approaching significance.

There were significant between group differences on the Six Elements subtest of the BADS. The anger group was significantly more impaired on this test than the other two groups. This result is extremely important and will be discussed in detail later. For the Stroop Test there was a significant difference between groups (at the 0.05 significance level exactly). This assessment tests a person's ability to inhibit their automatic responses. Like the Rule Shift test, it is possible that some but not all of the anger group were impaired on this test. The anger group's mean performance on this test is lower than the other group's mean performance but the standard deviation is higher suggesting a large performance range within the anger group.

There was a significant difference between groups on the Controlled Oral Word Association Test (Verbal Fluency). However this test is known to be affected by education level and favours those with good verbal skills (Spreen and Strauss 1998). It seems likely, given the high correlations between performance on certain neuropsychological tests and IQ / education levels, that the healthy control group's significantly better performance of this test can be explained by their higher education levels. For the Trails test, a sensitive indicator of neuropsychological impairment (Spreen and Strauss 1998), differences between groups were observed on Trails B speed and number of errors (this part requires more complex attention skills). However, the significant differences were between the anger and the healthy control group. The Trails test is strongly affected by the education level and intelligence of the subjects. Given that the demographic variables indicated the healthy control group were significantly more intelligent and educated than the other groups and this has a strong correlational relationship with Trails test performance, it seems likely this explains the Trails test results. It would be noteworthy if there had been a significant difference between the anxious group and the anger group's

performance on this test as this would not be explained by education or intelligence levels.

Finally, a measure of memory served as a useful indicator of non- executive cognitive function between the three groups. There was significant between group differences on both immediate and delayed memory. The anger group performed significantly less well than the healthy control group on these tests. However, this test also biases towards people with higher education levels (Spreen and Strauss 1998). Again the higher education level of the healthy control group explains the results. Had there been a significant difference between the anger group and the anxious group's performance on this test, different conclusions could be drawn about cognitive function. For example, if the anger group were significantly more impaired on the memory test than the anxious group then perhaps all significant differences on neuropsychological measures could be explained by a general cognitive impairment present in people with anger problems rather than a specific executive function impairment.

4.2 Executive Function deficits in people with anger problems

Therefore, the evidence from the early analysis of the results of the present study did not support the general hypothesis that there would be significant differences between groups on measures of executive function except on the one neuropsychological measure: the Six Elements subtest.

4.3 Further analysis

Because the analysis had indicated several unexpected between group differences these were explored in more detail. Comparisons between the anxious control group and the anger group were of particular interest because they appeared to be so closely matched on demographic variables. As previously mentioned, the anger group consumed significantly more alcohol and were significantly more depressed than the anxious group. Performance on the Six Elements subtest was the only neuropsychological measure to show significant differences between the anger and anxious groups. Alcohol or depression may be potential confounders so were correlated with Six Elements. Results indicated alcohol did not correlate with

Six Elements test performance. However, depression was correlated. To explore the contribution of depression to Six Elements test performance, Multivariate Analysis of Covariance was carried out. When the effects of depression were controlled for there was no longer a significant difference between the performance of the two groups on Six Elements.

4.4. The Role of Depression

Arguably then, it appears that the significant difference between matched groups on the Six Elements executive function measure was an artifact of depression. Therefore, the experimental hypothesis can be rejected outright as there is no evidence to support it. Anger patients have not demonstrated specific impairments on executive function tasks relative to both anxious and healthy controls when confounding variables are controlled for.

However, if all significant differences are due to depression and there is no executive function impairments specific to the anger group, then significant differences would also have been expected between matched groups on other executive function measures due to the depression. For example, one would expect psychomotor slowing on the Trails test performance of the more depressed (anger) group. Depression is thought to affect neuropsychological test performance in several ways: psychomotor slowing; slowed mental processing; attentional deficits and impaired short term memory recall (Lezak 1995). As such, it would affect performance on the Story Recall test, the Stroop test and the Trails B test (Spreen and Strauss 1998). Yet, there was no significant differences between the anger (more depressed) and anxious (less depressed) groups on these measures.

Closer examination of the Six Elements test indicates it is a complicated multi- task assessment where the ability to structure and plan is critical. The subject has the instructions visible in front of them to reduce the memory component to the test. An unusual aspect of this test is that it is not important how well the subject performs in the individual components (e.g. how many pictures they name). Rather, the Six Elements makes demands on the person's ability to plan, organise and monitor their behaviour over an extended period of time (Wilson et. al. 1998). Therefore, poorer memory and psychomotor slowing should not affect overall performance on this test.

It is not at all clear how depression would affect a subject's performance on the Six Elements test. Although there was no longer a significant difference between the anxious and anger groups' performance on the Six Elements, once the effects of depression had been controlled for, the p value of 0.072 is approaching significance. The anger group's mean performance on this test was certainly lower than the anxious group's mean performance. Perhaps the Six Elements test is mapping onto some subtle deficit in executive functioning in the anger group?

4.5. The Six Elements Test

As previously mentioned, the Six Elements test is a complicated multi- task test. To summarise, the test takes ten minutes and subjects are required to do six tasks; two dictation tasks, two arithmetic tasks and two picture naming tasks. The subject is required to attempt at least something from each of the six tasks. There is one rule which cannot be broken: the subject is not allowed to do the two parts of the same task consecutively. For example, if they were doing one dictation task they could not switch to the second dictation task immediately. They would have to do one of the arithmetic or other naming tasks first and return to the dictation later. The point of the test is to measure how well subjects organise themselves. Indeed, the six elements test makes

*“ demands on a person's ability to plan, organise and monitor behaviour ”*⁸

It also taps onto intention, the ability to remember to carry out something. The subject has the instructions visible in front of them to reduce any memory component to the test. The examiner focuses on how the subject performs the test and is less concerned with their performance on the individual components.

Wilson et. al. (1998) administered this test to three groups of subjects: a control group, a head injured group and a schizophrenic group. The largest difference in performance between the groups was obtained on the Six Elements test. They did not offer any explanation as to why this might be but it is plausible that the Six Elements test is sensitive to impairment in very specific executive functions e.g. the planning and organisation of behaviour.

⁸ P. 219 Wilson et al (1998)

The Six Elements was originally developed from the work of Shallice and Burgess (1991). In this paper they described the rationale for developing a test with open ended multiple subgoal tasks. Previous authors (Shallice and Burgess 1991; Cripe 1996) have described patients who have sustained head trauma yet perform well on all neuropsychological tests administered. Despite this good performance, these people's ability to organise their life was impaired and their recent history is characterised by job changes, broken relationships and lack of decision making. The neuropsychological tests administered to this type of patient

*" typically have a single explicit goal, are of short duration and are initiated by the therapist"*⁹.

These patients are rarely required to organise or plan their behaviour over time or in the face of competing tasks. Yet it is these sort of 'executive' abilities which are a large component of many every day activities and characterise the difficulties these individuals have in day to day life.

Shallice and Burgess (1991) presented three such cases: people who have sustained head injuries but whose neuropsychological test results are generally in the good range. Their three subjects had all sustained frontal lobe lesions yet performed perfectly on all traditional 'frontal' tests. They administered two tests (the Multiple Errands Test and the Six Elements Test) chosen because they are open- ended multiple goal tasks addressing the criticism directed at other executive function tests. The results indicated that all three patients performed at below the normal range on quantitative measures of performance on the Six Elements task and their performance was qualitatively atypical. The authors give a detailed description of the nature of performance impairments observed in subjects with executive dysfunction completing the Six Elements. Shallice and Burgess (1991) proposed that four basic types of process are relevant for completion of this task. Motivational and memory processes, cognitive processes and a bridge process or intention which enables the specific cognitive processes to be used to satisfy motivational requirements. Shallice and Burgess (1991) proposed that their subjects are particularly impaired in the creation and maintenance of goals and intention. If a well- learned action is interrupted, an alternative plan with specific goals must be drawn up. These authors proposed that crucial to this are markers which trigger behaviour change. For example, having to post an urgent letter on the way to work. This necessitates

⁹ P.727 Shallice and Burgess (1991)

interrupting the routine route to work at specific markers e.g. passing a Post Office is a reminder to buy stamps. This marker leads to inhibition of the activity being carried out, the reassessment of the situation and a possible switch to a new course of action. Shallice and Burgess (1991) reviewed their patient's performance and identify that marker creation or triggering seemed particularly problematic for them. Possibly the Six Elements is a crude measure which taps onto impairments in this marker system for self-regulation. A purer measure may highlight the deficits more clearly. Plan formulation and evaluation, goal setting and behaviour change in response to markers are key elements in the temporal integration of behaviour which Furster (1980) referred to.

Perhaps the anger group have impairments in these processes, yet other cognitive functions are essentially intact. If this 'marker' system is impaired, individuals may not be responding to environmental cues: either social convention cues or rules or physical cues which in others would precipitate behaviour change. As a result, their behaviour does not change according to, for example, social cues and they find themselves in social situations of increasing hostility (when many another person would have responded to the marker and backed down). Perhaps this also explains the apparent illogical behaviour often displayed by people with anger problems. For example, kicking out at furniture that obstructs their path. The environmental marker that this was an immovable object would in normal individuals lead to plan modification but these markers are impaired in this group, so no plan modification occurs. Instead they see their goal as frustrated (by the furniture) which as already mentioned by Mabel (1994) may be one of the main triggers for anger.

4.6. The Role of Executive Dysfunction in Anger Problems.

Executive dysfunction possibly serves as a mediator between anger provoking situations and anger outbursts. Although anyone who experiences an anger provoking situation may have an anger outburst, if the person has executive function deficits it makes this more likely. Anger problems may be more likely

- because of the person's reduced behavioural control
- due to strategy application problems: People with executive dysfunction are not good at altering their behaviour in response to environmental markers.

Executive dysfunction can reasonably be incorporated into models of anger.

Novaco (1993) referred to anger as a stress reaction which occurs when the demands of the environment become overwhelming. This would seem particularly likely if an individual's ability to adapt to a changing environment and develop new behavioural strategies is impaired.

Kassinove and Sukhodolsky (1995) emphasised the social component of anger. If an individual is impaired in his/her ability to respond and adapt to social cues or 'markers' this may also make anger more likely.

Within the SPAARS model of emotion (Power and Dalgleish 1997) someone with impaired ability to perceive, respond and adapt to environmental markers may therefore have reduced information at the schematic level. If there is executive dysfunction then the anger is at the automatic level as there is an impairment in the system that appraises the situation and regulates the persons behaviour and anger accordingly. Executive dysfunction would take away that appraisal process or lead to an incomplete process as environmental markers are not included in the cognitive processing so anger will occur when it is inappropriate or excessive in intensity.

In terms of the context of anger, Mabel (1994) identified that interruption of goal directed behaviour is a trigger for anger. If a person has executive dysfunction-impaired strategy application in addition to this, their ability to modify their goal directed behaviour is impaired therefore making an anger outburst even more likely.

4.7. Treatment Implications

If research conclusively establishes executive function impairments in people with anger problems, this would have treatment implications. Treatment for anger problems which to date focuses on social skills training, relaxation training and cognitive techniques, could then be tailored to include strategies to remediate some of these executive function difficulties. In this context, the aim is on substitution not necessarily restitution of skills. A starting point would be successful identification of the stage where the system is breaking down whereupon specific deficits could then be targeted.

Meier, Benton and Diller (1987) proposed that to rehabilitate attention deficits specific training tasks should be used. The patient could be trained to actively scan the environment for cues then attend and react to environmental signals. The patient might then be trained to time his responses in relation to changing environmental cues. Gray and Robertson (1989) successfully employed computer games and computerised tasks (e.g. symbol matching) to rehabilitate attention deficits in three people who had sustained closed head injury.

*“ In all three cases selected indices of attentional function improved with the introduction of training on information processing tasks requiring the deployment and coordination of a number of cognitive and psychomotor processes ”*¹⁰

They speculated that the development of verbal self -regulation strategies is a possible mechanism for recovery of function. Indeed self instructional techniques have already been used for anger treatment and could be usefully adapted to make executive function skills explicit. For impairments in concept formation the aim of treatment would be for the individual to develop abstract reasoning skills and practise adopting another person’s point of view. Environmental modification e.g. breaking tasks into component parts and establishing routine, may also be helpful.

Problem solving techniques would be a useful adjunct to treatment of anger problems. Teaching problem solving involves specific retraining of the steps required which are: orientation, analysis of the task, generation of alternative hypothetical solutions, putting solution to action and evaluating the end result. D’ Zurilla and Goldfried (1971) proposed that problem solving encourages self-monitoring, inhibits impulsive action and enhances a persons ability to produce solutions and self monitor. Patients would be encouraged to think flexibly and practise generating solutions to problems. Some in vivo practice may help this strategy to generalise to real life problems. Some attempts could also be made to identify ‘markers’ in certain situations and then explicitly use them as cues for behaviour change. The three cases described in the Shallice and Burgess (1991) paper had strategy application deficits. Lawson and Rice (1989) devised ‘executive strategy’ training which was designed to compensate for the problems caused by injury to the frontal lobes. The patients were trained to identify a problem, initiate a search strategy for dealing with it , select, initiate and monitor an appropriate strategy. Essentially treatment would need to make explicit these executive functions which are automatic to people who do not have these difficulties.

¹⁰ P.168 Gray and Robertson (1989)

4.8. Methodological Issues

The necessity of a matched control group to make useful between group comparisons is salient from this study. A more matched healthy control group would have reduced the confounding effects of demographic variables such as length of education and intellectual functioning on test performance and so enabled conclusions to be drawn about anger and executive function across all three groups. The fact that the anxious group were well matched with the anger group allowed useful comparisons to be made.

Due to time limitations, exclusion and inclusion criteria were fairly general. If more time was available, the exclusion criteria should be expanded. In this study people with a previous neurological trauma, psychosis or a known history of addiction were excluded. It would be helpful to also exclude people who were presenting with anger problems as a symptom of a grief reaction or as a result of Post Traumatic Stress Disorder. This may afford a purer sample of people with anger problems. I would predict that between group differences on neuropsychological tests which in this sample have not been significant (e.g. the Rule Shift cards test, the Stroop test and the Trails test) would become significant giving clearer evidence of neuropsychological deficits in people with anger problems.

4.9. Conclusions and future directions

This research has attempted to explore a previously under- researched area, that of neuropsychological deficits in people with anger problems. Results of the research provide an interesting first step although nothing definite can be concluded without further research which meets the methodological limitations of this study and includes a larger sample size. Given that remediation strategies exist for people with executive function deficits, clearly defining the role of executive impairments in people with anger problems would ensure more appropriately tailored treatment programmes.

REFERENCES

Army Individual Test Battery (1944) "*The Trails Test*" manual of Directions and Scoring, War Dept. Washington D.C.

Averill, J.R. (1982) "*Anger and Aggression: an Essay on Emotion*" New York, Springer-Verlag.

Baddeley, A., Della Sala, S., Gray, C., Papagno, C. and Spinnler, H. (1995) "*Testing Central Executive Functioning with a Pencil and Paper Test*". Chapter 20 in Rabbit, P. (editor) "*Methodology of Frontal and Executive Functions*" LEA: Hove.

Bandura, A. (1973) "*Aggression: A Social Learning Analysis*" Prentice Hall.

Baumeister, R., Smart, L. and Boden, J. (1996) "*Relation of threatened egotism to violence and aggression: the Dark Side of High Self-Esteem*" *Psychology Review*: Volume 103, No.1, Pages 5-33.

Beck, A.T. (1976) "*Cognitive Therapy and the Emotional Disorders*" New York: International Universities Press.

Begley, T. (1994) "*Expressed and suppressed anger as predictors of health complaints*" *Journal of Organisational Behaviour*: Volume 15, Pages 503- 516.

Benton, A.L. and Hamsher, KdeS. (1989) "*Multilingual Aphasia Examination*" A.J.A. Assoc.

Berkowitz, L.(1982) "*Advances in Experimental Social Psychology*" Volume 5, New York, Academic Press.

Blake, P., Pincus, J. and Buckner, C. (1995) "*Neurological abnormalities in murderers*" *Neurology*: Volume 45, Page 1641- 1647.

Cannon, W.B. (1927) "*The James Lange Theory of Emotions: A critical examination and an alternative theory*" *American Journal of Psychology*: Volume 39, Pages 106-124.

Carlson, N.R. (1986) “ *The Physiology of Behaviour*” Third Edition, Allyn and Bacon.

Carstairs, V. and Morris, R. (1991) “ *Deprivation and Health in Scotland*” Aberdeen University Press.

Coughlans, A. and Hollows, K. (1985) AMIPB Test Battery.

Cripe, L.I. (1996) “ *The Ecological Validity of Executive Function Testing*” in Sbordone, R. and Long, C. “ *Ecological Validity of Neuropsychological Testing*” G.R. Press.

Crowder, A. (1995) “ *Opening the Door: A treatment model for therapy with male survivors of sexual abuse.*” Brunner/ Mazel Publishers.

D’Zurilla, T.J. and Goldfried, M.R. (1971) “ *Problem Solving and Behaviour Modification*” Journal of Abnormal Psychology: volume 78, Pages 107-126.

Damasio, H., Grabowski, T., Frank, R., Galaburda, A. and Damasio, A. (1994) “*The Return of Phineas Gage: Clues about the Brain from the Skull of a Famous Patient*” Science: Volume 264, 20th May 1994.

David, A. (1992) “ *Frontal Lobology- Psychiatry’s New Pseudoscience*” British Journal of Psychiatry: Volume 161, Pages 244- 248.

Deffenbacher, J. Oetting, E., Lynch, R. and Morris, C. (1996) “ *The expression of Anger and it’s consequences*” Behaviour Research and Therapy: Volume 34, No.7, Pages, 575- 590.

Deffenbacher, J.L., Demm, P.M. and Brandon, A.D. (1986) “ *High general anger: correlates and treatment*” Behaviour Research and Therapy: Volume 24, No.4, Pages 481-489.

Deffenbacher, J.L., Oetting, E.R., Huff, M.E., Cornell, G.R. and Dallager, C.J. (1996) “ *Evaluation of two Cognitive Behavioural approaches to general Anger reduction*” Cognitive Therapy and Research: Volume 20, No. 6, Pages 551-573.

Diagnostic and Statistical Manual of Mental Disorders, Volume IV (1994)
American Psychiatric Association.

DiCesare, A., Parente, R., Anderson- Parente, J. (1990) “ *Personality Change after Traumatic Brain Injury: Problems and Solutions*” Cognitive Rehabilitation: March/ April 1990.

Duffy, J. and Campbell, J. (1994) “ *The Regional Prefrontal Syndromes: A Theoretical and clinical Overview*” Journal of Neuropsychiatry and Clinical Neurosciences: Volume 6, No. 4, Pages 379- 387.

Dura, J. (1997) “ *Expressive Communicative Ability, Symptoms of Mental Illness and Aggressive Behaviour*” Journal of Clinical Psychology: Volume 53(4) Pages 307- 318.

Edmondson, C.B. and Conger, J.C. (1996) “ *A review of treatment efficacy for individuals with Anger problems: Conceptual, Assessment and Methodological Issues*” Clinical Psychology Review: Volume 16, No. 3, Pages 251-275.

Evans, D.R., Hearn, M.T. and Saklofske, D. (1973) “ *Anger arousal and systematic desensitization*” Psychological Reports: Volume 32, Pages 625- 626.

Fava, M., Anderson, K. and Rosenbaum, J. (1990) “ *Anger attacks: Possible variants of panic and major depressive disorders*” American Journal of Psychiatry: Volume 147, No.7., Pages 867- 870.

Firth, H. (1993) “ *Self control of aggression: some beliefs about treatment*” Clinical Psychology Forum: 51, Pages 20-21.

Fitzharding, S. (1997) “ *Anger management groupwork with women prisoners*” Forensic Update: Issue 48. Division of Criminological and Legal Psychology- The British Psychological Society.

Furster, J.M. (1980) “ *Outline of a Theory: the Prefrontal Cortex and the Temporal Integration of Behaviour*” in “ The Prefrontal Cortex: anatomy, physiology and neuropsychology of the frontal lobe”.

Furster, J.M. (1989) "*The Prefrontal Cortex: Anatomy, Physiology and Neuropsychology of the Frontal Lobe*" Second Edition, New York, Raven Press.

Garner, D.M. and Garfinkel, P.E. (1985) "*Anorexia Nervosa and Bulimia. Handbook of Psychotherapy*" The Guilford Press.

Garth, J., Anderson, V. and Wrennall, J. (1997) "*Executive Functions following moderate to severe frontal lobe injury : impact of injury and age at injury*" Paediatric Rehabilitation: Volume 1, No.2, Pages 99-108.

Giancola, P. and Zeichner, A. (1994) "*Neuropsychological Performance on Tests of Frontal lobe Functioning and Aggressive Behaviour in Men*" Journal of Abnormal Psychology: Volume 103, No.4, Page 832.

Gleitman, H. (1986) "*Psychology*" Second edition, Norton and Co.

Glick, R. and Roose, S. (1993) "*Rage, Power and Aggression*" Yale University Press.

Goldstein, A.P. and Keller, H. (1987) "*Aggressive Behaviour: Assessment and Intervention*", Pergamon Press.

Gould, R., Ball, S., Kaspi, S., Otto, M., Pollack, M., Shekhar, A. and Fava, M. (1996) "*Prevalence and correlates of anger attacks: A two site study*" Journal of Affective Disorders: Volume 39, Pages 31-38.

Grattan, L. and Eslinger, P. (1991) "*Frontal lobe damage in Children and Adults: A Comparative Review*" Developmental Neuropsychology: Volume 7, No. 3, Page 357.

Gray, J. (1990) "*Brain systems that mediate both Emotion and Cognition*" Cognition and Emotion: Volume 4, No. 3, Pages 269-288.

Gray, J.M. and Robertson, I. (1989) "*Remediation of attentional difficulties following brain injury: three experimental single case studies*" Brain Injury: Volume 3, No. 2, Pages 163- 170.

Greene, A.F., Colen, C.J. and Johnson, E. (1994) “ *Psychopathology and Anger in Interpersonal Violence Offenders* ” Journal of Clinical Psychology: November 1994, Volume 50, No.6, Page 906.

Hall, H.V. (1993) “ *Criminal - Forensic Neuropsychology of Disorders of Executive Functions* ”. Chapter 2 in Sbordone, R. and Hall, H. “ Disorders of Executive Function: Civil and Criminal Law Applications ” PMD Publishers.

Hall, P. and Davidson, K. (1996) “ *The Misperception of Aggression in behaviourally hostile men* ” Cognitive Therapy and Research: Volume 20, No.4, Pages 377-389.

Harmon-Jones, E. and Allen, J. (1998) “ *Anger and Frontal Brain Activity : E.E.G. Asymmetry Consistent with Approach Motivation Despite Negative Affective Valence* ” Journal of Personality and Social Psychology: Volume 74, No. 5, Page 1310-1316.

Holzman, A. and Turk, D. (1986) “ *Pain management : a handbook of Psychological Treatment approaches* ” Pergamon Press.

Howells, K. (1989) “ *Anger management methods in relation to the prevention of Violent Behaviour* ”. Chapter 7 in Howells, K. and Hollin, C. (editors) “Clinical approaches to Violence”, John Wiley and sons.

James, W. (1890) “ *Principles of Psychology* ” New York: Henry Holt

Joseph, S., Williams, R. and Yule, W. (1997) “ *Understanding Post Traumatic Stress. A Psychosocial Perspective on P.T.S.D. and Treatment* ” Wiley Publishers.

Kassinove, H. and Sukhodolsky, D.G. (1995) “ *Anger Disorders: Basic Science and Practice Issues* ”. Chapter 1 in Kassinove, H. “Anger Disorders: Definition, Diagnosis and Treatment”, Taylor and Francis Publishers.

Kemp, S. and Strongman, K.T. (1995) “ *Anger theory and management: A historical analysis* ” American Journal of Psychology: Volume 108, No. 3, Pages 397-417.

Kennedy, H.G. (1992) "*Anger and Irritability*" British Journal of Psychiatry: Volume 161, Pages 145- 153.

Kopelman, M., Guinan, E. and Lewis, P. (1995) "*Delusional memory, confabulation and frontal lobe dysfunction*" in Campbell, R. and Conway, M. (Eds.) "Broken Memories: Case studies in Memory Impairment" Blackwell Science Publishers.

Kremer, J.F. and Stephens, L. (1983) "*Attributions and Arousal as Mediators of Mitigation's effect on Retaliation*" Journal of Personality and Social Psychology: Volume 45, No.2, Pages 335-343.

Lawson, M.J. and Rice, D.N. (1989) "*Effects of training in use of executive strategies on a verbal memory problem resulting from closed head injury*" Journal of Clinical and Experimental Neuropsychology: Volume 11, Pages 842-854.

Levey, S. and Howells, K. (1991) "*Anger and its management*" Journal of Forensic Psychiatry: Volume 1, No. 3, Page 305-327.

Lewis, D.O. (1990) "*Neuropsychiatric and Experiential Correlates of Violent Juvenile Delinquency*" Neuropsychology Review: Volume 1, No. 2, Page 125- 135.

Lezak, M. (1995) "*Neuropsychological Assessment*" Third Edition, Oxford University Press.

Likierman, M. (1987) "*The Function of Anger in Human Conflict*" International Review of Psycho-Analysis: Volume 14, Page 143.

Luria, A. (1973) "*The Frontal Lobes and the Regulation of Behaviour*". Chapter 1 in Pribram, K. and Luria, A. "Psychophysiology of the frontal lobes" Academic Press.

Mabel, S. (1994) "*Empirical Determination of Anger Provoking Characteristics Intrinsic to Anger Provoking Circumstances*" Journal of Social and Clinical Psychology: Volume 13, No.2, Pages 174- 188.

Malloy, P., Bihrlé, A., Duffy, J. and Cimino, C. (1993) "*The Orbitomedial Frontal Syndrome*" Archives of Clinical Neuroscience: Volume 8, Pages 185-201.

McDougall, C. and Boddis, S. (1991) "*Discrimination between anger and aggression: implications for treatment*" Issues in Criminological and Legal Psychology: Volume 2, No. 17.

McGovern, J. (1996) "*Management of risk in psychiatric rehabilitation*". The Psychologist: Volume 9, No.9, September 1996. The British Psychological Society.

McMurrin, M. (1994) "*The Psychology of Addiction*" Taylor and Francis Publishers.

Meichenbaum, D. (1972) "*Cognitive modification of a test anxious college student*" Journal of Consulting and Clinical Psychology: 39, Pages 370- 380.

Meier, M., Benton, A. and Diller, L. (1987) "*Neuropsychological Rehabilitation*" Churchill Livingstone.

Miller, L. (1994) "*Traumatic Brain Injury and Aggression*" in "The Psychobiology of Aggression" Pages 91-103, Haworth Press.

Milner, B. (1982) "*Some cognitive effects of frontal lobe lesions in man*" Philosophical Transactions of the Royal Society of London, Volume 298, Pages 211-226.

Mizes, J.S., Morgan, G.D. and Buder, J. (1990) "*The Relationship of Cognitions, Assertion and Anger Arousal*" Journal of Cognitive Psychotherapy: Volume 4, No. 4, Page 369.

Morrison, G. and Sandowicz, M. (1994) "*Importance of Social Skills in the Prevention and Intervention of Anger and Aggression*". Chapter 11 in Furlong, M.S. and Smith, D.C. (1994) "*Anger, Hostility and Aggression: Assessment, Prevention and Intervention Strategies for Youth*" Clinical Psychology Publishing Company.

Nelson, H.E. (1982) "*The National Adult Reading Test*" Nfer Nelson.

Novaco, R. (1975) "*Anger Control: The Development and Evaluation of a Treatment*" Lexington, MA: DC Health.

Novaco, R. (1983) "*Stress Inoculation Therapy for Anger Control- A manual for therapists*" Unpublished.

Novaco, R. (1988) "*Novaco Provocation Inventory*" In Hersen, M. and Bellack, A. (editors) "Dictionary of Behavioural Assessment Techniques", New York, Pergamon Press.

Novaco, R. (1993) "*Clinicians ought to view Anger Contextually*" Behaviour Change: Volume 10, No. 4. Pages 208-218.

Novaco, R. (1994) "*Anger as a risk factor for violence among the mentally disordered*". Chapter 2 in Monahan, J. and Steadman, H. (editors) "Violence and Mental Disorder, Developments in Risk Assessment", University of Chicago Press.

Novaco, R. (1994) "*Clinical Problems of Anger and it's assessment and regulation through a Stress Coping Skills Approach*" Chapter 15 in Donohue, W. and Knashir, L. (editors) "Handbook of psychological skills training : Clinical Techniques and Applications", Allyn and Bacon.

Novaco, R. and Welsh, W. (1989) "*Anger Disturbances: Cognitive Mediation and Clinical Prescriptions*". Chapter 3 in Howells, K. and Hollin, C. (editors) "Clinical approaches to Violence", John Wiley and sons.

Papps, B.P. and O'Carroll, R.E. (1998) "*Extremes of Self- Esteem and the experience and expression of anger and aggression*" Aggressive Behaviour (in press).

Petty, R., Bonner, D., Mouratoglou, V. and Silverman, M. (1996) "*Acute frontal lobe syndrome and dyscontrol associated with bilateral caudate nucleus infarctions*" British Journal of Psychiatry: Volume 168, Pages 237-240.

Power, M. and Dalgleish, T. (1997) "*Anger*", Chapter 8 in "Cognition and Emotion: From Order to Disorder", Psychology Press.

Pribram, K. and Luria, A.(1973) “ *Psychophysiology of the frontal lobes*” Academic Press.

Rolls, E. “ *A theory of Emotion and its’ application to understanding the Neural Basis of Emotion*” Cognition and Emotion: Volume 4, No.3, Page 161.

Rose, D. and Johnson, D. (1996) “ *Brain Injury and after- Towards Improved Outcome*” Wiley Publishers.

Sachdev, P., Smith, J.S., Matheson, J., Last, P. and Blumberg, P. (1992) “*Amygdala- Hippocampectomy for Pathological Aggression*” Australia and New Zealand Journal of Psychiatry: Volume 26, Pages 671-676.

Schacter, S and Singer, J. (1962) “*Cognitive, social and physiological determinants of emotional state*” Psychological Review:69, Page 379.

Selzer, M.L. (1971) “ *The Michigan Alcoholism Screening Test: The Quest for a new Diagnostic Instrument*” American Journal of Psychiatry: Volume 127, No.12, June 1971, Page 89.

Shallice, T. and Burgess, P. (1991) “ *Deficits in Strategy Application following frontal lobe damage in man*” Brain: Volume 114, Pages 727-741.

Sharkin, B.S. and Gelso, C.J. (1991) “ *The Anger Discomfort Scale: Beginning Reliability and Validity Data*” In “ *Measurement and Evaluation in Counselling and Development*” July 1991, Volume 24, Page 61- 68.

Smedslund, J. (1993) “ *How shall the concept of anger be defined?*” Theory and Psychology: Volume 3 (1), Pages 5-33.

Spielberger, C. (1978/1988) “ *The State Trait Anger Expression Inventory*”, research edition, Psychological Assessment Resources.

Spreen, O. and Strauss, E. (1998) “ *A Compendium of Neuropsychological Tests: Administration, Norms and Commentary*” Second Edition, Oxford University Press.

"*Standard Occupational Classification*," Volumes 1, 2 & 3 (1990). A publication of the government statistical service from the Office of Population Censuses and Surveys, London HMSO.

Stroop, J.R. (1935) "*Studies of interference in serial verbal reactions*"
Journal of Experimental Psychology: Volume 18, Pages 643- 662.

Stuss, D.T., Esken, G.A. and Foster, J.K. (1994) "*Experimental neuropsychological studies of frontal lobe functions*". Chapter 6 in Boller, F. and Grafeman, J. (editors) "*Handbook of Neuropsychology*" Volume 9, Elsevier science.

Stuss, D.T., Gow, C.A. and Hetherington, C.R. (1992) "*No Longer Gage: Frontal Lobe Dysfunction and Emotional Changes*" Journal Of Consulting and Clinical Psychology: Volume 60, No.3, Pages 349-359.

Tangney, J.P., Wagner, P., Fletcher, C. and Gramzow, R. (1992) "*Shamed in to Anger? The relation of shame and guilt to anger and self-reported aggression*"
Journal of Personality and Social Psychology: Volume 62, No. 4, Pages 669-675.

Thomas, H.E. (1995) "*Experiencing a shame response as a precursor to violence*" Bulletin of the American Academy of Psychiatry and Law: Volume 23, No. 4.

Thomas, S. (1990) "*Theoretical and Empirical Perspectives on Anger*"
Issues in Mental Health Nursing: Volume 11, Pages 203-216.

Towl, G. (1993) "*Anger control groupwork in practice*". In Issues in Criminological and Legal Psychology: Volume 20, Page 75. Division of Criminological and Legal Psychology, The British Psychology Society.

Tranel, D., Anderson, S. and Benton, A. (1994) "*Development of the concept of 'executive function' and it's relationship to the frontal lobes*". Chapter 5 in Boller, F. and Grafeman, J. (editors) "*Handbook of Neuropsychology*" Volume 9, Elsevier Science Publications.

Trenerry, M.R., Crosson, B., DeBoe, J. and Leber, W.R. (1989) "*The Stroop Neuropsychological Screening Test*" Psychological Assessment Resources.

Tulloch, R. (1990) "*Anger and Violence*" in Dryden, W. and Rentoul, R. (editors) "Adult Clinical Problems" London, Routledge.

Vygotsky, L. (1962) In Hanfman, E. and Vakar, G. (Eds. and translators), "*Thought and Language*" Cambridge, MA: M.I.T. Press.

Weiger, W.A. and Bear, D.M. (1988) "*An approach to the Neurology of Aggression*" Journal of Psychiatric Research: Volume 22, No.2, Pages 85-98.

Wilson, B., Evans, J., Emslie, H., Alderman, N. and Burgess, P. (1998) "*The Development of an Ecologically Valid Test for Assessing Patients with a Dysexecutive Syndrome*" Neuropsychological Rehabilitation: Volume 8, No. 3, Pages 213-228.

Wilson, B.A., Alderman, N., Burgess, P., Emslie, H. and Evans, J. (1996) "*Behavioural Assessment of the Dysexecutive Syndrome*" Manual for test. Thames Valley Test Company.

Worden, W. (1983) "*Grief Counselling and Grief Therapy*" Second Edition, Routledge Publishers.

Yarnell, P. and Rossie, G. (1990) "*Bifrontal Brain Trauma and 'Good Outcome' Personality changes: Phineus Gage Syndrome updated*" Journal of Neuropsychological Rehabilitation: Volume 4, No.1, Pages 9- 16.

Zigmond, A.S. and Snaith, R.P. "*The Hospital Anxiety and Depression Scale*" Acta Psychiatrica Scandinavia: Volume 67, Pages 361-370.

Zwemer, W.A. and Deffenbacher, J.L. (1984) "*Irrational Beliefs, Anger and Anxiety*" Journal of Counselling Psychology: Volume 31, No.3, Pages 391-393.

APPENDICES

- 1.** Information sheet for participants of study
- 2.** Consent form for participants of study
- 3.** National Adult Reading Test answer sheet
- 4.** Controlled Oral Word Association Test answer sheet
- 5.** The Stroop Test answer sheet
- 6.** Coughlans and Hollows Story Recall answer sheet
- 7.** The Trails Test, parts A and B
- 8.** Photocopies of the BADS answer sheet for
 - Rule shift subtest
 - Temporal judgement subtest
 - Modified Six Elements subtest
- 9.** The Hospital Anxiety and Depression Inventory
- 10.** The State Trait Anger Expression Inventory answer sheet
- 11.** The Brief Novaco Provocation Inventory
- 12.** The Michigan Alcohol Screening Test

INFORMATION FOR PARTICIPANTS OF PROPOSED RESEARCH STUDY

You are being asked to participate in a study, the aim of which is to increase our understanding of anger/ anxiety.

Participating in the study would require you to come along to the Psychology Department for one extra session before your treatment begins.

This session would last for between 1 and 2 hours. During this time assessments will be completed. Some of these assessments will be about your anger/ anxiety. Other assessments will require you to do specific tasks- including problem solving and tests of memory.

Feedback will be provided on the assessments. These extra assessments are in no way harmful, indeed, if anything they will be beneficial as they may help identify particular skills you have which we can work with in psychological treatment.

Whether or not you participate will not affect your treatment and you are free to withdraw at any time.

If you have any other queries, please do not hesitate to contact Suzy Clark at the Clinical Psychology Dept.

STANDARD CONSENT FORM

TITLE OF THE PROPOSED RESEARCH:

Neuropsychological Functioning in People with Anger or Anxiety Problems

NAME OF INVESTIGATOR:

Suzy Clark

ADDRESS:

Dept. Of Clinical Psycholgy.

TELEPHONE:

FURTHER INFORMATION IS AVAILABLE FROM: (A person who is not involved in the study)

Head of Service

LIST ANY DRUGS TO BE GIVEN IN THE STUDY EXPLAINING THEIR ACTION:

N/A

I agree to participate in this study.

I have read this consent form and have had the opportunity to ask questions about the study.

I agree for notice to be sent to my General Practitioner about my participation in this study.

I agree to the provision of any clinically significant information to my General Practitioner.

I understand that I am under no obligation to take part in this study and that a decision not to participate will not alter the treatment that I would normally receive.

I understand that I have the right to withdraw from this study at any stage and that to do so will not affect my treatment.

Signature of Patient

.....
Name of Patient/Subject:

--

Signature of Investigator:

Date:

Three copies to be made

Top copy to be retained by Investigator

Second copy to be retained by patient/subject

Third copy to be sent to patient's/subject's General Practitioner

National Adult Reading Test (NART)

SECOND EDITION

Answer/Record Sheet

Name:

Date of test:

Errors

Errors

CHORD	<input type="text"/>
ACHE	<input type="text"/>
DEPOT	<input type="text"/>
AISLE	<input type="text"/>
BOUQUET	<input type="text"/>
PSALM	<input type="text"/>
CAPON	<input type="text"/>
DENY	<input type="text"/>
NAUSEA	<input type="text"/>
DEBT	<input type="text"/>
COURTEOUS	<input type="text"/>
RAREFY	<input type="text"/>
EQUIVOCAL	<input type="text"/>
NAIVE	<input type="text"/>
CATACOMB	<input type="text"/>
GAOLED	<input type="text"/>
THYME	<input type="text"/>
HEIR	<input type="text"/>
RADIX	<input type="text"/>
ASSIGNATE	<input type="text"/>
HIATUS	<input type="text"/>
SUBTLE	<input type="text"/>
PROCREATE	<input type="text"/>
GIST	<input type="text"/>
GOUGE	<input type="text"/>

SUPERFLUOUS	<input type="text"/>
SIMILE	<input type="text"/>
BANAL	<input type="text"/>
QUADRUPED	<input type="text"/>
CELLIST	<input type="text"/>
FACADE	<input type="text"/>
ZEALOT	<input type="text"/>
DRACHM	<input type="text"/>
AEON	<input type="text"/>
PLACEBO	<input type="text"/>
ABSTEMIOUS	<input type="text"/>
DETENTE	<input type="text"/>
IDYLL	<input type="text"/>
PUERPERAL	<input type="text"/>
AVER	<input type="text"/>
GAUCHE	<input type="text"/>
TOPIARY	<input type="text"/>
LEVIATHAN	<input type="text"/>
BEATIFY	<input type="text"/>
PRELATE	<input type="text"/>
SIDEREAL	<input type="text"/>
DEMESNE	<input type="text"/>
SYNCOPE	<input type="text"/>
LABILE	<input type="text"/>
CAMPANILE	<input type="text"/>

CONTROLLED ORAL WORD ASSOCIATION TEST

(BENTON & HAMSHER 1976)

- 1 GIVE ME THE NAMES OF AS MANY ANIMALS/OCCUPATIONS AS YOU CAN THINK OF.
- 2 I AM GOING TO GIVE YOU A LETTER AND I WOULD LIKE YOU TO TELL ME AS MANY WORDS AS YOU CAN THINK OF THAT BEGIN WITH THAT LETTER EXCLUDING PROPER NOUNS (IE NAMES), NUMBERS, AND THE SAME WORD WITH A DIFFERENT SUFFIX (EG ALL, ALWAYS, ALTOGETHER, ETC). THE FIRST LETTER IS C/P. THE SECOND LETTER IS F/R. THE THIRD LETTER IS L/W.

TIME (secs)	ANIMALS OCCUPATIONS	C/P	F/R	L/W
0 - 15				
15 - 30				
30 - 45				
45 - 60				
TOTALS				

Total :.....
Adjusted Score :.....
Percentile Range:.....
Classification:.....

Form C-W Responses – Color-Word Task

1 RED_____	29 BLUE_____	57 BLUE_____	85 TAN_____
2 BLUE_____	30 TAN_____	58 TAN_____	86 RED_____
3 GREEN_____	31 GREEN_____	59 RED_____	87 GREEN_____
4 BLUE_____	32 RED_____	60 GREEN_____	88 BLUE_____
5 RED_____	33 BLUE_____	61 TAN_____	89 TAN_____
6 TAN_____	34 GREEN_____	62 RED_____	90 GREEN_____
7 BLUE_____	35 BLUE_____	63 GREEN_____	91 RED_____
8 RED_____	36 GREEN_____	64 BLUE_____	92 TAN_____
9 TAN_____	37 RED_____	65 GREEN_____	93 BLUE_____
10 GREEN_____	38 TAN_____	66 TAN_____	94 GREEN_____
11 BLUE_____	39 BLUE_____	67 BLUE_____	95 RED_____
12 RED_____	40 RED_____	68 GREEN_____	96 TAN_____
13 TAN_____	41 BLUE_____	69 RED_____	97 RED_____
14 BLUE_____	42 TAN_____	70 BLUE_____	98 GREEN_____
15 GREEN_____	43 RED_____	71 RED_____	99 RED_____
16 RED_____	44 TAN_____	72 GREEN_____	100 BLUE_____
17 TAN_____	45 BLUE_____	73 BLUE_____	101 RED_____
18 GREEN_____	46 RED_____	74 TAN_____	102 BLUE_____
19 BLUE_____	47 GREEN_____	75 GREEN_____	103 TAN_____
20 RED_____	48 BLUE_____	76 BLUE_____	104 GREEN_____
21 TAN_____	49 TAN_____	77 RED_____	105 RED_____
22 GREEN_____	50 GREEN_____	78 TAN_____	106 TAN_____
23 BLUE_____	51 RED_____	79 GREEN_____	107 BLUE_____
24 GREEN_____	52 TAN_____	80 RED_____	108 TAN_____
25 TAN_____	53 GREEN_____	81 TAN_____	109 RED_____
26 BLUE_____	54 TAN_____	82 BLUE_____	110 BLUE_____
27 TAN_____	55 BLUE_____	83 GREEN_____	111 GREEN_____
28 RED_____	56 RED_____	84 BLUE_____	112 TAN_____

STORY RECALL - IMMEDIATE

Mrs Angela / Harper / was sitting in her bedroom / mending the curtains / when she heard a noise / coming from the kitchen / . She rushed to investigate / and found a boy / climbing out of the window / with her handbag / . She threw a vase at him / but it missed / and he ran off laughing / . She chased after him / past the shops / and into the park / but he got away / by squeezing through some railings / . On her way back home / Mrs Harper phoned / the police / . She described / the thief as quite tall / and neatly dressed / . He had a scar / on his face / but she could not remember the colour of his hair / .

* Score 1 if implied

Score (Max 56) _____

STORY RECALL - DELAYED

Mrs Angela / Harper / was sitting in her bedroom / mending the curtains / when she heard a noise / coming from the kitchen / . She rushed to investigate / and found a boy / climbing out of the window / with her handbag / . She threw a vase at him / but it missed / and he ran off laughing / . She chased after him / past the shops / and into the park / but he got away / by squeezing through some railings / . On her way back home / Mrs Harper phoned / the police / . She described / the thief as quite tall / and neatly dressed / . He had a scar / on his face / but she could not remember the colour of his hair / .

* Score 1 if implied

Score (Max 56) _____

STORY RECALL - Form 1

	Score	%ile range
Immediate (I)	_____	_____
Delayed (D)	_____	_____
Retained % (D/I)	_____	_____

FIGURE RECALL - Form 1

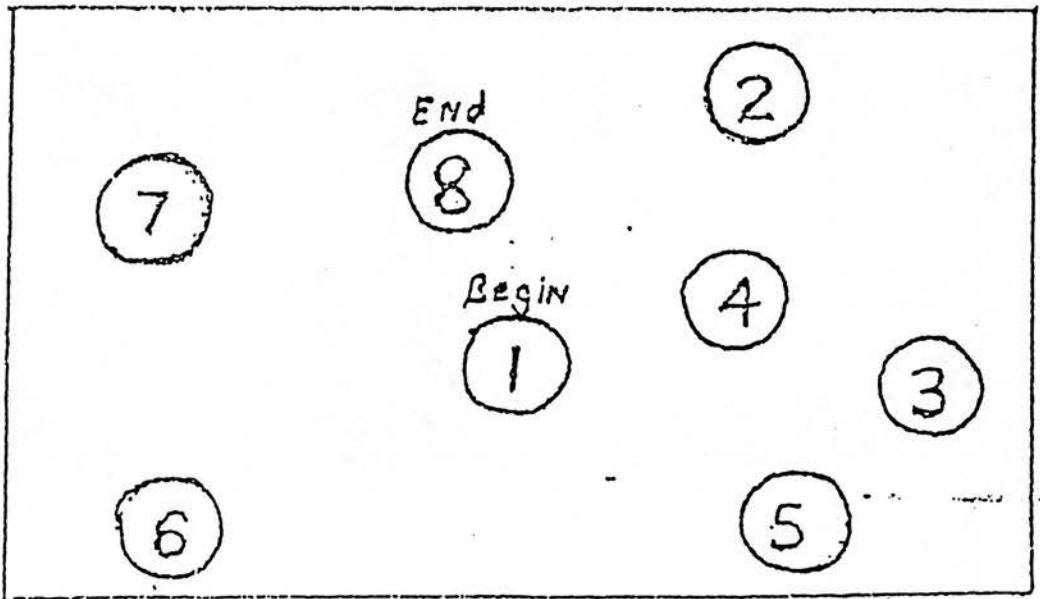
	Score	%	%ile rang
Copy(C)	_____ *	(C/80)	_____
Immediate(I)	_____ *	(I/C)	_____
Delayed(D)	_____ *	(D/C)	_____
Retained %		(D/I)	_____

* Max = 80

TRAIL MAKING:

PART A

SAMPLE



15

17

21

20

19

16

18

4

22

5

6

13

Begin

24

7

1

14

2

8

10

3

9

End

25

11

23

12

17

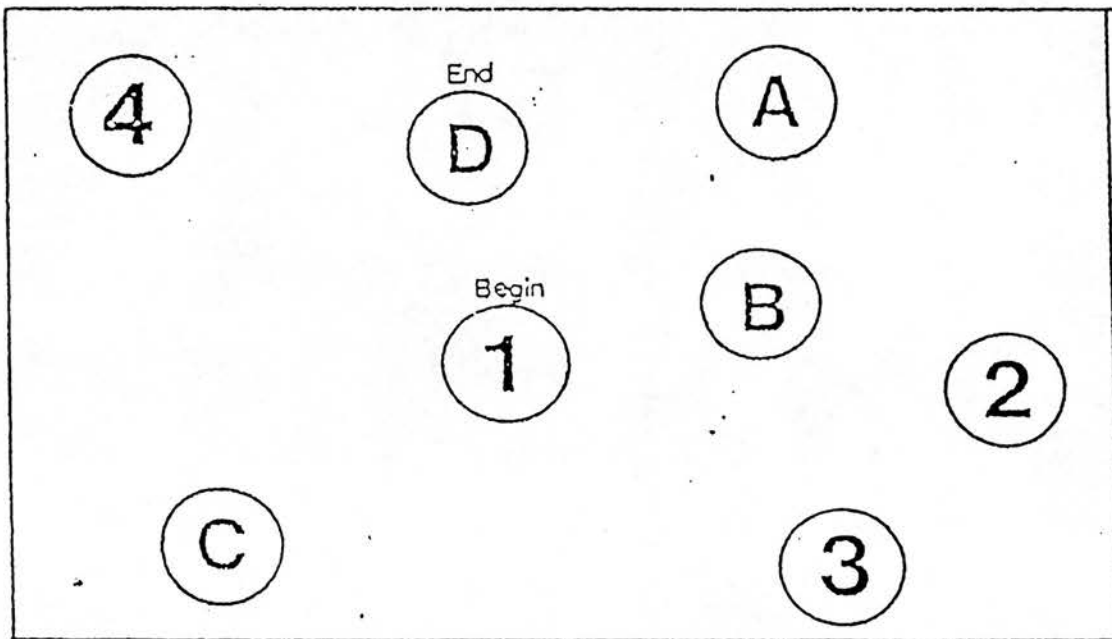
NAME:

DATE:

TRAIL MAKING

Part B

TIME (seconds) :



8

9

I

D

B

4

3

7

Begin
1

5

H

C

G

A

J

L

2

6

E

F

K

T

4: Temporal judgement

For text and procedure see Manual p. 9

Instructions: Please try to estimate how long it takes to do four

Question	Raw score
Question 1 How long does it take to do a dental check up?	<input type="checkbox"/> If between 5 & 15 mins score 1, otherwise 0
Question 2 How long does it take a window cleaner to clean the windows of a average size house?	<input type="checkbox"/> If between 15 & 25 mins score 1, otherwise 0
Question 3 How long do most dogs live for?	<input type="checkbox"/> If between 9 & 15 years score 1, otherwise 0
Question 4 How long does it take to blow up a balloon?	<input type="checkbox"/> If between 50 & 70 secs score 1, otherwise 0
Total raw score	<input type="checkbox"/> = total profile score <input type="checkbox"/>

Hospital Anxiety and Depression Scale (HADS)



Name: _____ Date: _____

Clinicians are aware that emotions play an important part in most illnesses. If your clinician knows about these feelings he or she will be able to help you more.

This questionnaire is designed to help your clinician to know how you feel. Read each item below and **underline the reply** which comes closest to how you have been feeling in the past week. Ignore the numbers printed at the edge of the questionnaire.

Don't take too long over your replies, your immediate reaction to each item will probably be more accurate than a long, thought-out response.

FOLD HERE

FOLD HERE

A	D			A	D
3		I feel tense or 'wound up'			
2		Most of the time		3	
1		A lot of the time		2	
0		From time to time, occasionally		1	
		Not at all		0	
	0	I still enjoy the things I used to enjoy			
	1	Definitely as much		0	
	2	Not quite so much		1	
	3	Only a little		2	
		Hardly at all		3	
3		I get a sort of frightened feeling as if something awful is about to happen			
2		Very definitely and quite badly		3	
1		Yes, but not too badly		2	
0		A little, but it doesn't worry me		1	
		Not at all		0	
	0	I can laugh and see the funny side of things			
	1	As much as I always could		3	
	2	Not quite so much now		2	
	3	Definitely not so much now		1	
		Not at all		0	
3		Worrying thoughts go through my mind			
2		A great deal of the time		0	
1		A lot of the time		1	
0		Not too often		2	
		Very little		3	
	3	I feel cheerful			
	2	Never		3	
	1	Not often		2	
	0	Sometimes		1	
		Most of the time		0	
0		I can sit at ease and feel relaxed			
1		Definitely		0	
2		Usually		1	
3		Not often		2	
		Not at all		3	
				0	
				1	
				2	
				3	
				0	
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Self-Rating Questionnaire

STAXI Item Booklet (Form HS)

Name _____ Sex _____ Age _____ Date _____

Education _____ Occupation _____ Marital Status _____

Instructions

In addition to this Item Booklet you should have a STAXI Rating Sheet. Before beginning, enter your name, sex, age, the date, your education and occupation, and your marital status in the spaces provided on this booklet and at the top of the Rating Sheet.

This booklet is divided into three Parts. Each Part contains a number of statements that people use to describe their feelings and behavior. Please note that each Part has *different* directions. Carefully read the directions for each Part before recording your responses on the Rating Sheet.

There are no right or wrong answers. In responding to each statement, give the answer that describes you best. **DO NOT ERASE!** If you need to change your answer, make an "X" through the incorrect response and then fill in the correct one.

Examples

- | | | | | |
|----|---|----------------------------------|-----------------------|---|
| 1. | ① | <input checked="" type="radio"/> | <input type="radio"/> | ④ |
| 2. | ① | <input type="radio"/> | ③ | ④ |

Part 1 Directions

A number of statements that people use to describe themselves are given below. Read each statement and then fill in the circle with the number which indicates how you feel *right now*. Remember that there are no right or wrong answers. Do not spend too much time on any one statement, but give the answer which seems to *best* describe your *present feelings*.

Fill in ① for *Not at all*
Fill in ② for *Somewhat*

Fill in ③ for *Moderately so*
Fill in ④ for *Very much so*

How I Feel Right Now

1. I am furious.
2. I feel irritated.
3. I feel angry.
4. I feel like yelling at somebody.
5. I feel like breaking things.
6. I am mad.
7. I feel like banging on the table.
8. I feel like hitting someone.
9. I am burned up.
10. I feel like swearing.

Part 2 Directions

A number of statements that people use to describe themselves are given below. Read each statement and then fill in the circle with the number which indicates how you *generally* feel. Remember that there are no right or wrong answers. Do not spend too much time on any one statement, but give the answer which seems to *best* describe how you *generally* feel.

Fill in ① for *Almost never*
Fill in ② for *Sometimes*

Fill in ③ for *Often*
Fill in ④ for *Almost always*

How I Generally Feel

11. I am quick tempered.
12. I have a fiery temper.
13. I am a hotheaded person.
14. I get angry when I'm slowed down by others' mistakes.
15. I feel annoyed when I am not given recognition for doing good work.
16. I fly off the handle.
17. When I get mad, I say nasty things.
18. It makes me furious when I am criticized in front of others.
19. When I get frustrated, I feel like hitting someone.
20. I feel infuriated when I do a good job and get a poor evaluation.

Part 3 Directions

Everyone feels angry or furious from time to time, but people differ in the ways that they react when they are angry. A number of statements are listed below which people use to describe their reactions when they feel *angry* or *furious*. Read each statement and then fill in the circle with the number which indicates how *often* you *generally* react or behave in the manner described when you are feeling angry or furious. Remember that there are no right or wrong answers. Do not spend too much time on any one statement.

Fill in ① for *Almost never*
Fill in ② for *Sometimes*

Fill in ③ for *Often*
Fill in ④ for *Almost always*

When Angry or Furious...

21. I control my temper.
22. I express my anger.
23. I keep things in.
24. I am patient with others.
25. I pout or sulk.
26. I withdraw from people.
27. I make sarcastic remarks to others.
28. I keep my cool.
29. I do things like slam doors.
30. I boil inside, but I don't show it.
31. I control my behavior.
32. I argue with others.
33. I tend to harbor grudges that I don't tell anyone about.
34. I strike out at whatever infuriates me.
35. I can stop myself from losing my temper.
36. I am secretly quite critical of others.
37. I am angrier than I am willing to admit.
38. I calm down faster than most other people.
39. I say nasty things.
40. I try to be tolerant and understanding.
41. I'm irritated a great deal more than people are aware of.
42. I lose my temper.
43. If someone annoys me, I'm apt to tell him or her how I feel.
44. I control my angry feelings.

Self-Rating Questionnaire

STAXI Rating Sheet (Form HS)



Name _____ Sex _____ Age _____ Date _____

Education _____ Occupation _____ Marital Status _____

PART 1

How I Feel Right Now

- | | | | | |
|-----|---|---|---|---|
| 1. | ① | ② | ③ | ④ |
| 2. | ① | ② | ③ | ④ |
| 3. | ① | ② | ③ | ④ |
| 4. | ① | ② | ③ | ④ |
| 5. | ① | ② | ③ | ④ |
| 6. | ① | ② | ③ | ④ |
| 7. | ① | ② | ③ | ④ |
| 8. | ① | ② | ③ | ④ |
| 9. | ① | ② | ③ | ④ |
| 10. | ① | ② | ③ | ④ |

PART 3

When Angry or Furious

- | | | | | |
|-----|---|---|---|---|
| 21. | ① | ② | ③ | ④ |
| 22. | ① | ② | ③ | ④ |
| 23. | ① | ② | ③ | ④ |
| 24. | ① | ② | ③ | ④ |
| 25. | ① | ② | ③ | ④ |
| 26. | ① | ② | ③ | ④ |
| 27. | ① | ② | ③ | ④ |
| 28. | ① | ② | ③ | ④ |
| 29. | ① | ② | ③ | ④ |
| 30. | ① | ② | ③ | ④ |
| 31. | ① | ② | ③ | ④ |
| 32. | ① | ② | ③ | ④ |
| 33. | ① | ② | ③ | ④ |
| 34. | ① | ② | ③ | ④ |
| 35. | ① | ② | ③ | ④ |
| 36. | ① | ② | ③ | ④ |
| 37. | ① | ② | ③ | ④ |
| 38. | ① | ② | ③ | ④ |
| 39. | ① | ② | ③ | ④ |
| 40. | ① | ② | ③ | ④ |
| 41. | ① | ② | ③ | ④ |
| 42. | ① | ② | ③ | ④ |
| 43. | ① | ② | ③ | ④ |
| 44. | ① | ② | ③ | ④ |

PART 2

How I Generally Feel

- | | | | | |
|-----|---|---|---|---|
| 11. | ① | ② | ③ | ④ |
| 12. | ① | ② | ③ | ④ |
| 13. | ① | ② | ③ | ④ |
| 14. | ① | ② | ③ | ④ |
| 15. | ① | ② | ③ | ④ |
| 16. | ① | ② | ③ | ④ |
| 17. | ① | ② | ③ | ④ |
| 18. | ① | ② | ③ | ④ |
| 19. | ① | ② | ③ | ④ |
| 20. | ① | ② | ③ | ④ |

Appendix 1. The Brief Novaco Provocation Inventory (BNPI)

Instructions: The items on this scale describe situations that are related to anger arousal. For each of the items, please rate the degree to which the incident described by the item would anger or provoke you by using the following scale:

1. For very little 2. For little 3. For a moderate amount 4. For much 5. For very much

Use the same scale for each of the items. Please mark your answers in the space provided. Try to imagine the incident actually happening to you, and then indicate the extent to which it would have made you angry.

In the actual situations, the degree of anger that you would experience certainly would depend on other factors that are not specified in the items (such as, what kind of day you were having, exactly who was involved in the situation, how the act occurred, etc.). This scale is concerned with your *general* reactions, and so the details of particular situations have been omitted. Please do your best to rate your responses in this general fashion...

1. You are waiting to be served at a restaurant. Fifteen minutes have gone by and you still haven't received a glass of water_____.
 2. Being singled out for correction, when the actions of others go unnoticed_____.
 3. Being called a liar_____.
 4. You are in the midst of a dispute, and the other person calls you a stupid jerk_____.
 5. People in authority that refuse to listen to your point of view_____.
 6. Being stood up for a date_____.
 7. You are driving along at 45mph, and the person behind you is right on your bumper_____.
 8. You are talking to someone, and they don't answer you_____.
 9. You have made arrangements to go somewhere with a person, who backs out at the last minute and leaves you hanging_____.
 10. Being joked about or teased_____.
 11. Being pushed or shoved by someone in an argument_____.
 12. You accidentally make the wrong kind of turn in a car park. As you get out of your car someone shouts at you, "Where did you learn to drive?"_____.
 13. Working hard on a project and getting a poor evaluation_____.
 14. Someone makes a mistake and blames it on you_____.
 15. When you are criticised in front of others for something you've done_____.
 16. Someone who is always trying to get one up on you_____.
 17. People who constantly brag about themselves_____.
 18. Loosing a game that you wanted to win_____.
 19. Someone making fun of the clothes you are wearing_____.
 20. Being told by a teacher or employer that you have done poor work_____.
 21. Being mocked by a small group of people as you pass them_____.
 22. You are out for an evening with someone who indirectly conveys to you that you just don't measure up to their standards_____.
-

The Michigan Alcohol Screening Test, Selzer, M. (1971)

Points

Questions

- 2* Do you feel you are a normal drinker?
- 2 Have you ever wakened the morning after some drinking the night before and found you could not remember a part of the evening before?
- 1 Does your wife or parents ever worry or complain about your drinking?
- 2* Can you stop drinking without a struggle after one or two drinks?
- 1 Do you ever feel bad about your drinking?
- 2* Do friends or relatives think you are a normal drinker?
- 0 Do you ever try to limit your drinking to certain times of the day or to certain places?
- 2* Are you always able to stop drinking when you want to?
- 5 Have you ever attended a meeting of AA?
- 1 Have you gotten into fights when drinking?
- 2 Has drinking created problems with you and your wife?
- 2 Has your wife ever gone to anyone for help about your drinking?
- 2 Have you ever lost friends or girlfriends/ boyfriends because of drinking?
- 2 Have you ever gotten into trouble at work because of drinking?
- 2 Have you ever lost a job because of drinking?
- 2 Have you ever neglected your obligations, your family or your work for two or more days in a row because you were drinking?
- 1 Do you ever drink before noon?
- 2 Have you ever been told you have liver trouble? cirrhosis?
- 2 Have you ever had the delirium tremens, severe shaking, heard voices or seen things that weren't there after heavy drinking?
- 5 Have you ever gone to anyone for help about your drinking?
- 5 Have you ever been in a hospital because of drinking?
- 2 Have you ever been a patient in a psychiatric hospital or on a psychiatric ward of a general hospital where drinking was part of the problem?
- 2 Have you ever been seen at a psychiatric or mental health clinic or gone to a doctor, social worker or clergyman for help with an emotional problem in which drinking had played a part?
- 2 Have you ever been arrested, even for a few hours, because of drunk behaviour?
- 2 Have you ever been arrested for drunk driving?

{ * negative responses are alcoholic responses)