

An experimental investigation of mixed anxiety depression.

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Declaration

**This thesis has been composed by myself,
the work contained herein is my own
and it has not been submitted for any other degree
or professional qualification except as specified.**

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September 2001

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First of all, I would like to thank the Faculty of Medicine for its Scholarship award, which has given me the opportunity to undertake this intriguing study on mixed anxiety depression (MAD).

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ABSTRACT

A brief presentation of the background to this thesis is given followed by an outline of the main clinical aspects and theories of anxiety and depression. The concept of comorbidity in relation to the two disorders is then introduced and the resulting clinical and theoretical issues reviewed. The most prominent models of mixed anxiety depression are consequently introduced with particular emphasis on cognitive and dimensional perspectives.

One aim of the experimental investigations carried out was the provision of evidence of discriminant group validity amongst three clinical groups (anxious or depressed only and mixed outpatients) by means of clinical interview, self-report measures and a variety of cognitive tasks. A review of attentional and mnemonic processes in anxiety and depression is reported together with the results of a preliminary investigation showing the presence of different cognitive patterns in the three clinical groups on implicit and explicit memory tests.

Another fundamental aspect of cognition and emotional disorder, prospective cognitions, is then addressed. Firstly, with the employment of a Personal Future Task examining the anticipation of personal positive and negative life events in the three clinical groups. Secondly, in order to evaluate the effects of possible mediating factors in future-directed thinking a multi-level framework of cognition-emotion relation was used. This involved the use of subliminal and supraliminal emotional priming (sad, fearful, happy and neutral faces) assessing pre-attentive and attentional biases and their potential influence on the execution of a Subjective Probability

Judgement Task for depression-relevant, anxiety-relevant and positive future events. Results from the two tasks revealed specific patterns for the three clinical groups in terms of generation and valence of events, mood-congruency, probability judgements, prime type and reaction times.

A further follow-up investigation of recovered and not recovered outpatients from the three clinical groups examined three aspects of autobiographical memory: accuracy of prediction; reality monitoring; implicit theory of consistency and change.

A second aim was to explore the temporal relationship between anxiety and depression. This was achieved with the employment of a neuropsychological face-processing task typically associated with lateralisation biases in anxiety and depression and a range of anxiety mood-induction techniques with a student sample.

Results provided evidence that the shift from an anxiety towards a depressive state may serve an evolutionary adaptive mechanism devoted to the prevention from exhaustion.

Finally, a general evaluation of the main findings and implications for future research are presented.

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CHAPTER 1

ANXIETY AND DEPRESSION: CLINICAL ASPECTS AND THEORIES.

“In the mid twentieth century the times in which we were living were called the Age of Anxiety. More recently they came to be called the Age of Depression. Since no one has yet announced an end to the Age of Anxiety, we are now presumably living in an Age of both Anxiety and Depression.”

(Charles G. Costello, "Anxiety and Depression. The Adaptive Emotions")

1. 1. General introduction.

Anxiety and depression are, to some extent, part of everyday living. However, the point at which ordinary emotions become emotional disorders may be difficult to identify, and it is generally defined as the point above a particular threshold (arbitrary to a certain degree) at which those negative emotions become persistent and severe enough to create problems for the individual who experiences them.

In general terms, the experience of both anxious or depressive emotional states are interlinked with three other aspects: *physical reactions*, *behaviours* and *cognitions*. Physical reactions may include muscle tension, sleep disturbance, palpitations and fatigue. Behavioural aspects may consist of restlessness, psychomotor retardation, tearfulness and suicidal attempts. Cognitions comprise poor concentration, worry,

indecisiveness and generally biased information processing (perception, encoding, storage, retrieval and anticipation), which may set up a vicious circle by generating negative distortions in thinking and, in turn, further biased processing.

Anxiety and depression constitute the two most common complaints amongst both the general and clinical populations. Epidemiological studies reveal that approximately 8.3-19.3% and 14.6-24.9% of the general population will experience an affective or anxiety disorder respectively in their lifetime (e.g. Kessler, McGonagle, Zhao, Nelson, Hughes, Eshleman, Wittchen & Kendler, 1994; Regier, Burke & Burke, 1990). These are indicative figures drawn from a variety of studies that vary considerably in terms of the methodology adopted (see Section 1. 4. 2. in this Chapter, and Section 2. 3. 1. in Chapter 2, for details of some of these studies).

Although the debate about whether the two disorders are distinct or states of a single underlying affective disorder (varying in severity) is still ongoing, several studies have shown considerable overlap of the two disorders in terms of aetiology, symptomatology, treatment response, and family history (e.g. Maser & Cloninger, 1990; Mineka, Watson, & Clark, 1998). With a lifetime diagnostic overlap of some 56%, the co-occurrence of the two disorders (commonly referred to as “comorbidity”) has therefore become one of the most topical issues in psychopathology research.

The empirical work described in this thesis has a twofold purpose. Firstly, it aims at the provision of evidence of discriminant group validity amongst three clinical groups: anxious only, depressed only and mixed anxious and depressed outpatients (i.e. evidence that the three groups can be operationally distinguished or discriminated from each other).

We shall concentrate on the investigation of cognitive processes in clinical anxiety, depression, and mixed anxiety depression, in an attempt to identify cognitive profiles that specifically characterise and distinguish the three clinical groups from a control group. In particular, the emphasis will be on attention, memory and prospective cognitions, as these would appear to play a central role in the vulnerability, maintenance and recovery processes.

Much of the experimental work carried out in this area has focussed on the study of cognitive aspects of anxiety or depression in isolation. On the one hand, this has given the opportunity to explore basic cognitive functions – attention and memory in particular – and to develop fundamental models of cognition and emotion (e.g. Williams, Watts, MacLeod & Mathews, 1988; 1997) that have facilitated our understanding of essential elaboration of information processes in anxiety and depression. On the other hand, new experimental paradigms and techniques have been developed, which aid researchers in testing new hypotheses and current theoretical models.

However, during the last decade or so, mounting evidence for comorbidity of anxiety and depression deriving from epidemiological, genetic, biologic and treatment studies, has given rise to several issues ranging from classification and theoretical concerns to new methodological and research questions (e.g. Katon & Roy-Byrne, 1991; Maser & Cloninger, 1990). This body of evidence has pushed cognitive researchers towards the consideration of the co-manifestation of the two disorders and the necessity to address the resulting hypotheses experimentally. Hence, the inclusion in more recent studies of a mixed group and/or the more careful appreciation of both anxiety and depression levels in the participants, also in the

hope that this might be able to account for the inconsistencies present in psychological literature.

In this thesis we shall report the results of a preliminary investigation showing specific implicit and explicit memory biases in mixed anxiety depression compared to depression or anxiety only and a control group. We shall then build upon this investigation and explore the domain of prospective cognitions in more detail. This will be done in two stages. Firstly, a clinical sample of depressed, anxious, mixed anxious-depressed outpatients and a control group will be compared in their performance on a Personal Future Task assessing their aptitude in generating possible personal future positive and negative life events as well as their probability judgements for the same events. Secondly, a more complex design will be employed involving the execution of a Subjective Probability Judgement Task in which participants will be asked to rate the likelihood that a set of future events might happen to them during the next twelve months. In order to test for mood-congruency effects, the same sample will be presented with possible depression-relevant, anxiety-relevant and positive future events and required to provide probability judgments. Moreover, an emotional priming paradigm (e.g. Power & Brewin, 1990) applied to complex stimuli (emotional sad, fearful, happy and neutral faces) will be utilised both subliminally and supraliminally in an attempt to manipulate the participants' mood experimentally at both levels, pre-attentive (i.e. unconscious) and attentive (i.e. conscious). This will allow us to test for any modulating effects on the participants' future-directed thinking due to the potential influence of the emotional primes.

An investigation of mental representations closely related to autobiographical memory processes will be carried out by following-up a number of recovered and not recovered outpatients from the three clinical groups and our control sample. This will tap into three important aspects of psychopathology: accuracy of prediction, reality monitoring, and biased memory for previous attitudes and mental states.

Anxiety and depression tend to overlap both within and across episodes. Within a single episode, anxiety symptoms are more likely to precede symptoms of depression and, across episodes, an anxiety disorder is more likely to precede a mood disorder (e.g. Mineka et al., 1998). Therefore, with the intention of providing a clearer understanding of the typical manifestation of the disorders, a second intention behind the work reported in this thesis is that of investigating more closely one of the central features of comorbidity: the temporal relationship between anxiety and depression.

A student sample was recruited and administered a modified version the Chimeric Faces Task (CFT) (e.g. Levy, Heller, Banich & Burton, 1983). This is a neuropsychological face-processing task typically associated with opposing lateralisation biases in anxiety and depression due to different levels of activation of the posterior region of the right hemisphere of the brain.

The CFT, which included the basic emotional faces (angry, disgusted, fearful, happy and sad), in conjunction with a variety of anxiety mood-induction techniques was employed in this experiment as a reliable candidate for the provision of a sensitive measure of mood shifts from anxiety to depression.

However, before we begin to report the experimental work outlined above, we shall dedicate the remaining part of this chapter to the introduction of anxiety and depression as separate emotional disorders and the presentation of the main clinical

aspects and theories. Then, in Chapter 2, we shall introduce the concept of comorbidity, review the evidence in its favour, and illustrate the main clinical issues and theoretical models of mixed anxiety depression.

1. 2. Anxiety: definition and clinical aspects.

1. 2. 1. The nature of anxiety.

As mentioned above, a certain level of anxiety is a normal part of everyday life. Its main function is to keep us motivated to make the necessary effort to handle potentially threatening situations (e.g. Rachman, 1998). In general terms, the level of functioning of the anxious individual determines whether we are dealing with pathological or adaptive anxiety. The difference may lie in the ability to identify adequately the source of threat (in a psychopathological state the person may not be aware of what is feared), or in the appraisal of a particular situation which, in clinical anxiety, becomes biased or irrational or out of proportion.

As one might expect, there is no universally accepted definition of anxiety, however, a description of the main features or components of emotional disorder – anxiety, in this case – will be given here. Anxiety is often described as a state of unpleasant tension, dread, apprehension and nervousness, accompanied by autonomic hyperarousal (e.g. Eysenck, 1997; Rachman, 1998). Characteristic physiological symptoms of anxiety include a general sympathetic autonomic activation (i.e. increased secretion of adrenaline or noradrenaline), muscle tension, dry mouth, dizziness, increased heart rate, sweating, breathing difficulties. Behaviourally,

anxiety is characterised by avoidance of the feared situations since this reduces the intensity of the physical symptoms. Typical cognitive aspects include hypervigilance, worry, anticipating the worst, poor concentration.

When an individual experiences these symptoms only transitorily in response to a particular life event, then the individual is said to be experiencing “state” anxiety. In contrast, “trait” anxiety is referred to as a more stable and enduring personality disposition to regularly perceive situations as threatening and to react to them with increased levels of anxiety (i.e. the individual is more prone to experience State anxiety) (e.g. Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). Many individuals who present with clinical levels of anxiety report feeling nervous and anxious “all their lives” and describe their “chronic” condition worsening in times of stress.

There may also be substantial cultural variation in the expression of anxiety, with some cultures expressing more somatic and others more cognitive symptoms (e.g. Al-Issa & Oudji, 1998). Moreover, the prevalence of anxiety disorders appears to be more common in the age group 15-30 years, with women having about twice the incidence of anxiety disorders as men, and declines as a function of increasing education and income (e.g. Zuckerman, 1999).

1. 2. 2. Psychiatric classification of anxiety disorders.

The DSM-IV-TR (Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition – Text Revision; American Psychiatric Association, 2000), and the ICD-10 (International Classification of Diseases – Tenth Edition; World Health

Organization, 1990; 1993) are the most widely used diagnostic classification systems of mental disorders. Although the two classification systems are equivalent under many respects, in this thesis the use of the DSM-IV-TR was preferred because it gives more precise research criteria. According to the DSM-IV-TR anxiety disorders are divided into categories in terms of evidence provided by research on factors such as: essential and associated features, specific culture, age of onset, gender ratio, prevalence, course, familial pattern and differential diagnosis. This subdivision provides explicit inclusion and exclusion diagnostic criteria that can be operationally used in clinical research. The taxonomic classification of anxiety disorders in DSM-IV-TR is the following:

- *Panic Disorder* (with or without Agoraphobia): recurrent panic attacks characterised by discrete and sudden onset of physiological symptoms such as palpitations, shortness of breath, dizziness and accompanied by intense apprehension, impending doom and fear of losing control.
- *Agoraphobia*: fear (or avoidance) of being in any place or situation (usually public or crowded) in which help might not be available or from which it might be difficult to escape.
- *Specific Phobia*: fear and avoidance of specific objects or situations that do not present a real danger.

- *Social Phobia*: fear and avoidance of one or more types of social or performance situations (usually speaking, eating or writing) in which the individual feels exposed to the scrutiny of others.
- *Obsessive-Compulsive Disorder*: characterised by obsessions (persistent and intrusive ideas, images or thoughts) which cause anxiety and distress, and compulsions (repetitive behaviours or mental acts) which serve to neutralise anxiety.
- *Posttraumatic Stress Disorder*: aftermath of a traumatic event in which the individual experiences increased arousal, anxiety, and avoidance of stimuli associated with the event.
- *Acute Stress Disorder*: characterised by the same symptoms as those of Posttraumatic Stress Disorder, but lasting for four weeks or less.
- *Generalised Anxiety Disorder*: persistent, excessive and uncontrollable anxiety and worry (often about minor things) that last for at least six months.
- *Anxiety Disorder Due to a Medical Condition*: characterised by symptoms of anxiety that are deemed to be a direct physiological consequence of a medical condition.

- *Substance-Induced Anxiety Disorder*: characterised by symptoms of anxiety that are deemed to be a direct physiological consequence of medication or drug abuse.
- *Anxiety Disorder Not Otherwise Specified*: includes disorders which cause anxiety or phobic avoidance that do not meet criteria for any of the above defined anxiety disorders.

Despite the care with which such a long list has been compiled, which is certainly useful when examining each of the phenomena separately, the overlap between the above subgroups of anxiety disorders in the clinical population is considerable, which makes the proposed distinction debatable at least in terms of practical validity (e.g. Clark, Watson & Reynolds, 1995). Often, a clinically anxious individual meets diagnostic criteria for more than a single anxiety disorder. This could be due to common aetiological factors amongst anxiety disorders or to the fact that symptoms of various anxiety disorders are not entirely disorder specific (e.g. Zuckerman, 1999). This is particularly true for Generalised Anxiety Disorder (GAD), which appears to be the most common form of anxiety disorder (e.g. Brown, Di Nardo, Lehman & Campbell, 2001).

For these reasons, and due to the fact that GAD encompasses most of the features of anxiety described above, in this thesis we have decided to include in the anxious group outpatients who meet diagnostic criteria for GAD with or without a concomitant diagnosis of Panic Disorder, Agoraphobia or Social Phobia, since these are its most frequently related anxiety disorders.

The detailed DSM-IV-TR diagnostic criteria for GAD are reported on Table 1. 1. below.

Table 1. 1. Diagnostic criteria for Generalized Anxiety Disorder.

- A. Excessive anxiety and worry (apprehensive expectation), occurring more days than not for at least 6 months, about a number of events or activities (such as work or school performance).
- B. The person finds it difficult to control the worry.
- C. The anxiety and worry are associated with three (or more) of the following six symptoms (with at least some symptoms present for more days than not for the past 6 months).
 - (1) restlessness or feeling keyed up or on edge
 - (2) being easily fatigued
 - (3) difficulty concentrating or mind going blank
 - (4) irritability
 - (5) muscle tension
 - (6) sleep disturbance (difficulty falling or staying asleep, or restless unsatisfying sleep)
- D. The focus of the anxiety and worry is not confined to features of an Axis I disorder, e.g., the anxiety or worry is not about having a Panic Attack (as in Panic Disorder), being embarrassed in public (as in Social Phobia), being contaminated (as in Obsessive-Compulsive Disorder), being away from home or close relatives (as in Separation Anxiety Disorder), gaining weight (as in Anorexia Nervosa), having multiple physical complaints (as in Somatization Disorder), or having a serious illness (as in Hypochondriasis), and the anxiety and worry do not occur exclusively during Posttraumatic Stress Disorder.
- E. The anxiety, worry, or physical symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- F. The disturbance is not due to the direct physiological effects of a substance (e.g., drug of abuse, a medication) or a general medical condition (e.g., hyperthyroidism) and does not occur exclusively during a Mood Disorder, a Psychotic Disorder, or a Pervasive Developmental Disorder.

1. 3. Depression: definition and clinical aspects.

1. 3. 1. The nature of depression.

The term *depression* is commonly used in day-to-day conversation to describe the experience of a normal low mood. Like anxiety, it may be adaptive in that it can function as a signal that we are in an unpleasant situation and that we need to take the necessary action in order to improve matters (e.g. Williams & Hargreaves, 1995). However, if depression becomes more prolonged and deepens, it begins to cause more problems than it solves.

Clinical depression is typically marked by great sadness, hopelessness and loss of interest and pleasure in usual activities (e.g. Champion, 2000). Physical symptoms include fatigue, poor sleep, loss of appetite, decreased sexual interest. Behavioural changes include feeling restless or slowed down, and withdrawal. Cognitively, depressed individuals are unable to concentrate, have low self-esteem, feelings of guilt, shame, and suicidal thoughts.

The onset of a depressive episode can occur at any age in adult life, and may include a prodromal period of anxiety and mild depressive symptoms that can last for weeks before a full depressive episode develops, which can then last for about 4-6 months.

As for anxiety, women are about twice as likely as men to develop a depressive disorder. In particular, following a depressive episode, women are more likely to become depressed again than men (Amenson & Lewinsohn, 1981). However, more recent investigations show that the greater incidence of depressive disorders in women aged 15-54 years may result from a higher prevalence of “somatic

depression” (i.e. associated with fatigue, appetite and sleep disturbance) and anxiety in women than in men (Silverstein, 1999); and that there is a clear reversal of gender difference in prevalence of depression over the age of 55 (i.e. post-menopausal years) (Bebbington, Dunn, Jenkins, Lewis, Brugha, Farrell & Meltzer, 1998). This finding offers some support to the possibility that the hormonal changes of a woman’s menstrual cycle may play a role in vulnerability. On the other hand, other studies have pointed out that gender ratios differ significantly with age – with about twice as many boys as girls being treated for depression prior to mid-adolescence (Harrington, 1993) – according to marital status, with lower rates for currently married persons compared to divorced, separated, or never married individuals, and a greater risk for divorced or separated men than for women in most countries (e.g. Zuckerman, 1999). Therefore it might be more fruitful to consider the onset of a depressive disorder bearing in mind the transitions that are likely to occur in each stage of life (e.g. gaining independence, love relationships, work, child rearing), the demands that these place on more vulnerable individuals and the social support (e.g. partner, friends or other family members) that the person receives (Champion, 2000).

1. 3. 2. Psychiatric classification of mood disorders.

The DSM-IV-TR diagnostic classification of mood disorders divides and sets criteria for Depressive Disorders (Unipolar Depression), Bipolar Disorders and two mood disorders based on aetiology as follows:

- *Major Depressive Disorder*: characterised by at least one Major Depressive Episode (i.e. minimum of 2 weeks of depressed mood or loss of interest or pleasure together with at least four more additional depressive symptoms) (see Table 1.2. below).
- *Dysthymic Disorder*: characterised by at least 2 years of depressed mood for most of the time together with additional symptoms of depression, but not severe enough to meet criteria for a Major Depressive Episode.
- *Depressive Disorder Not Otherwise Specified*: category used when an individual has symptoms of depression that do not meet criteria for the above depressive diagnoses or for any other diagnosis in which depression is a feature.
- *Bipolar I Disorder*: characterised by at least one Manic Episode (i.e. minimum of 1 week of abnormally and persistently elevated, expansive or irritable mood together with at least three more additional manic symptoms), usually accompanied by a Major Depressive Episode.
- *Bipolar II Disorder*: characterised by at least one Major Depressive Episode and accompanied by at least one Hypomanic Episode (i.e. much like a Manic Episode but briefer and less severe).

- *Cyclothymic Disorder*: characterised by at least 2 years of repeated mood swings, but that are not severe enough to meet criteria for a Major Depressive Episode or Manic Episode.
- *Bipolar Disorder Not Otherwise Specified*: category used when an individual has bipolar symptoms that do not meet criteria for the above bipolar diagnoses.
- *Mood Disorder Due to a General Medical Condition*: either high or low moods that are prominent and persistent, caused by various types of physical illness.
- *Substance-Induced Mood Disorder*: either high or low moods that are prominent and persistent, caused by medication or drug abuse.
- *Mood Disorder Not Otherwise Specified*: includes disorders with mood symptoms that do not meet criteria for any of the above defined mood disorders.

Of the variety of mood disorders described above, in our study we will only consider depressive disorders, or unipolar depression (i.e. Major Depressive Episode and Dysthymic Disorder), because it is nosologically distinct from bipolar depression and because of its higher overlap with anxiety disorders (e.g. Zuckerman, 1999).

As for the anxiety disorders reported previously, depressive disorders show a substantial overlap with each other. This amounts at approximately to 50% for Major Depressive and Dysthymic Disorders. The number of cases who fulfil the criteria for both disorders at the same time is so high that their comorbidity has been referred to

as *double depression* (Keller & Shapiro, 1982). Some of the patients who meet criteria for Dysthymic Disorder (DD) may in reality be suffering from a Major Depressive Episode (MDE) that has been attenuated either by some form of treatment or spontaneously, or from a chronic form of MDE (Brown et al., 2001). Therefore, in our investigations, we will include outpatients who meet diagnostic criteria for either a Major Depressive Episode and/or Dysthymic Disorder.

The detailed DSM-IV-TR diagnostic criteria for Major Depressive Episode are reported on Table 1. 2. below.

Table 1. 2. Criteria for Major Depressive Episode.

- A. Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.
- (1) depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful)
 - (2) markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others)
 - (3) significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly everyday
 - (4) insomnia or hypersomnia nearly every day
 - (5) psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down)
 - (6) fatigue or loss of energy nearly every day
 - (7) feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)

- (8) diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others)
 - (9) recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide
- B. The symptoms do not meet criteria for a Mixed Episode.
 - C. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.
 - D. The symptoms are not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition (e.g., hypothyroidism).
 - E. The symptoms are not better accounted for by Bereavement, i.e., after the loss of a loved one, the symptoms persist for longer than 2 months or are characterized by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms, or psychomotor retardation.

1. 4. Theories of anxiety and depression.

It is beyond the remit of this thesis to provide a comprehensive report of every theory of anxiety and depression. However, at this point it is useful to introduce briefly some of the most influential theoretical accounts of anxiety and depressive disorders. A general overview of the psychodynamic, biological, behavioural and cognitive approaches will now be considered in turn, before a summary of this chapter is given.

1. 4. 1. Psychodynamic perspective.

In order to illustrate the basic ideas about the origin of anxiety and depression from a psychodynamic point of view, the description of a few key concepts is necessary.

The founding father of the psychodynamic perspective was Sigmund Freud (1856-1939). In a nutshell, the basic concept of his theory is that most of our mental activity takes place unconsciously (Freud, 1915/1949). According to Freud, the human mind can be divided into three structural levels. At the bottom lies the *unconscious*, which contains desires, memories, fears and other psychological materials that are not attended to. At the top (above the surface) is the *conscious*, consisting of a narrow range of mental activities and events of which the individual is aware at any particular moment. In between the two lies the *preconscious*, which contains those mental materials that are normally unconscious but that can be retrieved quite easily. Moreover, Freud divided the mind into three structural forces called the *Id*, the *Ego* and the *Superego* (Freud, 1923/1984). The *Id* is the foundation of the psychic structure. It contains the primitive biological drives (“libido”) and it is the source from which both the *Ego* and *Superego* must “borrow” their energy when they later develop. The *Id* seeks immediate gratification, operating on what Freud called the *pleasure principle*. It is entirely hedonistic, seeking its own pleasure and release from any tension without taking into account the logic of reason, reality or morality. Next is the *Ego*, which, unlike the *Id*, is primarily conscious. Its task is to deal with reality and thus it operates on the *reality principle* by mediating between the immediate gratification desired by the *Id* and the restrictions demanded by reality. The *Superego* is that part of the mind that represents the moral standards of the parents and the

society in general, which are internalised throughout childhood, and so it operates as the conscience.

Human behaviour is conceptualised as the interplay of these three forces, referred to as the psychodynamics of the personality. Thus, the Ego has to deal with both the Id, which seeks only satisfaction of the primitive drives, and the Superego, which seeks only the satisfaction of the moral ideals, as well as reality.

Freud distinguishes between *realistic anxiety*, which is the Ego's reaction to a dangerous situation in the external world, and *neurotic anxiety*, which is the result of internal dynamics (Freud, 1926/1979). In the latter case, anxiety arises from the fear of punishment that would occur if an Id impulse broke through the Ego's control. The punishment could then ensue from either the Superego, in the form of guilt, or from reality.

In order to cope with anxiety, the Ego develops *defense mechanisms*, which are unconscious strategies utilised to distort or deny reality and protect the individual from experiencing anxiety at a conscious level (Freud A., 1937). Normally, these strategies serve an adaptive function, however, if anxiety is too intense it can still be experienced consciously and, as the defence mechanisms become too rigid in an attempt to keep anxiety at bay, neurotic behaviour may emerge. From a psychodynamic point of view, the type of the anxiety disorder experienced will depend on the type of defence mechanism employed by the Ego (i.e. the particular defense style of the individual), which in turn depends on the nature of the underlying conflict. So, for example, in the case of phobias anxiety is displaced from the feared Id impulse and moved to a situation or object that has a symbolic connection to it, but if the Ego does not develop the displacement defense

mechanism then the person will experience constant distress and apprehension without knowing why (i.e. GAD). Moreover, since most of the Ego's energy is employed in the maintenance of the defences, the individual will have little Ego strength left for other important functions (e.g. problem solving, reasoning etc.).

There are several psychodynamic models of depression that share a number of salient features in terms of formulation (e.g. see Arieti & Bemporad, 1978; Greenberg & Mitchell, 1983). Depression is seen as an unconscious intra-psychic conflict and is associated to the grief in response to loss (real or symbolic) of a love object: a loved one, an ideal, a valued plan, and so on (Freud, 1917/1984). The potential for depression is formed early in childhood when insufficient or too much gratification of the child's needs may lead the individual to become extremely dependent on others for the maintenance of self-esteem. Moreover, the primal wound of a loss or threatened loss of a principal caretaker (usually a parent) maybe reactivated as a result of a recent loss. The person plunges into a sense of helplessness and hopelessness and incorporates (introjects) and identifies with the lost object, perhaps in an attempt to undo the loss. However, because of the conflicting feelings (positive and negative) towards the lost object, the person becomes the object of his/her own hate and anger on one side, and feels guilty for real or imagined sins against the lost person on the other side. As in the case of neurotic anxiety, also these unconscious conflicts result in a weakened Ego.

Despite its undisputed contribution to the field of abnormal psychology, the psychodynamic perspective is very much open to the criticism of being based on clinical evidence (i.e. observation of patients in therapy) rather than on more rigorous scientific evidence, standing at the antipode of the perspective considered next.

1. 4. 2. Biological perspective.

Genetic, neuropsychological and biochemical studies suggest that organic predisposition and dysfunction play a role in the vulnerability, development and maintenance of anxiety and depressive disorders (e.g. see Zuckerman, 1999).

Twin studies show that the concordance rate of anxiety disorders is about double in identical twins (34%) compared to fraternal twins (17%) whereas, for unipolar depression the rates are 53% for both monozygotic and 29.4% for dizygotic twins (e.g. Kendler, Pederson, Johnson, Neale & Mathe, 1993; Torgesen, 1983). On the other hand, family studies show that amongst the anxiety disorders, panic disorder seems to have the strongest genetic basis with rates ranging from 13-16% for first-degree relatives of patients, compared with rates of 1-2% in relatives of healthy controls (e.g. Zuckerman, 1999). For major depression, first-degree relatives of patients seem to have a 5.9-28.6% risk of developing a depressive disorder compared to a 0.7-5.8 risk for relatives of controls (Nurnberger & Gershon, 1992).

However, although these studies provide some evidence that anxiety and depression may be inherited to a certain extent, they do not give an answer to the question "what is inherited?". In the case of anxiety, some answers have been attempted with the proposal of biological theories of personality that assume individual differences in Trait anxiety (or Neuroticism) to depend largely (approximately 50%) on genetic factors and based on different levels of cortical arousal and activation of other brain structures (Eysenck, 1967; Gray, 1982). According to Eysenck (1967) positive emotions are associated with moderate levels of arousal whilst negative emotions are associated with levels of arousal that are either too high or too low. Anxiety is

characterised by high resting levels of cortical arousal and high autonomic nervous system activity, which depend on the functioning of the so-called “visceral brain”. This consists of the hypothalamus, hippocampus, amygdala, septum and cingulum. Similar structures have been identified by Gray (1982): the septo-hippocampal system, its monoaminergic afferents form the brain stem, and its cortical projections to the frontal lobe, referred to as the Behavioural Inhibition System (BIS). The BIS is a system sensitive to signals of aversive outcomes. It functions as a comparator, comparing the predicted state of the environment with the actual current state of the environment on a moment-to-moment basis. Any perceived mismatch between the two (i.e. a likely punishment or frustrative nonreward) would result in the BIS being activated and the inhibition of ongoing behaviour. Another twin system called Behavioural Approach System or Behavioural Activation System (BAS) is, in contrast, sensitive to signals of desirable outcomes (Fowles, 1988; Gray 1987). Its biological substrate includes the dopaminergic pathways and it initiates approach behaviour when a reward (or relieving non-punishment) outcome is perceived as likely. Anxiety is thought to reflect activation of the BIS, whereas depression would reflect disruption of the BAS.

Some empirical evidence in support of Gray’s (1982; 1987) view derives from neuropsychological studies investigating individual differences in asymmetric prefrontal activation. Subjects with greater left-sided prefrontal activation reported more BAS activity and Positive Affect, whereas subjects with greater right-sided prefrontal activation reported more BIS activity and Negative Affect (Davidson, 1999). More recently, Henriques & Davidson (2000) have provided further evidence of a decreased responsiveness to reward in depressed individuals, consistent with the

hypothesis that the left anterior hypoactivation in depression reflects a diminution in approach-related motivation and behaviour.

Current neuropsychological models of anxiety and depression (e.g. Heller, 1993; Heller, Nitschke & Miller, 1998) combine the above reported anterior asymmetric activity implicated in the *valence* dimension of emotion (i.e. positive vs. negative) with the *arousal* dimension associated with lateralisation of posterior regions of the brain. In particular, high arousal is associated with increased right parietotemporal activity and low arousal with a decreased activity of the same region.

Furthermore, pharmacological studies have sought to understand the role played by neurotransmitters in mood and anxiety disorders and have identified a number of abnormalities in the levels of catecholamines such as *dopamine* (DA) and *noradrenaline* (NA), and the indoleamine *serotonin* (5-HT). Typically, depression is associated with low levels of DA, NA and 5-HT, whilst anxiety is associated with high levels of NA and 5-HT (e.g. Deakin, 1998; Goldberg & Huxley, 1992). Moreover, there is evidence that the hypothalamic-pituitary-adrenocortical axis (HPA), a major hormone system involved in the response to prolonged exposure to stress, is overactive in depression (e.g. Holsboer, 1999).

Biological researchers have made much progress in elucidating brain-behaviour relationships, however, a note of caution should be considered against the dangers of reductionism (e.g. Turkheimer, 1998), a criticism to which behaviourist researchers are also vulnerable.

1. 4. 3. Behavioural perspective.

Behavioural theorists argue that anxiety disorders are the result of faulty learning (e.g. Bandura & Rosenthal, 1966; Wolpe & Rowan, 1988). The processes of acquisition and maintenance of anxiety can be divided into two stages. At first, a person can learn to fear (conditioned response: CR) a neutral stimulus (conditioned stimulus: CS) – an object or event – if this is associated with an aversive stimulus (unconditioned stimulus: UCS), via *classical conditioning*. Secondly, the person finds that escaping from CS will produce a relief from CR (i.e. negative reinforcement) so that the avoidance response becomes habitual via *operant conditioning* (Mowrer, 1960). This theoretical model seems to fit many cases of anxiety disorders quite well, however there are other cases in which an anxiety disorder may develop in the absence of a previous unpleasant experience with the feared object or situation (e.g. Ost, 1987). In an attempt to overcome this impasse it has been proposed that, besides learning to fear something as a result of an unpleasant experience with it, fears can be learned through imitating the reactions of others, referred to as *vicarious learning* (e.g. Bandura & Rosenthal, 1966). Another question that is not directly addressed by the two-stage model outlined above is the fact that people tend to fear only certain objects or events, such as snakes or heights, and not others. Seligman (1971) argued that via natural selection human beings are physiologically prepared to be more sensitive and fear certain stimuli that would have been threatening to our evolutionary ancestors. This proposal has been referred to as the “*preparedness hypothesis*”.

In behavioural terms depression is the result of *extinction*. In other words, the depressed individual does not receive sufficient positive reinforcement from his/her environment and as a consequence stops enacting those behaviours that may be potentially reinforcing. Lewinsohn (1974) proposed that the positive reinforcement a person receives is a function of three factors: (1) the number of potentially reinforcing stimuli (activities or experiences) for the person; (2) the availability of reinforcers in the person's environment; and (3) the person's ability in obtaining such reinforcement (usually, social skills).

Although the adoption of learning paradigms has led to the development of useful treatment techniques, such as the systematic desensitization (Wolpe, 1961), the fact that a treatment based on learning principles is effective in changing a particular behaviour does not necessarily show that that behaviour was itself learned in a similar way. Therefore, the objection of oversimplification can be made, as well as the criticism of determinism.

Another, well known, behavioural approach to mood disorders is Seligman's (1975) *learned helplessness* model of depression. This model was developed following a series of laboratory experiments in which dogs were exposed to inescapable electric shocks! When the same dogs were later subjected to escapable shocks, they were lethargic and did not initiate escape responses, showing severe learning deficits. The dogs had learned that the shocks were uncontrollable (i.e. there was no contingency between the animals' responses and the outcome they achieved) and developed a state of helplessness. This state of helplessness was thought to resemble a depressive state so closely that Seligman (1975) proposed that, like learned helplessness, depression was a learned reaction to uncontrollable and inescapable stressors.

Normal adaptive responses are undermined by the fact that the person *expects* his/her lack of control over the reinforcement. This is an important point that distinguishes the learned helplessness model from the extinction model outlined above where the core factor here is an *objective* lack of positive reinforcement from the individual's environment.

This represents a first shift from a rigid behaviouristic explanation of emotional disorder in terms of mere observable aspects of behaviour, and opens the way to models that include a cognitive level of explanation of anxiety and depression, which will be considered next.

1. 4. 4. Cognitive perspective.

In cognitive theories, cognitive processes (i.e. the way people think about themselves, the world and the future) play a decisive role in emotional behaviour (e.g. Beck, 1976; Ellis, 1984).

The original *learned helplessness* model was able to explain the passivity of depressive behaviour, but not other central characteristics of depression, such as guilt, suicidal thoughts, sadness, nor the considerable variation in terms of duration or severity of the disorder. It was found possible to induce a dysphoric state in a laboratory by exposing people to helplessness training consisting in unsolvable discrimination tasks (e.g. Hiroto & Seligman, 1975). However, it soon became clear that the way the person perceived a negative experience was crucial to whether or not a depressive state arose. As a result, Abramson, Seligman & Teasdale (1978) adapted the model to include the concept of *attribution*. The essence of this *reformulated*

helplessness model is that individuals prone to become depressed tend to attribute negative life events to internal, stable and global causes; whereas, they attribute positive life events to external, unstable and specific causes. However, this “depressogenic” attributional style” does not seem to be specific to depression and several studies have failed to find significant differences in attributional styles between anxious and depressed individuals (e.g. Ganellen, 1988; Telgassi & Hoffman, 1982). The reformulated helplessness model has been developed further and called the *hopelessness theory* of depression (Abramson, Metalsky & Alloy, 1989). This revision states that some forms of depression (hopelessness depression) are caused by a state of hopelessness. The individual will have an expectation that negative events will occur, positive events will not occur, and that he/she will be unable to influence future outcomes (i.e. helplessness). Diatheses are the depressogenic attributional style, low self-esteem and the assumption that negative life events will necessarily have severe negative consequences. More recently, Alloy, Kelly, Mineka and Clements (1990) have extended the hopelessness theory of depression to account for the comorbidity of depression with anxiety disorders and referred to it as the *helplessness-hopelessness model* of anxiety and depression, but this will be dealt with in Chapter 2.

Another major cognitive theory of anxiety and depression is Beck’s cognitive therapy model (e.g. Beck, Emery & Greenberg, 1985; Beck, Rush, Shaw & Emery, 1979). According to this theory, the knowledge that people acquire about themselves and the world in general is stored in stable mental structures called schemas. These schemas constitute the person’s beliefs and assumptions and are used to perceive, interpret and think about the self, the world and the future. Early experiences may

influence the constructions of schemas in such a way that they become dysfunctional and generate negative biases when used by the individual to interpret experience. Accordingly, a “depressogenic cognitive triad” will comprise a negative view of self, the world and the future; whereas, an “anxiogenic cognitive triad” will consist of a view of self as vulnerable, the world as threatening and the future as unpredictable. The theory proposes that a critical incident will occur in a person’s life, which may involve *loss* or *threat* in the case of depression or anxiety respectively. This will trigger the dysfunctional schemas, which will generate negative automatic thoughts and in turn depression or anxiety.

Cognitive theorists go a step beyond behaviourism by considering not only visible behaviours but also intangible, yet measurable, factors (i.e. thoughts). However, they give negative thoughts or hopelessness a causal status in the generation of a disorder, which is in turn diagnosed for the presence of the same negative thoughts or pervasive hopelessness, lending themselves to the criticism of tautology.

The last decade has witnessed the emergence of several *multi-level models* of cognition and emotion, such as the Perceptual Motor Processing (Leventhal & Scherer, 1987), the Multiple Entry Modular Memory System (MEM; Johnson & Multhaup, 1992), the Interacting Cognitive Subsystems (ICS; Teasdale & Barnard, 1993), the Self-Regulatory Executive Function (S-REF; Wells & Matthews, 1996), the Schematic, Propositional, Analogical and Associative Representation Systems (SPAARS; Power & Dagleish, 1997). In these models, the emotional effects of internal and external events are understood taking into account the separate contributions of different types and levels of information, mental representations, and their interactions. Summarising and focusing on the similarities among these models,

emotions and emotional disorders can be generated *automatically* (e.g. through a low sensory-perception level) or through a higher and more *controlled* and *effortful* schematic level (i.e. following appraisal of the meaning of an event). This differentiation compares well also with neurobiological models, whereby emotions can be elicited as an immediate response of the amygdala to sensory-perceptual aspects of a given stimulus, or expressed through the modulation of the hippocampus where the stimulus might be related to episodic memories of a particular event (LeDoux, 1995).

The obvious advantages of complex multi-level theories, which are able to explain the cognition-emotion relationship on several levels, can however limit the amount of verifiable predictions with the risk of making such models not falsifiable.

1. 5. Summary.

In this Chapter, the issue of comorbidity between anxiety and depression has been introduced and an outline of the aims of this thesis has been given.

The methodology employed in the experimental investigations reported in the next Chapters draws from paradigms used in cognitive psychology and neuropsychology, which have been duly modified and extended to address specific hypotheses.

The concepts of anxiety and depression – considered separately – have been illustrated, and their main clinical aspects and diagnostic classifications have been reported. Detailed inclusion and exclusion criteria have been given for the anxious and depressed groups of outpatients involved in this work, and it has been

highlighted how within each emotional disorder there is considerable overlap amongst subtypes of anxiety or depression.

Finally, the main theoretical views of anxiety and depression have been briefly presented with a description of some of the key features for each the approaches considered.

In the next Chapter we shall go onto consider the central issue of this thesis: the comorbidity of anxiety and depression.

CHAPTER 2

MIXED ANXIETY DEPRESSION.

“No one ever told me that grief felt so like fear”

(C. S. Lewis, “A Grief Observed”)

2. 1. Introduction.

In this Chapter we shall endeavour to address the complex issue of overlap between anxiety and depression in an attempt to build a clear picture of the subject. During the last two decades, there has been an increasing emphasis on the phenomenology of affective and anxiety disorders (e.g. Barlow & Campbell, 2000; Katon & Roy-Byrne, 1991; Maser & Cloninger, 1990; Mineka et al., 1998). We will start by describing the different ways in which anxiety, depression and their relationship have been conceptualised. Then, a review of the evidence for mixed anxiety depression (MAD) will follow, with support deriving from a range of perspectives. These will include epidemiological, genetic, biological and treatment studies.

Most of the research impetus has originated from a number of attempts to define operational inclusion and exclusion criteria in order to delineate the margins between the two disorders. Consequently, we will address the resulting diagnostic classification problems before turning our attention to the phenomenology and

features of MAD. Finally, we will present the theoretical models that have been put forward to explain the co-occurrence of anxiety and depression.

2. 2. Views of anxiety and depression.

Traditionally there have been three distinct conceptual models that define how anxiety and depression relate to each other. The two disorders have been considered as: (a) distinct disorders, qualitatively different; (b) variations of the same underlying disorder, quantitatively different; or (c) phenomenologically (qualitatively and quantitatively) different, when both present, from either pure anxiety or depression (e.g. Katon & Roy-Byrne, 1991; Stahl, 1993; Stavrakaki & Vargo, 1986).

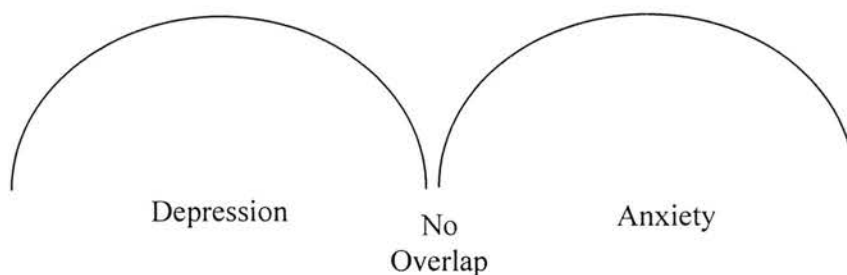
The following is a description of each model with a review of research findings on which each position is based.

2. 2. 1. Traditional dichotomous position.

According to this position, anxiety and depression are classically viewed as discrete entities (see Figure 2. 1. below). The pioneering studies in this field have been carried out by the Newcastle Group (Gurney, Roth, Garside, Kerr & Schapira, 1972; Roth, Gurney, Garside & Kerr, 1972). Although aware of the overlap between anxious and depressive symptomatology, the Newcastle Group suggested that the two disorders could be shown to differ if the appropriate statistical methods were used. Their studies showed such differentiation in terms of clinical symptoms,

course, treatment, prognosis and rating scales (Mountjoy & Roth, 1982a; 1982b). In particular, the Group found poorer social adjustment, dependent personality traits, higher neuroticism and lower extraversion scores, an earlier age of onset, longer duration of the illness and a greater prevalence of psychiatric disturbance in first-degree relatives for anxiety compared to depressive disorders. Moreover, the anxious and depressed groups of the Newcastle studies also differed in terms of treatment response, as electro convulsive therapy (ECT) and tricyclic antidepressants were found to be more beneficial to depressed patients and traditional anxiolytics were more effective in anxious patients. This differentiation was upheld also at follow-up with ratings showing a better prognosis for depressed patients in terms of global adjustment, frequency and severity of symptoms. Furthermore, anxious patients showed an increased physiological response, whereas depression was associated with a psychological response to stress. Finally, factor analyses of rating scales identified a depression factor in both groups, but an anxiety factor only in the anxious group. Thus, it was concluded that diverse clinical patterns had been isolated and evidence was provided that showed differences between anxious and depressive syndromes.

Figure 2. 1. Dichotomous representation of anxiety and depression. (Adapted from Stahl, 1993.)



These first studies have been followed by more recent research supporting the notion that the two disorders can be distinguished on a number of parameters.

Cognitively, in anxiety states patients are overwhelmed with uncertainty about a dangerous future and feel insecure and helpless. On the other hand, the central theme of depression is loss accompanied by hopelessness, self-depreciation and suicidal ideation (e.g. Akiskal, 1985; Beck, 1976). In addition, anxiety is associated with heightened negative affective arousal, whereas depression is related to reduced positive affect (e.g. Tellegen, 1985). Behaviourally, both anxiety and depression can show increased activity, but psychomotor retardation is unique to clinical depression. On the other hand, anxiety, but not depression, is characterised by autonomic activation, which is particularly evident in psychophysiological studies, for example on skin conductance (e.g. Ward, Doerr & Storrie, 1983).

From a more “normal” perspective, the identification of basic emotions – anger, disgust, fear, happiness, and sadness (e.g. Oatley & Johnson-Laird, 1987) – could be used to defend the dichotomous position, in that the basic emotion of “fear” can be viewed as the core disordered emotion in anxiety states and, conversely, “sadness” can be seen as the core disordered emotion in depression. However, it could be argued that clinical anxiety and depression are the result of more than a single negative emotion (cf. Power & Dagleish, 1997).

The dichotomous position is largely based on cross-sectional studies looking at distinctive features of the two disorders mainly from the perspective of the medical model. Historically, this can be attributable to the revival of interest in diagnosis and classification during the 1970s, which led to the reaffirmation of the concept of multiple discrete disorders and the use of categorical operational criteria in clinical

judgement (Neo-Kraepelian Paradigm). The concept of two separate disorders was then accepted in clinical practice and implemented in treatment protocols with the preferential use of benzodiazepines and tricyclic antidepressants in anxiety in depressive disorders respectively. This approach was most useful in the definition of discrete diagnostic groups for early clinical studies of novel therapeutic treatments, however the increasing recognition that anxiety frequently coexists with depression has led to the emergence of alternative standpoints.

2. 2. 2. Unitary position.

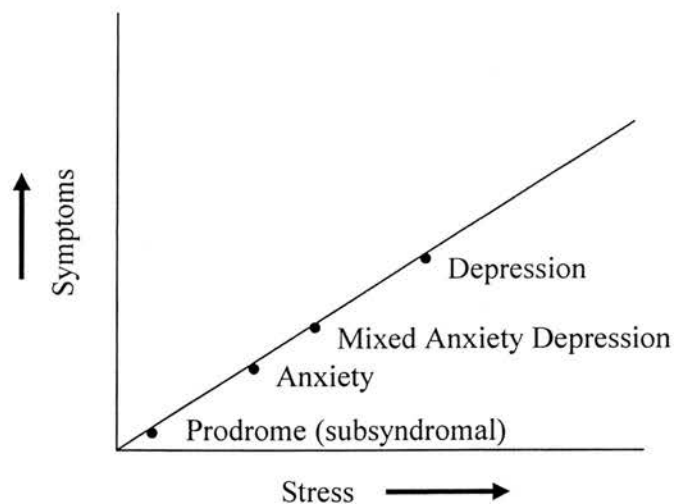
The main source of evidence in support of the conceptualisation of anxiety and depression as belonging to a single continuum of affective disorder derives from clinical studies showing overlap in their symptomatology (e.g. Katon & Roy-Byrne, 1991). These are conceived as symptomatic stages of a single affective disorder varying in severity with the ratio of anxiety and depressive symptoms changing over time so that the type of diagnosis will depend upon when, in the course of the illness, the clinical assessment is made.

This concept has received further support from studies that have concentrated on the possible aetiological factors and course of anxiety and depression. We have already seen that early studies (e.g. Roth et al., 1972) reported an earlier age of onset for anxiety compared with depression. Moreover, Schapira, Roth, Kerr & Gurney (1972) noted that longstanding anxiety states tended to acquire depressive characteristics over time, and that the average length of time between the onset of anxiety and the development of depressive symptoms was five years (Clancy, Noyes, Hoenk &

Slymen, 1979). In agreement with this evidence, Lesse (1982) proposed the axis stress→anxiety→depression in an attempt to explain the relationship between the two disorders, suggesting that high levels of stress can lead to the emergence of anxiety, which in turn can lead to the emergence of depression. Although the possibility that, in some situations, depression may be the primary response to stress was not ruled out, Lesse was unable to document a severe depressive state in the absence of previous symptoms of anxiety.

This proposal has been substantiated by more recent studies and constitutes the basis of some recent neurobiological theories of stress in the aetiology of anxiety and depression (e.g. Gulley & Nemeroff, 1993; Paul, 1988). In this case, genetically vulnerable individuals with a sub-syndromal prodrome may, under stress, decompensate and progress to symptoms of anxiety, then mixed anxiety depression and, finally, depression (see Figure 2. 2.).

Figure 2. 2. Progression from subsyndromal symptoms to depression.
(Source: Stahl, 1993.)



Additional support for the unitary approach derives from studies that report the lack of a specific response to drug treatment. That is, traditional antidepressants are effective anxiolytics and some anxiolytics produce antidepressant effects (e.g. Rickels & Schweizer, 1993; Sussman, 1993). Moreover, the high psychometric correlation between anxiety and depression rating scales (e.g. Bystritsky, Stoessel & Yager, 1993) has been cited as evidence in favour of this position.

Adherents of the unitary approach of anxiety and depression tend to oppose and dismiss the differential diagnostic considerations reviewed above, as of theoretical rather than clinical significance. Most of the studies that advocate a unitary view refer to the broader longitudinal sequence and overlap between the two disorders rather than focusing on specific cross-sectional differentiations. Thus, supporters of this position consider studies that concentrate on aetiology, course of illness and treatment of critical value when embracing this theoretical approach.

2. 2. 3. Mixed position.

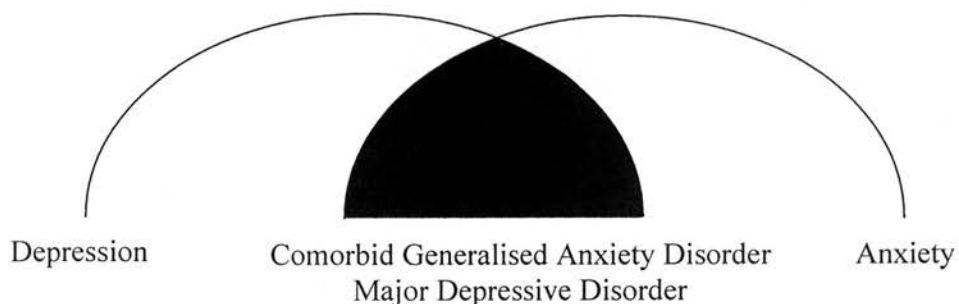
The two conceptual positions reviewed above represent opposing views of the relationship between anxiety and depression, seen as either two distinct disorders or as manifestations of a single disorder. Together with these contrasting positions there is a third intermediate standpoint that brings together evidence from both extremes of the debate in search of a more balanced stance, in good interactionist spirit! However, to dissipate any sense of moderation and compromise that an intermediate position may provoke, we will start by saying that this does not constitute a unitary

perspective and that the subdivisions within the mixed position reflect different theoretical approaches.

The first point of view refers to the concept of *comorbidity*. The term was first coined by Feinstein (1970) and was defined as “any distinct additional clinical entity that has existed or that may occur during the clinical course of a patient who has the index disease under study” (pp. 456-457). This applies only to diseases and disorders and not to symptoms. Thus, symptoms can be said to co-occur with a disorder, but they are not comorbid either with a disorder or with other symptoms.

Therefore, comorbid anxiety and depression in an individual indicates that the person meets diagnostic criteria for both an anxiety and depressive disorders (see Figure 2. 3.). This can be seen as a modern extension of the dichotomous position, in that it takes into account the possibility that the two disorders may coexist, but it retains its emphasis on the original categorical approach. Consequently although coexisting, the two disorders are seen as discrete entities.

Figure 2. 3. Comorbid representation of anxiety and depression. (Adapted from Stahl, 1993.)



In the case of an individual who meets criteria only for one of the disorders but who presents with symptoms from other categories but to the extent that they are

insufficient to diagnose a second disorder, only one diagnosis will be given. This is seen as the need to improve diagnostic precision by increasing the discriminant power of the diagnostic criteria.

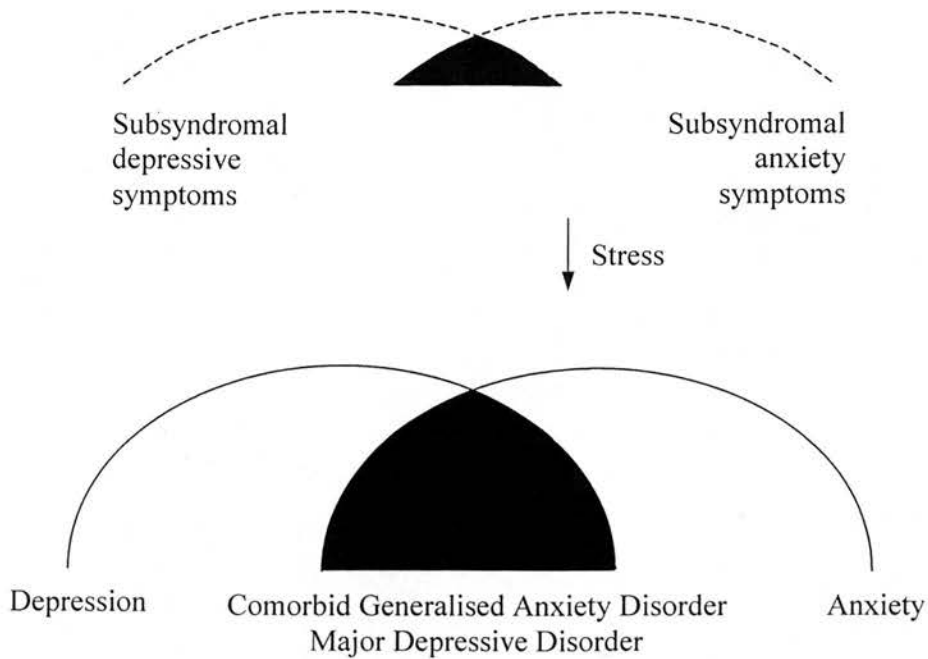
A second variation of the comorbid approach refers to the concept of *sub-threshold* (e.g. Stahl, 1993). This is an even more lenient version of the original dichotomous position, in that, the co-occurrence of anxiety symptoms in a major depressive episode (or vice versa) that are not severe enough to reach the “threshold” defined in the inclusion diagnostic criteria, is seen as of relevance and should therefore require attention. This will inevitably have important implications for both treatment and prognosis.

The greater flexibility shown by this second version seems to represent an attempt to overcome the obstacle erected by the strict application of the definition of comorbidity, that is the prohibitive use of the term to describe the co-occurrence of a disorder and symptoms from another diagnostic category.

Whereas the comorbid perspective recognises that anxiety can be an additional secondary state in patients with a depressive disorder (and vice versa), the *sub-syndromal* position proposes that some individuals may have chronic symptoms of anxiety and depression that are not severe enough to require a diagnosis of anxiety or affective disorder. However, if under stress, the person may decompensate and develop a mixed anxiety depressive disorder (see Figure 2. 4. below).

The sub-syndromal category represents here a vulnerability factor that would account for individuals with low levels of symptoms who might be at a higher lifetime risk for an anxiety, depressive or mixed anxiety depressive disorder.

Figure 2. 4. Sub-syndromal representation of anxiety and depression.
 (Adapted from Stahl, 1993.)



This seems to represent an evolution of the dimensional unitary position reviewed above. Most important, the original unitary view was based on a unidimensional model of anxiety and depression with anxiety at one end and depression at the opposite end of a continuum. This had central implications in terms of prediction of course of illness as a function of severity ranging from prodrome (sub-syndromal) to anxiety, to mixed anxiety depression, to depression. However, the sub-syndromal mixed position has added flexibility to its model, which has at least two dimensions, because an individual may develop either a “pure” anxious state, a “pure” depressive state or a mixed state without having to go through a predefined “disorder pathway” based on a severity diagnostic hierarchy (typical of categorical models) (e.g. Boulenger & Lavallée, 1993). This surmounts the double impasse of having a spurious model and the inability to account for the fact that when the two syndromes

coexist there is increased chronicity of the illness, reduced response to conventional therapies, a poorer outcome and prognosis (e.g. Angst, 1997; Emmanuel, Simmons & Tyrer, 1998; Fawcett, 1997; Lydiard, 1991). In other words, mixed anxiety depression seems to represent a disorder qualitatively and quantitatively different.

2. 3. Evidence for the mixed position.

There is a substantial amount of evidence in favour of the mixed point of view of anxiety and depression, be it comorbidity, sub-threshold or sub-syndromal. Some of it has already been reviewed above as in support of the unitary position; however, at this point it will be covered in more details below with a review of studies that have investigated the phenomenon more closely.

2. 3. 1. Epidemiological and longitudinal studies.

We have already seen in Chapter 1 that anxiety and depressive disorders constitute the most common mental disorders in the general population. Here we will review some specific epidemiological evidence that the two disorders often manifest concurrently.

Epidemiological investigations in psychiatric illness have produced substantial variation in their findings (e.g. Baldwin, 1998). This can plausibly be attributed to methodological differences, such as various sampling methods and diagnostic instruments, to different diagnostic criteria and lack of consensus on the definition of

overlap, and finally, but not least important, to differences in timeframe (cross-sectional vs. longitudinal), population studied (young adults vs. older adults), period in history, and culture.

A relatively recent study (The National Comorbidity Survey) conducted in 34 US states between 1990 and 1992 on a sample of over 8,000 respondents revealed a 12-month comorbidity of 51.2% and lifetime comorbidity of 58% between major depression and any anxiety disorders. Moreover, 62% of people with GAD developed a major depressive disorder in the same year (Kessler, Nelson, McGonagle, Liu, Swartz & Blazer, 1996). Further analyses of the National Comorbidity Survey and Midlife Development in the United States Survey also showed that the majority of respondents with GAD at 12 months (58.1% and 69.7% respectively) also met criteria for major depression (Kessler, DuPont, Berglund & Wittchen, 1999).

A previous US study (The National Institute of Mental Health, 1980 Epidemiologic Catchment Area Program) carried out in five sites on a sample of more than 20,000 community and institutionalised adults reported a six-month and lifetime prevalence of affective and anxiety disorders of 1.9 and 3.6% respectively (Regier, Burke & Burke, 1990).

The World Health Organisation (WHO) Study on Psychological Disorders in Primary Health Care conducted in 15 centres worldwide, distinguished between supra-threshold comorbidity (4.6%) accounting for about 42% of the current cases of anxiety and depression, and sub-threshold [term here and below used to indicate sub-syndromal overlap, as reported above] comorbidity (1.3%) accounting for about 18%

of the current sub-threshold cases of anxiety and depression (Sartorius, Üstün, Lecrubier & Wittchen, 1996).

Another study that differentiated between supra and sub-threshold co-occurrence of anxiety and depression is the Munich Follow-Up Study carried out over 7 years, between 1974 and 1981 (Wittchen & Essau, 1993). Here the prevalence of lifetime comorbidity varied between 67.8% in a clinical sample of 218 patients and 44.4% in the general population (N = 1366) for supra-threshold disorders, and only 0.8% for sub-threshold comorbidity. However, Stein, Kirk, Prabhu, Grott & Terepa (1995) reported more comparable rates of supra (19.2%) and sub-threshold (12.8%) mixed anxiety depression in a primary care sample of 796 attendees.

The Stirling County Study carried out in Canada shows very high rates of overlap between anxiety and depression in 1952 (72%) and in 1970 (75%) in samples of just over 1,000 people in both years of study (Murphy, 1990).

In Europe, the Zurich Cohort Study of young adults reported a mean 6.8% cross-sectional and 15.4% longitudinal association between anxiety and depression after a 7 year follow up from 1979 to 1986. Besides, over the same period, of those who had received a diagnosis of anxiety disorder in 1979, 36% were diagnosed as having mixed anxiety depression, 13% depression, and 10% anxiety only, at follow up. In contrast, of those who had originally received a diagnosis of depression, 19% developed a mixed disorder, 14% anxiety only, and 28% remained depressed. Taken together, these data show a large overlap between the two disorders as well as the relative stability of a diagnosis of depression compared to anxiety (Angst, Vollrath, Merikangas & Ernst, 1990).

A similar pattern comes from a Swedish study (The Lundby 25-Year Prospective Study) carried out between 1947 and 1972. Approximately 25% of the individuals with anxiety, plus other unspecified psychiatric symptoms, developed depression; whereas, among those with depression plus other unspecified psychiatric symptoms only 7% switched to anxiety (Hagnell & Gräsbeck, 1990).

In conclusion, there seems to be strong evidence of both *within-episode* and *across-episode* overlap between anxiety and depression. Additionally, longitudinal epidemiological studies show that over time the direction of the relationship between the two disorders is more likely to be of anxiety moving towards depression than the reverse.

2. 3. 2. Family, genetic, and biological studies.

Some evidence from family and genetic studies was reported in Chapter 1 regarding the inheritability of anxiety and depression and the higher risk of developing the same disorder in first-degree relatives of probands. Here we will review further evidence that indicates familial transmission of anxiety and depression and that the two disorders may be manifestations of the same underlying aetiological factor.

Early family studies of depression and panic disorders show an increased risk of depression among relatives of probands with depression and a similar increase in risk of developing a panic disorder among relatives of probands with panic disorder (e.g. Crowe, Noyes, Pauls & Slymen, 1983; Van Valkenburg, Akiskal, Puzantian & Rosenthal, 1984). Maier, Buller and Hallmayer (1988) argued that although there seems to be specificity in the familial transmission of depressive and panic disorders,

the increased prevalence of panic disorder in relatives of probands with depression only and, vice versa, the increased risk of depression in relatives of probands with panic disorder, suggests that there is some shared aetiological factor between the two.

Results from a twin study (Torgersen, 1990) investigating the relationship among depression only, anxiety only and mixed anxiety depression in a sample of 177 twin pairs suggest that depression and mixed anxiety depression share the same aetiology, whereas, "pure" anxiety shows no relationship with either of the other two disorders. Furthermore, mixed anxiety depression seemed more strongly influenced by genetic factors than was depression.

This last notion was supported in a study that examined differences in familial environmental factors, such as parental rearing style and bonding, among patients with depression only, anxiety only, and mixed anxiety depression. Results showed that low scores in parental care was the best discriminating variable between the mixed group and the other two groups of patients, supporting the view that mixed anxiety depression may have a different aetiology (Alnæs & Torgersen, 1990).

However, a larger study (N = 1033) of female twin pairs carried out in Virginia, US (Kendler, 1996; Kendler, Neale, Kessler, Heath & Eaves, 1992) shows that the same genetic factors influence the liability to major depression and GAD in women. On the other hand, environmental risk factors that predispose to GAD or depression may be relatively distinct.

Also family and genetic studies of children show that offspring of anxious or depressed parents are at high risk of developing a depressive, an anxious or both

disorders, and also that adult relatives of children with anxiety or depression have high rates of the two disorders (e.g. Weissman, 1990).

Neurobiological studies have identified a number of biological markers that may be responsible for the overlap of anxiety and depressive disorders.

One possible candidate in producing many of the symptoms of anxiety and depression is hyperactivity of the hypothalamic-pituitary-adrenocortical axis (HPA). As mentioned in Chapter 1, there is evidence of dysregulation of this hormone system in depression; yet, the HPA seems to be involved in a similar fashion in anxiety.

In response to stress, the hypothalamus secretes corticotropin releasing factor (CRF) that stimulates the anterior pituitary gland to release adrenocorticotrophic hormone (ACTH), which travels to the adrenal cortex where it releases cortisol and other corticosteroid hormones, which elevate blood sugar and increase the metabolic rate throughout the body. In addition, CRF increases the firing rates of noradrenergic neurons located in the locus ceruleus, also involved in the stress response and associated with anxiety.

It is proposed that CRF is involved in the production of many signs and symptoms of both anxiety and depression, such as disturbed sleep, alterations in locomotor activity, agitation, decreased food consumption and sexual behaviour (Butler & Nemeroff, 1990; Gulley & Nemeroff, 1993).

Other candidates include dopamine (DA), noradrenaline (NA), and serotonin (5-HT). Since anxiety is associated with high levels of NA and 5-HT, whereas depression is associated with low levels of DA, NA and 5-HT, it has been suggested that depletion of these neurotransmitters as a result of anxiety may explain the emergence of

depression in anxious patients (e.g. Goldberg & Huxley, 1992). Among these neurotransmitters, the role of 5-HT has been particularly advocated as a common neurochemical link between anxiety and depression.

Serotonin would appear to be implicated in the individual's adaptive responses to aversive life events. 5-HT₂ receptors mediate *acute* adaptive responses (e.g. anxiety and avoidance of aversive stimuli), whereas 5-HT_{1A} receptors are thought to be involved in *long-term* adaptation to chronic stress and are therefore related to resilience. If this resilience system breaks down the development of a depressive state will be the likely result (e.g. Deakin, 1998; Stahl, 1997). Related is the use serotonin selective reuptake inhibitors (SSRIs) as pharmacological management of patients with mixed anxiety depression (e.g. Nutt, 1997; Zajecka & Ross, 1995).

In summary, despite the methodological inconsistencies in the studies review above, there seems to be a considerable amount of evidence from family, genetic and neurobiological studies that common aetiological factors as well as biological correlates (see also the BIS/BAS approach described in Chapter 1, Section 1. 4. 2.) may be involved in both anxiety and depression.

2. 4. Classification issues.

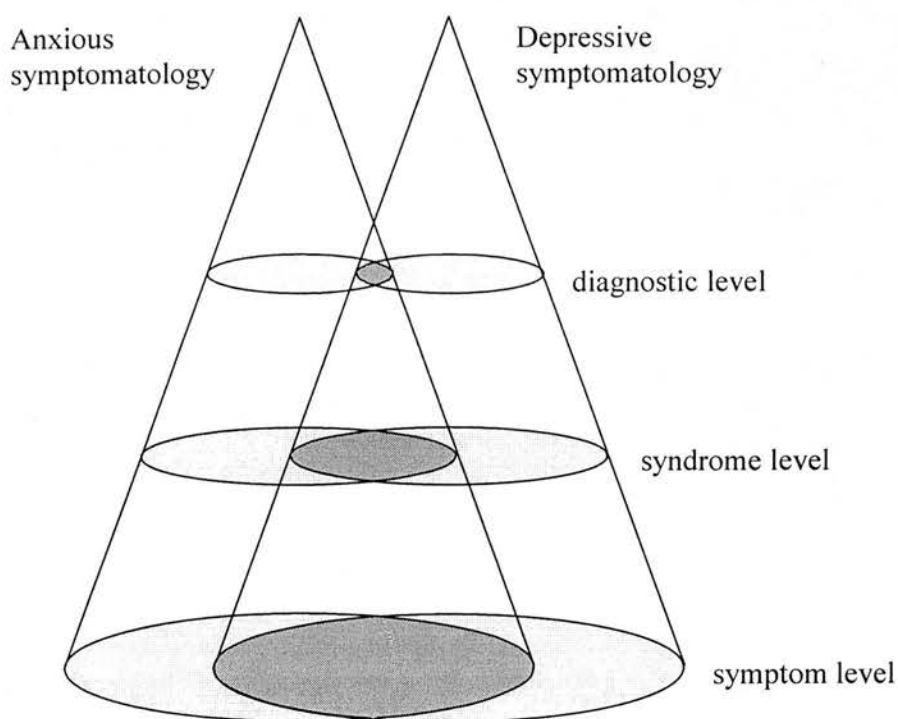
Although the co-occurrence of anxiety and depression is a phenomenon widely accepted, there is no clear agreement about the extent to which they are interrelated. The proportions of overlap range considerably from about 1% for sub-threshold comorbidity reported by Wittchen and Essau (1993) in the Munich Follow-Up Study,

to approximately 75% in the Stirling County Study (Murphy, 1990). As a consequence, contrasting parties have interpreted these variations as supportive of the unitary or the dichotomous position.

These discrepancies seem to be due mainly to differences in sample selection, methodology used in the assessment of anxiety and depression, and to the criteria and level of psychopathology considered.

Of this view are Hiller, Zaudig and Bose (1989) who suggested that these apparent inconsistencies could be explained by looking at the phenomenon at different levels: symptomatological, syndromic, and diagnostic (see Figure 2. 5.).

Figure 2. 5. A model of overlap between anxiety and depression. (Source: Hiller et al., 1989.)



By screening a sample of 420 adult outpatients in Munich and by examining the data according to the three different levels, the authors demonstrated that the proportion of outpatients included in the mixed anxiety depression group (i.e. the rate of overlap) varied consistently. Specifically, the overlap rates were 28.5% at the diagnostic level, but went up to almost double (52%) at the symptomatological level, whereas intermediate rates were obtained when syndromes were taken into consideration.

Katon and Roy-Byrne (1991) also argued that minor forms of anxiety and depression, more common in primary care settings, may show greater overlap in symptom profiles and, as such, may be more difficult to distinguish compared to more severe forms of the disorders which include more distinct symptomatology.

These data have important implications for the classification of psychiatric disorders and have proved to be a major challenge for the present diagnostic classification systems. There are at least three ways in which “the problem of comorbidity” has been addressed within the neo-Kraepelinian paradigm currently in force.

The first one is the introduction of a *multiaxial system*. The DSM-IV-TR (American Psychiatric Association, 2000) contains five different axes: Axis I (Clinical Syndromes), Axis II (Mental Retardation and Personality Disorders), Axis III (General Medical Conditions), Axis IV (Psychosocial and Environmental Problems), and Axis V (Global Assessment of Functioning Scale). The first three axes are nosological and the last two are dimensional. DSM-IV-TR acknowledges the phenomenon of comorbidity and encourages the clinician to use all of the axes. However, comorbidity often occurs within the same axis.

Another way of addressing the phenomenon has been the use of the distinction between *primary* and *secondary* (e.g. see Klerman, 1990). This implies a causal inference between two distinct disorders (i.e. “due to”), and it is often used to indicate an organic cause of the disorder, which is considered aetiological and therefore higher (i.e. primary) in the *hierarchy*. However, many researchers and clinicians alike see the use of a hierarchy with strict exclusion criteria and causative implications about the relationship among disorders as largely arbitrary. Moreover, the primary-secondary distinction is often used to indicate a chronological sequence of two disorders or a symptomatic predominance of one disorder over another.

A third approach makes use of the genetic concept of *spectrum disorder*, first used by Kety, Rosenthal, Wender and Schulsinger (1968) in the Danish adoption studies. Here the classic distinction between genotype and phenotype is extended so that for example, a genotype that is considered to be a genetic predisposition to anxiety, can manifest itself in a number of different ways: panic disorder, GAD, phobias and so on and cause comorbidity within a single class of disorders. Alternatively, personality disorders, such as avoidant or dependent may be chronic variations of anxiety or depression respectively. However, in this sense the term “spectrum” could be used to refer to “dimension”.

More problems with the current classification systems derive by the continuous emerging of new sub-categories within each disorder. For example, as we have seen in Chapter 1 there are 11 different types of anxiety disorders. Generally, the more slices you cut in a diagnostic cake the higher the comorbidity rates will be. What is more, the higher the number of similar or identical items shared by inclusion criteria belonging to different typologies, the higher the overlap.

Finally, the threshold or cut-off point used to determine whether or not an individual meets inclusion criteria for a certain disorder will largely influence the degree of comorbidity among disorders. Given that such thresholds are arbitrary to a large extent, it may be more beneficial to measure anxiety and depressive disorders on dimensions to better allow the analysis of the critical factor of severity of the disorders.

On the other hand, the use of diagnostic taxonomies has some undisputed advantages, in that, it facilitates both clinical practice and understanding, and assists research by having a standard set of diagnostic criteria. Besides, the dimensional and categorical approaches are not necessarily incompatible since categories could be defined as the convergence of several dimensions, with some dimensions being more central and defining features of a category and making up a particular profile (e.g. Barlow, 1988).

2. 4. 1. The diagnostic category of mixed anxiety depressive disorder.

Of the three mixed conceptual models of anxiety and depression presented above, so far the one that has found expression in the current classification systems is the sub-syndromal position. This is a diagnostic category reserved for those patients who suffer from a non-specific pattern of anxious and depressive symptoms that are not severe enough (i.e. do not reach the threshold levels) to justify a diagnosis of an anxiety or depressive disorder. It is therefore a “sub-threshold” category that acknowledges the unitary nature of anxiety and depression but only when they present themselves in milder forms, that is at the symptomatological and syndromic

levels (cf. Hiller et al., 1988). From now on we shall refer to this category as *sub-threshold* as opposed to sub-syndrome, in order to be consistent with the current literature on the topic and avoid confusion.

This new category, Mixed Anxiety-Depressive Disorder (MAD), was first introduced in the most recent version of the International Classification of Diseases (ICD-10; World Health Organization, 1990; 1993). Although the ICD-10 does not give clear-cut research criteria for this new category (labelled F41.2), the manual defines MAD as a mixture of anxiety and depressive symptoms of equal importance, with at least some autonomic symptoms, that are mainly related to cases seen in primary-care settings.

This has consequently prompted the DSM-IV (American Psychiatric Association, 1994) task force to investigate the phenomenon more closely and identify operational criteria that could be used to categorise sub-threshold MAD (Zinbarg, Barlow, Liebowitz, Street, Broadhead, Katon, Roy-Byrne, Lepine, Teherani, Richards, Brantley & Kraemer, 1994).

A total of 666 patients from 5 primary-care medical centres and 2 outpatient mental health centres were screened and administered a semi-structured psychiatric interview assessing DSM-III-R (American Psychiatric Association, 1987) diagnostic criteria. Results revealed that 80% of the cases “not otherwise specified” were judged to meet definite levels of impairment and distress. Of these sub-threshold outpatients, 14% had previously fulfilled diagnostic criteria for major depression, and 84% reported that their problems with anxiety and depression had begun more than 6 months prior to the time of interview. The modal presentation among these patients was a non-specific pattern of anxious and depressed symptoms. Principal component

analyses of items and scales used for the psychiatric assessment led to the identification of four main symptomatic criteria: negative affect, anxiety, depression, and physiological arousal. Sub-threshold patients could also be significantly differentiated from patients with major depression, GAD and panic disorder for having lower levels of depression, anxiety and physiological arousal respectively. Moreover, of the four symptomatic criteria identified, negative affect was the one that yielded higher scores. This dimension is very similar to that of general distress and, being common to both anxious and depressed syndromes, it is thought to be a manifestation of chronic personality traits related to neuroticism (e.g. Clark, Watson & Mineka, 1994).

Consequently, the negative affect symptom list was used to define the operational criteria for MAD. By using these criteria and excluding all participants with a history of Axis I disorder, 54% of the sub-threshold patients received a final diagnosis of MAD. The DSM-IV task force admitted that many of these cases could be included in the current nomenclature by lowering the definitional thresholds for either GAD or major depression, or by creating a new mixed anxiety depression category. However, although symptomatic discriminant validity was demonstrated, it was concluded that there was not enough evidence regarding its predictive validity (e.g. associated features, familial pattern, longitudinal and treatment studies) to warrant its inclusion as an official Axis I diagnosis in the DSM-IV. Moreover, since the MAD patients could not be differentiated from sub-threshold patients with a previous history of psychiatric disorders, it was not clear whether the MAD symptom profile could be better thought of as a distinct diagnosis or a mild form or prodromal phase of GAD or major depression. The final recommendation was therefore to include the MAD

category in the appendix of the DSM-IV reserved for proposed diagnostic categories that need further research study. This is also included in the latest version (DSM-IV-TR) with the following research criteria (see Table 2. 1. below):

Table 2. 1. Research criteria for Mixed Anxiety Depressive Disorder.

- A. Persistent or recurrent dysphoric mood lasting at least 1 month.
- B. The dysphoric mood is accompanied by at least 1 month of four (or more) of the following symptoms:
 - (1) difficulty concentrating or mind going blank
 - (2) sleep disturbance (difficulty falling or staying asleep, or restless, unsatisfying sleep)
 - (3) fatigue or low energy
 - (4) irritability
 - (5) worry
 - (6) being easily moved to tears
 - (7) hypervigilance
 - (8) anticipating the worst
 - (9) hopelessness (pervasive pessimism about the future)
 - (10) low self-esteem or feelings of worthlessness
- C. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- D. The symptoms are not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition.
- E. All of the following:
 - (1) criteria have never been met for Major Depressive Disorder, Dysthymic Disorder, Panic Disorder, or Generalized Anxiety Disorder
 - (2) criteria are not currently met for any other Anxiety or Mood Disorder (including an Anxiety or Mood Disorder, In Partial Remission)
 - (3) the symptoms are not better accounted for by any other mental disorder.

Even if somehow overcoming the concept of comorbidity, the sub-threshold approach does not take into account all the cases often encountered in clinical practice in which the two disorders coexist above threshold (i.e. patients who meet the diagnostic criteria for both an anxiety and a depressive disorder). For such patients the DSM-IV-TR currently maintains its original comorbid position and appeals to the primary-secondary distinction and diagnostic hierarchies with exclusionary rules as seen above.

Since one of the aims of this thesis is the attempt to provide evidence of discriminant group validity among anxious, depressed, and mixed anxious depressed groups of outpatients, it has been decided to include both sub and supra-threshold cases of mixed anxiety depression in the mixed group. That is to say, people who meet either the above DSM-IV-TR research criteria for sub-threshold MAD or individuals who meet full criteria for both an anxiety and a depressive disorder as described in Chapter 1. Furthermore, given the high probability of overlap between anxiety and depression, and given the purpose of distinguishing as far as possible the mixed group from the other two clinical groups (anxious only and depressed only) it has been decided to apply some additional inclusion research criteria for the “pure” anxious and depressed groups:

- Include in the depressed group outpatients who meet diagnostic criteria for a depressive disorder (see Chapter 1) and who present with sub-threshold anxiety (or with secondary anxiety, meaning symptomatic non-predominance).

- Include in the anxious group outpatients who meet diagnostic criteria for an anxiety disorder (see Chapter 1) and who present with sub-threshold depression (or with secondary depression, meaning symptomatic non-predominance).

These steps will allow us to identify a mixed group (sub or supra-threshold) with anxiety and depressive disturbance of comparable intensity; a depressed group with high depressive disturbance and “relatively low” anxiety levels; and an anxious group with high anxiety disturbance and “relatively low” depression levels.

At this point, it is essential to stress two important aspects. The first one is that the term “relatively low” is here used to indicate the point along the anxiety and depression dimensions that conforms to sub-threshold levels as defined by the DSM-IV-TR criteria. The second point is that sub-threshold levels of anxiety and depression found in a clinical population are likely to be significantly higher than the ones found in the general population, so that our anxious and depressed groups will probably still show some (hopefully) minor effect due to the presence of “secondary” depression and anxiety respectively.

2. 5. Important features of anxiety-depression overlap.

In recent years, three important features of the overlap between anxiety and depression have been identified that merit particular theoretical attention and empirical investigation (Alloy et al., 1990; Mineka et al., 1998).

These phenomena are: (a) the temporal relationship between anxiety and depression; (b) the differential co-occurrence of depression with various anxiety disorders; and (c) the relative infrequency of “pure” depression compared with “pure” anxiety.

This will now be considered in turn.

2. 5. 1. Temporal relationship between anxiety and depression.

The temporal relationship between anxiety and depression has been examined both across and within episodes. Longitudinal studies of lifetime comorbidity reviewed above have observed the stability of anxiety and depressive diagnoses over time and have revealed that mood disorders are more likely to follow an anxiety disorder than vice versa.

Kandell (1974) found that only 2% of individuals who had first received a diagnosis of depression were five years later re-diagnosed with an anxiety disorder. In contrast, about 24% of those individuals first diagnosed with an anxiety disorder were later re-diagnosed with a depressive disorder.

Results pointing in the same direction have also been reported by later studies. For example, Angst et al. (1990) report that about 33% of depressed cases went on to develop anxiety or mixed anxiety depression seven years later; whereas, 49% of anxiety cases developed depression or mixed anxiety depression. Similarly, in the Lundby study (Hagnell & Gräsbeck, 1990) only 7% of the individuals with depression developed anxiety, while 25% of anxiety cases switched to depression.

The elevated risk of depression in those with a temporally primary anxiety disorder is also reported in the NCS data (Kessler et al., 1996) where 62% of people with GAD developed major depression in the same year.

Likewise, within a single episode of illness symptoms of anxiety are more likely to precede symptoms of depression. Initial observations of this phenomenon have been reported in human and non-human primates' responses to separation and loss of an attachment figure (e.g. Mineka & Suomi, 1978). More recently, Bowlby (1980) described a biphasic response in young human children of protest followed by despair as a consequence of prolonged physical separation from their mothers or as a response to loss through death of an attachment figure. According to Bowlby, the protest response is a prototype for anxiety, and the despair response is a prototype for depression in adults. Noteworthy is the fact that when both a protest and a despair response are experienced, the protest (anxiety) always precedes the despair (depression). Experimental literature on uncontrollable aversive stimuli (e.g. Seligman, 1975) also suggests that depressive symptoms are more likely to follow anxiety, than vice versa.

Thus, the probability of experiencing anxiety followed by depression, both within a single episode and across episodes, seems to be much higher than the reverse.

2. 5. 2. Differential co-occurrence of depression with anxiety disorders.

A second feature of overlap is the differential co-occurrence of major depression with various anxiety disorders. Evidence for this phenomenon derives from clinical, family and epidemiological studies.

Alloy et al.'s (1990) review suggested that people who received a diagnosis of GAD, social phobia or simple phobia, were less likely to experience depression than individuals diagnosed with panic disorder, obsessive-compulsive disorder (OCD), agoraphobia and posttraumatic stress disorder (PTSD).

The more recent NCS data (Kessler et al., 1996) largely confirmed these conclusions, however, a particularly strong association of GAD with major depression was reported, so that of all the anxiety disorders, GAD was the most likely to co-occur with depression. In 1992, Brown and Barlow found that agoraphobia and OCD were more likely to overlap with depression, while simple phobia was the least likely and GAD and social phobia were midway between the two. The NIMH-ECA project (Regier et al., 1990) reported that depressed individuals were twice as likely to suffer from panic disorder (18%) compared to simple phobia (9%). Lepine, Wittchen and Essau (1993) also found a strong association of panic disorder and agoraphobia with major depression, but only weaker association between social phobia and major depression.

Finally, genetic analyses also help clarify this issue. A study looking at the genetic architecture of depressive and anxiety disorders identified two main genetic factors (Kendler, Walters, Neale, Kessler, Heath & Eaves, 1995). The first one was defined by major depression and GAD (with loadings of .64 and .47 respectively) and more moderately by panic disorder (.35). The second factor was defined by panic disorder (.58) and phobias (.57).

In summary, although results from various studies are not always consistent, it would appear that GAD, panic disorder with agoraphobia, OCD and PTSD are more

strongly associated with major depression, whereas social phobia and simple phobia in particular are less likely to overlap with depression.

2. 5. 3. Infrequency of “pure” depression.

Studies of anxiety and depression that have investigated episodes of illness cross-sectionally have often found that it is much more difficult to identify cases of “pure” depression than it is to find cases of “pure” anxiety (e.g. Dobson, 1985).

This phenomenon appears to exist both at symptomatic and at diagnostic levels. At a symptomatic level, people with major depression score consistently as high as or higher on self-report scales assessing levels of clinical anxiety (e.g. Di Nardo & Barlow, 1990). At a diagnostic level, it also occurs that the probability of an individual with a depressive disorder meeting diagnostic criteria for an anxiety disorder is greater than the reverse. This has generally been found in epidemiological studies, such as the ECA (Regier et al., 1990) where about 25% of individuals with an anxiety disorder also received a diagnosis of depression, against 43% of depressed people who also received a diagnosis of anxiety disorder. Kessler et al. (1996) confirmed this finding in the NCS data analyses with 58% of depressed individuals having a concomitant anxiety disorder. Thus, in many cases, anxiety seems to precede and to develop into depression, whilst depression usually follows an anxiety state and is more stable over time.

2. 6. Theoretical models of mixed anxiety depression.

As we have seen above, the debate between the dichotomous and unitary models of anxiety and depression has gradually dwindled and given way to more refined ways of conceptualising the relationship between the two disorders.

A range of “mixed” views has emerged. At one end of the spectrum, the “diagnostic confusion” of anxiety and depression due to the categorical overlap occurring above, below, or both above and below thresholds at the same time, has been resolved by appealing to the concepts of comorbidity, primary-secondary distinction and hierarchical exclusionary rules. At the other end, a more unitary and dimensional view has conceptualised mixed anxiety depression as a disorder that is both qualitatively and quantitatively different from either “pure” anxiety or “pure” depression, and that can vary in severity along a continuum so as to occur above or below any preset threshold.

Given the strong emphasis placed by the medical taxonomic model on the need to search for discrete boundaries among diagnostic categories, it is perhaps not surprising that the theoretical models that have developed to account for the co-occurrence of anxiety and depression adopt a dimensional perspective.

One such model, reviewed below, represents an extension of the hopelessness theory of depression (Abramson et al., 1989) reviewed in Chapter 1 to the *helplessness-hopelessness theory* of anxiety and depression (Alloy et al., 1990), which is able to account for many of the features of anxiety-depression overlap.

Other models have instead made use of a range of multivariate statistical techniques in an attempt to identify common and unique factors of anxiety and depression at a

phenotypic level. The results of these analyses have provided the basis for promising structural models of anxiety and depression, and two of the most influential ones, Goldberg's (1994; 1996; Goldberg & Huxley, 1992) *biosocial model*, and Clark and Watson's (1991) *tripartite model*, will also be reviewed below.

2. 6. 1. Helplessness-hopelessness theory.

The first theoretical account of mixed anxiety depression to be considered is the helplessness-hopelessness model (Alloy et al., 1990). This model integrates the hopelessness theory of depression (Abramson et al., 1989), with findings from research indicating the central causal role played by perceived uncontrollability in the development of anxiety (e.g. Barlow, 1988; Mineka & Kelly, 1989). Once a negative life event is perceived as likely to happen, an individual will determine to what degree the event is within his/her control (i.e. control style). Then, once the negative event has occurred, the person will also judge to what extent the cause of the event is internal, stable and global (i.e. depressogenic attributional style). Within a diathesis-stress framework, Alloy et al. (1990) proposed that both control style and depressogenic attributional style in a particular content domain (e.g. work or career) provide the individual with specific vulnerability to hopelessness depression when the individual has to deal with negative life events within the same domain (e.g. job loss). Both styles are therefore deemed to be distal contributory causes that operate early in the etiologic sequence to hopelessness depression.

According to this model, the interrelation of three cognitive components of helplessness and hopelessness will determine the relationship between anxiety and

depression. These components are: helplessness expectancy, negative outcome expectancy, and certainty of these expectancies. In particular, a person who expects to be helpless in trying to control important future outcomes, but who is unsure about his/her helplessness, will experience “pure” anxiety. This is due to the fact that the individual believes that future control may be possible, so he/she engages in activities (e.g. intense scanning of the environment, worry) that are aimed towards attempts to gain control, but that result in high arousal and a strong autonomic reaction. In contrast, an individual who is certain about their helplessness, but who is still uncertain about whether a negative outcome will occur (or a positive outcome will not occur), will experience mixed anxiety depression. The person will give up his/her idea of control and as a result this state will be characterised by a more passive behaviour accompanied by worry about future events. Finally, individuals who are certain about their uncontrollability of important future events and are also certain that negative events will occur (and positive events will not) will experience hopelessness depression. In this last case, helplessness becomes hopelessness and anxiety gives way to a depressive state characterised by loss of interest, despair and suicidality. Hence, hopelessness is seen as a proximal (i.e. that operates relatively late in the causal pathway to the disorder) sufficient, but not necessary, cause of depression.

Therefore, this theory views anxiety and depression as sharing the expectation of uncontrollability (i.e. helplessness) but differing in that only depression is characterised by the expectation that negative outcomes will occur (i.e. hopelessness) due to the attribution that causes of negative events are internal, stable and global (see Table 2. 2. below).

Table 2. 2. Relationship between cognitive expectancies and symptom patterns proposed by the helplessness-hopelessness theory.

	Symptom Pattern		
	Pure Anxiety	Mixed Anxiety Depression	Hopelessness Depression
Expectancy			
Helplessness	Uncertain	Certain	Certain
Negative Outcome	None	Uncertain	Certain

This theory is able to account for the three features of comorbidity reviewed above in the following way. The sequential relationship between anxiety and depression is explained by the progression from helplessness to hopelessness. The certainty of negative outcome expectancy for a particular life event is likely to follow expectancy of helplessness (certain or uncertain), that is, hopelessness depression is more likely to occur after all the person's efforts to gain control have failed, than the reverse. The across-episode sequence is thought to occur because prior experience of anxiety and helplessness may render an individual more vulnerable to future stressors and to certain helplessness and hopelessness. Consistent with this view are findings that anxiety is often preceded by threat or danger events, depression is often preceded by a major loss event, and mixed anxiety depression is often associated with both types of events (Brown, Harris & Eales, 1993; Finlay-Jones & Brown, 1981).

The higher frequency of "pure" anxiety compared to "pure" depression is accounted for by the observation that helplessness, which causes anxiety, can occur without hopelessness. In contrast, hopelessness cannot occur without helplessness, in that the former is seen as a subset of the latter. As a result, individuals who are hopeless

perceive themselves as being also helpless, whereas the opposite may not necessarily be the case.

Finally, the differential overlap of various anxiety disorders with depression is explained by the fact that some anxiety disorders, such as panic disorder, agoraphobia, OCD, and PTSD are characterised by a more pervasive and chronic sense of helplessness compared to more circumscribed disorders, such as social and specific phobias. The more pervasive nature of some anxiety symptoms and the consequent helplessness experienced by the individual are more likely over time to lead to depression. However, Alloy et al. (1990) are unable to explain the high rates of co-occurrence between GAD and major depression (Kessler et al., 1996).

Recent empirical support exists for those parts of the theory that relate to the cognitive vulnerability to depression. For example, Gibb, Alloy, Abramson, Rose, Whitehouse, Donovan, Hogan, Cronholm and Tierney (2001) found that college students at high cognitive risk for depression, based on the presence of negative cognitive styles, reported childhood emotional, but less childhood physical maltreatment than did low-risk participants. In addition, levels of maltreatment were related to levels of hopelessness and depression. More evidence from the Temple-Wisconsin Cognitive Vulnerability to Depression (CVD) Project, confirmed the cognitive vulnerability hypothesis, in that, high-risk participants had higher lifetime prevalence of major and hopelessness depression and were more vulnerable to clinically significant depressive disorders and suicidality compared to low-risk participants (e.g. Abramson, Alloy, Hogan, Whitehouse, Donovan, Rose, Panzarella & Ranieri, 1999; Alloy, Abramson, Hogan, Whitehouse, Rose, Robinson, Kim &

Lapkin, 2000; Alloy, Abramson, Whitehouse, Hogan, Tashman, Steinberg, Rose & Donovan, 1999).

However, other important assumptions posited by the extended helplessness-hopelessness theory, have not been verified empirically. For example, the model does not predict any negative outcome expectancy (certain or uncertain) in anxiety, whilst predicting certain negative outcome expectancy in depression. Conversely, research in prospective cognitions shows that anxious individuals typically report an increased anticipation of negative events, whereas depression is associated with a decreased expectancy for positive events but an equal anticipation of negative life events compared to controls (see MacLeod, 1999 for a review). Other recent studies have also failed to find the predicted association between anxiety and helpless causal attributions (Swendsen, 1997; Waikar & Craske, 1997). Likewise, its key predictions about the sequential relationship of anxiety and depression still need to be demonstrated. Nonetheless, the helplessness-hopelessness model of anxiety and depression offers a good theoretical framework and some of its aspects will be addressed experimentally in this thesis.

2. 6. 2. Goldberg's biosocial model.

Goldberg (1994; 1996; Goldberg & Huxley, 1992) has formulated an integrative model of common mental disorders – anxiety and depression in particular – that articulates biological variables (e.g. genetic vulnerability, neurotransmitters) and social variables (e.g. social environment, life events) within a dimensional perspective.

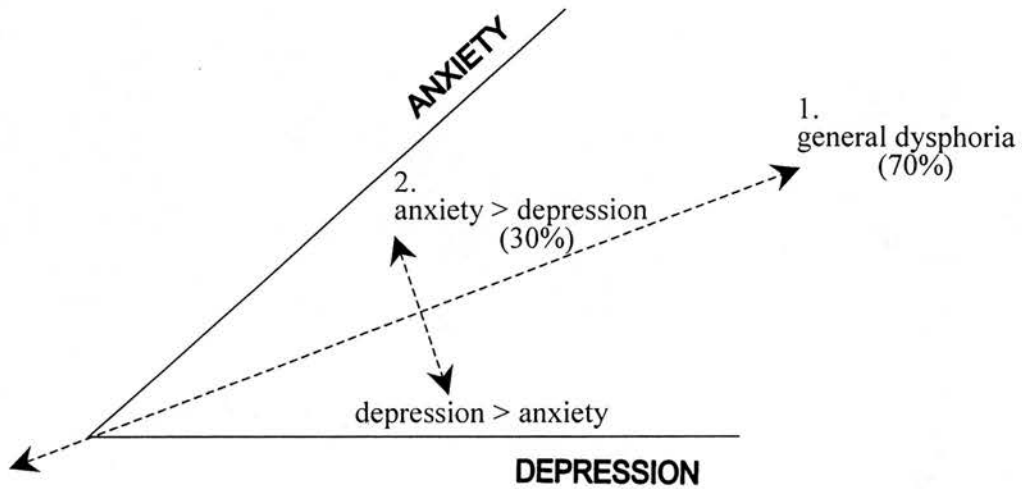
In 1987, Goldberg, Bridges, Duncan-Jones and Grayson used latent trait analysis to examine the relationship between psychiatric symptoms that constitute common psychiatric disorders encountered in primary care. Latent trait analysis is a form of dichotomous factor analysis suitable for variables, such as symptoms and diagnoses, that are not normally distributed in the population, and which are either present or absent (Duncan-Jones, Grayson & Moran, 1986). A latent trait model gives a mathematical picture of the relationship between a set of symptoms and the underlying latent illness (e.g. anxiety or depression), which is assumed to be normally distributed in the general population with a mean of 0 and a standard deviation of 1. In particular, the analysis provides two measures about each symptom: the *threshold* and the *slope*. The threshold is a measure of *severity* of a symptom and it represents the point on the underlying illness dimension where 50% of the population will possess that particular symptom. The slope, on the other hand, is a measure of the *discriminatory power* of a symptom, that is, how good a symptom is a measure of the underlying dimension. These analyses were carried out on a final sample of 283 patients from 15 general practices in the Greater Manchester area, UK, who presented with their first psychiatric illness. Assessments were carried out using the Psychiatric Assessment Schedule (PAS), which consists of the short (40-item) version of the Present State Examination, and 19 additional DSM-III (American Psychiatric Association, 1980) symptoms (Surtees, Dean, Ingham, Kreitman, Miller & Sashidharan, 1983). Results indicated that two dimensions rather than a one-dimensional solution provided the best fit for the data, but also that an additional third dimension offered no further advantage (see Table 2. 3. below).

Table 2. 3. Latent trait analysis for anxiety and depression.

	<i>Threshold (Severity)</i>	<i>Slope (Discriminatory power)</i>
<i>Latent trait: anxiety</i>		
Subjective nervous tension	0.36	4.47
Worrying	0.38	6.06
Irritability	0.50	2.13
Muscular tension	0.75	1.71
Poor sleep	0.76	1.65
Tension pains	0.85	1.71
Free-floating anxiety	1.01	1.54
Health worries	1.24	1.09
Delayed sleep	1.24	1.34
Observed anxiety	1.88	0.98
<i>Latent trait: depression</i>		
Anergia	1.09	1.18
Loss of interest	1.23	2.65
Loss of libido	1.29	1.15
Observed depression	1.32	1.96
Self-depreciation	1.42	1.34
Low self-confidence	1.60	1.68
Loss of appetite	1.67	1.07
Hopelessness	1.74	1.50
Subjective inefficient thinking	1.92	1.06
Social withdrawal	1.93	1.05
Weight loss due to poor appetite	2.43	0.76
Early waking	2.48	0.88
Slow, underactive	3.18	0.90
Diurnal variation; worse morning	5.23	0.44

The two resulting dimensions of anxiety and depression were also highly positively correlated with each other (.70) so that two axes drawn at an angle to one another defined a two-dimensional space within which symptoms clustered into two reasonably distinct groups corresponding to anxiety and depression (see Figure 2. 6.).

Figure 2. 6. The two latent traits of anxiety and depression. (Source: Goldberg & Huxley, 1992.)



Noteworthy, as well as these two dimensions there was a third cluster of non specific symptoms which included: tiredness or exhaustion, restlessness, poor concentration, simple ideas of reference, depressed mood, situational anxiety, neglect due to brooding.

Figure 2. 6. also shows that an equivalent way to conceptualise the two dimensions is by considering the two axes that correspond to *illness severity* and “*anxiety-depression imbalance*” (i.e. the axis running from anxiety to depression). By definition, most people will be found around the area of intersection between the depression and the anxiety axes, whereas well being, happiness and contentment would be found in the area to the left of the point of intersection.

In order to explain the reason why the anxiety and depression symptom dimensions overlap, Goldberg (1994; Goldberg & Huxley, 1992) argues that common social and

biological variables take part in the *vulnerability, destabilisation* (decompensation) and *restitution* (how long the illness will last) processes.

Goldberg and Huxley (1992) review evidence which suggests that genetic factors do not determine which disorder (anxiety or depression) and individual will develop, but they simply determine the individual's overall vulnerability to emotional disorders. Environmental causes of vulnerability, such as parental loss or deprivation also seemed to be non-specific causes of vulnerability, but only when followed by poor parenting and childrearing, and neglect. However, the authors report studies that seem to suggest that parental discord and traumatic events may favour later anxiety, whereas, a combination of low care and overprotective parents may favour depression. Moreover, the authors present also evidence that shows how long-term social adversity (e.g. poor housing, unemployment) and poor social support contribute to complete the picture of vulnerability factors.

According to Goldberg and Huxley (1992), the greater risk (i.e. vulnerability) of some individuals to develop common mental disorders can be captured by measures of personality traits, such as the *N* score of general neuroticism (Eysenck & Eysenck, 1991). Goldberg (1994) defines neuroticism as an individual's sensitivity to reinforcing events, either rewarding or punishing. However, since depression and anxiety relate to the reward (loss) and punishment (threat) systems respectively and these systems are in a state of reciprocal inhibition, depression will lead to secondary anxiety, and vice versa. Thus, for example, being diagnosed as having cancer will lead to an initial anxiety state through the activation of the punishment system, which in turn will lead to depression through the inhibition of the reward system. Similarly, the loss of a valued source of reinforcement (e.g. death of a spouse, being sacked)

will lead to primary depression through the loss of reward, but this will lead to secondary anxiety through the release of the punishment system. Therefore, whichever is released first, the other is likely to follow as a secondary consequence. Goldberg (1994; Goldberg & Huxley, 1992) also points out the presence of biological correlates of reward and punishment systems indicating their relationship with Gray's (1982; 1987) BIS and BAS systems and with dopamine and serotonin receptors as reviewed above.

The authors refer to destabilisation (or decompensation) as those factors that will cause a person to experience anxiety or depression at a particular time of his/her life. These factors are negative life events and include the onset of physical illness, and personal and social circumstances. Also Goldberg (1994; 1996; Goldberg & Huxley, 1992), like Alloy et al. (1990) did above, refers to research that supports the *specificity hypothesis*, which relates anxiety to threat and danger, and depression to loss. As we have already reported, there is evidence of specific events causing specific disorders (Brown, Harris & Eales, 1993; Finlay-Jones & Brown, 1981). This can be summarised in the Table 2. 4. below.

Table 2. 4. Possible relationship between types of life event and specific symptoms.

<i>Types of life event</i>	<i>Possible intervening mechanisms</i>	<i>Predominant symptoms</i>
THREAT	Stress, emotional reactivity	ANXIETY
THREAT + LOSS	Poor coping ability	MIXED ANXIETY DEPRESSION
LOSS	Negative self-evaluation, poor support, generalised hopelessness	DEPRESSION

According to Goldberg's dimensional model, it is hypothesised that once individuals have decompensated, they do not hold a fixed position within the two axes, but move around in response to environmental stresses. To say it with Goldberg and Huxley (1992):

“In the individual case, the exact sequence of events in the development of symptoms of anxiety and depression may arise through complex combinations of events and reactions to them. Anxiety may arise first in the context of a threat of loss, and then depressive symptoms are predominant when the loss occurs. Anxiety may arise again as the changes, challenges, and opportunities occasioned by the loss have to be addressed, and depression may arise again in so far as the person becomes hopeless in the face of continued failure to meet these challenges and adjust to the changes required by the loss or by the crisis in their lives.” (p. 103).

The last of the three processes, restitution, refers to those factors that will cause the individual to lose his/her symptoms and lead to recovery. Once again, several factors can work towards this process. Goldberg (1994; Goldberg & Huxley, 1992) distinguishes among four types of restitution:

- *Chemical restitution*: this includes self-administered recreational drugs, tobacco, alcohol, and prescribed anxiolytics and antidepressants. This type of restitution may be maladaptive when it creates dependence.
- *Neurotic restitution*: this refers to behavioural and intrapsychic manoeuvres that are used by the individual in order to reduce anxiety or guilt. For example, obsessive-compulsive symptoms, avoidance or depersonalisation can reduce anxiety. However, this type of restitution can be rather maladaptive since it often substitutes a set of symptoms with another set. Nonetheless, Goldberg (1994;

Goldberg & Huxley, 1992) prefers to see this as a different mechanism for trying to remove distressing symptoms rather than the development of another disorder.

- *Psychosocial restitution*: this includes psychotherapy but also social support by partner, friends etc. In some cases this can also be maladaptive if it leads to chronic somatisation, which is often rewarded by the response of others.
- *Environmental changes*: these include important changes in the person's life, positive self-evaluation, a reduction in ongoing difficulties, fresh start.

The main strength of Goldberg's bio-social model is that of bringing together common mental disorders, such as anxiety and depression, into a unifying theoretical framework. This model has no difficulty in accounting for the co-occurrence of anxiety and depression in that their overlap is predicted on two grounds: they share common biological subsystems, and they are associated with common social factors. The model can explain the symptom overlap given the strong correlation between the two dimensions of anxiety and depression and can also account for the temporal relationship between the two in a way that is more flexible than the one proposed by the helplessness-hopelessness theory. In fact, not only the model predicts a shift from anxiety into depression but, depending on the individual's specific environmental and social circumstances, also the reverse is possible. On the other hand, this model does not attempt to provide any explanation for why the first causal pathway (i.e. from anxiety to depression) is more common; nor does the model give a justification for the other two features of overlap, namely: the differential co-occurrence of

depression with various anxiety disorders and the relative infrequency of “pure” depression compared to anxiety.

Thus, although this model offers a unifying theoretical framework of anxiety and depression, its utility may be more valuable when investigating aetiological factors (vulnerability) and the clinical aspects of decompensation and restitution. Given the more general tone of its predictions this model offers less testable hypothesis about the relationship of anxiety and depression that can be examined in a laboratory setting.

2. 6. 3. Clark and Watson's tripartite model.

Another phenotypic structural representation of anxiety and depression is provided by Clark and Watson's (1991) tripartite model.

This model is based on an earlier two-factor affective model (Watson & Tellegen, 1985; Watson, Clark & Carey, 1988). Seminal work of Tellegen (1985) recognised that affective experiences could be characterised by two basic dimensions of affect: *Positive Affect* (PA) and *Negative Affect* (NA). PA indicates the degree to which an individual reports he/she is experiencing positive mood states, such as feeling energetic, enthusiastic, joyful, confident, proud, assertive, friendly. In contrast, NA refers to the extent to which an individual is experiencing a broad range of negative mood states, including not only fear and sadness, but also hostility, guilt, anger, self-dissatisfaction.

According to the two-factor model of affect (Watson & Tellegen, 1985; Watson, Clark & Carey, 1988), these two general dimensions are differentially associated

with anxiety and depression. In particular, the authors argue that NA is strongly related to both anxiety and depression, whereas, PA is negatively correlated to depression and largely unrelated with anxiety. Therefore, this two-factor dimensional model conceptualises NA as a non-specific factor common to both anxiety and depression, and PA as a specific factor primarily related to depression.

In 1991, Clark and Watson reviewed the psychometric convergent and discriminant validity of a large number of self-report and clinical rating scales of anxiety and depression and identified a third factor, *Physiological Hyperarousal* (PH), which was relatively specific to anxiety. Consequently, the authors extended the original two-factor model to a three-factor model, *tripartite model*, which offers a more accurate theoretical framework for anxious and depressive phenomena.

Accordingly, the first factor, NA, is responsible for the overlap between anxiety and depression and includes all those non-specific symptoms (e.g. dysphoria, poor concentration, irritability, sleep disturbance) common to both types of disorders. More recently, NA has been regarded as a general distress factor and identified as a stable and heritable personality trait equivalent to Neuroticism (N) and, as such, also a vulnerability factor for the development of anxiety and depression (Clark et al., 1994).

The second factor, low PA, is characterised by a cluster of symptoms (e.g. anhedonia, lack of energy, disinterest) relatively specific to depression and, parallel to NA, it has been regarded as a temperamental core of the broader personality trait of Extraversion (E), and therefore related to positive emotionality, energy, affiliation, and dominance (Clark et al., 1994). Finally, the third factor, PH, encompasses a group of physiological symptoms (e.g. feeling dizzy or light-headed, difficulty

breathing, racing heart) reflecting autonomic hyperarousal and is relatively unique to anxiety.

Following the tripartite formulation of anxiety and depression a number of studies have subjected existing psychometric instruments to factor analyses to investigate the phenotypic structure of anxiety and depression at both symptomatic and cognitive levels in clinical and normal samples (e.g. Clark, Steer & Beck, 1994; Dyck, Jolly & Kramer, 1994; Jolly, Dyck, Kramer & Wherry, 1994; Jolly & Dykman, 1994). These studies have largely supported the tripartite model and reported results consistent with the three-factor solution. However, given the fact that these studies used measures that were mostly laden with items assessing NA, one limitation of these studies is that they tended to produce a quite large non-specific general distress factor and rather small specific factors (i.e. low PA and PH). In order to overcome these limitations and provide a test for the tripartite model, an *ad hoc* measure, the Mood and Anxiety Symptom Questionnaire (MASQ) was created (Watson, Clark, Weber, Assenheimer, Strauss & McCormick, 1995a; Watson, Weber, Assenheimer, Clark, Strauss & McCormick, 1995b).

The MASQ is a 90 item self-report measure divided into 5 subscales. Three of these scales, *General Disturbance* (GD), *Non-Specific Anxiety* (N-SA), and *Non-Specific Depression* (N-SD) represent the non-specific NA dimension. The remaining two sub-scales, *Anxious Arousal* (AA) and *Anhedonic Depression* (AD) reflect the dimensions specific to anxiety and depression respectively. This scale was subjected to factor analyses with data collected from five different samples (3 student, 1 adult, and 1 patient) and the hypothesised three dimensions emerged in each of the data sets. Mean correlations among the sub-scales were as follows: between GD and N-

SA $r = .78$; GD and N-SD $r = .76$; N-SA and N-SD $r = .69$; GD and AA $r = .66$; GD and AD $r = .59$; AA and N-SA $r = .72$; AD and N-SD $r = .70$; AA and AD $r = .34$. Thus, the specific scales provide the best differentiation between anxiety and depression.

More recent studies that examined the convergent and discriminant validity of the MASQ have generally revealed the presence of three factors relating to general distress, PA, and PH and that the MASQ specific sub-scales measure the constructs of depression and anxiety with minimal overlap when compared with other more commonly used self-report scales (e.g. Keogh & Reidy, 2000; Joiner & Lonigan, 2000; Ruth & Mehrotra, 2001).

The tripartite model has also been recently broadened by other studies that have shown the emergence of the hypothesised three factors in clinical samples of children and adolescents (e.g. Chorpita, Albano, & Barlow, 1998; Joiner, Catanzaro & Laurent, 1996).

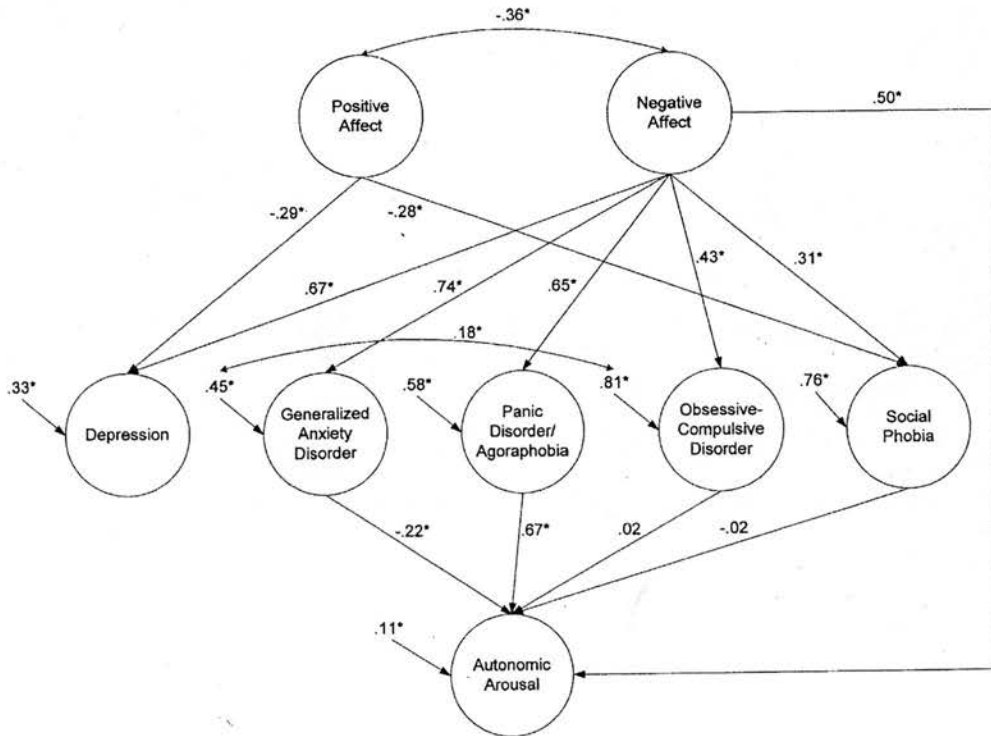
Although there is plenty of evidence demonstrating the existence of three distinctive factors, the nature of the relationship between these dimensions has been more debatable. In fact, results from some earlier studies (e.g. Clark et al., 1994; Steer, Clark, Beck & Ranieri, 1995) suggested a hierarchical three-factor model, with two narrow lower order dimensions of anxiety (PH) and depression (low PA) constructs that are highly interrelated, and a broader higher order factor of general distress (NA) that represents the strong degree of overlap between the two lower order factors. However more recent studies have found three separable first order factors and have suggested that a non-hierarchical arrangement of the three factors may be preferable to a hierarchical one (e.g. Chorpita et al., 1998; Joiner, 1996; Joiner et al., 1996).

To a certain extent these differences in findings seem to reflect the type of assessment instruments used in the structural analyses. Earlier studies used more traditional instruments with items mostly tapping the general NA factor, whereas, more recent studies used more carefully selected items specifically linked to the tripartite model. More recently, Brown, Chorpita, and Barlow (1998) tested various alternative models that examined the structural relationship among DSM-IV mood and anxiety disorders and the tripartite dimensions of NA, PA and PH on a sample of 350 outpatients with anxiety and mood disorders. Their results indicated a higher order non-specific NA factor related to both depressive and anxiety disorders, a higher order PA factor specifically related to depression (but also to social phobia), and a lower order PH factor specifically related (but in different ways) to anxiety disorders, especially GAD and panic disorder with agoraphobia (see Figure 2. 7. below).

Given the heterogeneity of anxiety disorders, Barlow and colleagues (Barlow, 1991; Brown & Barlow, 1992; Brown et al., 1998; Zinbarg & Barlow, 1996) proposed a hierarchical model of the anxiety disorders in which each anxiety disorder is thought to contain a shared higher order factor of NA and a specific unique lower level component that distinguishes one anxiety disorder from all the others. Following the evidence provided by Brown et al. (1998), Mineka, Watson, and Clark (1998) proposed an integration of the original tripartite model with Barlow's hierarchical model of anxiety disorders. This integration comprises a higher order NA factor that is shared among depressive and anxiety disorders and is responsible for their overlap. In addition, each disorder will be characterised by a specific component that will differentiate it from all the others. For example, low PA will be relatively specific to

depression, PH will be relatively specific to panic disorder (Brown et. al., 1998; Joiner, Steer, Beck, Schmidt, Rudd, & Catanzaro, 1999), whereas the nature of the relatively unique components specific to each of the other anxiety disorders need yet to be clarified.

Figure 2. 7. A structural model of anxiety and depression. (Source: Brown et al., 1998.)



The formulation of this multilevel hierarchical model represents a good step forward for our understanding of the relationship between anxiety and depressive disorders in terms of a combination of common and relatively unique components.

In addition, this model can also be used to account for the patients' relative inability to distinguish anxiety from depression compared to the much more differentiated concept of unpleasant emotions held by psychiatrists (Leff, 1978). In fact, patients

are more likely to communicate their experience of unpleasant emotions in terms of general distress (i.e. NA), whereas, as suggested by Leff (1978), health professionals are more likely to identify the relatively unique components of depressive and anxiety disorders on the basis of their training.

Although this model does not offer any explanations regarding the dynamic relationship between anxiety and depression (i.e. their temporal relationship and the seemingly related phenomenon of the relative infrequency of “pure” depression), it does offer a valuable account of their overlap at symptomatological, syndromic, and diagnostic levels. This will be extremely useful in our experimental work since we will need to differentiate among three clinical groups (i.e. anxious only, depressed only and mixed anxious-depressed) and attempt to understand the nature of the unique contributions that anxiety, depression and their combination will place on the experimental tasks at hand.

2. 7. Summary.

In this Chapter we have presented alternative views of anxiety and depression and have delineated the evolution of the theoretical debate regarding the different conceptualisations of the overlap between anxiety and depression. We have then examined the evidence in favour of a “mixed” position by reviewing epidemiological, longitudinal, family, genetic and biological studies of the two disorders. The classification issues surrounding the diagnosis of mixed anxiety depression have been addressed, and then detailed inclusion and exclusion criteria

have been given for the mixed group and the implications for formation of the other two clinical groups have also been considered. Finally, the main features of anxiety-depression overlap have been described and three of the major and most influential theoretical models of mixed anxiety depression have been presented and evaluated. These will constitute much of our theoretical framework and will be used to guide us in the generation of specific hypotheses in the next experimental Chapters.

CHAPTER 3

PRESENT AND PAST: ATTENTIONAL AND MNEMONIC PROCESSES IN ANXIETY AND DEPRESSION.

A PRELIMINARY INVESTIGATION OF MIXED ANXIETY DEPRESSION.

“The perfect past was present there, and I could see
it whole”

(G. A. Studdert Kennedy, “Judgment”)

3. 1. Introduction.

One of the implicitly or explicitly stated hypotheses of many psychological theories of anxiety and depression is that differences in how individuals process information (emotional information, in particular) may play a crucial role in the aetiology, development, maintenance, and treatment of emotional disorders (e.g. Mathews & MacLeod, 1994). For example, the more anxious individuals will attend to threatening information from their environment, the more they will encode information which is potentially threatening which, in turn, will maintain or increase their anxious state and selective processing in a circular fashion (e.g. Mathews, 1990). Similarly, depressed individuals tend to recall relatively unhappier memories

compared to normal controls, which in turn maintains or worsens their depressed mood (e.g. Teasdale & Barnard, 1993). Consequently, over the past two decades researchers have increasingly turned to information processing paradigms derived from experimental cognitive psychology in order to understand attentional and mnemonic biases occurring at different levels of information processing.

One of the basic questions that experimental psychopathologists have had to address is whether the biases observed in both anxious and depressed individuals occur at an *automatic* or *controlled* level of information processing, an issue which is closely intertwined with the distinction made between *conscious* and *unconscious* mental processes and the corresponding level of *awareness* an individual holds at a particular time (see e.g. Öhman, 1999, for a recent review). The distinction is based on the concept of “limited cognitive resources”, that is, an individual possesses a limited amount of processing resources and these are allocated selectively and strategically across stimuli and tasks at hand at any specific moment (Shiffrin & Schneider, 1977). Thus, automatic information processing is defined as being resource independent, while controlled processes are defined as being resource dependent (Schneider, Dumais & Shiffrin, 1984). For a more detailed list of other important features of automatic and controlled processes see Table 3. 1. below.

Although several researchers have attempted, or claimed, to measure purely automatic or controlled processes, today it is largely recognised that there is no single measure influenced merely by automatic or controlled processes, rather, experimental tasks seem to involve different degrees of each process ranging along an automatic-controlled continuum so as to measure *mainly* automatic or *mainly* controlled processes (e.g. Jacoby, Yonelinas & Jennings, 1997; McNally, 1995).

Table 3. 1. Characteristics of automatic and controlled information processing. (Adapted from Schneider, Dumais & Shiffrin, 1984.)

Characteristic	Automatic processing	Controlled processing
Cognitive resources	Independent	Heavily dependent
Intentional control	Incomplete	Complete
Attention	Not required, may be called	Required
Effort	Little, if any	Much
Serial-parallel dependence	Parallel	Serial
Awareness	Little, if any	High
Indivisibility	Holistic	Fragmentised
Storage in long-term memory	Little, if any	Large amounts
Performance level	High	Low, except for simple tasks
Practice	Gradual improvement	Little effect
Modification	Difficult	Easy

Bearing this essential distinction in mind, we shall now proceed to consider briefly some of the most accredited cognitive models of information processing in emotional disorders. In particular we will focus on those models that have been especially constructed to account for depressive and anxious performance impairment and biases in memory and attention. Then, we will provide an overview of the attentional and mnemonic biases occurring in anxiety and depression. Finally, we will present the details of a preliminary comparative study of anxiety, depression and mixed anxiety depression in this area, in an attempt to provide some evidence of discriminant validity among the three clinical groups.

3. 2. Theoretical models of attention and memory in anxiety and depression.

In Chapter 1 Beck's cognitive theory of anxiety and depression was introduced (e.g. Beck et al., 1985; Beck et al., 1979). According to this theory, individuals normally

interpret events by using a *schema-based processing* style. This is normally economical in that the individual does not have to rely on all the information present in order to interpret a particular event. However, once dysfunctional schemas have been activated they will override the more functional ones, so that the sacrifice of accuracy for economy of information processing will result in distortion in cognitive processes with the introduction of negative biases and “thinking errors”. In other words, individuals will use their dysfunctional negative schemas to perceive, interpret and think about the self, the world and the future. Beck and colleagues (e.g. 1979; 1985) proposed the “*content-specificity hypothesis*”, that is, in depression dysfunctional schemas will be centred on negative themes of loss and failure, whereas in anxiety the central themes will be of threat and danger. Consequently, given the pervasive presence of schemas, anxious and depressed individuals are expected to show content-specific negative biases at any level of information processing (i.e. automatic and controlled) for both attentional and mnemonic processes. More recently, Beck and Clark (1996) proposed a schema-based information-processing model specific to anxiety. This is still in line with the original model, but it distinguishes among three stages of information processing to account for differences in the use of cognitive resources: (a) initial registration of a threat stimulus (a very rapid and totally automatic recognition of a stimulus); (b) activation of a cluster of interrelated threat schemas, called “*mode*” (a number of goal-directed responses aimed at minimising danger and maximising safety, such as autonomic arousal, behavioural mobilisation and inhibition, hypervigilance for threat cues and so on which use much of the individual’s attentional resources); and (c) secondary activation of more elaborative semantic processing (a more controlled processing

style which involves an appraisal of the situation: the individual will evaluate the availability and effectiveness of his/her coping resources, that is, he/she will worry and will look for safety signals).

Bower (1981; 1987) proposed a *network theory* of cognition and emotion. The essence of his model is that long-term memory can be seen as an associative semantic network in which concepts, events and emotions are represented by discrete units called "*nodes*". These can be activated by an appropriate external input or through the activation of adjoining nodes. In the second case, the strength of the activation will depend on a number of factors, such as the proximity of nodes to each other, the strength of the initial activation and the time lapse since activation. The general prediction is that, once activated, emotional nodes (e.g. fear or sadness) will facilitate mood-congruent information processing (i.e. bias) through activation and priming of related nodes. This will result in a number of phenomena, such as Mood-State Dependent memory (MSD), where neutral material is better recalled when moods at encoding and retrieval are similar; Mood-Congruent memory (MC), where memory is better for items whose affective content is congruent with mood at encoding and/or retrieval. Moreover, a similar facilitating mechanism is expected to bias other cognitive processes, such as free associations, interpretation of events, perception, and selective attention. Thus, similarly to Beck's model, Bower predicts MC biases at all levels of information processing.

However, experimental studies of memory and attention in anxiety and depression conducted during the 1980s showed contrasting results. In fact, if on the one hand MC attentional and memory biases were found in anxious and depressed individuals respectively (e.g. MacLeod, Mathews & Tata, 1986; Bradley & Mathews, 1983), on

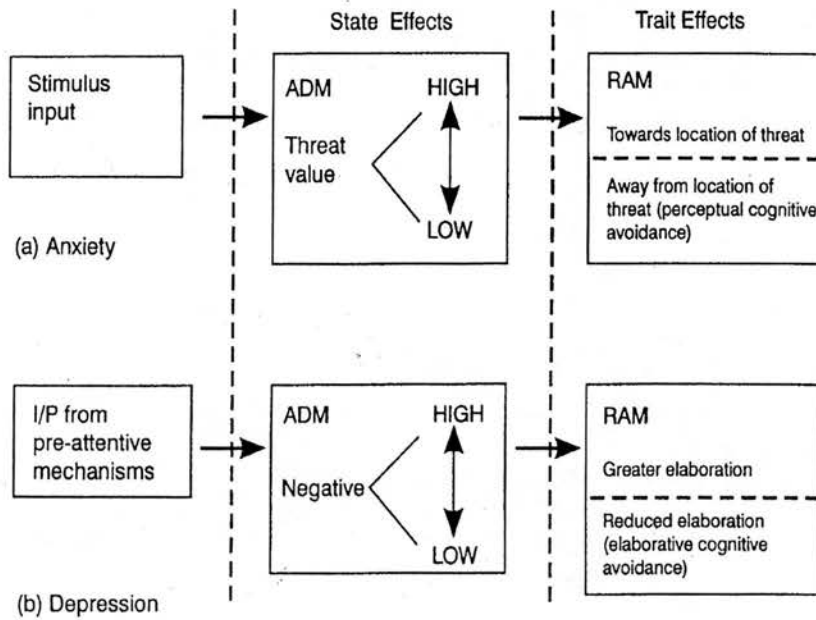
the other hand there were failures to find MC attentional biases in depression and MC explicit memory biases in anxiety (e.g. MacLeod et al., 1986; Mogg, Mathews & Weinman, 1987). Therefore, contrary to Beck's and Bower's predictions cognitive biases did not appear to operate at all levels of information processing, but they seemed to be confined to an attentional level in anxiety states, and to explicit memory in depression.

In order to account for these discrepancies, Williams et al. (1988) proposed an *information-processing model* of anxiety and depression in which each disorder is associated with different patterns of cognitive biases. This model is based on the distinction between *integration* and *elaboration* put forward by Graf and Mandler (1984). Integration is seen as an automatic process that takes place when a stimulus is processed. This involves an automatic activation of the internal mental representation of the stimulus (e.g. a word), which becomes stronger and more readily accessible when only some of its components are presented. Williams and colleagues have also referred to this process as "*priming*". In contrast, elaboration is a strategic and controlled process that involves linking and relating the stimulus (e.g. a word) to other material in memory and which makes it more easily retrievable because of the newly formed relationships with other words and the greater number of cues.

Williams et al. (1988) proposed that anxiety is related to biases that reflect integration, whereas depression is related to biases reflecting elaboration (see Figure 3. 1.). Specifically, anxious people would show a bias in favour of threat stimuli at a *pre-attentive* stage of processing, where a presumed Affective Decision Mechanism (ADM) would be able to assess the affective valence (e.g. threat) of the incoming

stimulus and also at an *attentional* level at which stage anxious individuals would shift their selective attention and allocate more resources towards the location of threat via a presumed Resource Allocation Mechanism (RAM).

Figure 3. 1. Information processing model of anxiety and depression.
(Source: Williams et al., 1988.)



Moreover, while the ADM is affected by state anxiety, the operation of the RAM is influenced by trait anxiety. According to the authors' *interaction hypothesis*, given an increase in ADM output (either because of a high threat value of a stimulus or because of high levels of state anxiety), high trait anxiety individuals will become more vigilant, whereas low trait anxiety individuals will become more avoidant of threat.

On the other hand, depressed individuals would show a bias for negative MC bias at a *post-attentive* or elaboration stage of information processing. That is, those stimuli

that have been assigned a high negative affective value by the ADM would be subjected to greater elaboration at a RAM level, which would enhance MC cues at retrieval facilitating recall of negative material.

Therefore, Williams and colleagues predicted a double dissociation between the two disorders: anxiety will have an effect only on the automatic aspects of information processing (i.e. perception and attention), whereas depression will affect only the elaborative aspects of information involved with memory processes, such as encoding and retrieval. This is very much a data-driven model and it seems more valid at a descriptive level rather than in its explanatory power. In fact, biases are explained by means of concepts that we have already seen in Bower's (1981; 1987) network theory, such as activation of mental representations of stimuli, priming, and association among related stimuli in long-term memory. More recently Williams et al. (1997) have updated their model within a connectionist framework, but this revision retains its core assumptions unchanged.

An alternative model that is mainly based on the concept of "limited cognitive resources" is Ellis and Ashbrook's (1988) *resource allocation model*. This model assumes that the presence of an emotional state, be it positive or negative, will reduce the likelihood that an individual will allocate attentional resources to the relevant aspects of a task at hand and will cause impairment. For example, depressed or anxious individuals will think more about their moods and will tend to allocate attentional resources to the increased amount of irrelevant thoughts. Consequently, the individuals' cognitive resources available for the execution of a task will be reduced causing impairment in their performance. Therefore, it is not the mood state

per se that creates problems, but the cognitive consequences of the mood state that interfere and distract the individual by competing for the limited resources available. Although this model was created to account for the effects of mood on memory, it can be used to account for similar mood effects on attention. Furthermore, an implicit corollary of this model would be the prediction of no or little impairment in anxiety and depression when the task to be carried out does not necessitate many resources (i.e. it can be executed automatically).

A related view of depressed mood effects on memory and attention is Hertel's (1994; Hertel & Rude, 1991) *cognitive initiative model*. According to this view, depressed individuals lack appropriate cognitive initiative and motivation necessary to carry out tasks efficiently. Thus, encouraging or constraining depressed individuals to pay attention to the current task and therefore to deploy cognitive resources, should eliminate or minimise performance deficits.

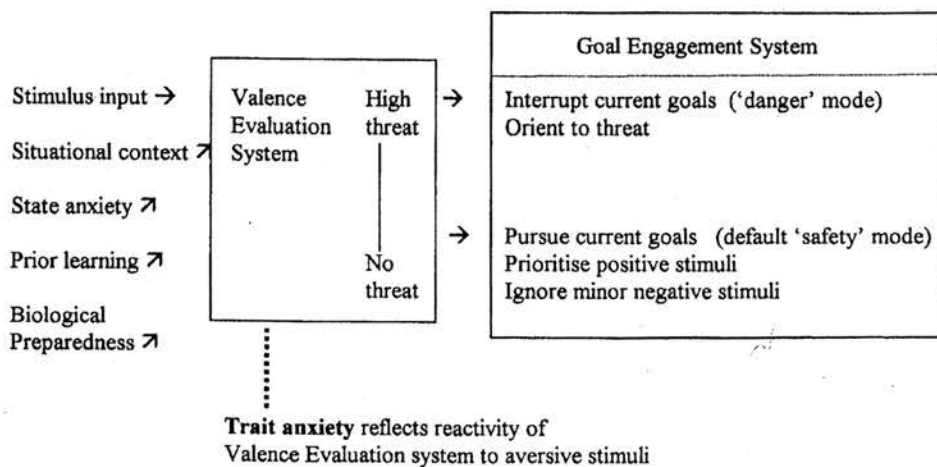
Specific to anxiety, Eysenck and Calvo (1992) proposed the *processing efficiency theory*, which states that worry impairs performance of anxious persons by reducing the storage and processing capacity of the working memory available for a concurrent task and by incrementing the amount of effort and activities designed to improve performance. In other words, more than effectiveness (i.e. the quality of performance), anxiety impairs processing efficiency, that is, performance effectiveness divided by effort. Moreover, Eysenck (1992; 1997) proposed another view of anxiety: the *hypervigilance theory*. According to this theory, pre-attentive and attentional biases constitute a vulnerability factor for GAD, so that such biases would be more evident in individuals with high state anxiety and anxiety prone individuals under stress. In addition, Eysenck (1992) argued that, along with specific

threat hypervigilance, high trait anxiety individuals would show a general hypervigilance, which is a tendency to attend to any task-irrelevant stimuli and scan the environment by broadening their attention until a salient stimulus (e.g. threat) has been detected and narrowing their attention when the salient stimulus is being processed.

Put together, these last two theories explain cognitive biases at pre-attentive and attentional levels by advocating vulnerability factors in anxiety and relating to the basic concept of “limited cognitive resources”. They also offer a wider perspective within which it is possible to take in hand performance impairment in general terms and not only when it relates to MC biases. However, the focus is placed only on attentional processes and the theories do not extend their domain to memory issues.

A more recent view of pre-attentive and attentional biases in anxiety has been developed by Mogg and Bradley (1998; 1999a). Their *cognitive-motivational view* of anxiety proposes the presence of two underlying mechanisms similar to Williams et al.’s (1988; 1997) ADM and RAM (see Figure 3. 2.).

Figure 3. 2. Cognitive-motivational view of anxiety. (Source: Mogg & Bradley, 1998.)



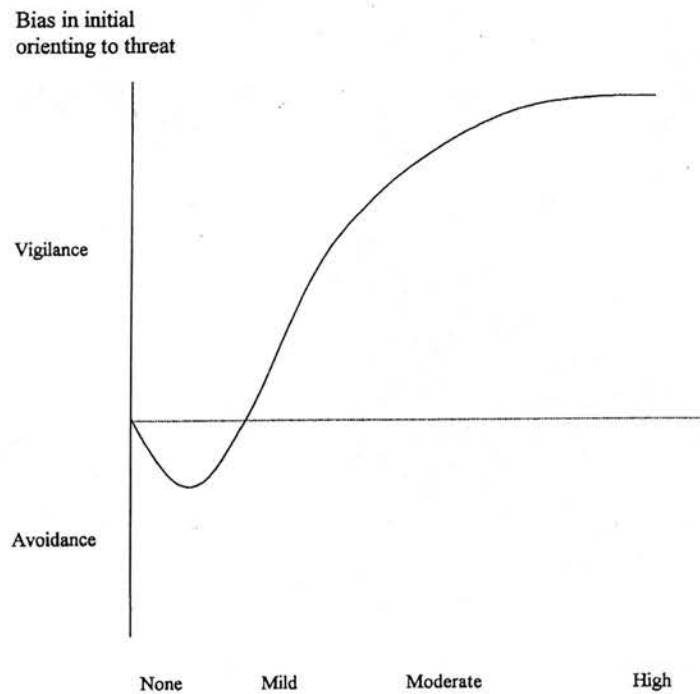
These are the Valence Evaluation System (VES) and the Goal Engagement System (GES). The VES is responsible for assessing the threat value of a stimulus but, apart from the nature of the stimulus itself, the output of this system is influenced by other factors, such as the situational context, prior learning, biological preparedness and state anxiety. However, trait anxiety also plays a role here in making an anxiety-prone individual more sensitive to trivial negative stimuli, which are labelled as being excessively high in threat value.

The output of the VES feeds into the GES, which determines the amount of processing resources to be allocated to current goals and stimuli. Consequently, if a stimulus is evaluated as highly threatening the current goals are interrupted and resources are allocated towards the threat. In contrast, if the VES appraises a stimulus as being low in threat value, then the individual will disregard it and will pursue his/her current activities. The operation of these two mechanisms is seen as having evolutionary adaptive value in that they allow the individual to be sensitive to potential threats and automatically draw his/her attention to possible danger.

In addition, Mogg and Bradley (1998; 1999a) argue that the relationship between the subjective threat value of a stimulus and the amount of bias is not linear (see Figure 3. 3. below). Contrary to Williams et al.'s (1988; 1997) interaction hypothesis, it is hypothesised that when no threat is perceived there will be no bias; however, when stimuli are appraised as having mild threat value, attention will be directed away from the stimuli (i.e. avoidance) and the individual will be able to carry on with his/her goals and to preserve a positive mood state. This would account for research findings indicating avoidance of threat stimuli (e.g. words, emotional faces) in low-anxiety individuals (e.g. Bradley, Mogg, Millar, Bonham-Carter, Fergusson, Jenkins

& Parr, 1997; MacLeod et al., 1986; McCabe & Gotlib, 1995; McCabe & Toman, 2000). On the other hand, if the subjective threat value is high (either because of the objective nature of the stimulus or because of the individual's high trait anxiety), then attention will be allocated towards the threat.

Figure 3. 3. Hypothetical relationship between attentional bias and the subjective threat value of stimuli. (Source: Mogg & Bradley, 1998.)



Although this model has been developed to explain pre-attentive and attentional biases in anxiety, the authors suggest that it can also account for differences between anxiety and depression or mixed anxiety depression. Specifically, Mogg and Bradley (1998; 1999a) predict that while anxious people will show pre-attentive biases for external threat stimuli (i.e. negative valence + engagement → vigilance for environmental threat), depressed or mixed anxious depressed individuals who have

low or impaired external goal engagement will not show such bias (i.e. negative valence + disengagement → no pre-attentive bias for environmental threat). This would be consistent with the apathy, disinterest and lack of motivation characteristic of depression. However, if negative information enters a depressed or MAD individual's focus of attention then he/she might have more difficulty in disengaging from it due to their propensity for rumination and their difficulty in distracting themselves from such material (Nolen-Hoeksema, 1991). Therefore, anxiety would be characterised by a bias in the initial automatic orienting of attention towards threat stimuli, whereas depression and MAD would be associated with a bias in the maintenance of attention towards negative information.

To summarise thus far, we have seen how across the different theoretical approaches considered here the emphasis has been placed on searching for those factors that might be responsible for the impairment and biases in information processing found in depression and anxiety. Early theories such as Beck's and Bower's have looked for common processes that might explain content-specific or MC biases. However, as newer evidence surfaced that was inconsistent with these theories, more articulated models, such as Williams et al.'s, have been put forward. These models have recognised that different processes may be involved at different levels of information processing and have tried to identify specific mechanisms that might account for contrasting results found in anxiety and depression. Each model has concentrated on particular cognitive aspects, such as motivation, hypervigilance and resource limits, and these and other factors have been deemed to be responsible for attentional and mnemonic dysfunctions, which in turn may constitute factors involved in vulnerability and maintenance of the two disorders.

Finally, from our review it has become apparent that researchers and theorists have increasingly associated anxiety and depression with attentional and memory processes respectively and corresponding models specific to anxiety or depression have been proposed. Given the heterogeneity of the models on offer it might be more valuable not to consider them as contrasting views to which to subscribe, but as alternative approaches to specific aspects of the relationship between cognition and emotion.

3. 3. Attentional biases in anxiety and depression.

Attentional functioning in anxiety has been widely investigated, both at pre-attentive and attentional levels, by many researchers in clinical and non-clinical samples (for reviews see Dalglish & Watts, 1990; MacLeod, 1999; Mathews & MacLeod, 1994; Mogg & Bradley, 1999a). At a pre-attentive level, among the variety of techniques employed, interference paradigms have been extensively used. These paradigms usually involve presenting subjects with a central task to perform in the presence of distracting information. By measuring the amount of interference that particular distracting information creates (i.e. by recruiting selective attention), researchers have been able to assess specific pre-attentive biases. In the case of anxiety it is threatening information that typically elicits interference and hence pre-attentive biases by gaining participants' initial orienting of attention automatically. For example, using a dichotic listening task in which two different channels of information are presented simultaneously one to each ear, Mathews and MacLeod

(1986) found that anxious patients were slower to respond to a dot probe task (the central task in this case) when the information in the unattended channel was a threatening word than when it was a neutral word. However, Holender (1986) has argued that in this paradigm it might be possible for subjects to switch their attention to the unattended channel and therefore visual masking tasks would be more effective and suitable paradigms when investigating attentional processes in situations of restricted awareness. One such task is an emotional adaptation of the classic Stroop colour-naming task (Stroop, 1938) known as the emotional Stroop task (e.g. Williams, Mathews & MacLeod, 1996). In the masked variant, subjects are presented very briefly (usually approximately 14 ms., corresponding to a computer monitor display refresh rate) with threatening and non-threatening words that are either printed in different colours or white against different coloured backgrounds. Immediately after the presentation, a string of random letters or signs masks the words and subjects are required to name the colour of the stimulus item as quickly as possible. Both high trait anxiety individuals and GAD patients show higher colour-naming interference when the words are threatening rather than non-threatening, compared to controls. Moreover this finding is replicated in both masked and unmasked versions of the task (e.g. Bradley, Mogg, Millar & White, 1995; MacLeod & Rutherford, 1992; Mogg, Kentish & Bradley, 1993). Subjects' awareness is typically checked by assessing their ability to discriminate whether a word or a non-word was presented before the mask, and whether a word was present or absent before the mask. Performance on these forced choice tasks reflects an *objective* measure of subjects' awareness thresholds (i.e. subjects whose performance reaches above-chance levels are excluded from analyses), as opposed to *subjective* measures

of subjects' awareness threshold, which rely on subjective experience (e.g. Cheesman & Merikle, 1986).

Another commonly used task is the dot probe task (e.g. MacLeod et al., 1986). In its masked version, word-pairs are presented briefly (14 ms.) in two different locations of a computer screen (e.g. top and bottom, or left and right). These are then immediately masked and followed by a dot probe in the position of one of the masks. On critical trials one of the word stimuli is neutral and the other is negative. Subjects are required to press a response key button to indicate the position of the dot probe, so that their reaction times reflect the extent to which their attention was directed towards the area around the negative or neutral stimulus. Results show a pre-attentive bias for negative words in GAD patients compared to controls (Mogg, Bradley & Williams, 1995). This study included also a supra-threshold condition in which a similar bias was also found.

Results from emotional Stroop and dot probe tasks also show some interesting temporal effects of processing in terms of content specificity. In particular it has been found in many studies that in the sub-threshold condition (i.e. at a pre-attentive level) the anxious bias is general and refers to any negative stimulus, however, in the supra-threshold condition (i.e. at an attentional level) GAD patients and high trait anxiety individuals preferentially attend to stimuli that are of greatest relevance to their concerns (e.g. MacLeod & Rutherford, 1992; Mathews & Klug, 1993; Mogg et al., 1995; Mogg, Mathews & Eysenck, 1992; Mogg, Mathews & Weinman, 1989). These results suggest that in anxiety there is a pre-attentive bias for negative information, but also that prior to awareness, the level of semantic analysis of the stimuli is rather superficial, whereas, the processing of the stimuli at an attentional level goes beyond

their basic valence (positive vs. negative) assessment and includes their evaluation in terms of self-reference.

Similar attentional biases have also been observed with other anxiety disorders, such as social phobia (e.g. Gilboa-Schechtman, Foa & Amir, 1999; Hope, Rapee, Heimberg & Dombek, 1990; Mattia, Heimberg & Hope, 1993), specific phobia (e.g. Lavy, van den Hout & Arntz, 1993; Watts, McKenna, Sharrock & Trezise, 1986), panic disorder (e.g. Ehlers, Margraf, Davies & Roth, 1988; Lundh, Wikström, Westerlund & Öst, 1999; McNally, Amir, Louro, Lukach, Riemann & Calamari, 1994), OCD (e.g. Foa, Ilai, McCarthy, Shoyer & Murdock, 1993; Lavy, van Oppen & van den Hout, 1994) and PTSD (e.g. Kaspi, McNally & Amir, 1995; Thrasher, Dalgleish & Yule, 1994).

Investigations of the time course of attentional biases in anxiety have looked at the possibility that after their initial orienting to threat anxious individuals may not maintain their attentional bias (i.e. no subsequent bias), or that they may have greater difficulty in trying to disengage their attention from threatening stimuli, that is, maintenance of the bias, as suggested by Beck's (Beck et al., 1985) and Bower's (1981; 1987) theories, or that they may show a "vigilance-avoidance" pattern (i.e. initial shift of attention and subsequent disengagement and avoidance). Non-clinical studies that manipulated the duration of the stimuli, found that high trait anxious individuals showed greater vigilance for threat words at 100 ms. duration, but only non-significant trends at 500 ms. and 1500 ms. compared to low trait anxiety individuals (Mogg, Bradley, de Bono & Painter, 1997). However, for more complex stimuli high trait anxious individuals showed greater attentional bias for threat faces than for happy faces at both 500 ms. and 1250 ms. durations (Bradley, Mogg, Falla

& Hamilton, 1998). On the other hand, Mogg and Bradley (1999a) report a clinical study that looked at the time course of attentional biases in spider phobics. Compared to non-phobic individuals, spider phobics showed more vigilance for photographs of spiders only at 200 ms. but not at 500 ms. and 2000 ms. Similar patterns were obtained in another recent study of spider phobics in which eye movements were continuously registered during the 3-second presentation of stimuli (Hermans, Vansteenwegen & Eelen, 1999). Results showed that, compared to controls, spider anxious participants looked significantly more at pictures of spiders than of flowers (i.e. control materials) at the beginning of the stimulus presentation, but subsequently their gaze shifted more and more away from the threatening materials.

The results from these studies seem to suggest that attentional avoidance strategies might be associated only with clinical levels of anxiety. However, the extent to which attention is sustained towards threat may well be a function of both the stimulus threat value and the anxiety level of the individual.

As for the specific effects of state and trait anxiety on attention, in the absence of stress and state anxiety, there is no difference in the attentional responses to threatening words of high and low trait anxious individuals. However, in the presence of stress and state anxiety only high trait anxious individuals show pre-attentive and attentional biases for such threat (e.g. MacLeod & Mathews, 1988; MacLeod & Rutherford, 1992). This would appear to support Williams et al.'s (1988; 1997) interaction hypothesis, however as Mogg & Bradley (1998; 1999a) point out, with regard to the second part of the interaction hypothesis results are not at all conclusive in that MacLeod and Mathews (1988) found only a non-significant trend of avoidance in the low trait anxiety group; results which were replicated by Mogg,

Bradley and Hallowell (1994). Moreover, it is plausible that stimuli other than threat words or different types of stressors may elicit different effects on attentional biases. More recently, the dot probe task has been modified to examine anxiety related attentional biases for human emotional expressions with happy, angry (i.e. threatening), and neutral faces. These studies have provided further evidence of pre-attentive and attentional biases in clinical and non-clinical anxiety (e.g. Bradley et al., 1997; Bradley, et al., 1998; Bradley, Mogg & Millar, 2000; Bradley, Mogg, White, Groom & de Bono, 1999; Mogg & Bradley, 1999b; Mogg & Bradley, 1999c; Mogg, Millar & Bradley, 2000).

In a direct test of the interaction hypothesis versus the cognitive-motivational view, Mogg, McNamara, Powys, Rawlinson, Seiffer and Bradley (2000) used the probe detection task including high threat and mild threat pictorial scenes. Results showed an increase in vigilance with the increase in threat value of the stimuli, not only in the high trait but also in the low trait anxious individuals. These results provide support for the cognitive-motivational view of anxiety; however, the study was carried out with college students and findings are yet to be replicated in a clinical sample.

Turning our attention to depression, several studies that have used masked versions of the dot probe and emotional Stroop tasks have failed to find any evidence of pre-attentive biases (e.g. Bradley et al., 1995; Mathews, Ridgeway & Williamson, 1996; Mogg et al., 1995; Mogg, Bradley, Williams & Mathews, 1993). This lack of effects cannot be attributed to methodological problems, such as task sensitivity, because anxious individuals do show pre-attentive biases under the same conditions. Similar results were found in a more recent study measuring the initial eye movement of

GAD and depressed (most of which also showed high levels of generalised anxiety) patients in response to a dot probe task that used threatening, sad, happy and neutral emotional faces (Mogg et al., 2000). While GAD participants tended to shift their gaze quickly towards threat faces, depressed individuals did not show any biases.

On the other hand, studies assessing attentional biases for supra-threshold stimuli have found more conflicting results. Several studies have failed to observe any attentional bias in depression (e.g. Bradley et al., 1995; MacLeod et al., 1986; McCabe & Toman, 2000; Mogg et al., 1993), whereas, other studies have found evidence of such bias in depression (e.g. Gotlib & Cane, 1987; Mathews et al., 1996; Mogg et al., 1995; Segal, Gemar, Truchon, Guirguis & Horowitz, 1995), although some of these used also a priming methodology.

Put together, these findings seem to suggest that depressed individuals do not shift their initial attention towards negative information automatically, but tend to dwell on it for longer and have more difficulties disengaging from it, once this has entered their focus of attention. Consistent with this view are the findings from a non-clinical study of the time course on attentional biases in depression in which a word dot probe task was used with variable durations (i.e. 14 ms., 500 ms. and 1000ms.). Results indicate that induced depressed mood was associated with a bias for depression relevant words at 500 ms., with a similar trend at 1000 ms; whereas, naturally occurring dysphoric mood was related to higher vigilance for negative words at the 1000 ms. duration (Bradley, Mogg & Lee, 1997). More recently, Compton (2000) reports an experimental investigation showing that negative affect is associated with a slowness to disengage attention from one focus and the ability to shift it to a new one.

Summarising, research findings in attention and emotional disorders seem to point towards the presence of a strong effect of anxiety on attentional processes. Biases in anxiety appear to be mainly pre-attentive and involve the initial orienting of attentional resources towards threatening stimuli. In contrast, the role of attentional biases in depression is more controversial. These do not appear to be present at a pre-attentive level of analysis of the environmental stimuli, but may be associated with later information processing, which involves the maintenance of attention on negative materials.

3. 4. Mnemonic biases in anxiety and depression.

Anxious and depressed individuals often complain about memory problems, such as difficulties remembering simple things or their “mind going blank”. Memory impairment constitutes one of the symptomatic manifestations of the two disorders and has consequently received considerable interest from researchers (e.g. Watts, 1995). It is widely recognised that memory processes in anxiety and depression are impaired due to – in cognitive terms – diminished processing resources available as a result of emotional preoccupations (see Ellis & Ashbrook, 1988; Eysenck & Calvo, 1992; Hertel, 1994, above). Thus, depressed individuals typically show a failure to allocate processing resources to memory tasks due to their lack of cognitive initiative, which, coupled with their reduced resources, produces impairment performance. On the other hand, anxious individuals tend to compensate for their

reduced amount of processing resources by a more effortful, but less efficient performance.

Other than investigating memory problems under the light of capacity of the “cognitive processor”, research has also been focussing on other aspects of memory that may play a role in the development and/or maintenance of the disorders, rather than being a consequence (e.g. Mathews & MacLeod, 1994). Potentially important factors include memory biases for negatively valenced materials (i.e. MC biases) that may occur at different levels of information processing, such as explicit and implicit (see below), and that may permeate the content of anxious and depressed people’s thinking so as to have a detrimental effect on mood.

Typical studies of autobiographical memory present subjects with a word cue and then ask them to report the first personal memory brought to mind. It has been found that both anxious and depressed individuals tend to report more negative than positive memories (e.g. Clark & Teasdale, 1982; Burke & Mathews, 1992). Additionally, when emotionally valenced word cues are used to elicit memories, both anxious and depressed individuals show significantly shorter recall latencies for negative relative to positive memories (e.g. Richards & Whittaker, 1990; Williams & Broadbent, 1986). These findings seem to reflect an increase in availability of negative personal memories in anxious and depressed people. However, a limitation of this approach is that it is difficult to determine whether the individual differences observed are caused by differences in retrieval processes or simply reflect qualitative differences in the person’s actual past experiences. In order to tease out the effects of idiosyncratic retrieval processes it is necessary to test memory processes for materials to which all subjects have equal previous exposure. One method is to

present participants with lists of words that vary for their emotional valence (e.g. negative vs. positive) and/or mood congruency (e.g. anxiety-relevant vs. depression-relevant) and later on, usually in the same experimental session, assess memory for those stimuli unexpectedly.

This procedure can be used to assess both explicit and/or implicit memory. *Explicit memory* refers to conscious recollection of recently presented information. In Graf and Mandler's (1984) terms this involves an "elaboration" process, which is "controlled" in nature, as defined above (Schneider et al., 1984). Explicit memory tasks are also referred to as "direct" tests of memory and include traditional free recall, cued recall and recognition tasks.

Implicit memory, on the other hand, refers to the "facilitation or change in task performance that is attributable to information acquired during a previous study episode" (Schacter, 1987; p. 501). Implicit memory reflects "integration" and it is regarded as an "automatic" process (Graf & Mandler, 1984; Schneider et al., 1984). This process is assessed "indirectly" in tests that do not involve intentional retrieval instructions, such as priming effects on lexical decision, word identification, and word stem or fragment completion tasks.

MC explicit memory biases in depression have been found in several studies and they constitute a robust phenomenon (e.g. see Blaney, 1986; Dalgleish & Watts, 1990; Matt, Vazquez & Campbell, 1992; Singer & Salovey, 1988 for reviews). In particular, depressed individuals show a recall bias for negative words that are self-referent as opposed to negative information in general (e.g. Bradley & Mathews, 1983; Bradley, Mogg & Williams, 1995; Watkins, Mathews, Williamson & Fuller, 1992). These results demonstrate that it is not a general MSD explicit memory bias

(i.e. biased recall for items that were learned in a mood state that is similar to the mood state at retrieval) that is relevant to depression, but it is memory for material that contains specific self-referent items. In addition, MC biases in recall are more likely to occur when the encoding task requires depressed participants to relate each stimulus word to themselves (e.g. Bradley & Mathews, 1983; Denny & Hunt, 1992; Watkins et al., 1992) or when word stimuli are rated for their emotional valence (e.g. Hertel, 1994). In fact, if depressed individuals are required to encode words in relation to other people or in relation to the physical appearance of the stimuli, then a negative bias at recall is not found (Bradley & Mathews, 1983; Hertel, 1994).

Interestingly, studies of recovered depressed individuals have found that the negative MC self-referent recall bias shown by currently depressed individuals is much reduced or eliminated following recovery (Bradley & Mathews, 1988; Dobson & Shaw, 1987). These findings suggest that the explicit memory biases exhibited by depressed individuals are state-dependent consequences of depression rather than antecedent trait vulnerability factors. Nonetheless, these negative self-referent recall biases may play a consistent role in the maintenance of depressed mood.

In contrast to the fairly consistent pattern of results that have been obtained in experimental studies of explicit memory in depression, the evidence of an equivalent anxiety-related explicit memory bias for threatening information has been scarcer (e.g. Dalgleish & Watts, 1990; Mathews & MacLeod, 1994; MacLeod, 1999).

Despite the findings observed in autobiographical memory tasks that non-clinical high trait anxious individuals and GAD patients report significantly more negative past events, and quicker, than positive ones in response to cue words (Burke & Mathews, 1992; Mayo, 1989; Richards & Whittaker, 1990), it might be the case that

individuals vulnerable to anxiety may experience an excessive number of negative events, or that they may experience negative events with excessive intensity (e.g. physiological hyperarousal). In fact, studies that have investigated the phenomenon of explicit memory in clinical anxiety under controlled laboratory conditions have found little or no evidence of any recall bias for threatening materials (e.g. Becker, Roth, Andrich & Margraf, 1999; Cloitre, Cancienne, Heimberg, Holt & Liebowitz, 1995; Mathews & MacLeod, 1985; Mogg et al., 1989; Mogg, Gardiner, Stavrou & Golombok, 1992; Rapee, 1994; Rapee, McCallum, Melville, Ravenscroft & Rodney, 1994).

However, there has been a stronger support of anxiety related explicit memory biases in panic disorders. Contrary to what is found in other anxiety disorders, several studies have found evidence that panic disorder patients show a significant bias towards the recall of threat-related word stimuli (e.g. Becker, Rinck & Margraf, 1994; Becker et al., 1999; Cloitre & Liebowitz, 1991; Cloitre, Shear, Cancienne & Zeitlin, 1994; McNally, Foa & Donnell, 1989). These studies seem to show that MC explicit memory biases may be a peculiarity of panic but not of other anxiety disorders. Becker et al., (1999) speculate that these results could be explained by taking into account the higher autonomic arousal present in patients with panic disorder. Some indication exists that memory bias for threat-related information increases with heightened physiological arousal (McNally et al., 1989) however the effect reported in this study was only marginal.

Thus, with the exception of panic disorder, anxiety is generally not associated with biases that facilitate the retrieval of threat-related information as it is assessed with incidental free recall, cued recall and recognition.

Studies that have investigated MC implicit memory biases in depression have yielded conflicting results. Denny and Hunt (1992) and Watkins et al. (1992) used respectively word fragment completion and word stem completion tasks with depressed and non-depressed participants, however, both studies found no evidence of implicit memory bias in depression. Subsequently, Roediger and McDermott (1992) in their commentary on these studies argued that a plausible reason for these findings might be that both studies had used “perceptually-driven” implicit memory tests, that is, the cognitive processes used by participants to complete these tasks are driven by the perceptual features of the word stimuli (e.g. “Complete the following with the first word that comes to mind: “Dep_____” or “D_p____io_”). However, memory tests, such as free recall that usually produces MC biases, typically rely on meaningful processing of the stimuli and therefore are “conceptually driven”. Therefore, it was proposed that MC implicit memory biases would be found if conceptually driven tasks, both at encoding and retrieval phases, were used.

Consequently, a study was devised that used a conceptually driven task in which after a self-referent study phase of positive negative and neutral words and a 30 second distracter task, depressed and non-depressed participants were asked to produce one-word associations to cue words (Watkins, Vache, Verney, Muller & Mathews, 1996). Although the authors claim to have found MC implicit memory bias in the depressed group, 58% of their subjects (perhaps not surprisingly) had awareness of the memory aspects of the experiment. Thus, MC memory biases found in this study could be the result of explicit as much as implicit memory. On the other hand, also in Watkins et al. (1992) the majority of the participants (some 96%!) were aware of the memory nature of the task, and yet no MC memory bias was found,

which suggests that the “perceptual vs. conceptual” distinction may not be the key solution to the problem.

Some studies have been able to find evidence of MC implicit memory bias in depression using perceptually driven tasks. Ruiz-Caballero and González (1994) found a MC implicit memory bias for negative compared to positive words in a group of dysphoric individuals using a word stem completion task. Similar findings are reported in a non-clinical study where evidence of a MC depression bias on a repetition-primed lexical decision task was found in the subliminal but not supraliminal condition (Bradley, Mogg & Williams, 1994). These findings were confirmed in a clinical study by Bradley et al. (1995) that used a lexical decision task with sub-threshold and supra-threshold priming and found a MC implicit memory bias in a clinically depressed group in both conditions for depression-relevant words. These results were also replicated in a subsequent similar study (Bradley, Mogg & Millar, 1996).

More recently, a methodical comparison of four different implicit memory tasks was used with depressed and non-depressed individuals (Watkins, Martin & Stern, 2000). The authors used two perceptually driven tasks (i.e. word stem completion and word identification) and two conceptually driven tasks (i.e. free association and word retrieval) in both match and mismatch perceptual and conceptual encoding conditions. Results indicated MC implicit memory bias in the depressed group only in one of the conceptually driven tasks (i.e. word retrieval, which consists in providing participants with a definition and then ask them to produce a word that fits the definition), but only in the conceptual encoding condition. Given that, against prediction, the free association task failed to elicit MC biases, Watkins et al. (2000)

concluded that although conceptually driven tests might be necessary for demonstrating MC implicit memory biases in depression, they are not sufficient. In another recent study with dysphoric students, Scott, Mogg and Bradley (2001) used both a repetition and a semantic priming lexical decision tasks in order to investigate further the automaticity of priming effects. A MC implicit memory bias was found in the semantic priming condition only at a relatively short 56 ms. SOA (Stimulus Onset Asynchrony, the time between the presentation of the prime and the presentation of the target) and not for the longer 2000 ms. SOA condition. These findings provide further evidence that MC memory biases can occur relatively automatically, although results cannot be generalised to clinical levels of depression. However a conceptual criticism can be made of Scott et al.'s (2000) as well as Bradley et al.'s (1994; 1995; 1996) studies that used a sub-threshold priming condition to investigate implicit memory biases. Under this condition, the authors are more likely to investigate facilitation effects (or attentional biases) rather than implicit memory. This is especially true with semantic priming, in that a word is used to assess facilitation effects on a different target word. In this case, being the target word a "new" word, by definition any effects found do not reflect implicit "memory" processes but rather semantic facilitation and activation (e.g. Bower, 1981; 1987). Bradley and colleagues also criticise Watkins et al. (1996) for claiming to have found "unconscious" MC implicit memory effects, because the latter have used supra-threshold primes in their studies. However, we argue that the use of supra-threshold primes in this case is a legitimate paradigm as long as participants are unaware of using the knowledge previously acquired while performing the implicit memory task, a condition that was not satisfied in Watkins et al. (1996).

Thus, in sub-threshold – repetition or semantic – priming lexical decision paradigms we are assessing short-lived facilitation or activation effects of different emotionally toned materials that can influence temporarily a person's decision. In contrast, with supra-threshold priming we are exposing participants to a controlled set of stimuli and then, during the test phase, assess how readily individuals use the same information previously provided when given an implicit memory task. In other words, it gives us a measure of what type of stimuli materials (e.g. MC) tend to stay with the person for longer periods of time, are maintained and/or elaborated through rehearsal and become short or long memory traces which are available for use (e.g. Baddeley, 1995).

Therefore, despite the inconsistency of results and the variability in methodology among the investigations reviewed above, depression does appear to be associated with some levels of automatic memory processes. However, where positive priming effects were found, depressed or dysphoric participants did show high levels of anxiety, or anxiety levels were not measured or reported. Consequently, this status of affairs makes any conclusion rather tentative.

The picture that emerges from studies of MC implicit memory biases in anxiety is not very dissimilar from the one we have seen for depression, although the majority of studies confer support for such biases in anxiety (e.g. MacLeod, 1999; MacLeod & Rutherford, 1998).

Several studies have found evidence of MC implicit memory biases in clinical and non-clinical anxiety for threat-related materials (e.g. Amir, McNally, Riemann & Clements, 1996; Cloitre et al., 1994; Lang & Craske, 1997; MacLeod & McLaughlin, 1995; Mathews, Mogg, May & Eysenck, 1989; Richards & French, 1991). These

studies have included a variety of tasks ranging from visual to auditory tests and have used both conceptual and perceptual processing at encoding with traditional perceptually driven tasks. Despite the large body of evidence supporting this phenomenon, a good number of experimental studies have failed to replicate these findings with high trait anxiety individuals (Nugent & Mineka, 1994; Russo, Fox & Bowles, 1999); with GAD patients (Bradley et al., 1995; Mathews, Mogg, Kentish & Eysenck, 1995); in panic disorder (Becker et al., 1994); in PTSD (McNally & Amir, 1996).

These inconsistencies are hard to explain since they cannot easily be attributed to cognitive differences among types of anxiety disorders or to different methods of assessments, since positive and null results have been obtained under comparable conditions with similar clinical and non-clinical groups. Eysenck and Byrne (1994) advocated for differences in the nature of the encoding tasks used in different studies. In particular, the authors argued that anxiety would be linked to perceptual MC implicit memory and therefore it was necessary to use a perceptual encoding task to match the perceptual nature of the task. Their experiment found support for this position, in that high trait anxious individuals showed an implicit memory bias for threat stimuli on a word fragment completion task following a perceptual but not a conceptual encoding condition. These results highlight the importance of the encoding procedure used in these experiments, however, they are at odds with the findings of other studies in which the same word completion task was used with GAD patients and yielded positive results under conceptual encoding (Mathews et al., 1989) and negative results under perceptual encoding condition (Mathews et al., 1995).

Once again, given the current level of inconsistency in the literature reviewed it might appear premature to draw firm conclusions about the presence of MC implicit memory biases in anxiety. However, there is evidence that anxiety is associated with threat-related biases on automatic aspects of memory, although the exact conditions under which this occurs are currently not entirely clear.

3. 5. Summary.

Memory and attention are the two most widely studied cognitive processes. We have presented alternative theoretical points of view and have reviewed the literature concerning attentional and mnemonic biases in anxiety and depression.

From the evidence at hand, it appears that anxiety is strongly associated with automatic processes at pre-attentive and attentional levels, but less so with automatic memory processes (i.e. implicit memory). As a result, anxious individuals will attend and allocate resources towards threatening stimuli and may show more sensitivity for threat-related materials which become automatically more available. However, with the exception of panic disorder, anxiety is not linked with biases for more controlled cognitive processes, such as explicit memory; and this might be due to avoidance of threat following its initial identification.

On the other hand, depression does not seem to be associated with automatic pre-attentive or attentional biases. The performance of depressed individuals suggests that mood disorders might be characterised by the inability to disengage attentional resources from negative materials once they have become the focus of attention. This

ruminative behaviour might be responsible for the strong MC effects observed in tests of explicit memory, and the association of depression with implicit memory biases following initial conceptual encoding.

These findings have important implications in terms of identification of vulnerability factors, maintenance and treatment of the two disorders.

In conclusion, although there seems to be notable dissociation of automatic and controlled cognitive processes in anxiety and depression, the emerging picture is not as clear-cut as some current cognitive models would suggest. The number of inconsistencies found, especially in studies of implicit memory, is in need of a more accommodating theoretical framework.

3. 6. Preliminary investigation.

The experimental work reported here is an investigation carried out by myself in this Department of Psychiatry, University of Edinburgh, before the commencement of this PhD research programme. It was submitted as part of my undergraduate degree, but formed the starting point for the PhD. It deals with attentional and mnemonic processes in mixed anxiety depression and, as a result, it constitutes an integral part of the aims of the current research programme.

3. 6. 1. Introduction.

The preliminary investigation described below is a comparative study of anxiety, depression and mixed anxiety depression in a clinical sample. In Chapter 2 we have seen that the coexistence of anxiety and depressive disorders in clinical settings has led to controversial debates about their relationship. In the last 25 years, several studies have used different methods (e.g. biology, treatment response, family history) in order to determine whether anxiety and depression can be conceptualised as: (a) distinct disorders, qualitatively different; (b) variations of the same underlying disorder, quantitatively different; or (c) phenomenologically (qualitatively and quantitatively) different, when both present, from either pure anxiety or depression (Katon & Roy-Byrne, 1991; Stahl, 1993; Stavrakaki & Vargo, 1986). This last conceptual model has found its expression in the 10th edition of the International Classification of Diseases (ICD-10; World Health Organization, 1990) and in the appendix of the DSM-IV (American Psychiatric Association, 1994) with the

introduction of the Mixed Anxiety Depressive Disorder (MAD) as a new diagnostic category. This is a “sub-threshold” diagnostic category reserved for those patients who suffer from a non-specific pattern of anxious and depressive symptoms that are not severe enough to justify a diagnosis of an anxiety or depressive disorder. Even if somehow overcoming the concept of comorbidity, the sub-threshold approach does not take into account all the cases often encountered in clinical practice in which the two disorders coexist above threshold (i.e. patients who meet the diagnostic criteria for both an anxiety and a depressive disorder).

A more comprehensive view of the relationship between anxiety and depression is offered by dimensional models such as Alloy et al.’s (1990) helplessness-hopelessness model, Goldberg’s (1994; 1996; Goldberg & Huxley, 1992) biosocial model, and Clark and Watson’s (1991) tripartite model. Clark and Watson (1991) proposed that those patients who only report non-specific symptoms reflecting general distress, should be diagnosed as *mixed anxiety-depression mild* (or *moderate*). This is equivalent to the diagnostic categories included in the ICD-10 and DSM-IV. However, according to the authors, those patients who present high levels of negative affect together with specific symptom clusters reflecting low positive affect and physiological hyperarousal, should receive a diagnosis of *mixed anxiety-depression severe*. This would emphasise the synergistic quality (see point c above) of a dual diagnosis, compared with the mere additive value recognised by the comorbid approach.

The present study aims to provide evidence in support of the validity of the dimensional perspective of anxiety and depression by means of self-report measures

and experimental tasks, as well as clinical interviews, as necessary components of a multiple method of assessment (Power, 1991).

This is not to say that the present investigation will attempt to corroborate the *construct validity* of either the ICD-10 or DSM-IV MAD sub-threshold diagnostic categories (corresponding to *mixed anxiety-depression mild* or *moderate* as proposed by Clark and Watson (1991)) or of the suggested diagnosis of *mixed anxiety-depression severe*. The main focus of this study is the provision of evidence of *discriminant group validity* amongst three clinical groups (depressed only, anxious only, and mixed). Accordingly, given the dimensional perspective adopted in this study, we shall not differentiate between sub and supra-threshold patients in the mixed group. Exploration and comparison of information processing styles in the three groups of patients will allow us to examine whether mixed anxiety and depression have an additive (comorbid approach) or a phenomenologically distinct (dimensional approach) effect on cognitive processes. In other words, we expect the three groups to differ from each other and to present with qualitatively discrete cognitive profiles as would be predicted if the basic principle of Gestalt – “*a whole is different from the sum of its parts*” - in psychology of perception was applied to clinical psychology. In particular, we focus on patients’ performance in typical experimental tasks assessing implicit and explicit memory biases, namely, word identification and free recall.

Williams et al. (1988; 1997) proposed a cognitive model of information processing in order to account for the different biases in memory and attention found in clinical anxiety and depression. This model is based on the dissociation between biases occurring in an automatic way, reflecting in their terminology an integration process,

and biases involving controlled processes indicating elaboration. Specifically, the general prediction is that anxious patients would show a pre-attentive/attentional bias for threatening information at encoding; whilst, a mood-congruent memory bias at retrieval is expected to be found in depressed patients. It is therefore predicted that these biases at integration and elaboration processes are to be revealed by implicit and explicit memory tests respectively.

However, we have seen above that several studies have found an implicit memory bias for negative information in depression (e.g. Bradley et al., 1995; 1996; Watkins et al., 1996; 2000). Whereas, a few experiments have failed to replicate the relationship between anxiety and implicit memory bias for threatening information (e.g. Mathews et al., 1995; Nugent & Mineka, 1994). It is apparent that this divergent pattern of results on implicit memory tests in anxiety and depression might be due to a number of reasons. For instance, the use of different experimental tasks (perceptual vs. conceptual, involving varying amounts of automatic and strategic processing), inappropriate selection of stimuli materials, different sample groups (clinical vs. non-clinical), and, probably most important, failure in forming distinct experimental groups (i.e. anxious or depressed only, or mixed) (e.g. McNally, 1995; Roediger & McDermott, 1992; Sanz, 1996).

In summary, contrary to prediction, current evidence shows that implicit memory biases can be found in both anxiety and depression, whilst, explicit memory tests, usually free of cued recall, seem to provide a more robust set of findings in support of Williams et al.'s (1988; 1997) model.

In the present study, implicit memory biases were evaluated by means of a word identification task (with supra-threshold priming) assessing implicit memory for

depression relevant, anxiety relevant, emotional positive and neutral words. Subjects were asked to read aloud a list of briefly displayed words, only half of which had been previously presented. Word identification is an implicit memory test since conscious attention is not directed to the attempt of remembering past events but it is absorbed by the reading task (e.g. Hertel, 1994). This test gives a measure of priming effects inasmuch as previously exposed words are identified more frequently than new ones.

Although it may be argued that implicit memory performance on this task might be associated only with perceptual processing of the word stimuli as found in basic research with neutral materials (see Schacter (1987) for a review), several studies have used either lexical decision or word identification tasks with emotional materials and have shown selective improved implicit memory only for some types of stimuli (e.g. mood-congruent), which is most likely to reflect a conceptual bias occurring at encoding during the study phase (e.g. Bradley et al., 1995; 1996; MacLeod & McLaughlin, 1995.). Therefore, both perceptual and conceptual types of processing are probably involved. This is even more bound to be the case when using word identification, since subjects are not merely asked to discriminate words from non-words as in a lexical decision task, but are required to read the word stimuli aloud.

It ought to be mentioned at this point that no test of memory is a pure test of either integration or elaboration processes. However, word identification, in comparison with other tasks (e.g. word stem or word fragment completion), represents a more reliable and uncontaminated measure of implicit memory (e.g. MacLeod & McLaughlin, 1995).

An incidental free recall for the priming material was used as an explicit memory test to assess the mood-congruent biases at the elaboration stage of information processing (e.g. Denny & Hunt 1992; Elliot & Greene, 1992; Lang & Craske, 1997). Because there seems to be reasonable evidence for predicting implicit memory biases in both anxious and depressed groups and explicit memory biases only in the depressed group, if anxiety and depression are two distinct disorders and a comorbid approach is preferable to a dimensional perspective, then we would expect to find:

- a) only an implicit memory bias for threatening information in the anxious group;
- b) implicit and explicit memory biases for MC information in the depressed group;
- c) an additive effect (on the self-report measures likewise the experimental tasks) in the mixed (anxious and depressed) group; that is an implicit memory bias for depression and anxiety relevant stimuli, and a bias for emotional negative information on the incidental free recall.

3. 6. 2. Method.

3. 6. 2. 1. Experimental design.

The experimental design consisted of a mixed factorial design ($4 \times 4 \times 2$). There was one between-subjects variable - Group (4: depressed, anxious, mixed, control) - and two within-subjects variables - Word Type (4: depression relevant, anxiety relevant, emotional positive, neutral) and Priming (2: primed words, unprimed words).

3. 6. 2. 2. Participants.

There were four groups of participants: depressed, anxious, mixed anxiety-depression and normal control subjects. All subjects were between 20 and 64 and their first language was English. The depressed, anxious and mixed patients were recruited from the outpatient waiting list of the Royal Edinburgh Hospital. The selection criteria for the depressed group ($n = 18$) were: (i) a primary diagnosis of major depression or dysthymia, in the absence of any anxiety disorder according to DSM-IV criteria, and (ii) a score of 16 or more on the Beck Depression Inventory (BDI; Beck & Steer, 1987). This group included 11 outpatients with major depression and 7 with dysthymic disorder. The selection criteria for the anxious group ($n = 18$) were: (i) a primary diagnosis of an anxiety disorder, in the absence of any depressive disorder according to DSM-IV criteria, and (ii) a score of 16 or more on the Beck Anxiety Inventory (BAI; Beck & Steer, 1990). This group included: 5 outpatients with GAD, 3 with GAD and social phobia, 1 with GAD and OCD, 4 with panic disorder, 3 with panic disorder with agoraphobia, and 2 with panic disorder with agoraphobia and social phobia. The selection criteria for the mixed group ($n = 18$) were: (i) a diagnosis of mixed anxiety-depressive disorder (sub-threshold) or a dual diagnosis of any depressive and anxiety disorder (supra-threshold) according to DSM-IV criteria, and (ii) a score of 17 or more on the BDI + BAI. This group included: 2 outpatients with major depression and panic disorder with agoraphobia, 4 with major depression and panic disorder, 3 with major depression and GAD, 1 with dysthymic disorder and panic disorder with agoraphobia, 1 with dysthymic disorder and social phobia, 2 with dysthymic disorder and GAD, and 5 with mixed anxiety

depressive disorder (sub-threshold). The control group consisted of 18 subjects with (i) no known history of (or current) emotional disorder, and (ii) depression and anxiety scores below the cut-offs for the other three groups; they were matched to the other three groups for age and sex.

3. 6. 2. 3. Apparatus and materials.

For the word identification task, there were four types of stimulus words with 32 words of each type (see Appendix 1). There were two types of emotional negative words: depression relevant (e.g. guilty, hopeless, failure, grief, crying) and anxiety relevant (e.g. panic, criticism, mistake, urgent, worry). They were selected from lists of words previously used in studies assessing memory and attentional biases in anxiety and depression (e.g. Bradley & Mathews, 1983; Mathews et al., 1989). These words were originally selected on the basis of three judges' ratings on 0-5 scales according to their relevance to depression and anxiety. Depression relevant words received a score of 3 or more for their relevance to depression and less than 3 for their relevance to anxiety. Words were selected as anxiety relevant if they had received a score of 3 or more for their relevance to anxiety and less than 3 for their relevance to depression. Emotional positive (e.g. pleasant, happy, beauty, affection, charm) and neutral (e.g. paper, stove, garage, umbrella, potato) words were chosen according to Brown and Ure's (1969) and Rubin and Friendly's (1986) criteria. Emotional positive words exceeded 5 on a 7-point scale for their emotionality ($M = 5.52$) and positivity ($M = 5.97$); whereas neutral words fell below 2 for their emotionality ($M = 1.67$) and between 2 and 5 for their positivity ($M = 4.17$). All 128

words were then divided into 2 lists (A and B) of 64 words (with 16 words for each type). List A was used as the priming list and was then mixed with list B to form two new lists of words (A_1 and B_1) so that only half of each had been seen previously. These new two lists were used in the identification task, so that the randomised presentation of primed and unprimed words was forced to be as balanced as possible. In addition, 24 more neutral words, subdivided into 6 blocks of 4 words each, were selected according to the criteria described above. These were used in the initial phase of the experiment. Finally, all the lists (including sub-lists for each word-type) were matched for length and frequency determined by Kucera and Francis's (1967) and Francis and Kucera's (1982) average values, and no statistically significant differences were found. Stimulus words (in uppercase and white on black background) were presented by means of the software MEL (Micro Experimental Laboratory; Schneider, 1988) version 1.0 on an external Compaq 140 14" colour monitor connected to an AcerNote 760iC 486 DX4/75 portable computer.

3. 6. 2. 4. Procedure.

All patients completed the BDI and the BAI one week prior to the test session, except for the normal control subjects who were administered the inventories on the same day as the experimental tasks.

The word identification task was divided into three phases. Each part was preceded by instructions which were rephrased by the experimenter. During the first phase, subjects were asked to read aloud a list of words presented one at a time at the centre of the screen. Instructions emphasised the brief exposure of the stimuli, the presence

of the mask and of the fixation cross at the centre of the screen. In addition, subjects were invited to guess all the words presented even if they were not sure or did not believe they had actually seen a word, since it did not matter if their answers were right or wrong. This list of words was comprised of the 24 neutral words which were presented in a fixed order at the centre of the screen in six blocks of 4 words. For each block, the first word was presented for 133msec, the second for 100msec, the third for 67msec and the fourth for 50msec. Each word was preceded by a fixation cross at the centre of the screen for 1sec, and then replaced by a mask, which was a string of symbols matched for length with the word, for 33msec. The stimulus onset asynchrony (SOA) was 16msec, and the inter-trial interval (ITI), during which the screen was blank, was 3sec (i.e. fixation cross → stimulus word → mask → reading). As the subjects read aloud the words, the experimenter checked the accuracy of their answers by viewing simultaneously the same words on the Notebook's screen until the accuracy of the response was recorded, considering as correct responses only the exact reading of the words. The outcome of this part of the experiment was used to set up the exposure duration of the stimulus words for the third part of the task (i.e. the actual identification task) according to the subject's reading threshold. If the correct answers were at least 3 out of 6 (i.e. 50%) for the words with exposure duration of 133msec, 100msec, 67msec or 50msec, then the following exposure durations were assigned: 100msec, 67msec, 50msec or 33msec respectively. By doing so, a facilitating practice effect was balanced by reducing the exposure duration to a time that allowed participants to identify 30 to 50% of new words. During the second phase, list A (16 words of each type) was presented in a random order as the primes. Subjects were asked to pay attention to the words appearing one

at a time for 6 seconds at the centre of the screen, and to rate them for their emotionality on a 5 point scale (1 = not at all, 2 = a little bit, 3 = moderately, 4 = quite a bit, 5 = very) appearing at the top of the screen after each word. The rating scale remained on the screen until the subject pressed the selected key on the keyboard. Then, the next word appeared, preceded by a fixation cross for 1sec.

In the third phase lists A₁ and B₁ were used. For each subject the list presentation order (A₁B₁ or B₁A₁) and the stimulus presentation order within each list were randomised. Words were presented as in the first phase of the experiment, except for the exposure duration which was constant and adjusted according to each subject's reading threshold in order to avoid floor or ceiling effects. The instructions informed the subjects that because of the greater number of words, there was a short break halfway through. Before the presentation of the lists, 6 neutral words (chosen from the 24 neutral words shown during the first part) were used as practice words.

Immediately after the end of the word identification task, the explicit memory test for the priming list A took place. Subjects were asked to write down all the words they remembered in order to avoid false negatives (words not reported because falsely not attributed to the rating task). For the incidental free recall 5 minutes were allowed. This task was presented after the implicit memory test, because it is not clear how transient the phenomenon of priming might be in word identification (Schacter, 1987). The word identification task might have reminded participants of otherwise unretrievable words, but, on the other hand, recalled words might have facilitated their identification. Moreover, an immediate free recall would have produced a recency effect, which was avoided by the randomised presentation of words during the identification task.

After they had finished, participants completed the following questionnaires: BDI and BAI (normal controls only), the Mood and Anxiety Symptom Questionnaire (MASQ; Watson et al., 1995a; 1995b), and the Eysenck Personality Questionnaire-Revised Short Scale (EPQ-R Short Scale; Eysenck & Eysenck, 1991).

Finally, the Structured Clinical Interview for DSM-IV Axis I Disorders – Research Version (SCID-I; First, Gibbon, Spitzer & Williams, 1996) was carried out.

3. 6. 3. Results.

3. 6. 3. 1. Subject characteristics.

The four groups did not differ significantly in sex ratio or age (see Table 3. 2. below). The control group obtained significantly lower scores than the three clinical groups on all the measures except in the specific anxiety MASQ sub-scale AA (Anxious Arousal), where it did not differ significantly from the depressed group. The depressed and the mixed groups, compared to the anxious group, had significantly higher scores in the BDI and in the MASQ sub-scale AD (Anhedonic Depression). The anxious and the mixed groups obtained significantly higher scores in the two anxiety MASQ sub-scales N-SA (Non-Specific Anxiety) and AA (Anxious Arousal) compared to the depressed group. Thus, on self-report measures, the mixed group shows a comorbid additive effect, scoring highly in all the specific and non-specific anxiety and depression scales.

Table 3. 2. Participant characteristics.

	Group				<i>F</i> (3,68)	<i>p</i>
	Depressed	Anxious	Mixed	Control		
Sex M/F	10/8	11/7	8/10	8/10		
Age	43.11	36.67	34.50	38.00	2.14	<i>ns</i>
BDI	25.67 ^a	14.78 ^b	26.83 ^a	3.44 ^c	40.37	<0.001
BAI	16.83 ^a	24.50 ^a	24.67 ^a	3.44 ^b	17.08	<0.001
MASQ						
GD	46.39 ^a	42.78 ^a	51.06 ^a	23.50 ^b	24.78	<0.001
N-SA	23.67 ^a	32.17 ^b	31.72 ^b	15.17 ^c	20.44	<0.001
AA	24.78 ^a	38.67 ^b	39.22 ^b	19.17 ^a	14.93	<0.001
N-SD	38.39 ^a	30.00 ^a	38.89 ^a	17.39 ^b	19.98	<0.001
AD	86.00 ^a	66.78 ^b	84.06 ^a	46.44 ^c	34.05	<0.001
EPQ-R - Short Scale						
N	10.11 ^a	10.33 ^a	10.78 ^a	4.11 ^b	63.45	<0.001

Note. BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory; MASQ = Mood and Anxiety Symptom Questionnaire; GD = General Disturbance; N-SA = Non-Specific Anxiety; AA = Anxious Arousal; N-SD = Non-Specific Depression; AD = Anhedonic Depression; EPQ-R - Short Scale = Eysenck Personality Questionnaire-Revised Short Scale; N = Neuroticism. Within a row, means with different supra-scripted letters differ significantly from each other ($P < 0.05$).

3. 6. 3. 2. Word identification task.

The implicit memory test utilised in this study used supra-threshold primes with conceptual encoding (i.e. an emotional rating of the four types of words) and was conceived to test attentional and not pre-attentive biases. The latter have been verified only indirectly by calculating (for each group and for each word type) the number of unprimed words subjects were able to read correctly during the main identification task. In other words, the number of correctly identified new words, appearing on the screen for the first time, gives us a measure of pre-attentive biases.

For both word identification and free recall, boxplots revealed some outliers randomly distributed across the conditions (2.43%). These were dealt with through winsorization, by substituting each outlier with the nearest non-outlier value of the corresponding distribution (Winer, 1971).

An overall $4 \times 4 \times 2$ repeated measures analysis of variance (ANOVA) of the primed vs. unprimed identified words was carried out with Group (depressed, anxious, mixed, control) as a between-subjects variable, and Word Type (depression relevant, anxiety relevant, emotional positive, neutral) and Priming (primed words vs. unprimed words) as within-subjects variables. Significant main effects of Group $F(3,68) = 3.88, p < 0.01$, Word Type $F(3,66) = 19.00, p < 0.001$, and Priming $F(1,68) = 1301.77, p < 0.001$ were found, with a higher number of primed words being identified compared to the unprimed ones. Also the interactions Group \times Word Type $F(9,194) = 3.55, p < 0.001$, Group \times Priming $F(3,68) = 12.39, p < 0.001$, Word Type \times Priming $F(3,66) = 6.06, p < 0.001$, and Group \times Word Type \times Priming $F(9,194) = 3.15, p < 0.001$ were significant. However, in order to understand the sources of variation and the nature of the biases occurring at different stages of information processing more in depth, separate ANOVAs were computed for primed and unprimed words, as well as for priming effects. The percentages of words correctly identified in each condition are shown in Table 3. 3. below.

Table 3. 3. Mean percentages of unprimed and primed words correctly identified by each group in each condition. (Standard deviations in parentheses.)

Priming	Group	Word type			
		Depression	Anxiety	Positive	Neutral
Unprimed					
	Depressed	38.19 (10.91)	34.03 (4.51)	29.17 (13.22)	29.17 (11.14)
	Anxious	28.82 (11.57)	37.85 (11.24)	38.19 (14.20)	34.03 (10.11)
	Mixed	37.15 (20.05)	39.24 (16.85)	45.14 (17.88)	33.68 (14.87)
	Control	46.88 (21.89)	45.49 (24.24)	55.90 (25.77)	51.04 (22.30)
Primed					
	Depressed	64.58 (11.94)	58.33 (14.54)	76.39 (9.72)	51.74 (12.46)
	Anxious	67.71 (11.19)	77.08 (10.50)	74.65 (8.43)	70.49 (11.70)
	Mixed	65.28 (21.57)	69.79 (16.64)	69.44 (19.28)	52.43 (22.29)
	Control	72.92 (21.11)	73.96 (21.89)	81.94 (14.20)	72.57 (23.20)

(a) *Primed words.* The results of a 4×4 repeated measures analysis of variance (ANOVA) with Group (depressed, anxious, mixed, control) as a between-subjects variable, and Word Type (depression relevant, anxiety relevant, emotional positive, neutral) as a within-subjects variable showed significant main effects of Group $F(3,68) = 3.44, p < 0.02$, Word Type $F(3,66) = 22.16, p < 0.001$ and interaction of Group \times Word Type $F(9,194) = 4.77, p < 0.001$. Additional ANOVAs with planned orthogonal contrasts emphasised the major differences within the four groups. A significant effect of Word Type was found in the depressed group $F(3,15) = 27.11, p$

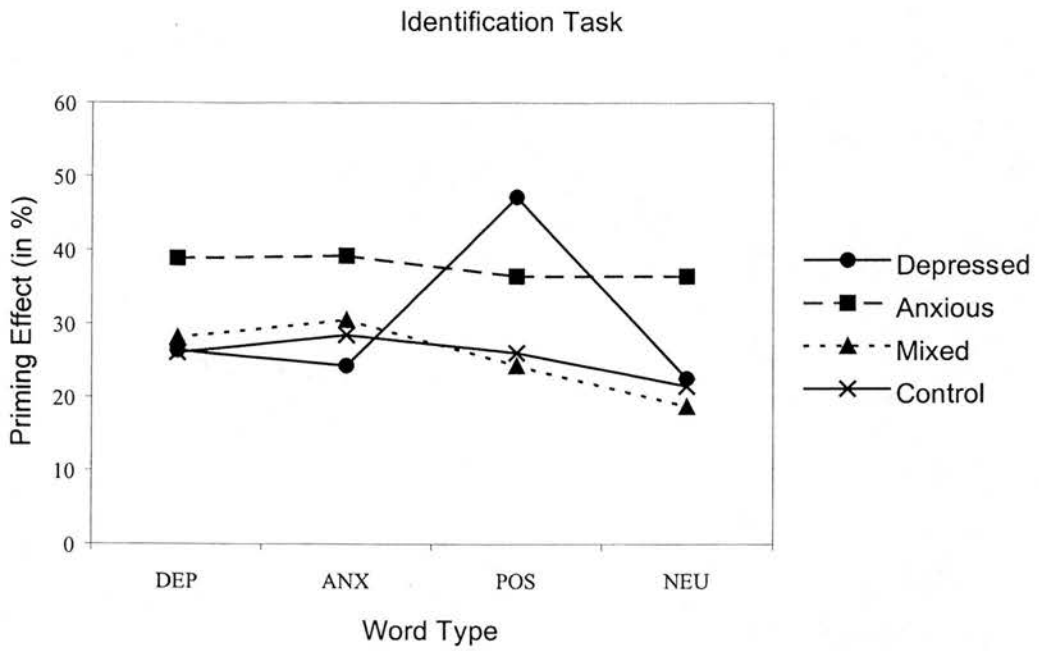
< 0.001. Orthogonal contrasts showed that the depressed patients were able to identify a significantly higher number of positive words compared to the other three word types, with the number of depression relevant words being also significantly higher than the number of neutral words. The significant Word Type effect found in the anxious group $F(3,15) = 4.17, p < 0.02$ was due to the patients being able to identify more anxiety relevant and positive words than depression relevant words, with the number of anxiety relevant words being also significantly higher than the number of neutral words. The mixed group identified a number of neutral words significantly lower compared to the other three word types $F(1,17) = 25.52, p < 0.001$. To estimate between-groups effects, one-way analyses of variance (ANOVAs) with Scheffé's *post hoc* analyses (significance level: $p < 0.05$) were carried out for each word type. These analyses showed a significantly higher number of anxiety relevant words being identified by the anxious group compared to the depressed group, and a significantly higher number of neutral words being identified by the anxious and the control groups compared to the depressed and mixed groups.

(b) *Unprimed words*. The same statistical tests used to analyse the results described in the previous sub-section (a) were replicated for this set of data. This represents the indirect measure of bias at a pre-attentive stage. Significant main effects of Group $F(3,68) = 5.38, p < 0.002$, Word Type $F(3,66) = 3.40, p < 0.02$ and interaction of Group \times Word Type $F(9,194) = 3.14, p < 0.001$ were found. Moreover, within-groups analyses indicated a main effect of Word Type in the anxious group $F(3,15) = 3.14, p < 0.05$, where planned contrasts showed a number of depression relevant words identified significantly lower than the other three word types. The mixed

group identified more positive words compared to the other three types of words $F(1,17) = 25.04, p < 0.001$. Between-groups analyses showed that the control subjects identified a higher number of words compared to the anxious group in the depression relevant words condition, compared to the depressed and anxious groups in the positive words condition, and compared to the three clinical groups in the neutral words condition ($p < 0.05$). The relative ease shown by the control subjects in identifying new words was possibly due to the clinical groups' *resource-limited* performance in a *data-limited* task (Holender, 1986).

(c) *Priming effect.* Priming effects were obtained (for each subject and for each word type) by subtracting the percentage of unprimed words from the percentage of primed words correctly read. Priming scores were then analysed in the same way as the primed and unprimed words. The results indicated significant main effects of Group $F(3,68) = 12.39, p < 0.001$, Word Type $F(3,66) = 6.06, p < 0.001$ and interaction of Group \times Word Type $F(9,194) = 3.15, p < 0.001$. Figure 3. 4. below, shows the magnitude of priming effects for all the groups in each experimental condition. Within-groups analyses revealed constant priming effects for the four word types in the anxious, mixed and control groups, but not in the depressed group, whose priming score for emotional positive words was significantly higher compared to the other three word types $F(1,17) = 51.55, p < 0.001$.

Figure 3. 4. Mean priming scores in percentages for each group and word type (DEP = depression relevant; ANX = anxiety relevant; POS = positive; NEU = neutral).



Between-groups analyses indicated that anxious patients obtained a significantly higher priming score for the depression relevant and neutral words in comparison with the other three groups, and for the anxious relevant words compared only to the depressed patients. Finally, for the emotional positive words, a significantly larger priming effect was found in the depressed group compared to the mixed and control subjects ($p < 0.05$).

3. 6. 3. 3. Incidental free recall.

The 24 neutral words used in the first part of the identification task and the unprimed set of words were excluded from statistical analyses. A repeated measures 4×4 ANOVA was conducted with Group (depressed, anxious, mixed, control) as a between-subject variable, and Word Type (depression relevant, anxiety relevant, emotional positive, neutral) as a within-subject variable. The percentages of words recalled in each condition are shown in Table 3. 4.

Table 3. 4. Mean percentages of primed words recalled by each group in each condition. (Standard deviations in parentheses.)

Group	Word type			
	Depression	Anxiety	Positive	Neutral
Depressed	22.57 (4.86)	17.71 (10.11)	20.49 (10.68)	13.89 (7.60)
Anxious	19.10 (4.53)	22.92 (10.50)	26.04 (8.64)	27.08 (13.56)
Mixed	20.14 (11.25)	30.21 (14.10)	19.79 (10.56)	25.00 (17.68)
Control	17.71 (14.42)	25.00 (10.93)	28.82 (10.75)	28.47 (12.90)

There was no significant main effect of Group $F(3,68) = 2.32$, ns, but significant main effects of Word Type $F(3,66) = 4.08$, $p < 0.01$ and of the interaction between Group and Word Type $F(9,194) = 5.37$, $p < 0.001$ were found. Separate ANOVAs with planned orthogonal contrasts emphasised significant differences within-groups. A significant main effect of Word Type was found in the depressed group $F(3,15) = 7.18$, $p < 0.003$, who recalled significantly more depression relevant and positive

words than neutral ones, with a percentage of depression relevant words being also significantly higher than the percentage of anxiety relevant words. No significant biases were found in the anxious group $F(3,15) = 2.32$, ns, for any word type. The mixed group recalled more anxiety relevant words than depression relevant and positive ones $F(1,17) = 19.61$, $p < 0.001$; whilst the control subjects showed a significant effect of Word Type $F(3,15) = 8.09$, $p < 0.002$ with more positive and neutral words than depression relevant words recalled. The between-groups analyses indicated that the depressed group recalled a lower number of anxiety relevant words in comparison with the mixed group and of neutral words compared to the anxious and control groups ($p < 0.05$).

3. 6. 4. Discussion.

The results of the present study support the main hypothesis that patients with mixed anxiety depression differ quantitatively and qualitatively from patients with pure anxiety or depression only. Comparing the scores obtained by the three groups of patients in the self-report measures, mixed patients scored as highly as the anxious patients on the anxiety measures, and as highly as the depressed patients on the depression measures. Moreover, the three clinical groups' scores did not differ in the non-specific scales: GD, N-SD, N (and N-SA in the anxious and mixed patients).

At first glance, these results seem to indicate that patients with mixed anxiety-depression are "equal to the sum of the worst parts" of the other two groups of patients. However, this additive effect, which would strengthen the comorbid

approach to emotional disorders, is not supported by the results obtained from the implicit and explicit memory tests.

3. 6. 4. 1. Implicit memory test.

The performance of the depressed group in the word identification task showed a large priming effect for emotional positive words which was significantly greater compared to the mixed patients and controls. This indicates that emotional positive information had a larger activation strength, or was paid more attention to, or was more processed (none of them are mutually exclusive) than other types of material, even the depression relevant items. The unequivocal accuracy of this emotional positive bias can be verified by looking at the depressed group's performance for primed and unprimed words separately. A high number of correctly identified unprimed words of any word type would reduce priming effects for those word types, since the difference between the percentages of primed and unprimed words read correctly by the subjects would be drastically reduced. In this study, the depressed group did not show any significant pre-attentive bias for any unprimed word type. However, in addition to an overall positive bias, also a mood congruent bias for depression relevant words compared to neutral material was found in the primed condition. Taken together, these results seem to confirm current literature on implicit memory and attentional biases, in that depression appears to facilitate the maintenance of attention (and not its automatic initial shift) to negative information once patients have focussed on it. This results in a greater difficulty in disengaging from negative material (Mogg & Bradley, 1998; 1999a).

As shown in Figure 3. 4., an overall significantly higher priming effect was found in the anxious group in comparison with the other three groups (except for the mixed and control groups in the anxious relevant words condition, and the depressed patients in the positive words condition). This finding suggests that anxious patients pay generally more attention to any kind of information coming from the external environment than depressed or mixed patients. A good fit to these data is offered by Eysenck's (1992; 1997) hypervigilance theory, which predicts a general hypervigilance in anxious subjects, who are inclined to attend to any task-irrelevant stimuli presented, with broad attention prior to the detection of a salient (e.g. threatening or task-relevant) stimulus. Once detected, there should be, according to Eysenck, a narrowing of attention, which in our case did not take place. One reason for this could be that the emotional rating task contained 16 threatening stimuli presented randomly together with 48 other "less salient" stimuli, so that anxious patients might have been bound to keep their attention broadened all the time during the performance of the task. However, separate analyses of primed and unprimed words revealed a consistency in the pattern shown by the anxious group, with more anxiety relevant, positive and neutral (at a pre-attentive stage only) words correctly identified than depression relevant ones. These results cannot be entirely explained by Williams et al.'s (1988; 1997) model, because their model predicts pre-attentive/attentional biases only for mood congruent material (i.e. threatening information) in clinical anxiety.

Opposite results to the ones just reviewed can be observed in the mixed group. Surprisingly, no implicit memory bias and no difference from the control group in the amount of priming effect for any word type was found in patients with mixed

anxiety depression. Eysenck (1992; 1997) suggested that depressed individuals are characterised by their *passive disengagement* from the external environment (e.g. psychomotor retardation or low motivation); whereas, anxious individuals are characterised by their *active engagement* with the external environment, reflected in their high distractibility and hypervigilance towards any kind of stimuli. In this sense, we speculate that mixed anxiety-depression might have an adaptive function, that is, to protect patients from a highly passive or an overactive engagement with the environment in which they live, maintaining a more adequate level of interest. Obviously, such hypothesised adaptation mechanism would be a dysfunctional one, for it causes the development of a further disorder (i.e. anxiety or depression). Moreover, unlike the control subjects who did not present any significant biases for any primed or unprimed word type, the mixed group exhibited a different pattern, with an overall higher number of positive unprimed words and a lower number of neutral primed words correctly identified. This suggests a passage from an emotional positive bias at a pre-attentive stage to a more comprehensive (positive and negative) emotional bias at an attentional stage of processing. The presence of a positive bias in this group, as well as the depressed and anxious groups is not atypical. In anxiety, this could be accounted for by studies which demonstrated that anxious patients were slowed by both positive and negative words, in comparison to neutral words, on an emotional Stroop task (Martin, Williams & Clark, 1991; Mathews & Klug, 1993). The authors argued that this may be because both word types, whether negative or positive, are highly related to likely personal concerns. For studies showing positive priming effects or positive completion of sentence stems in depression see Power,

Cameron & Dalgleish, (1996) and Teasdale, Taylor, Cooper, Hayhurst & Paykel, (1995).

Summing up the discussion so far, the implicit memory test shows different cognitive patterns in the three clinical groups. The only indication of an additive effect in the mixed group comes from their performance for the primed material, where a bias for depression, anxiety relevant and positive words was found. However, the anxious group differed significantly from both the depressed and mixed groups in the percentage of primed neutral words correctly identified. The mixed group showed also a distinct pattern for the unprimed material with a unique bias for positive information. Therefore, we suggest that anxiety and depression together constitute something different from the mere sum of the two disorders.

3. 6. 4. 2. Explicit memory test.

Different patterns for the three clinical groups were found also in the incidental free recall. The analyses based on the primed words data set indicated an explicit memory bias for anxiety relevant material in the mixed group. The number of anxiety relevant words recalled was significantly higher in comparison with the depressed group, which could reflect a dysfunctional feature of the above-mentioned postulated adaptive mechanism. Interestingly, no significant difference was found among the percentages of depression, anxiety relevant and positive primed words correctly identified by the mixed patients, suggesting impairment at retrieval for depression relevant and positive information in this group.

A similar “impairment” in the retrieval of positive material previously identified was found in the depressed group. In fact, although a higher number of positive compared to neutral words was recalled, this group had previously identified more positive words than any other word type. However, consistent with previous literature (e.g. Bradley et al., 1995; Watkins et al., 1992) the depressed patients were able to recall more depression relevant than neutral words, showing a mood congruent and content specificity bias, in that a higher number of depression over anxiety relevant words was also found.

In line with previous findings, in the explicit memory task, the anxious group did not show any of the biases exhibited in the identification task, as no significant difference of Word Type was found (e.g. Bradley et al., 1995; Lang & Craske, 1997; MacLeod & McLaughlin, 1995; Williams et al., 1988; 1997).

Finally, it is noteworthy that no significant difference between the anxious and mixed groups was found in the explicit memory test.

Overall, these results testify to the value of Clark and Watson’s (1991) tripartite model in distinguishing between specific and common factors in clinical anxiety and depression. The most interesting result of this research was the distinctive cognitive pattern found in patients with mixed anxiety-depression. Beyond any interpretation and theoretical speculations, it seems clear that the presence of both depression and anxiety symptoms changes significantly the profile of implicit and explicit memory biases of “purely” anxious or depressed patients providing evidence of *discriminant group validity* amongst the three clinical groups.

Some studies have recently included a mixed anxious depressed group in their comparative examination of information processing with other groups. One non-clinical study compared performance of high anxiety and high depression group (i.e. mixed) with a high anxiety and low depression group (i.e. anxious only) and a low anxiety and low depression group (i.e. control) on explicit and implicit memory tasks (Lang & Craske, 1997). Stimuli materials included physically threatening, socially threatening and neutral words. No differences were found among the three groups on the incidental free recall, however, both anxious and mixed groups used more physically threatening primed words when completing the word stem task compared to controls. These results are consistent with the ones found in our study where our anxious and mixed clinical groups also identified a greater number of anxiety relevant words compared to neutral ones. We also found evidence of a positive bias in both groups and a bias for depression relevant primed words in the mixed group, but Lang and Craske's (1997) study did not include emotionally positive or depression relevant materials. Moreover, the fact that the presence of depression in their non-clinical mixed group did not change the pattern of results observed in the anxious group is interpreted by the authors as supporting the view that information processing styles are "additive". This appears to be a gross misinterpretation of their results because, firstly, they did not include a high depression low anxiety group (i.e. depressed) and secondly, they did not present their participants with a more complete range of emotional word stimuli (i.e. depression relevant and positive).

Another study used a dot probe task to assess attentional biases in children and adolescent clinical anxiety and mixed anxiety depression (Taghavi, Neshat-Doost, Moradi, Yule & Dalgleish, 1999). Word stimuli comprised physical threat, social

threat, depression related and neutral words. Results showed that, relative to controls, the anxious group exhibited an attentional bias towards threat related information, whereas, the mixed anxious depressed group did not show any biases towards threat or depression related items, relative to controls. The pattern of results obtained in the mixed group in this study is consistent with our findings, in that our mixed group did not differ from the control group in terms of priming effect and did not show any biases for emotionally toned materials. This lends more support to the idea that the presence of depression may moderate the overactive engagement with the environment shown by the anxious group.

One limitation in the present investigation lies in the fact that the primed list of words was always list A. However extreme care was taken in order to make the two lists of stimuli as equivalent as possible (see Appendix 1.). A reassuring sign in this direction is the fact that this study replicates major findings in the current literature assessing implicit memory biases in anxiety and depression. Thus, if for some unknown reason the two lists of words were not equivalent, the possible confound must have been either minimal or negligible.

Another limitation derives from the dimensional perspective adopted in our study. We did not differentiate between sub-threshold ($n = 5$) and supra-threshold ($n = 13$) diagnoses in the mixed group. Although their cognitive patterns did not seem to differ in the two tasks carried out, this might be a restriction to the generalisation of our findings to both diagnostic taxonomies proposed by Clark and Watson (1991), namely: mixed anxiety-depression mild and severe. Consequently, further investigation is needed to test the possibility that the two mixed sub-groups might not behave homogeneously.

3. 7. Summary and conclusions.

In this Chapter we have addressed the issue of attentional and mnemonic processes in anxiety and depression. The study of the functioning of such cognitive processes has dominated the scene of cognitive experimental clinical psychology in the last two decades. Until recently, empirical research and resultant theoretical models have concentrated on the identification of specific cognitive patterns for anxiety and depression in isolation. To a large extent the ongoing debate concerning the overlap between the two disorders has been overlooked by experimental clinical psychologists who have progressed in their work with some degree of “denial and segregation” from the evidence gained in clinical practice. However, once “the last millisecond race” was concluded, researchers have started to look back in order to search for possible causes that might explain the many inconsistencies found. One of the most plausible sources of confound (together with others mentioned above) points towards the lack of well defined experimental clinical groups. Often, it has been the case that nominally “pure” depressed groups had high levels of anxiety or included individuals with mixed anxiety depression which almost certainly will have had an effect on the overall group’s performance on memory and attentional tasks. The present investigation tried to overcome some of the limitations posed by previous studies with the inclusion of a mixed group in the experimental design. This has yielded some very promising results with the identification of three distinct cognitive profiles for anxious, depressed, and mixed anxious depressed outpatients on the implicit and explicit tasks employed in this study.

The mixed group in particular showed no priming effect for any type of information, and its performance did not differ from that of control participants. This seems to suggest that depression might have a mitigating effect on the hypervigilance exhibited by the anxious group, which might bring attentional engagement levels down to a more adequate degree. On the other hand, the mixed group showed a bias for anxiety relevant stimuli on the incidental free recall, which shows that more controlled cognitive processes in this group are permeated with preoccupation.

This represents only one of the first attempts to clarify the relationship between anxiety, depression, mixed states, and automatic and controlled cognitive processes. In the next experimental Chapter we will extend our investigation of mixed anxiety depression to another key area of the cognition-emotion relationship by examining prospective cognitions.

CHAPTER 4

A LOOK INTO THE FUTURE: PROSPECTIVE COGNITIONS.

“I never think of the future. It comes soon enough.”

(Albert Einstein)

4. 1. Introduction.

Cognitive theories of anxiety and depression highlight the importance of prospective cognitions in the development and maintenance of emotional disorders. For example, Beck's (Beck et al., 1979; 1985) schema models view anxiety as characterised by an “anxiogenic cognitive triad” consisting of a view of self as vulnerable, the world as threatening and the future as unpredictable, whereas depression is characterised by the presence of a “depressogenic cognitive triad” comprising a negative view of self, the world and the future. Abramson et al. (1989) have revised the reformulated helplessness theory of depression in terms of hopelessness, stating that the expectancy that negative outcomes will occur and that positive outcomes will not occur plays a major role in the development of hopelessness depression. On the other hand, worry (or anxious apprehension) rather than hopelessness has been pointed at as being responsible for the generalised future expectancy of negative outcomes observed in anxiety (Barlow, 1988; Mathews, 1990). However, despite the important

role played in theories of anxiety and depression, the study of cognitions relating to the future has been somewhat neglected compared to the study of other cognitive processes, such as attention and memory.

In this Chapter we will address the issue of overlap between anxiety and depression from the point of view of future-directed thinking. In order to evaluate similarities and differences among anxiety, depression, and mixed anxiety depression we will present two experimental studies of prospective cognitions involving the three clinical groups. This will allow us to test for cognitive pattern specificity in the mixed group compared to anxious or depressed only, and provide further evidence of discriminant group validity in another important aspect of cognitive functioning. However, before the presentation of the empirical work we shall review some of the relevant literature in this field of study.

4. 2. Review of relevant research.

4. 2. 1. General processes and mechanisms of prospective cognitions.

The most prominent account regarding the processes and mechanisms behind the way people anticipate future outcomes originates from the early work of Tversky and Kahneman (1973). The authors proposed that people use what they termed *availability heuristic* when making judgements about the frequency or the probability that an event will happen. Specifically, people will judge the likelihood of a future event according to how easily they can recall an example of a similar event from

long-term memory or imagine it happening. Thus, the easier it is to bring relevant instances to mind or construct a scenario leading to the event happening, the more likely an event is deemed to be. The second mechanism, relating to the construction of a scenario, will be used to estimate the probability of real-life, unique or uncommon events happening. This second mechanism was later recognised to reflect a distinct process and was renamed *simulation heuristic* (Kahneman & Tversky, 1982). In the absence of a database of similar past experiences in long-term memory, the construction of a mental scenario will involve a set of causal explanations leading to the occurrence of a particular event. Again, the easier the production of such causal explanations the higher the likelihood of the event outcome will be judged.

The availability heuristic is susceptible to the criticism of tautology, in that availability is used to explain elevated subjective probabilities, which in turn is invoked as evidence of increased availability, thus creating a circular argument. However, there is some empirical evidence that supports its memory-based aspect. For example, Osberg and Shrauger (1986) found that the most common method used by college students to make subjective predictions about the probability of occurrence of various events was to use the frequency with which a similar event had happened to them in the past. MacLeod and Campbell (1992) also evaluated the validity of the availability heuristic. In their experiment, participants were asked to retrieve specific memories for general common pleasant and unpleasant events and then rate the likelihood of experiencing similar events in the following 6 months. Results showed a negative correlation between recall latency for past events and the perceived future probability of similar events. Moreover, when the Velten (1968) mood-induction procedure was used to manipulate experimentally the relative

accessibility of memories of positive and negative events, the perceived future probabilities of similar events also changed as predicted by the availability heuristic account. That is, increases in recall latencies resulting from the mood manipulations were related to reductions in perceived probability, and vice versa. However, since in both studies it was not checked whether subjects were actually retrieving specific instances from long-term memory, it is possible that what was being used to make predictions was a more general impression memory, that is a pre-computed index of how frequently certain events had happened in the past.

More recently, also some clinical investigations have shown the relationship between retrospective and prospective cognitions. In a series of experiments carried out with suicidal patients Williams, Ellis, Tyers, Healy, Rose and MacLeod (1996) found that, when asked to recall specific past events and generate specific future events in response to cues, suicidal patients recalled past events and generated future events that were more general compared to controls. Moreover, the specificity level for past and future events was significantly correlated for both groups. Further experiments carried out within the same study found that experimental induction of a generic retrieval style reduced the specificity of future anticipation. These results were interpreted as in support of the view that the same intermediate descriptions used to search autobiographical memory are also used to generate possible future events.

MacLeod, Tata, Kentish and Jacobsen (1997c) used an adaptation of the verbal fluency task (e.g. Lezak, 1995) – described in more details below – to investigate parallel processes between autobiographical memory and future anticipation in depressed and anxious patients. Participants were asked to generate future and recall past events (positive and negative) in response to different timeframe cues. Results

yielded almost identical patterns for anticipation of future experiences and recall of past events. Specifically, anxious patients anticipated and remembered more negative events than controls, whilst depressed patients anticipated and recalled fewer positive events relative to controls. Similar results have been replicated in a study with depressed patients (Cropley, MacLeod & Tata, 2000). Recently, MacLeod and Salaminiou (2001) have reported a study carried out with depressed inpatients which seems to suggest that the reduced anticipation of positive events in depression arises from a difficulty in accessing mental representations of such experiences.

Thus, there is evidence from both clinical and non-clinical studies that the availability heuristic offers a valid explanatory power for the phenomenon. People appear to use their memories of what happened in the past to predict what will happen in the future, but it is not clear what exact intermediate processes are entailed.

On the other hand, a number of other studies provide evidence that anticipation of future events is also based on simulation heuristic processes, rather than simply on retrieval of relevant past events. For example, Buehler, Griffin and Ross (1994) investigated the phenomenon of “planning fallacy”, that is believing that one’s own project will be completed on time despite being aware of plentiful contrary evidence with similar projects. Using a think-aloud procedure, the authors found that subjects focused primarily on future scenarios rather than on past experience when predicting their completion times. Moreover, participants attributed their past prediction failures to external, transient, and specific factors discounting their relevance for predicting future outcomes. However, the optimistic bias was eliminated for subjects instructed to connect relevant past experiences with their predictions.

Other studies have been able to influence judgements by manipulating the accessibility of causal explanations. Using the 1984 U.S. presidential debate (Reagan vs. Mondale), Levi and Pryor (1987) found that subjects who had been asked to generate reasons for why a candidate would win, estimated that particular candidate as being more likely to win. However, simple imagery of a candidate winning did not influence predictions, showing that causal thinking is more important in future judgements than simply bringing a mental picture to mind. Hoch (1985) also found that the over-optimistic probability judgements of graduate business students concerning the results of their job search efforts 9 months away (e.g. starting salary) could be normalised by asking participants to provide con reasons for the positive outcomes. Similarly, clinical studies have shown that by asking mood-disturbed individuals to generate counter-explanations for hypothetical future negative events, reduces their increased pessimism (e.g. MacLeod & Tarbuck, 1994; MacLeod, Williams & Bakerian, 1991). Further support for the idea that causal explanations play an important role in future expectancy derives from studies that have found that both normal and clinical samples report events as being more likely to happen if they can provide more pro reasons than con reasons (e.g. MacLeod, 1994; MacLeod, Tata, Kentish, Carroll & Hunter, 1997b). In another study, dysphoric individuals have been found to provide more con relative to pro reasons for the probability of negative events happening, and more pro relative to con reasons for negative events. Moreover, relative to the control group, dysphoric participants provided more internal and global reasons for why positive events would not happen and for why negative events would happen (Byrne & MacLeod, 1997).

Hence, there seems to be enough evidence to support the use of both the availability and the simulation heuristics in prospective cognitions. Given some puzzling findings, such as the ones reported by Buehler et al. (1994) in which past relevant events were discounted, future research will need to clarify further the circumstances under which the use of one heuristic rather than the other is given precedence.

4. 2. 2. Prospective cognitions in anxiety and depression.

One of the most common ways of investigating future-directed thinking is by presenting individuals with a range of future oriented positive and negative sentences expressing possible life events, and by asking subjects to judge the probability that those events might happen to them in the future (usually within a certain timeframe) by using a Likert-type scale. This task, known as subjective probability judgement task (SPJT), has been used in various experiments that have examined the extent to which anxious and depressed individuals differ in their judgements compared to controls (e.g. MacLeod, 1999).

Several clinical and non-clinical studies have found that high trait anxious individuals, dysphoric students, and anxious and depressed patients show an increase in probability judgements for negative events compared to controls (e.g. Butler & Mathews, 1983; 1987; MacLeod et al., 1991; 1997b; MacLeod & Cropley, 1995; Pietromonaco & Markus, 1985). Moreover, anxiety and depression have been found to be associated with a lower expectancy for positive events (e.g. MacLeod et al., 1997b; MacLeod & Cropley, 1995; Pyszczynski, Holt & Greenberg, 1987), although these findings have not always been replicated (e.g. Butler & Mathews, 1983;

Pietromonaco & Markus, 1985). Therefore, it would appear that when using the SPJT to assess future expectancy, both depressed and anxious individuals show a higher perceived likelihood for negative events and a lower expectancy for positive events (although this last result has proved to be more inconsistent). Inconsistencies found in the probability judgements for positive events could be partially explained by the fact that different studies have used different items and slightly different versions of the SPJT. For example a variant of this procedure requires subjects to provide “yes/no” answers to indicate whether or not a number of positive and negative events are likely to happen to them (e.g. Andersen, Spielman & Bargh, 1992; Dunning & Story, 1991).

Moreover, given the high levels of overlap and co-occurrence of anxiety and depression in the same individuals, it is likely that inconsistent results are due to failure in forming distinct experimental clinical and non-clinical groups, a problem common to other areas of experimental cognitive clinical psychology, such as attention and memory. In an attempt to address the issue of anxiety-depression overlap in prospective cognitions, MacLeod, Byrne and Valentine (1996) used the SPJT within the positive affect (PA) / negative affect (NA) framework (Watson et al., 1988) to assess the extent to which specific cognitions concerning the future could be explained by this two-dimensional model of affect. Consistent with this view, factor analyses revealed one factor consisting of PA, positive expectancies and negative loadings from hopelessness and depression measures; whereas, NA, anxiety, worry, negative expectancies and depression loaded onto a separate factor. Thus, NA, which is postulated to be a common dimension for both anxiety and depression, is strongly correlated with the anticipation of negative events; while PA,

which is negatively related only to depression, is correlated with the anticipation of positive events. Similar results were also obtained in another study that looked at the specificity of attributional styles for positive and negative events (Ahrens & Haaga, 1993).

Finally, a recent study carried out with clinically depressed participants replicated a decreased expectancy for positive events in depression but also highlighted the fact the depressed individuals showed relatively greater automaticity in their future event predictions (measured by “yes/no” responses to presented life events), as indicated by the fact that a concurrent attentional load (irrelevant task) caused only a smaller increase in response latency compared to controls (Andersen & Limpert, 2001). This has been interpreted as evidence that depressed individuals use a future-event schema that can be applied in an automatic fashion when making predictions about future events.

Another common method for estimating prospective cognitions in anxiety and depression is the personal future task (PFT). The PFT requires subjects to generate possible future experiences that might occur within 3 time periods (e.g. the next week, including today; the next year; the next 5 to 10 years). Participants are given 1 minute for each timeframe to generate as many events as possible. This task includes 2 conditions: one where participants are asked to think of future positive events (i.e. things they are looking forward to or that they would enjoy) and one where they are asked to think of future negative events (i.e. things they are not looking forward to or that they are worried about). The total number of events in each condition gives a measure of anticipation of future positive and negative events (e.g. MacLeod, 1999).

This task has been used in studies that have assessed future-directed thinking in parasuicides. Results have shown that relative to controls, both depressed and non-depressed parasuicides generate a smaller number of future positive events but a comparable number of negative items (MacLeod, Pankhania, Lee & Mitchell, 1997a; MacLeod, Rose & Williams, 1993; MacLeod, Tata, Evans, Tyrer, Schmidt, Davidson, Thornton & Catalan, 1998). However, these findings have not been replicated in a recent study that assessed future-directed thinking in parasuicides, although the authors raise the possibility that this might be the result of their hospital control group being admitted for serious physical problems as opposed to minor physical complaints as in the studies reported above (O'Connor, Connery & Cheyne, 2000).

The same paradigm was used in a study with high anxiety and low depression (i.e. anxious), high anxiety and high depression (i.e. mixed), and low anxiety and low depression (i.e. controls) college students (MacLeod & Byrne, 1996). Results showed that, relative to controls, anxious participants anticipated more negative experiences, whereas, the mixed group showed both an increase in anticipated negative experiences and a reduced anticipation of positive experiences. Comparable results derive from a clinical study with anxious and depressed patients (MacLeod et al., 1997c). In this study anxious individuals generated more negative future events but not fewer positive events, whilst depressed patients generated fewer future positive events but not more negative events. Similar results have recently been replicated in a study that used future-directed imagery (i.e. assessed speed, vividness and detailedness of mental images formed following the presentation of positive and negative future event cues) with a student sample (Stöber, 2000). In particular,

anxiety was correlated with enhanced imagery for negative future events, whilst depression correlated only with reduced imagery for positive events.

Put together, these results suggest that when a PFT is used to assess prospective cognitions anxiety is associated with an increase in negative expectancy, depression is associated with a decrease of positive expectancy, and mixed anxiety depression is associated with both an increase in negative anticipation and a lack of positive anticipation.

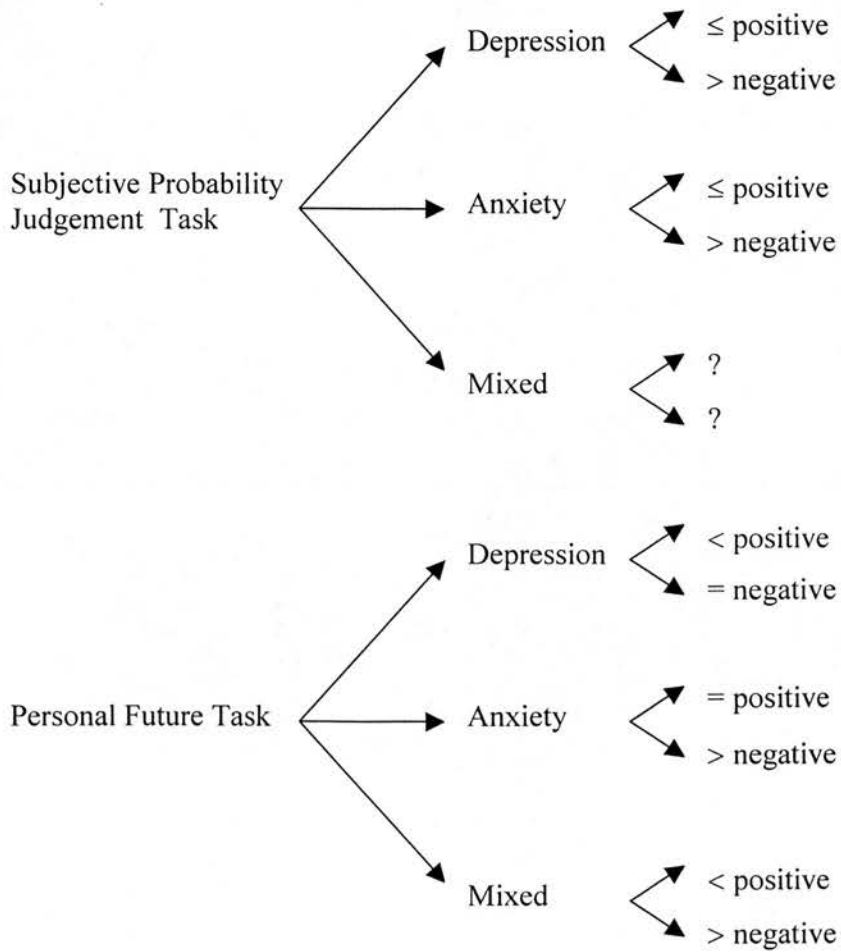
4. 3. Summary and hypotheses.

The literature reviewed so far suggests that prospective cognitions in anxiety and depression are characterised by distinctive mental processes that lead to an altered perception of the likelihood of future events. Specific mechanisms have been postulated that may guide individuals in their probability judgements about future life events, namely, the availability heuristic (i.e. recall of relevant memories) and the simulation heuristic (i.e. simulation of future possibilities). Evidence for the validity of both these mental processes exists but research in anxiety and depression has been inconclusive as to which processes and under which circumstances are used to make specific predictions regarding future positive and negative events. Equally inconclusive have been some research findings that have shown a depressive increased expectancy for negative events and an anxiety reduced expectancy for positive events. Different stimuli materials and procedures as well as the co-occurrence of anxiety and depression in the same individuals have been held

responsible for these inconsistent findings. All of these are valid points and several researchers have indicated very similar issues when investigating attentional and mnemonic processes in anxiety and depression (e.g. McNally, 1995; Roediger & McDermott, 1992; Sanz, 1996). However, another more general point that emerges regards the methodology adopted in the research reported above. Experimental studies have shown that when a SPJT is used to explore future-directed thinking, both anxiety and depression are associated with higher probability judgements for future negative events and lower probability judgements for positive events, although findings for this last aspect are less conclusive. On the other hand, when a PFT is employed, research has shown that depression is associated only with a reduction of positive anticipation, anxiety is associated only with an increase in negative anticipation, and (non-clinical) mixed anxiety depression is associated with both a reduced anticipation for positive events and an increased anticipation for negative events (see Figure 4. 1. below).

Without the need of much speculation, it would appear that the two tasks are probably examining the same expectancy phenomenon from different angles, or at least they are making use of separate mechanisms and tapping into distinct mental processes that are utilised to make prediction in different ways.

Figure 4. 1. Expectancy of future positive and negative life events in depressed, anxious and mixed anxious depressed individuals, as measured by the SPJT and the PFT.



The PFT, in the form described above, seems to produce a spurious measure of expectancy and its result seems to reflect mainly a measure of hope and worry. Subjects are instructed to report either future events that are known as being very likely to happen (i.e. already planned) "...things that you know are going to happen..." or, in the positive condition, "...things you are looking forward to, or that

you would enjoy if they happened...” (i.e. subject’s hopes and wishes) or, in the negative condition, “...things that you are not looking forward to, or things that you worry about...” (i.e. subject’s concerns and worries). Thus, depressed subjects show a reduction in positive hopes (i.e. increased hopelessness) and anxious individuals show an increase in negative worries. Compatible with this view are the results from the factor analysis reported by MacLeod et al. (1996). As seen above, measures of hopelessness and generation of positive events loaded both onto the PA factor, whereas both measures of worry and generation of negative events loaded onto the NA factor. If this was the case then subjects are more likely to use the availability heuristic when reporting future life events that “they know” are going to happen, and they would be more prone to use the simulation heuristic when imagining “all the good things and the bad things that may be”.

On the other hand, the SPJT is a more direct measure of expectancy, in that subjects are requested to judge the probability that a given set of presented events will or will not happen to them in the future. In this case subjects are likely to use a mixture of the availability and simulation heuristics, that is, they might recall relevant memories (if available) and then simulate the possibility that a particular event might happen (or happen again) in the future. Another possibility is that participants might use a “*feeling heuristic*” (Schwarz & Clore, 1983), which refers to a simplifying judgement method. According to the authors, when making evaluative judgements, individuals often do not use effortful analytic strategies, such as in this case recalling relevant events and then make a summary of similar instances before making a judgement, but rather use their momentary affective states in making judgments. In other words, subjects will base their evaluative judgement on the answer they give to the question

“How do I feel about this event?”. Siemer and Reizenstein (1998) found that this type of heuristic is more likely to be used under conditions of reduced processing capacity, induced by time pressure and competing task demands, which tallies with the findings reported above about depressed participants applying future-event schemas automatically when making “yes/no” predictions about future events under conditions of concurrent attentional load (Andersen & Limpert, 2001). According to Forgas (1995; 1999) retrieval of relevant information (in this case availability heuristic) will be more likely to occur when people engage in substantive and elaborative processing, whereas the feeling heuristic will be used whenever subjects are not motivated or able to engage in extensive processing and so simplify the task by relying on limited information and using whatever shortcuts are available to them. Consequently, conditions of personal motivation and processing capacity will be influencing factors in the type of processing method an individual will adopt.

Therefore, the seemingly inconsistent results obtained in anxiety and depression appear to be caused by a number of factors: overlap and co-occurrence of anxiety and depression, different sample groups (clinical vs. non-clinical), utilisation of different stimuli materials, employment of different tasks (SPJT vs. PFT), variations of these tasks, and the resulting type/s of heuristic/s used by participants.

With the following experimental investigation we shall endeavour to overcome some of the above limitations, first of which the overlap of anxiety and depression, since this is the main focus of our research programme. As we have done in the previous experiment on attention and memory, we will attempt to identify specific processing patterns concerning prospective cognitions in three clinical groups of depressed, anxious, and mixed anxious depressed outpatients. A question of interest is whether

anxiety, depression and mixed anxiety depression are related differentially to altered expectancies for future positive and negative events. It is expected that the mixed group will show a distinct profile compared to the other two clinical groups as well as a control group, and that patterns in results for the four groups may change as a consequence of a different methodology being employed to measure prospective cognitions.

In the present study two experiments will be carried out each employing a different task, namely PFT and SPJT. This procedure will allow us to carry out a direct comparison between the two methods and to test the hypothesis that in the same clinical and control groups different results about seemingly identical mental processes can be yielded depending on the experimental task used.

The first experiment will make use of an extended and modified version of the PFT. As for the canonical version of this task, participants will be asked to generate positive and negative possible personal future life events. However, following the generation task, participants will also be asked to give probability ratings for each of the self-generated events to indicate how likely those events are to happen in the future on a 10-point Likert scale. This will provide us with two measures: an "availability" measure (i.e. the number of life events generated under each condition), and a probability judgement measure (i.e. subjective estimates of the likelihood that each event generated will happen). Previously, MacLeod et al. (1998) have asked probability judgements of generated events to a group of high-risk parasuicides, but these were used to obtain composite scores of number of generated events, probability judgements and pleasure ratings for the same events. In contrast, we shall treat each measure as separate. The PFT will also be slightly modified in

order to make it a simpler and more unified task. Specifically, instead of providing participants with three different timeframes (i.e. the next week, including today; the next year; the next 5 to 10 years) and assigning 1 minute for the completion of each sub-condition, a single timeframe (i.e. next year) will be used with a time limit of 3 minutes to complete each condition. Previous research has shown that no difference is found in the number of events generated in the three timeframes (e.g. MacLeod et al., 1997a; 1998; MacLeod & Byrne, 1996), so in order to simplify the task and render it less fragmented and repetitive, “the next year” timeframe was chosen here as a “round and whole” time unit.

Consistent with previous literature (summarised in Figure 4. 1.) it was hypothesised that compared to the control group:

- a) the depressed group would generate less positive future events but an equal number of negative events;
- b) the anxious group would generate more negative future events but an equal number of positive events;
- c) the mixed group would generate both more negative future events and less positive events (although these results have previously been found only in a high anxiety and high depression non-clinical student group, therefore the present study represents an extension of this paradigm to a clinical sample).

As for the probability judgement measure the hypotheses are more tentative in that the literature reviewed reports results of probability judgements only when a SPJT was employed and (apparently) only with “purely” depressed or “purely” anxious groups. Therefore, it was cautiously expected that both depressed and anxious groups would judge negative events as being more likely to happen. No specific hypothesis

was formulated regarding the probability judgements of positive events since the literature presents contrasting results. Similarly, although one might expect a higher future expectancy for negative events and a lower expectancy for positive events in the mixed group, any explicit hypothesis would be rather provisional since no previous study has investigated subjective probability judgements on a PFT in a clinical mixed anxious depressed group.

The second experiment will make use of an extended and modified version of the SPJT. Participants will be presented with sets of positive and negative sentences expressing possible future life events and will be requested to make subjective probability judgements on a 10-point Likert scale regarding the likelihood that each event will happen to them in the next year. However, since this paradigm gives us the opportunity to experimentally manipulate the materials presented, negative stimuli will be distinguished for their relevance to either anxiety or to depression, which allows for the content-specificity hypothesis to be also tested. Moreover, emotional priming will be introduced to investigate the potentially interacting effect of different types of information received prior to the production of future self-relevant expectancies. Using the emotional priming paradigm with clinically depressed subjects, Power et al. (1996) have demonstrated that “key decisions in relation to the self-concept are influenced moment-to-moment by small but significant changes in the emotional valence of relevant input”. In the present experiment emotional positive (i.e. happy), emotional negative (i.e. sad and fearful), and neutral faces will be used both subliminally and supraliminally to examine possible emotional priming effects occurring at pre-attentive and attentional levels of information processing.

Finally, response latencies for each probability judgement in each of the experimental conditions will be also recorded.

In accordance with the theoretical background set in this and in previous Chapters it was hypothesised that compared to the control group:

- a) the depressed group would show an increased negative (depression relevant) expectancy (mediated by the NA component) and reduced positive expectancy (PA component);
- b) the anxious group would show only an increased negative (anxiety relevant) expectancy (NA + PH components);
- c) the mixed group would show both an increased negative (depression and anxiety relevant) expectancy (NA + PH components) and reduced positive expectancy (PA component). This last hypothesis is entirely based on theoretical grounds since no known study to date has investigated prospective cognitions in a mixed anxious depressed group using the SPJT.

Moreover, distinctive emotional priming effects and response latencies on the SPJT are expected to be found in the four groups depending on the priming condition (subliminal vs. supraliminal) and prime type (sad, fearful, happy, neutral).

4. 4. Experiment I: the personal future task (PFT).

4. 4. 1. Method.

4. 4. 1. 1. Experimental design.

The experimental design consisted of a mixed factorial design (2×4). There was one within-subjects variable – Event (2: positive, negative) – and one between-subjects variable – Group (4: depressed, anxious, mixed, control). The dependent variables were the number of events generated and future probability judgements for each of the two conditions.

4. 4. 1. 2. Participants.

There were four groups of participants: depressed, anxious, mixed anxious depressed and normal control. All subjects were between 18 and 55 years old. The depressed, anxious and mixed groups were recruited from the outpatient waiting list of the Psychology Department, Royal Edinburgh Hospital. The waiting list was screened at regular intervals and a total of 228 outpatients were identified as possible cases on the basis of the referrers' letters. These were contacted and invited to take part in this study. Of the original 228 outpatients, 50 attended the research session who also met inclusion criteria for this study. Another 11 outpatients did not meet inclusion criteria. The inclusion/exclusion criteria for these three clinical groups have been articulated in detail in Chapter 1 (Sections 1. 2. 2. and 1. 3. 2.) and Chapter 2

(Section 2. 4. 1.). In brief, depressed outpatients met diagnostic criteria for either a Major Depressive Episode and/or Dysthymic Disorder; anxious outpatients met diagnostic criteria for GAD with or without a concomitant diagnosis of Panic Disorder, Agoraphobia or Social Phobia; and the mixed anxious depressed outpatients met either the DSM-IV-TR research criteria for sub-threshold MAD (see Chapter 2, Table 2. 1.) or full criteria for both an anxiety and a depressive disorder as described in Chapter 1.

The depressed group ($n = 15$) included 2 outpatients with major depression (MD); 2 with MD and dysthymic disorder (DD); 3 with MD and sub-threshold GAD; 1 with MD and sub-threshold GAD and social phobia (SP); 2 with MD, DD and sub-threshold GAD; 2 with MD, DD and sub-threshold GAD and SP; 2 with MD, DD and sub-threshold GAD and panic disorder (PD); and 1 with MD, DD and sub-threshold PD and OCD.

The anxious group ($n = 15$) included: 6 outpatients with GAD; 1 with GAD and SP; 1 with GAD, SP and sub-threshold PD; 1 with GAD and PD with agoraphobia (AP); 1 with GAD and sub-threshold PD with AP; 1 with GAD, PD with AP and sub-threshold OCD; 1 with GAD, PD and sub-threshold OCD; 1 with GAD, AP and sub-threshold PD; 1 with GAD and sub-threshold DD; and 1 with GAD, PD, SP and sub-threshold MD.

At this point it is noticeable that only 2 anxious outpatients had concurrent sub-threshold depressive symptoms, against 11 depressed outpatients with simultaneous sub-threshold anxiety symptoms. This, although on a small scale, reflects well one of the features of overlap, namely that it is far more common to encounter a “pure” case of anxiety than it is to come across a “pure” case of depression.

The mixed group ($n = 20$) included: 4 outpatients with MD and GAD; 2 with MD, DD and GAD; 3 with MD, GAD and PD with AP; 1 with MD, DD, GAD, PD with AP and SP; 1 with MD, GAD, PD with AP and SP; 1 with MD, DD, GAD and PD; 1 with MD, DD, GAD and SP; 1 with MD, DD, GAD, SP and AP; 1 with MD, PD with AP and SP; 1 with MD, GAD, PD with AP, SP and OCD; 1 with MD, GAD and sub-threshold SP; 1 with DD, GAD and sub-threshold MD and PD; 1 with MD, DD, GAD and sub-threshold PD; and 1 with mixed anxiety depressive disorder (MAD, sub-threshold).

Three more points worth of note are: a) the common overlap between MD and DD both in the depressed and the mixed groups; b) the frequent overlap among the anxiety disorders in the anxious and mixed groups; c) the widespread overlap between anxiety and depression in the depressed and mixed groups with GAD being the anxiety disorder more frequently associated with depression.

The control group consisted of 20 participants with no known history of (or current) emotional disorder who were matched to the other three groups for age and gender. These included university and hospital employees and students, and acquaintances.

4. 4. 1. 3. Apparatus and materials.

Questionnaires. The following self-report questionnaires were used and administered in the given order (see Appendix 2.).

Measures of symptoms severity:

- *Beck Depression Inventory-II* (BDI-II; Beck, Steer & Brown, 1996). This is probably the most widely used instrument utilised to evaluate the severity of depressive symptoms in adults. In this version, it consists of 21 self-report items developed to assess symptoms corresponding to the DSM-IV criteria for major depressive disorder.
- *State-Trait Anxiety Inventory* (STAI; Spielberger et al., 1983). This is a very common instrument used both in clinical practice and research to state and trait anxiety as defined in Chapter 1. In its “Form Y” used in this research, it consists of two separate self-report scales. The state anxiety scale contains 20 statements that assess how the respondent feels “right now, at this moment”. The trait anxiety scale is composed of 20 items that evaluate how the respondent “generally feels”.
- *Mood and Anxiety Symptoms Questionnaire* (MASQ; Watson et al., 1995a; 1995b). This instrument has been described in details in Chapter 2. It is a 90-item

self-report measure that has been specifically developed to distinguish between common and specific symptoms of anxiety and depression.

Measures of cognitive attitudes:

- *Beck Hopelessness Scale* (BHS; Beck, Weissman, Lester & Trexler, 1974). This is a scale designed to quantify hopelessness. It consists of 20 true-false items that measure the generalised negative expectancy about one's own future.
- *Penn State Worry Questionnaire* (PSWQ; Meyer, Miller, Metzger & Borkovec, 1990). This is a 16-item self-report scale assessing trait worry.
- *Dysfunctional Attitude Scale* (DAS; Power, Katz, McGuffin, Duggan, Lam & Beck, 1994). In its 24-item version used in this study, this scale is used to assess the global level of dysfunctional attitudes and content-specificity dysfunctionality in relation to its three sub-scales of Achievement, Dependency and Self-Control.
- *Rosenberg Self-Esteem Scale* (RSES; Rosenberg, 1965). This is a 10-item measure global self-esteem. Each item is scored on a 5-point Likert scale ranging from -2 (Disagree strongly) to +2 (Strongly agree), so that the maximum negative (or lowest) self-esteem score is -20 and the maximum positive (or highest) self-esteem score is +20.

Measure of emotions:

- *Basic Emotions Scale* (BES; Power, submitted). This is a newly constructed scale that measures current state (i.e. during the last week) and trait (i.e. in general) experience of the basic emotions (anger, sadness, disgust, fear and happiness), as well as the impact and coping methods used with each emotion. Each part of the scale contains 30 items: the five basic emotions and an additional five emotion terms related to each of the basic emotions drawn from linguistic analyses of Johnson-Laird and Oatley (1989).

Experimental tasks. The following tasks were employed in this study in the given order.

Mill Hill Vocabulary Scale (MHVS; Raven, 1965). This is a standardised vocabulary task used to provide an index of the general level of education a person has attained. The “Form I Senior” used in this study consists of 33 multiple choice vocabulary items (see Appendix 3.). Thirty-three words, increasing in difficulty, are presented. Under each word are placed groups of six words. The subject’s task is to underline the word among the six which is a synonym of the word above.

Verbal Fluency Task (FAS-Test; e.g. Lezak, 1995). This is a common neuropsychological task used to test the spontaneous production of words beginning with a given letter. In this study the most commonly used letters F, A, and S were used and subjects were given 1 minute to produce as many words they could think of

beginning with each letter. The score is the sum of all admissible words for the three letters. Inadmissible words are proper nouns, wrong words, variations and repetitions, and these are not counted as correct.

Personal Future Task (PFT; e.g. MacLeod et al., 1993). This task is modelled on the FAS-Test and has been described in detail above. As already mentioned, in this study a modified and extended version of the PFT was especially devised. Participants were asked to generate as many personal future events as possible and to provide the experimenter with a brief description of each event. There were two conditions: positive and negative. In the positive condition participants were instructed to:

“Think about *positive* things happening to you in the next 12 months (next year) starting from today. Future positive experiences, things you are looking forward to, things that you would enjoy. These can be trivial or important things, and they can be things that you know are going to happen or things that you think may reasonably happen. Try to think of as many positive things as you can, until I tell you to stop.”

Likewise, in the negative condition participants were instructed to:

“Think about *negative* things happening to you in the next 12 months (next year) starting from today. Future negative experiences, things you are not looking forward to, things that you worry about. These can be trivial or important things, and they can be things that you know are going to happen or things that you think may reasonably happen. Try to think of as many negative things as you can, until I tell you to stop.”

The time limit for each condition was set to 3 minutes and, after each condition, participants were asked to rate each generated event on a 10-point Likert scale (1 = It will not happen, 10 = It will definitely happen) for probability that those events would or would not happen to them in the next year.

An audiocassette recorder was used to record the FAS-Test and the PFT as well as a stopwatch in order to measure the time limit accurately.

4. 4. 1. 4. Procedure.

Participants were tested in individual sessions. Upon arrival participants were given the opportunity to ask questions about the research study and for the outpatients to ask questions regarding their future psychological treatment. Then, after a consent form was signed, participants were administered the self-report measures described above. These were given one at the time and in the same order, and the experimenter rephrased the instructions of each questionnaire in order to ensure that participants were clear about the correct way to fill them in. Afterwards, the three experimental tasks were executed in the order given above. The MHVS was administered in its “paper-and-pencil” form. Participants were asked to chose and underline a word for each of the 33 items. They were encouraged to answer each item even though they were unsure of what the correct answer was, as it was emphasised that it did not matter if their answers were right or wrong. The FAS-Test was then used to assess verbal fluency levels. The three letters, F, A, and S were given one at a time and in the same order for 1 minute each, and responses were recorded both manually, by the experimenter, and with an audiotape recorder, so that participants could produce words as fast as they could without having to wait for the manual transcription. These first two tasks served as control tasks and they were used here to control for potential differences in the level of education (MHVS) and verbal fluency (FAS-Test) among the groups, as these would inevitably affect results in the PFT.

Finally, the PFT as described above was administered in counterbalanced order, so that half of the subjects in each group received the positive condition first followed by the negative condition and the other half was given the two conditions in the reverse order.

At this point, the tasks used for Experiment II were employed with the same participants, but these will be described later on in this Chapter for the sake of clarity.

In the end, participants were debriefed and the Structured Clinical Interview for DSM-IV Axis I Disorders – Research Version (SCID-I; First et al., 1996) was used to ascertain the participants' diagnostic clinical status.

4. 4. 2. Results.

4. 4. 2. 1. Subject characteristics.

The four groups did not differ significantly in age or gender ratio (see Table 4. 1. below). In general, the control group obtained significantly lower scores than the three clinical groups on all the clinical self-report measures (i.e. BDI-II, STAI, MASQ, BHS, PSWQ, DAS, Self-Esteem, and BES), except for the DAS-Self-Control subscale where no group differences were found, and the subscale "Happiness" (trait and state) of the BES where, as expected, controls gained higher scores. Overall, as expected, the mixed group appears to be the most severely affected of the three clinical groups due to the co-presence (above-threshold) of at least one mood and anxiety disorder.

Table 4. 1. Participant characteristics.

Variable	Group				Test	<i>p</i> <
	Depressed (<i>n</i> = 15)	Anxious (<i>n</i> = 15)	Mixed (<i>n</i> = 20)	Controls (<i>n</i> = 20)		
Gender (M/F)	7/8	10/5	5/15	9/11	$\chi^2(3) = 6.10$	.11
Age	34.07 (9.99)	38.20 (12.16)	33.35 (11.34)	32.10 (10.05)	$F(3, 66) = 0.96$	.42
BDI-II	31.93 _{ab} (7.25)	19.00 _{ab} (7.11)	37.85 _{ab} (9.52)	3.65 _A (4.20)	$F(3, 66) = 83.80$	.001
STAI						
State	48.07 _{ab} (6.53)	41.60 _{ab} (10.33)	58.45 _{ab} (11.87)	27.95 _A (5.74)	$F(3, 66) = 39.40$	.001
Trait	63.27 _{ab} (6.91)	54.60 _{ab} (7.69)	66.35 _{ab} (7.40)	31.65 _A (6.93)	$F(3, 66) = 91.17$	.001
MASQ						
GD	46.33 _{ab} (6.73)	36.13 _{ab} (9.25)	51.55 _{ab} (9.77)	24.50 _A (5.20)	$F(3, 66) = 43.79$	.001
N-SA	26.07 _{ab} (5.44)	27.53 _{ab} (5.63)	34.60 _{ab} (6.23)	16.85 _A (5.41)	$F(3, 66) = 32.58$	.001
AA	27.47 _b (6.64)	31.80 _a (11.38)	39.75 _{ab} (11.16)	19.00 _A (2.75)	$F(3, 66) = 19.80$	.001
N-SD	41.40 _{ab} (6.80)	28.67 _{ab} (8.31)	44.85 _{ab} (10.59)	17.50 _A (5.36)	$F(3, 66) = 45.88$	.001
AD	88.13 _{ab} (6.67)	71.93 _{ab} (11.34)	88.25 _{ab} (13.11)	48.00 _A (11.05)	$F(3, 66) = 56.59$	.001
BHS	14.93 _{ab} (3.49)	10.33 _{ab} (4.03)	13.85 _a (4.96)	2.35 _A (2.39)	$F(3, 66) = 41.44$	.001
PSQW	64.40 _a (11.01)	65.87 _a (11.03)	69.20 _a (8.15)	40.35 _A (14.38)	$F(3, 66) = 26.07$	.001
DAS						
Achievement	34.53 _a (7.42)	33.73 _a (11.44)	39.70 _a (9.56)	21.70 _A (7.77)	$F(3, 66) = 13.82$	.001
Dependency	37.67 _a (8.07)	34.33 (10.65)	40.20 _a (10.85)	27.70 _A (6.54)	$F(3, 66) = 6.81$	.001
Self-Control	31.20 (6.81)	30.87 (7.92)	33.55 (7.24)	28.25 (6.96)	$F(3, 66) = 1.80$	.16
Total	103.40 _a (13.91)	98.93 _a (23.22)	113.45 _a (19.49)	77.65 _A (12.01)	$F(3, 66) = 14.70$	.001
Self-Esteem	-9.73 _{ab} (5.16)	-1.93 _{ab} (6.26)	-9.30 _{ab} (6.28)	13.60 _A (4.17)	$F(3, 66) = 74.69$	.001

Table 4. 1. Participant characteristics (continued *i*).

Variable	Group				Test	<i>p</i> <
	Depressed (<i>n</i> = 15)	Anxious (<i>n</i> = 15)	Mixed (<i>n</i> = 20)	Controls (<i>n</i> = 20)		
BES						
State						
Anger	19.87 _a (7.21)	19.07 _a (6.10)	23.80 _a (8.47)	12.30 _A (4.76)	<i>F</i> (3, 66) = 9.85	.001
Sadness	25.20 _{ab} (4.75)	17.93 _{aB} (6.63)	27.70 _{ab} (7.57)	9.65 _A (4.72)	<i>F</i> (3, 66) = 34.20	.001
Disgust	18.80 _a (7.96)	15.07 _{aB} (7.70)	23.15 _{ab} (10.01)	7.55 _A (2.19)	<i>F</i> (3, 66) = 15.30	.001
Fear	27.47 _a (6.06)	28.93 _a (4.30)	32.10 _a (7.43)	14.40 _A (6.29)	<i>F</i> (3, 66) = 30.51	.001
Happiness	13.00 _{ab} (5.04)	19.87 _{aB} (5.50)	12.70 _{ab} (4.18)	27.50 _A (5.66)	<i>F</i> (3, 66) = 35.47	.001
Trait						
Anger	20.73 (7.73)	19.67 (5.39)	25.80 _a (7.67)	15.25 _A (4.58)	<i>F</i> (3, 66) = 8.95	.001
Sadness	28.87 _{ab} (6.00)	20.20 _{aB} (7.12)	28.50 _{ab} (8.33)	11.75 _A (5.11)	<i>F</i> (3, 66) = 26.89	.001
Disgust	22.40 _a (10.22)	16.53 _B (7.17)	25.70 _{ab} (9.36)	9.95 _A (3.68)	<i>F</i> (3, 66) = 14.93	.001
Fear	30.27 _a (7.81)	32.20 _a (6.70)	33.15 _a (6.96)	18.35 _A (6.36)	<i>F</i> (3, 66) = 18.97	.001
Happiness	15.07 _{ab} (5.39)	24.07 _{aB} (4.93)	17.20 _{ab} (6.23)	31.75 _A (4.88)	<i>F</i> (3, 66) = 35.64	.001
Control						
Anger	26.67 _a (6.48)	20.73 (7.83)	27.35 _a (7.05)	18.80 _A (6.43)	<i>F</i> (3, 66) = 6.94	.001
Sadness	32.80 _{ab} (4.07)	26.33 _B (8.34)	29.00 _a (5.15)	21.10 _A (6.23)	<i>F</i> (3, 66) = 11.57	.001
Disgust	28.80 _a (5.83)	23.00 (8.94)	27.10 _a (7.07)	17.25 _A (6.71)	<i>F</i> (3, 66) = 9.44	.001
Fear	31.80 _a (5.16)	32.13 _a (5.15)	31.00 _a (5.47)	21.65 _A (6.18)	<i>F</i> (3, 66) = 15.33	.001
Happiness	18.73 (8.02)	13.40 (6.86)	18.15 (7.72)	14.35 (6.45)	<i>F</i> (3, 66) = 2.26	.09

Table 4. 1. Participant characteristics (continued *ii*).

Variable	Group				Test	<i>p</i> <
	Depressed (<i>n</i> = 15)	Anxious (<i>n</i> = 15)	Mixed (<i>n</i> = 20)	Controls (<i>n</i> = 20)		
BES						
Identity						
Anger	19.87 (7.98)	13.40 _a (6.31)	22.75 _A (10.15)	13.00 _a (6.97)	<i>F</i> (3, 66) = 6.56	.001
Sadness	26.60 _{ab} (7.46)	17.93 _B (7.92)	24.85 _a (8.72)	13.35 _A (6.49)	<i>F</i> (3, 66) = 11.60	.001
Disgust	21.53 _a (7.60)	15.07 (6.01)	21.75 _a (9.35)	10.35 _A (4.57)	<i>F</i> (3, 66) = 11.10	.001
Fear	23.93 _a (8.78)	23.87 _a (7.00)	24.80 _a (10.04)	13.25 _A (6.14)	<i>F</i> (3, 66) = 8.72	.001
Happiness	15.27 (6.72)	10.53 (5.30)	16.35 _a (8.80)	10.10 _A (5.38)	<i>F</i> (3, 66) = 4.05	.01
State						
Positive	13.00 _{ab} (5.04)	19.87 _{ab} (5.50)	12.70 _{ab} (4.18)	27.50 _A (5.66)	<i>F</i> (3, 66) = 35.47	.001
Negative	22.83 _a (4.67)	20.25 _{ab} (4.66)	26.69 _{ab} (7.29)	10.98 _A (3.29)	<i>F</i> (3, 66) = 31.90	.001
Trait						
Positive	15.07 _{ab} (5.39)	24.07 _{ab} (4.93)	17.20 _{ab} (6.23)	31.75 _A (4.88)	<i>F</i> (3, 66) = 35.63	.001
Negative	25.57 _a (5.91)	22.15 _{ab} (4.91)	28.29 _{ab} (6.80)	13.83 _A (3.96)	<i>F</i> (3, 66) = 25.40	.001
Control						
Positive	18.73 (8.02)	13.40 (6.86)	18.15 (7.72)	14.35 (6.45)	<i>F</i> (3, 66) = 2.26	.09
Negative	30.02 _a (3.27)	25.55 _a (6.32)	28.61 _a (4.93)	19.70 _A (5.45)	<i>F</i> (3, 66) = 14.83	.001
Identity						
Positive	15.27 (6.72)	10.53 (5.30)	16.35 _a (8.80)	10.10 _A (5.38)	<i>F</i> (3, 66) = 4.05	.01
Negative	22.98 _a (5.91)	17.57 (5.14)	23.54 _a (8.02)	12.49 _A (5.34)	<i>F</i> (3, 66) = 12.83	.001

Table 4. 1. Participant characteristics (continued *iii*).

Variable	Group			Test	<i>p</i> <	
	Depressed (<i>n</i> = 15)	Anxious (<i>n</i> = 15)	Mixed (<i>n</i> = 20)			Controls (<i>n</i> = 20)
MHVS	21.47 (3.52)	21.33 (3.96)	19.75 (5.17)	20.30 (4.09)	<i>F</i> (3, 66) = 0.64	.59
FAS-Test	41.67 (8.15)	43.60 (12.60)	36.65 (12.32)	43.30 (12.47)	<i>F</i> (3, 66) = 1.45	.24

Note: BDI-II = Beck Depression Inventory-II; STAI = State-Trait Anxiety Inventory; MASQ = Mood and Anxiety Symptom Questionnaire; GD = General Disturbance; N-SA = Non-Specific Anxiety; AA = Anxious Arousal; N-SD = Non-Specific Depression; AD = Anhedonic Depression; BHS = Beck Hopelessness Scale; PSWQ = Penn State Worry Questionnaire; DAS = Dysfunctional Attitude Scale; BES = Basic Emotions Scale; MHVS = Mill Hill Vocabulary Scale; FAS-Test = Verbal Fluency Test. Within each row, means that share a subscript letter in lowercase differ significantly from the mean reporting the same letter in uppercase (*p* < .05, at least). Standard Deviations in parentheses.

At the other end of the clinical spectrum the anxious group reported the least emotional disturbance (although still significantly higher relative to the control group), reflecting the lower degree of overlap with depression, and the depressed group lay somewhere in between the two.

Of interest are the scores obtained by the three clinical groups on the specific anxiety or depression subscales (see Table 4. 1.). The mixed group scored significantly higher than the depressed group on the specific anxiety MASQ subscale AA (Anxious Arousal), with an intermediate score reported by the anxious group who did not differ significantly from either of them. The other specific MASQ subscale AD (Anhedonic Depression) revealed significantly higher scores for the depressed and mixed groups compared to the anxious participants. Similarly, the depressed and mixed groups obtained higher scores on the N-SD (Non-Specific Depression) MASQ subscale, BDI-II, BHS, "Sadness" BES subscale (state and trait) and lower self-esteem compared to the anxious group. On the other hand, the mixed and depressed participants reported also higher levels of trait anxiety compared to the anxious group, but it was the mixed outpatients who showed higher anxiety levels overall, scoring higher than the other two groups on state anxiety and N-SA (Non-Specific Anxiety) on MASQ.

Thus, self-report measures confirm the picture emerged from the definition of the groups following the structured clinical interviews. We have been able to identify and allocate outpatients to three relatively distinct clinical groups: *a*) a fairly "pure" anxious group, which shows moderate levels of depression but secondary to the anxiety disorder as revealed by both the clinical interview and the relative specificity exhibited on the self-report measures; *b*) a depressed group that shows higher levels

of overlap (as expected) than the ones seen in the anxious group as revealed by the scores obtained on the self-report measures and the clinical interview, but who still maintains depression as its clinical predominance; *c*) a mixed group that shares similar or higher levels of depression compared to the depressed and anxious groups and also shows as high as or higher levels of anxiety compared to the other to clinical groups. Again, as seen in the previous experimental investigation, results from self-report measures show a comorbid additive effect of mixed anxiety depression in terms of symptoms severity. However, these findings are hardly surprising given the fact that the mixed group is the only one of the three clinical groups to meet DSM-IV-TR supra-threshold inclusion criteria for at least one mood *and* one anxiety disorder. The symptomatic or diagnostic level of analysis is, however, rather limited and superficial and we shall try to provide also evidence of qualitative differences among the groups of participants as measured by their performance on the cognitive tasks described below.

No significant differences among the four groups were found on the vocabulary and verbal fluency tasks which indicates that we do not need to control for these factors as they are not likely to have any significant effect on the subjects' performance on the main experimental task.

4. 4. 2. 2. Personal future task (PFT).

A summary of the main PFT results (mean and standard deviation) of generation and probability judgement of future positive and negative events for the four groups is reported below on Table 4. 2.

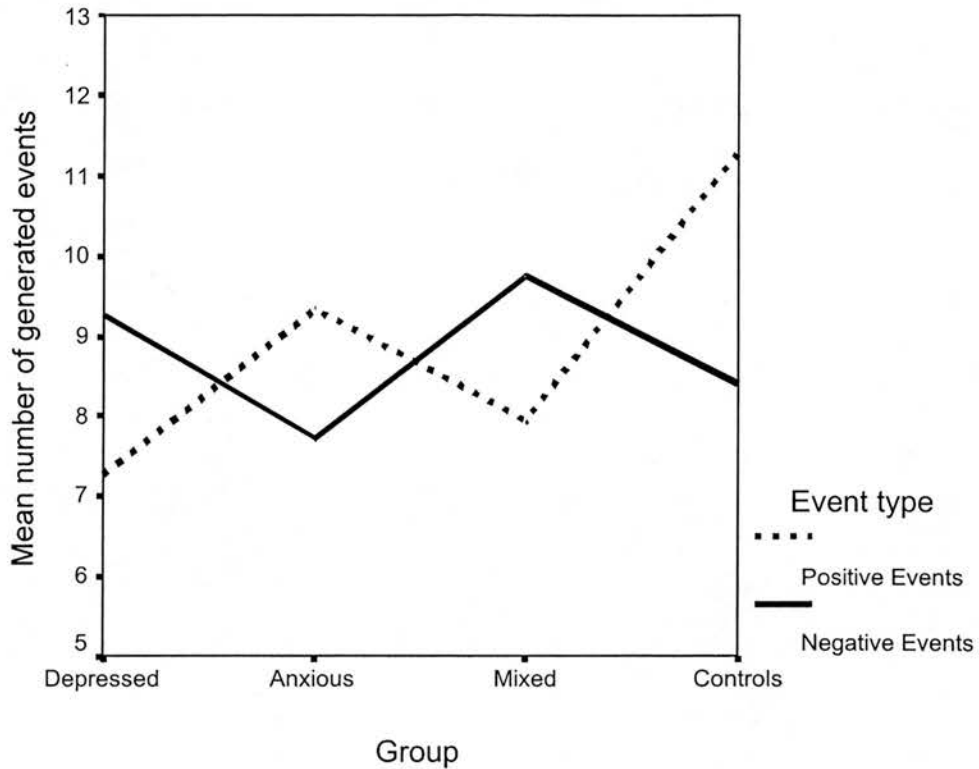
Table 4. 2. PFT. Mean number of generated events and mean probability judgements for each group in the positive and negative conditions. (Standard deviations in parentheses.)

	Group			
	Depressed	Anxious	Mixed	Control
Events generated				
Positive	7.27 (3.43)	9.33 (3.06)	7.95 (3.76)	11.30 (3.56)
Negative	9.27 (3.31)	7.73 (2.58)	9.75 (3.88)	8.40 (4.22)
Probability Judgements				
Positive	5.82 (1.88)	7.46 (1.22)	6.27 (1.54)	7.68 (1.65)
Negative	5.87 (1.40)	4.90 (1.19)	6.41 (1.78)	4.51 (2.07)

The results of a 2×4 ANOVA with Event (number of positive vs. negative events generated) as a within-subjects factor and Group (depressed, anxious, mixed, and control) as a between-subjects factor showed a significant interaction of Event \times Group $F(3,66) = 9.00, p < 0.001$ (see Figure 4. 2. below). Separate one-way ANOVAs were therefore calculated for positive and negative events to examine the source of the interaction. Contrary to predictions, between-group analyses showed no significant differences in the number of negative events generated by the four groups $F(3,66) = 1.05, ns$. However, a significant main effect of Event was found for the positive events $F(3,66) = 4.76, p < 0.01$, with Scheffé's *post hoc* analyses indicating that both depressed and mixed groups generated fewer future positive events compared to controls as hypothesised ($p < 0.05$). Within-group analyses revealed that both the anxious and control groups generated more positive than negative future events $t(14) = 2.60, p < .05$ and $t(19) = 3.81, p < .001$ respectively; the mixed group generated more negative than positive future events $t(19) = 2.17, p < .01$, whereas the depressed group only showed a non-significant trend towards the same direction with

the generation of fewer positive compared to negative future events $t(14) = 1.87, p < .08$.

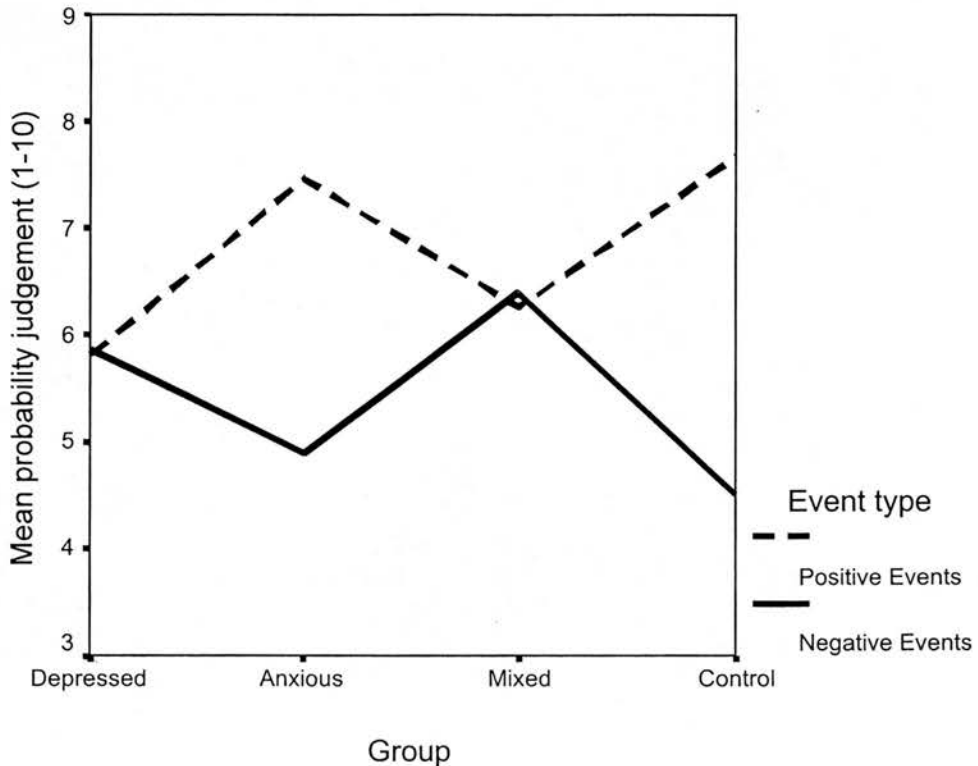
Figure 4. 2. PFT. Mean number of positive vs. negative events generated by each group.



A small number of outpatients (1 depressed, 3 anxious, and 4 mixed) did not complete the probability judgments on the PFT so that for this part of the analyses the number of subjects for the four groups is as follows: depressed ($n = 14$), anxious ($n = 12$), mixed ($n = 16$) and controls ($n = 20$). In order to assess the patterns of probability judgements in the four groups another 2×4 ANOVA was run with Probability (judgement of positive vs. negative future events) as a within-subjects factor and Group (depressed, anxious, mixed, and control) as a between-subjects factor. Results indicated the presence of a significant main effect of Probability

$F(1,58) = 26.22, p < 0.001$ and a more interesting significant interaction of Probability \times Group $F(3,58) = 11.10, p < 0.001$ (see Figure 4. 3. below).

Figure 4. 3. PFT. Mean probability judgements of generated positive vs. negative events for each group.



Between-group analyses showed a main effect Probability in the positive condition $F(3,58) = 4.98, p < 0.01$ with Scheffé's *post hoc* analyses revealing that the depressed group estimated positive events as being less likely to happen compared to the control group ($p < 0.05$). Similarly, a significant main effect of Probability was also found in the negative condition $F(3,58) = 4.34, p < 0.01$, but this time *post hoc* analyses indicated that the mixed group reported negative events as being more likely to happen relative to controls ($p < 0.05$). Results from the within-group analyses showed that both depressed and mixed groups estimated the likelihood of

future positive and negative generated events as equal $t(13) = 0.08$, *ns* and $t(15) = 0.24$, *ns*, respectively. On the other hand, both anxious and control participants indicated that positive events were more likely to happen than negative ones $t(11) = 5.65$, $p < .001$ and $t(19) = 7.37$, $p < .001$, respectively.

4. 4. 3. Discussion.

All together, the performance of the four groups on the PFT shows a mixture of expected and novel findings. The first part of the PFT relating to the generation of future positive and negative personal life events confirms only in part some of the previous literature on prospective cognitions. As predicted, participants in the depressed group generated a fewer number of future positive events, but not a higher number of negative events compared to the control group. This result replicates a general finding of several previous studies carried out with depressed and non-depressed parasuicides (MacLeod et al., 1993; 1997a; 1998), with depressed patients (MacLeod et al., 1997c), and with dysphoric high depression students (MacLeod & Byrne, 1996; Stöber, 2000). The replication of this well-established finding also suggests that the modification brought to the task (i.e. probe for a single timeframe but for a longer duration) is a legitimate amendment and it does not alter the construct validity of the PFT. Conversely, results did not confirm previous findings regarding the association between anxiety and the generation of a larger number of future negative events. In this study anxious participants did not differ significantly from the control (but also depressed and mixed) group in the number of generated negative events. In fact, Table 4. 2. shows that the anxious group reported relatively

less negative events than the other three groups. Two previous studies that have used the PFT have found a positive relationship between anxiety and generation of negative events. One of them (MacLeod & Byrne, 1996) was carried out with a non-clinical sample of high anxiety students, and the second one (MacLeod et al., 1997c) included only panic disorder patients in their anxious group. Therefore, if on the one side our results may conceivably differ from results obtained in a non-clinical sample, on the other side the apparent inconsistency with MacLeod et al.'s (1997c) clinical finding may be due to the discrepancy in the sample characteristics. Specifically, MacLeod et al. (1997c) excluded one GAD participant from their anxious group to maintain group homogeneity (all PD patients). In contrast, GAD outpatients, only four of whom met also full DSM-IV-TR criteria for panic disorder, formed our group. Consequently, it is possible that an increased generation of future negative events may be a peculiarity of panic disorder in the same way that only panic disorder patients have been found to show an explicit memory bias for mood-congruent materials (e.g. Becker et al., 1994; 1999; Cloitre & Liebowitz, 1991; Cloitre et al., 1994; McNally et al., 1989), but not other anxiety groups. In line with previous literature on attention and memory biases reviewed in Chapter 3, it is proposed that our anxious sample showed a higher level of avoidance compared to the non-clinical sample in MacLeod and Byrne (1996) and to the panic disorder sample in MacLeod et al. (1997c), or that simply there is no evidence of negative generation bias in a predominantly GAD sample. This might be a sign that, as suggested above, the availability heuristic and the simulation heuristic may both be involved in the generation of possible future events, in order to generate planned events and events the individual hopes for or dreads respectively. Given that only

panic disorder patients seem to have a facilitated recall of threat-related information, it is plausible that the basis for the availability heuristics (i.e. recall of relevant events) may have been missing. Alternatively, we may be witnessing a case of “vigilance-avoidance” strategy (i.e. initial shift of attention and subsequent disengagement and avoidance) associated only with clinical levels of anxiety (e.g. Mogg & Bradley, 1999a). If this was the case, then the basis for the simulation heuristics (i.e. simulation of future possibilities, a process that requires sustained attention) may have been missing instead.

Table 4. 2. shows that the mixed group generated a slightly higher number of negative events compared to the other three groups, but not enough to reach significance levels. In contrast, this clinical group did report fewer positive events relative to controls, as hypothesised. The only other experimental investigation that has looked at future-directed thinking in a mixed group using the PFT found both an increase in negative expectancy and a decrease in positive expectancy (MacLeod & Byrne, 1996). However, as mentioned above the authors used a dysphoric sample of high anxiety and high depression students, therefore once again it is possible that an increase in negative expectancy may be a feature of non-clinical MAD but not of clinical levels of mixed anxiety depression. Thus, the current study represents an extension of the use of this paradigm to a clinical mixed sample.

Another important extension regards the introduction of a measure of probability judgements in connection with the self-generated life events. Participants were asked to rate each of the generated events on a 10-point scale to test the extent to which they believed that the events reported would actually happen within the same timeframe. Therefore, while the first measure (i.e. generation of events) may

represent an evaluation of personal expectancy in terms of hopes and worries, this second measure (i.e. probability judgements) may reflect a more “rational” judgement driven by cognition and not merely by affectivity. Although it might be argued that the mechanisms involved in such exercise may be similar to the ones implicated in the SPJT (assessed in Experiment II), it was expected that PFT probability judgements would yield different findings as a result of the idiosyncratic self-reference that only personally generated life events can possess. For this reason only tentative hypotheses, “borrowed” and deducted from SPJT literature, were formulated with regards to the expected probability judgements in the four groups. In line with this prediction, our results confirmed the hypotheses provisionally put forward only in part. In the negative condition, the mixed group gave significantly higher probability judgements for self-generated events relative to the control group, whereas in the positive condition, the depressed group judged the likelihood that generated positive events might actually happen as significantly lower to the one reported by controls. However, in the depressed and mixed groups there is no correspondence between generation of positive and negative events and probability judgements of the same events. In fact, within-group analyses showed that the depressed and mixed participants gave equivalent ratings to both negative and positive events (see Figure 4. 3.). These findings suggest that what one hopes for or worries about does not necessarily correspond to what is actually expected to happen (cf. Garcia-Marques & Hamilton, 1996). In fact, although depressed and mixed outpatients hold a bleaker view of the future, in that they can think of more bad than good things, when making judgements at a more “rational” level they appear to show a more fair-minded attitude in that the probability that positive and negative events

might happen is deemed to be equal. Consequently, as proposed above, participants are likely to use different mechanisms in the two parts of the task. They are more likely to use the simulation heuristic in the generation of *possible* life events, but they are more likely to use the availability heuristic when having to give ratings to “materialised” hopes and worries in a more controlled fashion.

On the other hand, anxious and control groups estimated the likelihood that positive events might happen as significantly higher than the probability that negative self-referent events may occur. Once again these findings seem to go in the opposite direction to what was expected in the anxious group, and support the view that anxious participants might be using cognitive avoidance as a means of mood-regulation (e.g. Bonanno, 2001; Thompson, 1994). However, failure to replicate the association between anxiety and high negative expectancy in this second part of the task might well be due to differences in construct validity between the PFT probability judgements and the SPJT ratings, in that they might be tapping into distinct mental processes.

Generally speaking, the depressed and mixed groups behaved similarly and so did the anxious and the control groups. Specifically, both the depressed and the mixed groups generated more negative than positive events, but judged the likelihood of them happening as equal, whereas the anxious and control groups generated more positive than negative vents, and rated the former as more likely to happen. However, there are differences between depressed and mixed participants both in the number of events generated and their probability judgements. The mixed group generated significantly less positive than negative future events, whereas for the depressed participants this within-group difference reflected only a non-significant

trend. In the probability judgement measure, the two groups differed in their relation to the control group, namely the depressed group had lower expectancy for positive events, whereas the mixed group reported higher expectancy for negative events relative to controls. On the other hand, the similarities between the anxious and control groups are to be minimised by two important factors. First, the performance of the anxious group could not be distinguished statistically from the performance of the other two clinical groups. Secondly, the mechanisms or mental processes behind the anxious participants' behaviour in these future-oriented tasks are likely to differ from those of the control group's because of their clinical status and the use of avoidance strategy.

To conclude, this experiment extends the use of the PFT to a clinical mixed anxious depressed group and presents a direct group comparison with anxious or depressed only and control participants. Moreover, with the extension of the PFT to include probability judgements we were able to explore the differential involvement of mechanisms and processes in the different phases of the task. Similarities and differences have emerged among the groups that emphasise once again the importance of distinguishing between common and unique components of anxiety and depression when examining cognitive patterns in the three clinical groups. These, so far distinct, profiles will be investigated further in the next experiment, where the same groups will be compared on a different measure of future-directed thinking: the subjective probability judgement task.

4. 5. Experiment II: the subjective probability judgement task (SPJT).

The main purpose of this second experiment was to examine the role of content-specificity and of pre-attentive/attentional emotional priming on future-directed thinking. It also provided a direct task comparison (with the PFT) of mechanisms and processes involved in prospective cognitions in anxiety, depression and mixed anxiety depression relative to a normal control sample.

4. 5. 1. Method.

4. 5. 1. 1. Experimental design.

The experimental design consisted of a mixed factorial design ($3 \times 4 \times 2 \times 4$). There were three within-subjects variables – Event (3: depression relevant, anxiety relevant, positive); Prime (4: sad, fear, happy, neutral); Condition (2: subliminal, supraliminal) – and one between-subjects variable – Group (4: depressed, anxious, mixed, control). The dependent variables were the future probability judgements and the reaction times for each of the twenty-four conditions.

4. 5. 1. 2. Participants.

The same participants who took part in Experiment I composed also the four experimental groups for the current experiment. Hence, we had a depressed group ($n = 15$), an anxious group ($n = 15$), a mixed anxious depressed group ($n = 20$), and a

control group ($n = 20$). Details of the outpatients' clinical status and the control participants can be found earlier in this Chapter (Section 4. 4. 1. 2.).

4. 5. 1. 3. Apparatus and materials.

Questionnaires. Since Experiment I and II took place during a single experimental session, the same self-report questionnaires were used to gain measures of symptoms severity and cognitive attitudes (see Appendix 2.). To recapitulate the following instruments were administered in the given order: Beck Depression Inventory-II (BDI-II; Beck et al., 1996); State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983); Mood and Anxiety Symptoms Questionnaire (MASQ; Watson et al., 1995a; 1995b); Beck Hopelessness Scale (BHS; Beck et al., 1974); Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990); Dysfunctional Attitude Scale (DAS; Power et al., 1994); Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965); Basic Emotions Scale (BES; Power, submitted).

Experimental tasks. Apart from the Mill Hill Vocabulary Scale (MHVS; Raven, 1965) described above (see Appendix 3.), which was used as a control task for both Experiment I and II, the following tasks were employed in the present study in the given order.

Subject-Paced Reading Task (SPRT; e.g. Mitchell, 1984). This is a task designed to record participants' reading times. Subjects are presented with a brief passage that appears at the centre of a computer screen one sentence at the time and are instructed

to press a keyboard key (the “+” sign on the numeric pad) as soon as they have read (silently) each sentence to move onto the next one, and to continue to do so until the end of the passage. Each “+” keystroke is used to record individual reaction times for each of the passage’s sentences. The final reading speed for each subject is given by the average of all the reading times recorded during the task. The passage used in this experiment was a brief extract from tourist information material describing the city of Edinburgh (see Appendix 4.) and was composed of 110 words divided into 15 short sentences. In this study, the SPRT was compiled by using the experiment generator package MEL (Micro Experimental Laboratory) Professional Version 2.01 (Schneider, 1995).

Subjective Probability Judgement Task (SPJT; e.g. MacLeod et al., 1996). An outline of this task has already been given above. In its original version, it consists in presenting participants with a number of future oriented positive and/or negative sentences expressing possible life events, and by asking subjects to indicate the likelihood that those events might happen to them in the future (typically within a certain timeframe) by using a Likert-type scale. In this study the SPJT has been modified in several ways. Firstly, we distinguished among three types of event stimuli: depression relevant, anxiety relevant, and positive future events. A considerable number of possible future events were pooled together using materials developed in previous published experimental studies (e.g. MacLeod et al., 1991; 1996; Power & Brewin, 1990; Power et al., 1996) and appositely constructing future life events that would potentially satisfy the specificity requirements necessary for the present investigation. Five independent clinical psychologists then judged all of

the available events along three 7-point scales (1 = not at all; 7 = extremely): depression relevant, anxiety relevant, and positive.

A number of events were discarded because they were not discriminative enough between anxiety and depression. For example, sentences such as “You will lose your job” or “You will be evicted” relate equally well to anxiety and depression, since the unfortunate protagonist of such life events would have to cope with an important loss and address the consequences of an uncertain future at the same time. This shows two important points: a) the overlap of anxiety and depression can partially be accounted for by the intrinsic overlapping nature of many adverse life events; b) the resulting difficulty in trying to disentangle the two dimensions and the importance of an appropriate selection of stimuli materials in anxiety and depression research. Consequently, following the independent judges’ ratings we were able to identify 72 (24 of each type) sentences descriptive of depression relevant, anxiety relevant, and positive life events. In order to make the three sets equivalent in terms of life domains covered, each set of 24 events contained 5 work / financial related events, 5 social / relationships events, and 10 self / personal events (see Table 4. 3. below). The depression relevant events set included life events that gained a mean value of 6 or above in the depression scale, 4.40 or less in the anxiety scale, and 1.40 or less in the positive scale. Similarly, the anxiety relevant events set included life events that had mean ratings of ≥ 6 in the anxiety scale, ≤ 4.40 in the depression scale, and ≤ 1.40 in the positive scale (except one event “You will be asked to perform a difficult task” obtained a mean positive rating of 3.40, but this was still deemed to be an acceptable value since it fell below the mid point of the scale). Finally, positive

events included sentences that were judged low in the depression (≤ 2.20) and anxiety (≤ 2.40) scales and high (≥ 6.20) on the positive scale.

Table 4. 3. List of events and mean descriptive values for each set.

Depression relevant events					
Work / Financial		1. You will fail to get the job you want. 2. Your work won't be valued. 3. You will feel isolated at work. 4. You won't receive a promotion you worked for. 5. You will ruin a prized possession.			
Social / Relationships		6. A close friend will move away. 7. Your best friend will die. 8. A steady relationship will end. 9. People will think you are a failure. 10. You will have a serious disagreement with a good friend.			
Self / Personal		11. You will feel inferior. 12. You will feel rejected. 13. You will be disappointed. 14. You will become tired and lethargic. 15. You will be very lonely. 16. Things won't work out as you had hoped. 17. You will regret a major decision. 18. You will lose something very important. 19. All your efforts will be worthless. 20. You will be let down. 21. You will always be unlucky. 22. You will fail to achieve an important goal. 23. Your days will be dull and gloomy. 24. Your plans for the future will look pessimistic.			
Descriptive mean values					
Depression relevance	Anxiety relevance	Positive	Discriminative power (Dep – Anx)	Frequency	Length
6.68	3.50	1.08	3.18	3716	8.88

Table 4. 3. List of events and mean descriptive values for each set (continued *i*).

Anxiety relevant events					
Work / Financial		1. Your job will be under threat. 2. You won't be able to keep up with work. 3. You will feel under pressure. 4. Your house will be broken in to. 5. You will worry about possible financial problems.			
Social / Relationships		6. You will appear stupid. 7. An accident will occur to a loved one. 8. People will act hostile towards you. 9. Everyone will notice how anxious you are. 10. You will be unable to express yourself in social situations.			
Self / Personal		11. You will be nervous. 12. You will be afraid. 13. You will feel out of control. 14. Your life will be in danger. 15. You will be mugged. 16. You will have a serious accident. 17. You will be asked to perform a difficult task. 18. You will be followed by a stranger at night. 19. You won't have enough time to meet urgent deadlines. 20. You won't be able to handle an emergency situation. 21. You will witness a car crash. 22. You will be waiting for the test results of a suspected serious illness. 23. You will receive threatening phone calls. 24. Thinking about the future will scare you.			
Descriptive mean values					
Depression relevance	Anxiety relevance	Positive	Discriminative power (Dep – Anx)	Frequency	Length
3.48	6.65	1.16	3.18	3866.75	9.96

Table 4. 3. List of events and mean descriptive values for each set (continued *ii*).

Positive events					
Work / Financial		1. You will get a good job. 2. You will do well in your work. 3. Your work will be praised. 4. You will have a pay rise. 5. You will win an unexpected prize.			
Social / Relationships		6. You will have good times with friends. 7. Someone close will recover from illness. 8. Things will go well with your partner. 9. You will get on well with your family. 10. You will make a new good friend.			
Self / Personal		11. You will feel happy. 12. You will feel confident. 13. You will be fit and healthy. 14. You will be enthusiastic about things. 15. You will be pleased with yourself. 16. You will achieve a lifelong goal. 17. You will have lots of interesting things to do. 18. You will have a good birthday party. 19. You will receive a very good present from a friend. 20. You will be able to relax and enjoy your weekends. 21. Luck will be on your side. 22. You will receive a compliment. 23. You will have a nice holiday. 24. You will be interested in planning for the future.			
Descriptive mean values					
Depression relevance	Anxiety relevance	Positive	Discriminative power (Dep – Anx)	Frequency	Length
1.23	1.27	6.68	N / A	3989.33	8.88

Moreover, the three sets of events were also matched for length and frequency according to Francis and Kucera's (1982) values (see bottom of Table 4. 3. for the descriptive mean values for each set of events). In addition to the experimental stimuli, a smaller set of 16 relatively neutral events was generated for use as practice trials at the beginning of the task (see Table 4. 4. below).

Table 4. 4. List of events used as practice trials for the SPJT.

Practice events
1. You will take a train to London.
2. You will cook a delicious dinner.
3. You will redecorate your house.
4. You will buy tickets for the theatre.
5. You will go swimming.
6. Your favourite TV program will stop.
7. You will go and see your GP.
8. You will get hiccups.
9. You will read a good book.
10. You will play a musical instrument.
11. You will go to church on Sundays.
12. You will go for a long walk.
13. You will ride a motorcycle.
14. You will lend something to a neighbour.
15. You will wash your car.
16. You will mow the lawn in your garden.

The second modification of the SPTJ consisted in the introduction of emotional primes. Photographs of sad, fearful, happy and neutral faces were taken from standardised material (Ekman & Friesen, 1976) and used as primes in the subliminal and supraliminal conditions (see Appendix 5. for examples of faces shown). A total of 72 photographs were selected to prime each of the experimental trials. Of these,

36 were photographs of female and 36 photographs of male faces, and each set of 36 consisted of 9 photographs for each of the 4 prime types (i.e. 9 sad, 9 fearful, 9 happy, and 9 neutral faces). In addition, 16 more photographs were selected as primes for the practice trials. Of these, 8 were male and 8 were female faces, and each set of 8 consisted of 2 photographs for each of the 4 prime types (i.e. 2 sad, 2 fearful, 2 happy, and 2 neutral faces).

Both events and primes were mounted on 35mm slides and presented with three slide projectors (Kodak Ektagraphic III BR Projector). One of these served to present a fixation cross (a white “+” on black background); a second one (working in synchrony with the first) was used to present the primes and included a Kodak extra bright lamp module to allow the preservation of the stimuli features presented subliminally. The third one was used to show the target events. Each of the three slide projectors was fitted with mechanical shutters. The first two projectors were mounted with Lafayette Instrument shutters (42011NO/SH 322471, and 42011NC/SH 322471 respectively) and the third one with a Melles Griot (04 IES 001) shutter. Projectors and shutters were connected to tachistoscopes. A Lafayette Instrument Constant Illumination Tachistoscope (Model 271-42011*C) controlled the first two, and a Lafayette Instrument Automatic Projection Tachistoscope (Model 271-41010A*C) controlled the third one. The first of these tachistoscopes was set to control shutter times for the subliminal (5 ms) and supraliminal (2 sec) conditions.

Since precise timing is crucial in research that uses very short duration of stimuli display the accuracy of the subliminal 5 ms exposure time was checked, both for the Lafayette Instrument (42011NC/SH 322471) and the Melles Griot (04 IES 001) shutters, by subjecting them to initial calibration testing while being connected to the

Lafayette Instrument Constant Illumination Tachistoscope. These were carried out by using the PST Refresh Detector connected to the PST Serial Response Box (Psychology Software Tools) placed directly in front on the shutters in low lighting conditions. This is a photo transistor able to detect accurately (down to 3.5 ms) the refresh rate of a computer monitor. The calibration testing revealed that the Lafayette Instrument, but not the Melles Griot, shutter produced satisfactory results, hence the reason for using it in combination with the Kodak extra bright lamp module for the presentation of subliminal primes.

Slides were projected onto a 150 (w) × 100 (h) cm white projection screen positioned at approximately 200 cm in front of the projectors. The size of the projected fixation cross was 4 × 4 cm, whereas the size of the projected events and primes was 55 × 37 cm. The primes were projected vertically (i.e. portrait orientation) and the events were projected horizontally (i.e. landscape orientation). Fixation cross, primes and events were all centred in relation to each other and the screen.

The SPJT experiment was also compiled with MEL Professional Version 2.01. The computer program was used to coordinate the tachistoscopic presentation of the stimuli and the recording of the participants' responses. The tachistoscopes, which controlled the projectors and shutters, interfaced with the PC (RM – Pentium III, 800MHz) via a National Instruments Data Acquisition Card (NI-DAQ Lab-PC+), which was used as an output channel for signals to the projectors. The input channel (i.e. the collection of the participants' reaction times) was composed of a microphone (Anchor CollarMic 1000) connected to the PST Serial Response Box Voice Key via an EMO System E720 Phantom Supply. Subjective probability judgements were recorded with an audiotape recorder and logged on at a later stage.

4. 5. 1. 4. Procedure.

After obtaining written consent, participants were asked to fill in the self-report measures listed above and to take part in the PFT experiment reported above. Subsequently, the SPRT and the SPJT were carry out in the given order. The SPRT was used as a control task for the SPJT because, given the nature of the latter (i.e. subjects are required to read sentences silently before emitting probability ratings), any group differences in reading speed would invariably affect reaction times. For this task participants were requested to sit in from of a computer at a comfortable distance from the monitor (normally about 50 cm) and to read the instructions that were presented on the display:

“A short passage will be presented, one phrase at a time, the centre of the screen. Your task is to read each phrase of the passage in your head (not aloud). As soon as you have read one phrase, press the '+' key at the right far side of the keyboard so that the next phrase of the passage will come up. Continue pressing the '+' key as soon as you have read each phrase until the end of the passage. Please ask if you are not sure of what to do or if you have any questions.”

The experimenter, who rephrased the instructions, emphasised that this was not a memory task, that participants would not be required to answer any questions about the passage and that they were asked to read it normally as they would read any other text. This was done in order to avoid that people read each phrase several times in an attempt to study or memorise the content of the passage and by so doing compromised reaction times accuracy. The first time the “+” key was pressed a fixation cross appeared at the centre of the screen in the location where the text would subsequently appear every time the same key was pressed. This first keystroke also produced a reaction time, but it was discarded from analyses.

Once the SPRT was completed, participants were introduced to the SPJT. They were informed that they would be presented a sets of slides containing sentences expressing possible future positive and negative life events, one at the time, and that their task was to read each sentence silently and then judge the probability that each event would happen to them in the next year starting from today. They were also informed that before the presentation of each event, a face would be shown and that during half of the task the faces would be displayed for 2 seconds, while during the other half of the task the faces would be flashed up very quickly, so that they might not be able to see them, but it would not matter. Participants were also instructed to look at the fixation cross which would be in the position where the events and the faces would be shown, and that since a microphone would be used to allow the automatic advancement of the slide trays every time they had rated each event, it was of capital importance that they read the sentences silently and that only reported a number from 1 to 10 (1 = It will not happen, 10 = It will definitely happen) aloud once they had decided. They were then given the opportunity to ask questions before the voice key calibration was carried out. Subjects were told that it was necessary to adjust the microphone sensitivity to the level of their voice. Another MEL compiled program was used for this purpose. Participants were asked to read a series of single words (e.g. fish, one, this, water) that appeared at the centre of the screen one at the time. This task was repeated if necessary until a satisfactory voice detection rate was achieved. Then, participants were invited to sit in front of the projection screen at a distance of approximately 160cm, at which point the lighting of the room was restricted to the emission of light from a black background computer monitor, projectors lamps and a residual amount of natural light coming through inside the

room. This combination created the optimal lighting conditions for this task, in that the room needs to be dark enough to permit a good vision of stimuli presented with slide projectors, but not completely dark since this would not allow appropriate retinal habituation to occur as the presentation of the stimuli (i.e. emission of light) would alternate to complete darkness (e.g. Guyton, 1986). At this point, in order to allow habituation a few minutes were spent during which the instructions for the main task were rephrased and participants were informed that their responses would be audio recorded.

Events and primes were inserted into slide trays in randomised fixed order. There were 4 different randomised fixed orders so that each event was preceded once by each of the 4 primes. The use of these 4 randomised orders was counterbalanced across participants in each group and each participant was presented the same primes and events twice, in 2 different orders (one for each condition). The order of condition was also counterbalanced across participants in each of the four groups, so that in each group approximately half of the participants would receive the subliminal condition followed by the supraliminal condition, and the other half would receive the two conditions in reverse order. Each condition consisted of 8 practice trials followed by 72 experimental trials. In the subliminal condition the sequence of each trial was as follows. Given the synchronicity of the two projectors connected to the Constant Illumination Tachistoscope, a fixation cross was shown at all times except during the exposure of the primes. This served to keep the participants' gaze focused onto the central area of the projection screen and, given the fact that sentences were presented in black ink on white background, it did not interfere with the presentation of the event slides, on the contrary aided accuracy of

reaction times in that participants read the sentences beginning from the same starting point. The fixation cross was present for 5 seconds before the presentation of each trial (i.e. the Inter-Trial-Interval, ITI was 5 sec). Then the prime slide was shown for 5 ms and immediately replaced and masked by the appearance of the target event slide. Thus, the SOA (stimulus onset asynchrony) was 5 ms. The target event remained displayed until participants uttered a number from 1 to 10 to indicate their probability rating, at which point only the fixation cross remained and slide trays were automatically activated to move forward.

With this procedure it was possible to obtain an effective metacontrast masking of the primes. In fact, following Francis' (1997) recommendations our masking had the following features: *a*) a positive small SOA; *b*) a mask that is more luminous than the prime; *c*) short duration of the prime; *d*) no spatial distance between the prime and the mask (i.e. mask superimposed to the prime); *e*) long duration of the mask; and *f*) a broken rather than a continuous or uniform contour of the mask.

After the initial 8 practice trials, participants were again invited to raise any questions or problems, before the experimental trials were started. The supraliminal condition was analogous to the one just described except that the primes were displayed for 2 seconds before the target events. Thus, the SOA was 2 sec while the ITI remained constant at 5 sec., and the 72 experimental trials were preceded by 8 practice trials. Between the first and the second condition there was a short break during which the slide trays were changed and participants were reminded briefly about the difference in the duration of the display of the faces for the following condition (i.e. either shorter or longer). Once the SPJT was completed participants were debriefed and then administered the SCID-I (First et al., 1996).

4. 5. 2. Results.

4. 5. 2. 1. Subject characteristics.

Most of the information regarding the groups' details and scores on the self-report measure and control tasks are reported on Table 4. 1. and described in Section 4. 4. 2. 1. above. Here we will report results obtained by the four groups on the last on the control tasks used specifically for Experiment II (see Table 4. 5.).

Table 4. 5. Group performance on the subject-paced reading task (SPRT). (Values are in ms and standard deviations in parentheses.)

Group				Test	<i>p</i> <
Depressed (<i>n</i> = 15)	Anxious (<i>n</i> = 15)	Mixed (<i>n</i> = 20)	Controls (<i>n</i> = 20)		
2311.80 (1053.25)	2466.13 (736.72)	2492.55 (866.94)	1873.65 (707.89)	$F(3, 66) = 2.22$	.09

Between-group analyses showed that although the control participants were slightly faster at reading the passage, there was no significant difference among the four groups in their performance on the SPRT, consequently this factor was not considered further.

4. 5. 2. 2. Subjective probability judgement task (SPJT).

Probability judgements. Descriptive statistics summarising the performance of the four groups on the SPJT are reported on Table 4. 6.

Table 4. 6. SPJT. Mean probability judgements for the four groups in each experimental condition. Standard deviations in parentheses.

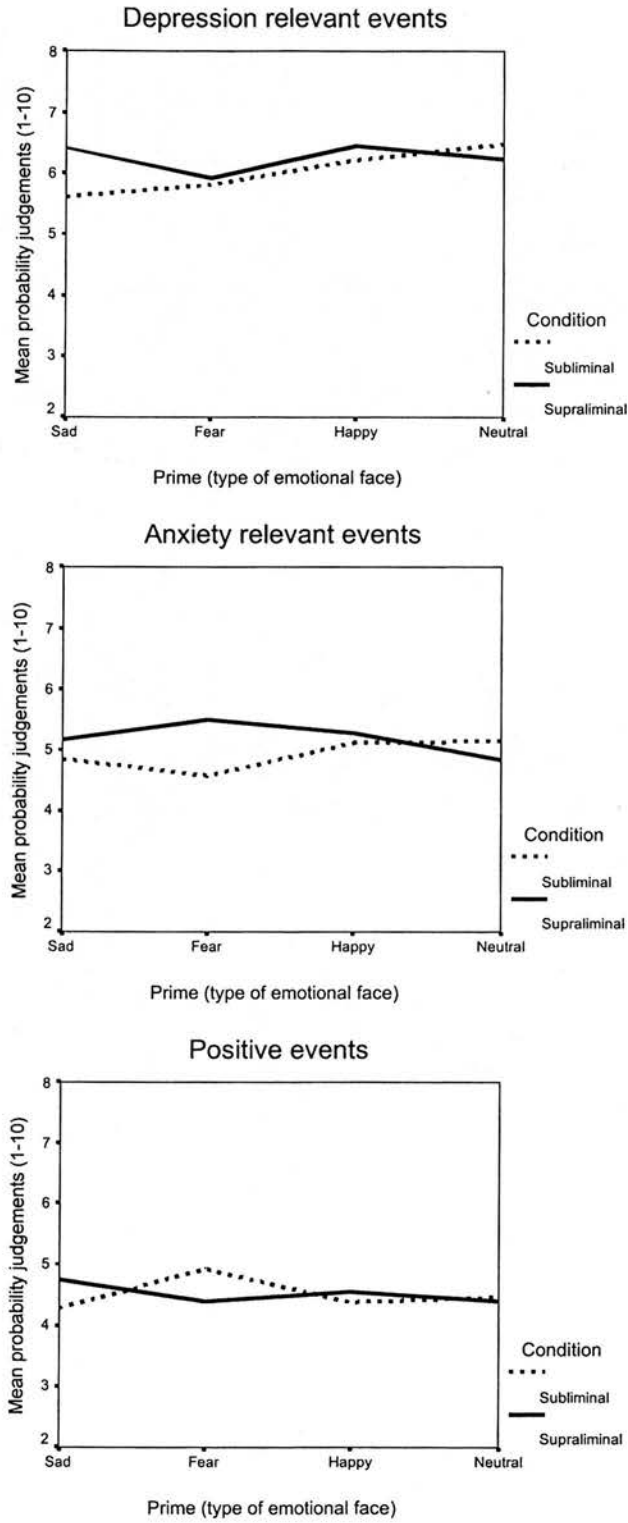
	Group			
	Depressed	Anxious	Mixed	Control
Depression relevant events				
Subliminal				
Sad	5.61 (1.62)	4.61 (0.97)	6.55 (1.90)	3.12 (1.13)
Fear	5.79 (1.52)	4.35 (1.44)	6.34 (1.82)	3.43 (1.22)
Happy	6.21 (1.44)	4.51 (1.72)	6.47 (1.80)	3.26 (1.39)
Neutral	6.50 (1.37)	4.82 (1.43)	6.67 (2.13)	2.97 (1.23)
Supraliminal				
Sad	6.41 (1.54)	4.47 (1.86)	6.53 (1.77)	3.21 (1.39)
Fear	5.92 (1.31)	4.22 (1.33)	6.30 (1.67)	3.02 (0.94)
Happy	6.45 (1.66)	4.70 (1.65)	6.56 (2.07)	3.27 (1.47)
Neutral	6.22 (1.43)	5.11 (1.15)	6.71 (1.84)	3.20 (1.18)
Anxiety relevant events				
Subliminal				
Sad	4.84 (1.34)	5.29 (1.44)	5.68 (1.65)	3.57 (1.22)
Fear	4.60 (1.58)	4.58 (1.21)	6.09 (1.88)	3.63 (1.22)
Happy	5.11 (1.63)	4.77 (1.15)	6.10 (1.81)	3.52 (0.98)
Neutral	5.15 (1.57)	5.09 (1.54)	5.17 (1.88)	3.34 (1.18)
Supraliminal				
Sad	5.16 (1.64)	5.07 (1.11)	6.07 (1.84)	3.32 (1.12)
Fear	5.54 (1.52)	5.28 (1.33)	5.96 (1.59)	3.93 (1.38)
Happy	5.28 (1.59)	4.49 (1.66)	5.51 (1.69)	3.84 (1.30)
Neutral	4.84 (1.51)	4.76 (1.46)	5.41 (1.90)	3.31 (0.98)

Table 4. 6. SPJT. Mean probability judgements for the four groups in each experimental condition. Standard deviations in parentheses (continued *i*).

	Group			
	Depressed	Anxious	Mixed	Control
Positive events				
Subliminal				
Sad	4.28 (1.55)	6.12 (0.86)	4.42 (1.66)	6.90 (1.49)
Fear	4.92 (1.58)	6.37 (1.41)	4.35 (1.69)	7.27 (1.57)
Happy	4.38 (1.19)	5.74 (1.56)	4.44 (1.38)	7.27 (1.35)
Neutral	4.46 (1.51)	6.14 (1.66)	4.24 (1.71)	7.58 (1.31)
Supraliminal				
Sad	4.74 (1.26)	6.23 (1.68)	4.61 (1.39)	7.42 (1.23)
Fear	4.40 (1.69)	5.69 (1.67)	4.51 (1.53)	7.34 (1.01)
Happy	4.54 (1.46)	6.06 (1.32)	4.06 (1.66)	7.40 (1.43)
Neutral	4.40 (1.40)	6.09 (0.97)	4.57 (1.61)	7.51 (1.45)

This Table gives means and standard deviations of the probability judgements yielded by the four groups in each experimental condition. An overall $3 \times 4 \times 2 \times 4$ mixed ANOVA was carried out for the probability judgements data with Event (depression relevant, anxiety relevant, positive), Prime (sad, fear, happy, neutral), and Condition (subliminal vs. supraliminal) as within-subjects factors and Group (depressed, anxious, mixed, control) as the between-subjects variables. Results revealed significant main effects of Event $F(2,65) = 15.32, p < 0.001$ and Group $F(3,66) = 4.58, p < 0.01$, significant 2-way interactions of Event \times Group $F(6,132) = 15.14, p < 0.001$ and Prime \times Group $F(9,198) = 2.99, p < 0.01$, and a significant 3-way interaction of Condition \times Event \times Prime $F(6, 61) = 3.45, p < 0.01$. In order to clarify the source of these interactions, within and between-group analyses were then performed. A general $3 \times 4 \times 2$ repeated measures ANOVA with Event, Prime and Condition as within-subjects variables was carried out within the depressed group (see Figure 4. 4. below). This showed significant main effects of Condition $F(1,14) = 4.89, p < 0.05$ and Event $F(2,13) = 11.56, p < 0.001$. Then, separate 2×4 repeated measures ANOVAs with Condition and Prime as within-subjects factors were computed for each event type, with the intention of identifying the experimental conditions in which the depressed group performed differently as a result of subliminal vs. supraliminal primes. No significant main effects or interactions were found when depression relevant or positive events were taken into account. However, a significant main effect of Condition $F(1,14) = 5.08, p < 0.05$ and interaction of Condition \times Prime $F(3,12) = 7.69, p < 0.01$ were found when anxiety relevant events were considered.

Figure 4. 4. SPJT. Mean probability judgements for the depressed group in each condition.

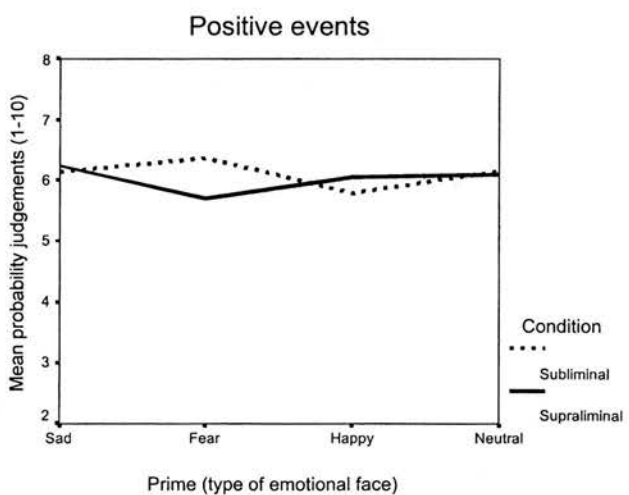
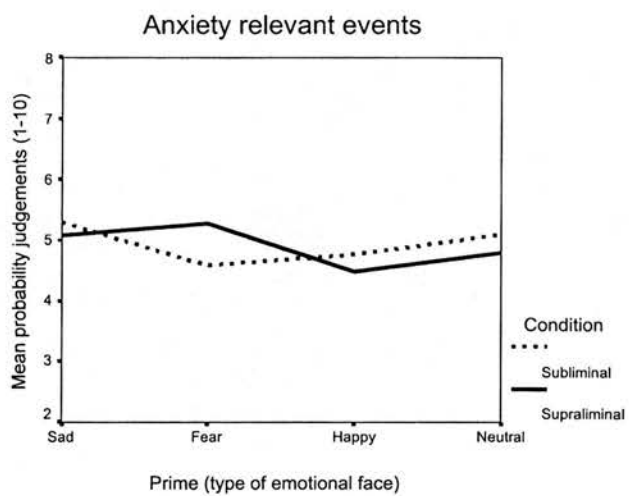
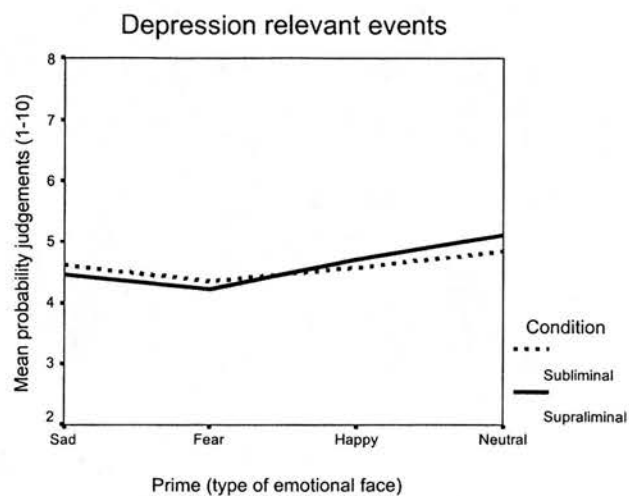


Paired samples T-tests carried out between subliminal vs. supraliminal conditions for each prime type revealed a significant difference for the “fear” prime conditions $t(14) = 3.94, p < .001$ indicating higher probability judgements for supraliminal “fear” relative to subliminal “fear” primes in the depressed group. Finally, no significant effect of Prime was found for each condition and event type considered separately. Afterwards, separate 2×3 repeated measures ANOVAs with Condition and Event as within-subjects variables were computed for each prime type, in order to explore the main effect of Event in more details. When “sad” primes were considered, a significant main effect of Event was found $F(2,13) = 6.08, p < 0.01$, and orthogonal planned contrasts indicated that the depressed group reported higher expectancy for depression relevant than positive events $F(1,14) = 7.41, p < 0.05$ in the subliminal condition, and compared to both anxious relevant and positive events $F(1,14) = 8.04, p < 0.01$ in the supraliminal condition. When “fear” primes were taken into account, a significant interaction of Condition \times Event $F(2,13) = 5.77, p < 0.05$ was found. Planned contrasts revealed that the depressed group reported higher probability judgements for depression relevant compared to anxiety relevant events $F(1,14) = 5.65, p < 0.05$ in the subliminal condition, and compared to the positive events $F(1,14) = 9.52, p < 0.01$ in the subliminal condition. A main effect of Event was also found in the “happy” prime condition $F(2,13) = 12.21, p < 0.001$ with contrasts showing that the depressed group gave higher ratings for depression relevant than anxiety relevant and positive events in the subliminal condition $F(1,14) = 10.61, p < 0.01$, but only compared to positive events in the supraliminal condition $F(1,14) = 11.74, p < 0.01$. Similar effects were also found for the “neutral” prime condition with a main effect of Event $F(2,13) = 6.60, p < 0.01$ and contrasts showing

higher expectancy ratings for depression relevant than anxiety relevant and positive events both in the subliminal $F(1,14) = 11.68, p < 0.01$ and supraliminal $F(1,14) = 9.87, p < 0.01$ conditions.

A similar procedure was adopted with the anxious group (see Figure 4. 5. below). An overall $3 \times 4 \times 2$ repeated measures ANOVA with Event, Prime and Condition as within-subjects variables revealed main effects of Event $F(2,13) = 7.02, p < 0.01$ and Prime $F(3,12) = 7.61, p < 0.01$. Then, 2×4 repeated measures ANOVAs with Condition and Prime as within-subjects factors were carried out separately for each event type. These however, did not indicate any significant effects for any type of event. No significant effects of Prime were also found for each condition and each event type. Separate 2×3 repeated measures ANOVAs with Condition and Event as within-subjects variables, computed for each prime type, revealed a main effect of Event for “sad” prime $F(2,13) = 8.33, p < 0.01$. Orthogonal planned contrasts showed that the anxious group rated as positive events as being more likely to happen compared to depression relevant events $F(1,14) = 12.75, p < 0.01$ in the subliminal condition and compared to both depression and anxiety relevant events $F(1,14) = 9.07, p < 0.01$ in the supraliminal condition. When the “fear” prime was considered, a significant main effect of Event $F(2,13) = 7.99, p < 0.01$ and a significant interaction of Condition \times Event $F(2,13) = 6.50, p < 0.01$ were found. Planned contrasts indicated that positive events were judged as being more likely compared to depression and anxiety relevant events $F(1,14) = 17.87, p < 0.001$ in the subliminal condition and compared to the depression relevant events $F(1,14) = 6.00, p < 0.05$ in the supraliminal condition.

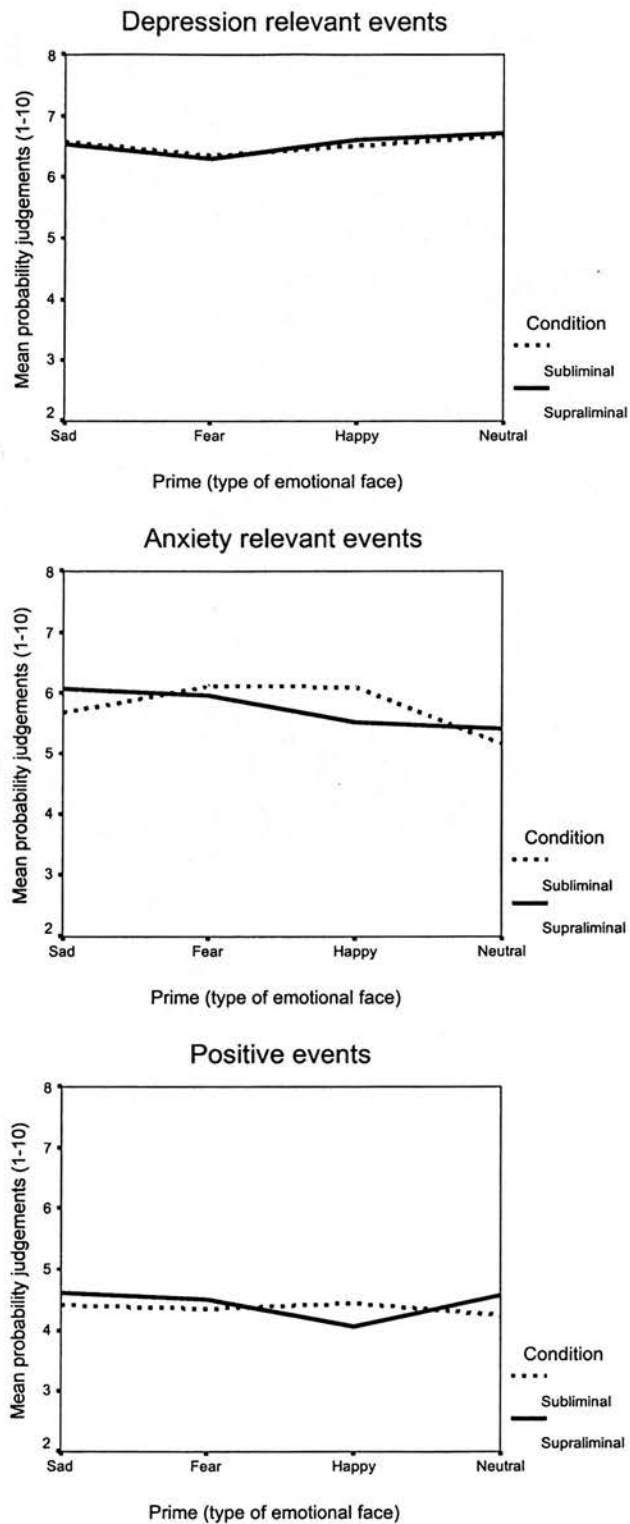
Figure 4. 5. SPJT. Mean probability judgements for the anxious group in each condition.



Also when “happy” and “neutral” primes were taken into account significant main effects of Event were found $F(2,13) = 5.79, p < 0.05$ and $F(2,13) = 4.92, p < 0.05$ respectively. Moreover, for the two prime types, contrasts revealed equivalent effects of higher expectancy for positive events compared to depression relevant events in the subliminal condition $F(1,14) = 5.39, p < 0.05$ and $F(1,14) = 4.80, p < 0.05$ respectively, and higher expectancy of positive events than depression and anxiety relevant events in the supraliminal condition $F(1,14) = 9.57, p < 0.01$ and $F(1,14) = 12.00, p < 0.01$ respectively.

A general $3 \times 4 \times 2$ repeated measures ANOVA within the mixed group with Event, Prime and Condition as within-subjects variables revealed a main effect of Event $F(2,18) = 8.54, p < 0.01$ (see Figure 4. 6. below). Separate 2×4 repeated measures ANOVAs with Condition and Prime as within-subjects factors were carried out for each event type. These revealed no significant effects of any of the variables, and neither did the separate ANOVAs carried out to look for possible effects of Prime for each Condition and each Event. However, the 2×3 repeated measures ANOVAs with Condition and Event as within-subjects variables, computed for each prime type, found main effects of Event for the “sad” $F(2,18) = 7.27, p < 0.01$, “fear” $F(2,18) = 5.09, p < 0.05$, “happy” $F(2,18) = 7.04, p < 0.01$, and “neutral” primes $F(2,18) = 6.15, p < 0.01$; and also a main effect of Condition for “happy” prime $F(1,19) = 4.81, p < 0.05$. Specifically, for “sad” prime the mixed group gave higher probability judgements for depression relevant compared to positive events $F(1,19) = 11.52, p < 0.01$ in the subliminal condition and for both depression and anxiety relevant compared to positive events $F(1,19) = 9.19, p < 0.01$ in the supraliminal condition.

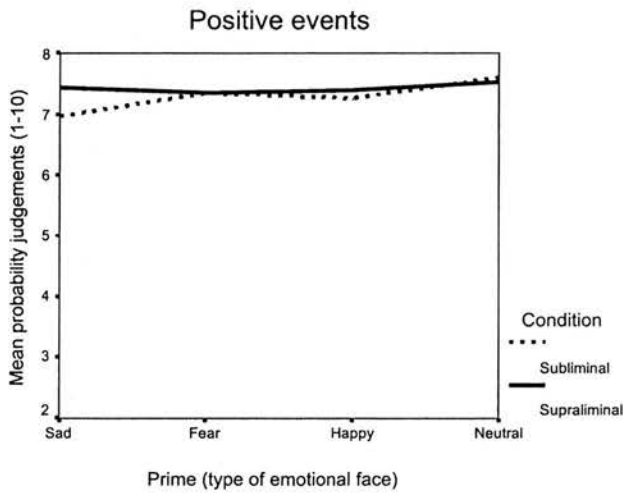
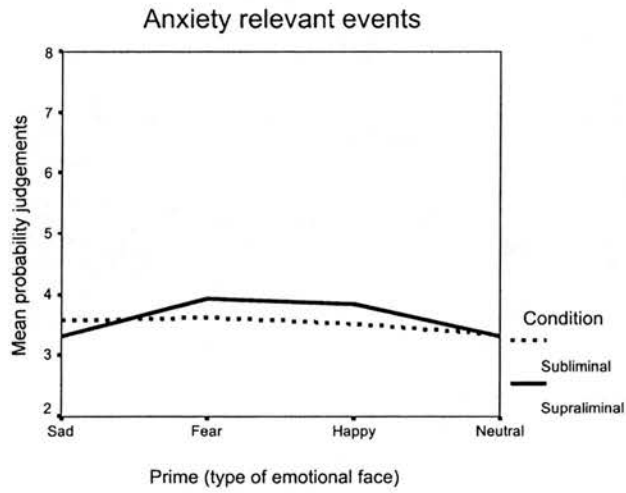
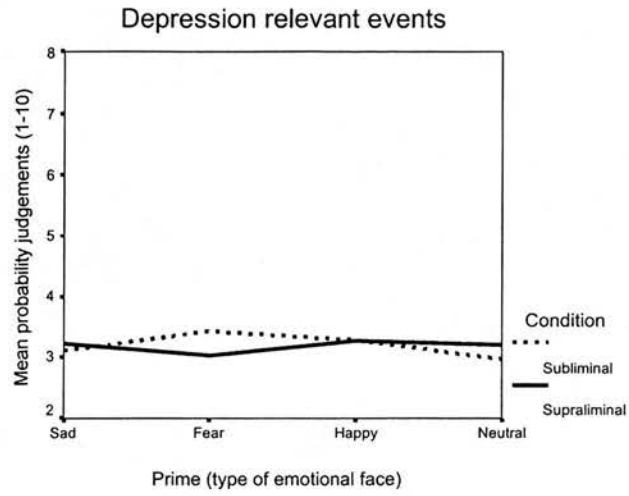
Figure 4. 6. SPJT. Mean probability judgements for the mixed group in each condition.



In the “fear” prime condition the mixed group reported higher ratings for both depression and anxiety relevant events compared to positive events in both subliminal $F(1,19) = 7.67, p < 0.01$ and supraliminal $F(1,19) = 9.22, p < 0.01$ conditions. Similarly, in the “happy” prime condition higher probability ratings were given for depression relevant and anxiety relevant events compared to positive events both in the subliminal $F(1,19) = 12.13, p < 0.01$ and supraliminal $F(1,19) = 10.35, p < 0.01$ conditions. Moreover, in the supraliminal condition the mixed group reported the depression relevant events as being also more likely to happen compared to the anxious relevant ones $F(1,19) = 4.69, p < 0.05$. Finally, for “neutral” primes the mixed group showed higher expectancy for depression relevant compared to both anxiety relevant and positive events in both subliminal $F(1,19) = 11.51, p < 0.01$ and supraliminal $F(1,19) = 10.12, p < 0.01$ conditions.

A $3 \times 4 \times 2$ repeated measures ANOVA with Event, Prime and Condition as within-subjects variables was carried out also within the control group (see Figure 4. 7. below). This indicated a main effect of Event $F(2,18) = 70.33, p < 0.001$ and a significant 3-way interaction of Condition \times Event \times Prime $F(6, 14) = 3.92, p < 0.05$. In order to clarify the nature of this interaction, three separate 2×4 repeated measures ANOVAs with Condition and Prime as within-subjects factors were carried out for each event type. These revealed only the presence of a main effect of Prime for the positive events $F(3,17) = 4.50, p < 0.05$. However, when separate repeated measures ANOVAs were carried out to look for specific effects of Prime for each Condition and each Event, only a main effect of Prime for anxiety relevant events in the supraliminal condition was found $F(3,17) = 4.71, p < 0.05$.

Figure 4. 7. SPJT. Mean probability judgements for the control group in each condition.

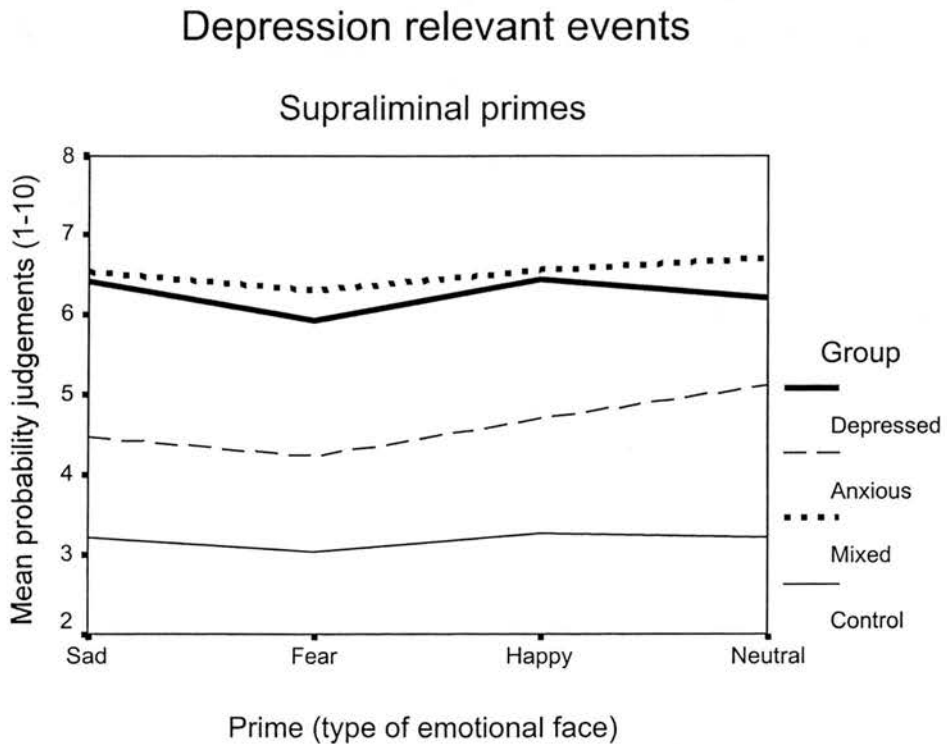
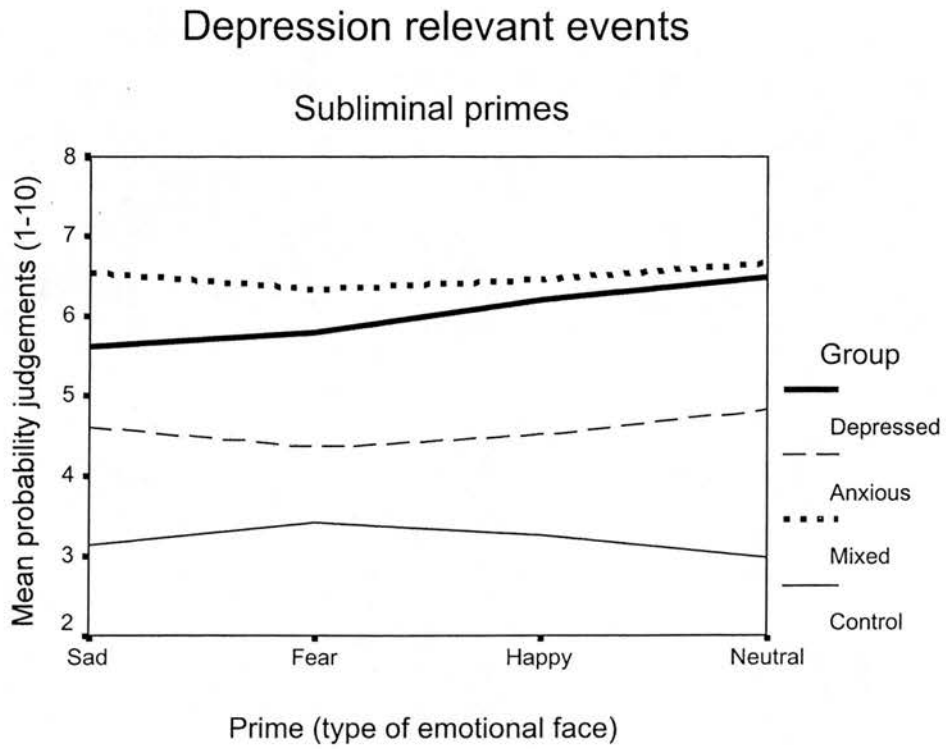


Orthogonal planned contrasts revealed that in the supraliminal condition the control group judged anxiety events as being more likely to happen when preceded by “fear” primes compared to “sad” $F(1,19) = 8.08, p < 0.01$ and “neutral” primes $F(1,19) = 5.47, p < 0.05$ and, unexpectedly, also when preceded by “happy” compared to “neutral” primes $F(1,19) = 5.68, p < 0.05$. In this group, 2×3 repeated measures ANOVAs with Condition and Event as within-subjects variables, computed for each prime type, found main effects of Event for the “sad” $F(2,18) = 55.97, p < 0.001$, “fear” $F(2,18) = 51.42, p < 0.001$, “happy” $F(2,18) = 64.20, p < 0.001$, and “neutral” primes $F(2,18) = 78.80, p < 0.001$. Planned contrasts revealed that in the “sad” prime condition controls had higher expectancy for positive compared to depression and anxiety relevant events both in the subliminal $F(1,19) = 69.34, p < 0.001$ and supraliminal conditions $F(1,19) = 98.43, p < 0.001$. Similarly, in the “fear” condition higher probability ratings were given for positive compared to depression and anxiety relevant events both in the subliminal $F(1,19) = 68.77, p < 0.001$ and supraliminal conditions $F(1,19) = 121.60, p < 0.001$. In addition, in the “fear” supraliminal condition also the anxiety relevant events were rated as being more likely to happen relative to depression relevant one $F(1,19) = 6.52, p < 0.05$. Finally, in both “happy” and “neutral” prime conditions control subjects showed again higher expectancy for positive compared to depression and anxiety relevant events in the subliminal $F(1,19) = 119.88, p < 0.001$ and $F(1,19) = 107.77, p < 0.001$ respectively, and supraliminal conditions $F(1,19) = 70.18, p < 0.001$ and $F(1,19) = 128.24, p < 0.001$ respectively.

Between-group comparisons on the twenty-four experimental conditions were carried out with one-way ANOVAs and Scheffé’s *post hoc* ($p < 0.05$) multiple

comparisons. Taking the depression relevant events into account, significant main effects of Group were found for “sad” prime in the subliminal $F(3,66) = 19.38, p < 0.001$ and supraliminal $F(3,66) = 17.95, p < 0.001$ conditions (see Figure 4. 8. below). *Post hoc* analyses revealed that in the subliminal condition the control group judged depression events as less likely to happen compared to the three clinical groups, and the anxious group reported lower ratings compared to the mixed group. In the supraliminal condition the depressed and mixed groups gave higher ratings compared to both anxious and control groups. For the “fear” prime condition significant main effects of Group were also found in the subliminal $F(3,66) = 14.58, p < 0.001$ and supraliminal $F(3,66) = 24.56, p < 0.001$ conditions. *Post hoc* analyses showed that in the subliminal condition depressed and mixed groups had higher expectancies for depression relevant events compared to controls, and the mixed group reported higher ratings compared also to the anxious group. In the supraliminal condition again the depressed and mixed groups gave higher expectancy ratings compared to both anxious and control groups. In the “happy” prime condition significant main effects of Group were obtained in the subliminal $F(3,66) = 16.70, p < 0.001$ and supraliminal $F(3,66) = 15.31, p < 0.001$ conditions. Scheffé’s comparisons indicated that in the subliminal condition depressed and mixed participants judged depression events as more likely to happen compared to anxious and control participants. Whereas, in the supraliminal condition the control group had lower expectancy compared to depressed and mixed groups, and anxious reported lower ratings relative to the mixed group. Finally, also in the “neutral” prime condition significant main effects of Group were found in the subliminal $F(3,66) = 22.06, p < 0.001$ and supraliminal $F(3,66) = 22.56, p < 0.001$ conditions.

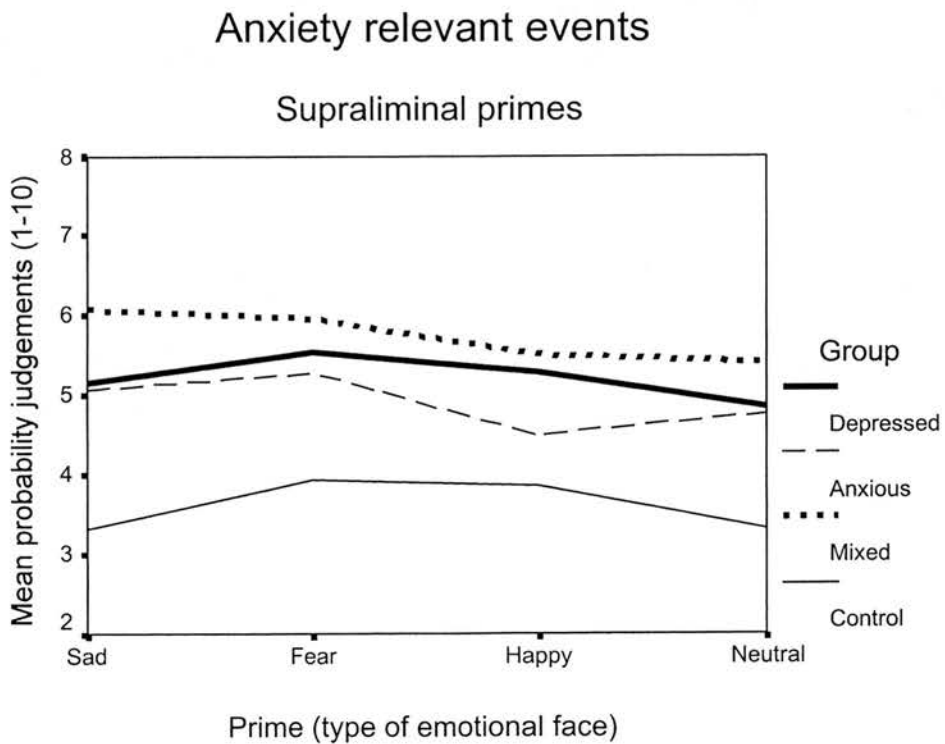
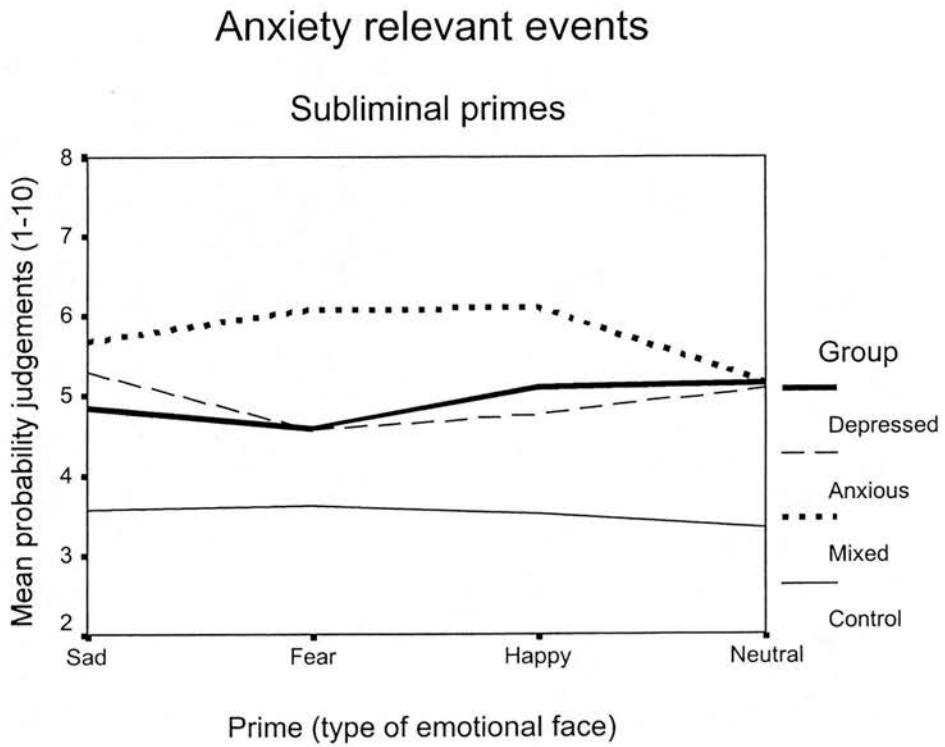
Figure 4. 8. SPJT. Between-group comparisons for depression relevant events in each condition.



Multiple contrasts highlighted that control participants reported lower expectancy of depression events compared to the three clinical groups and the anxious group had lower ratings relative to the mixed group in both the subliminal and supraliminal conditions.

Taking the anxiety relevant events into account, significant main effects of Group were found in the “sad” prime subliminal $F(3,66) = 8.09, p < 0.001$ and supraliminal $F(3,66) = 12.16, p < 0.001$ conditions (see Figure 4. 9. below). Group comparisons revealed that in the subliminal condition anxious and mixed groups had higher expectancy ratings for anxiety relevant events compared to controls. In the supraliminal condition the control group reported lower expectancy compared to the three clinical groups. Also for the “fear” prime main effects were found in the subliminal $F(3,66) = 8.96, p < 0.001$ and supraliminal $F(3,66) = 7.03, p < 0.001$ conditions. *Post hoc* tests showed that in the subliminal condition the mixed group gave higher ratings compared to the other three groups, whereas, in the supraliminal condition depressed and mixed participants reported higher probability judgements compared to controls. In the “happy” prime condition significant main effects of Group were obtained both in the subliminal $F(3,66) = 10.94, p < 0.001$ and supraliminal $F(3,66) = 4.54, p < 0.01$ conditions. Scheffé’s comparisons indicated that in the subliminal condition depressed and mixed participants gave higher ratings compared to controls, but in the supraliminal condition only the mixed group gave higher probability ratings compared to controls. When the “neutral” prime condition was considered, main effects of Group were obtained in the subliminal $F(3,66) = 6.35, p < 0.001$ and supraliminal $F(3,66) = 7.03, p < 0.001$ conditions.

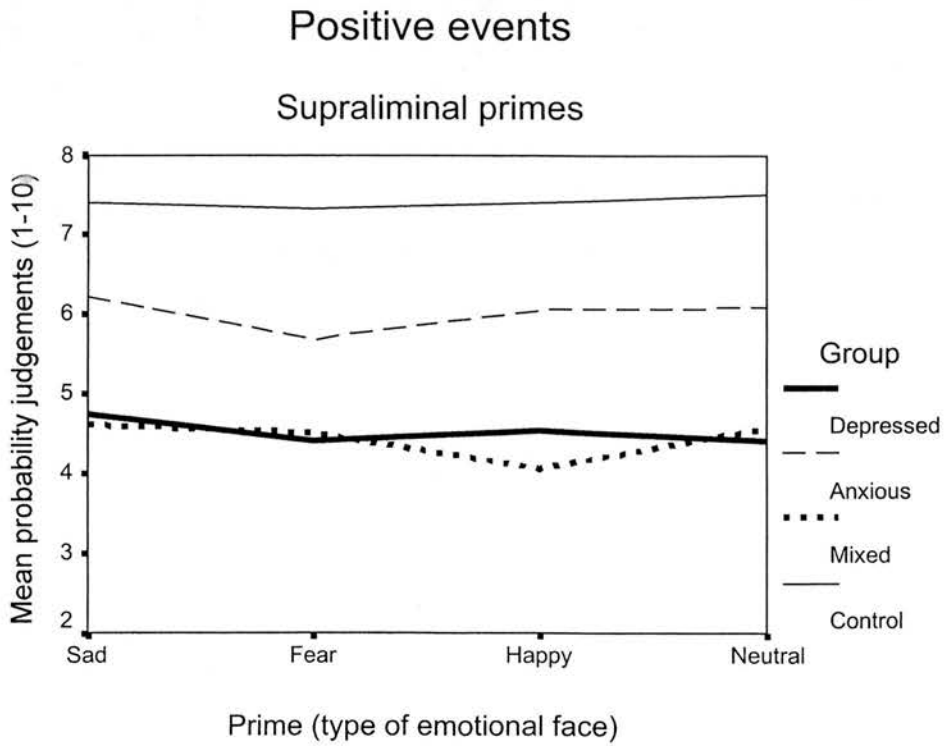
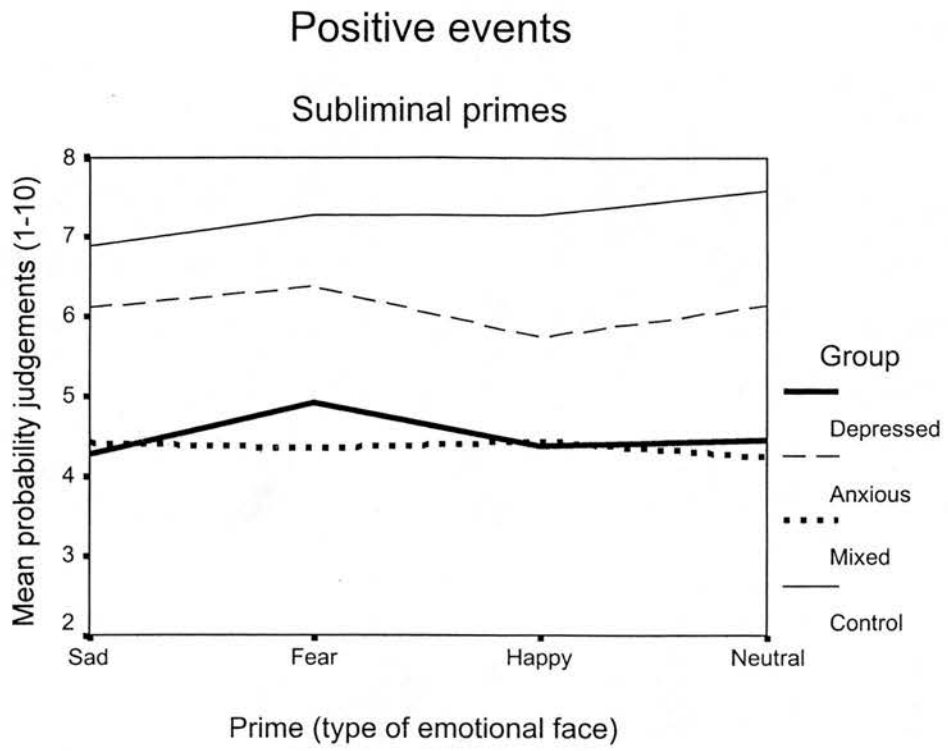
Figure 4. 9. SPJT. Between-group comparisons for anxiety relevant events in each condition.



Specifically, in the subliminal condition controls reported lower ratings compared to the three clinical groups, whereas, in the supraliminal condition this difference was only limited to the depressed and mixed groups.

Finally, considering the positive events, main effects of Group were found in the “sad” subliminal $F(3,66) = 14.43, p < 0.001$ and supraliminal $F(3,66) = 17.31, p < 0.001$ conditions (see Figure 4. 10. below). *Post hoc* analyses revealed that anxious and control participants rated positive events as being more likely to happen compared to the depressed and mixed groups both in the subliminal and supraliminal conditions. For “fear” prime main effects of Group were obtained in the subliminal $F(3,66) = 13.60, p < 0.001$ and supraliminal $F(3,66) = 16.31, p < 0.001$ conditions. Multiple comparisons indicated that in the subliminal condition the control group reported higher ratings compared to depressed and mixed groups, and the anxious group had higher expectancy compared to the mixed group. However, in the supraliminal condition the three clinical groups had lower ratings compared to the control group. Also in the “happy” prime condition main effects of Group were obtained in both the subliminal $F(3,66) = 18.51, p < 0.001$ and supraliminal $F(3,66) = 20.01, p < 0.001$ conditions. Scheffé’s tests indicated that the control group had higher expectancy ratings relative to the three clinical groups in the subliminal condition, but only compared to the depressed and mixed groups in the supraliminal condition, where the anxious group reported higher probability judgements compared to the mixed group. Finally, for “neutral” prime main effects were found in the subliminal $F(3,66) = 19.36, p < 0.001$ and supraliminal $F(3,66) = 20.24, p < 0.001$ conditions.

Figure 4. 10. SPJT. Between-group comparisons for positive events in each condition.



Further group comparisons revealed that anxious and control participants reported higher probability ratings compared to the depressed and mixed groups in the subliminal and supraliminal conditions, but in the latter, the control group had higher ratings also compared to the anxious group.

Reaction times. Table 4. 7. contains descriptive statistics (means and standard deviations) summarising data regarding the time latencies yielded by the four groups in each of the twenty-four experimental conditions. An overall $3 \times 4 \times 2 \times 4$ mixed ANOVA was carried out for the reaction times data with Event (depression relevant, anxiety relevant, positive), Prime (sad, fear, happy, neutral), and Condition (subliminal vs. supraliminal) as within-subjects factors and Group (depressed, anxious, mixed, control) as the between-subjects variables. Results indicated the presence of a main effect of Event $F(2,65) = 19.11, p < 0.001$, and significant interactions of Event \times Group $F(6,132) = 2.16, p < 0.05$ and Event \times Prime $F(6,61) = 3.39, p < 0.01$. Again, as it was done above with the probability judgements, within and between-group analyses were then performed in order to clarify the source of these interactions. A general $3 \times 4 \times 2$ repeated measures ANOVA with Event, Prime and Condition as within-subjects variables was carried out within the depressed group (see Figure 4. 11. below). This showed main effects of Event $F(2,13) = 5.39, p < 0.05$ and Prime $F(3,12) = 5.08, p < 0.05$. Then, 2×4 repeated measures ANOVAs with Condition and Prime as within-subjects factors were carried out separately for each event type. These revealed a main effect of Prime $F(3,12) = 3.68, p < 0.05$ only for the depression relevant events.

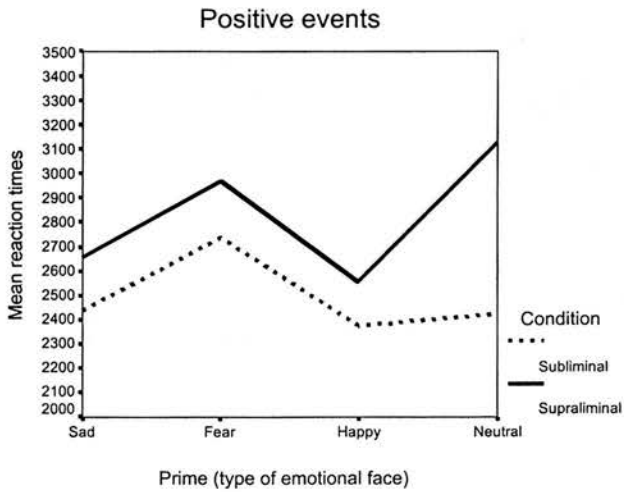
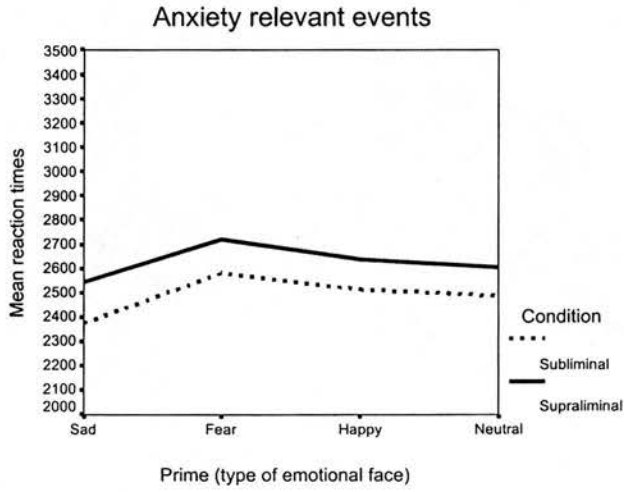
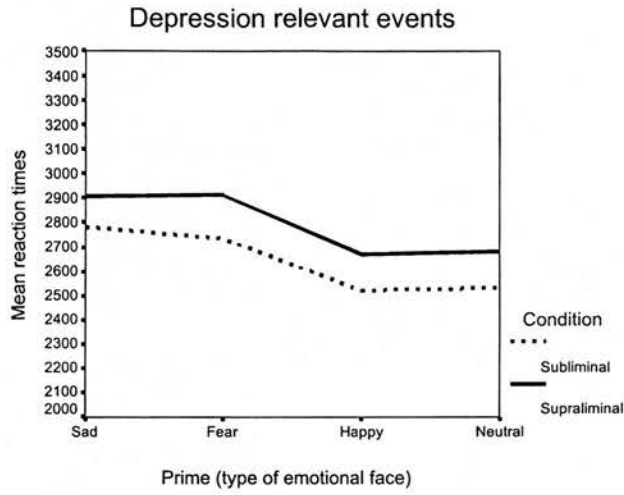
Table 4. 7. SPJT. Mean reaction times for the four groups in each experimental condition. Standard deviations in parentheses.

	Group			
	Depressed	Anxious	Mixed	Control
Depression relevant events				
Subliminal				
Sad	2782.71 (705.47)	2697.82 (901.96)	2462.52 (1064.15)	2516.72 (899.55)
Fear	2738.87 (648.60)	2539.87 (780.75)	2582.88 (1275.60)	2724.87 (1206.96)
Happy	2522.28 (719.24)	2613.88 (882.68)	2498.75 (1248.48)	2792.10 (1615.66)
Neutral	2525.36 (688.19)	2644.53 (810.56)	2420.77 (1002.42)	2441.46 (832.57)
Supraliminal				
Sad	2908.92 (1288.59)	2800.16 (849.47)	2490.86 (1026.43)	2390.04 (1191.28)
Fear	2910.68 (1108.42)	2563.34 (476.78)	2332.85 (843.57)	2340.38 (840.13)
Happy	2669.37 (984.03)	2590.51 (740.16)	2361.13 (875.58)	2642.42 (1352.30)
Neutral	2682.13 (992.34)	2624.30 (765.04)	2215.36 (908.96)	2639.64 (1133.47)
Anxiety relevant events				
Subliminal				
Sad	2374.73 (765.62)	2197.93 (603.29)	2179.56 (1017.67)	2287.38 (786.10)
Fear	2575.12 (803.79)	2393.45 (784.86)	2471.46 (1155.46)	2535.17 (1190.05)
Happy	2513.01 (692.58)	2521.74 (1031.71)	2354.68 (1120.37)	2310.89 (975.36)
Neutral	2486.81 (952.48)	2307.59 (868.47)	2426.88 (1258.52)	2431.47 (959.53)
Supraliminal				
Sad	2542.89 (978.17)	2458.53 (665.76)	2079.03 (727.33)	2379.56 (960.43)
Fear	2705.04 (1093.21)	2439.94 (827.39)	2142.41 (707.77)	2341.32 (1144.18)
Happy	2636.79 (880.61)	2407.53 (673.82)	2198.38 (783.57)	2497.83 (962.20)
Neutral	2604.52 (1202.71)	2434.66 (928.76)	2273.30 (866.01)	2344.77 (1320.13)

Table 4. 7. SPJT. Mean reaction times for the four groups in each experimental condition. Standard deviations in parentheses (continued *i*).

	Group			
	Depressed	Anxious	Mixed	Control
Positive events				
Subliminal				
Sad	2437.30 (681.93)	2244.54 (760.74)	2377.70 (1040.41)	2227.00 (1061.47)
Fear	2736.81 (1092.45)	2268.90 (959.73)	2433.46 (849.68)	2242.57 (925.66)
Happy	2374.38 (562.12)	2162.95 (821.83)	2416.51 (1006.64)	2159.35 (1087.11)
Neutral	2421.91 (576.96)	2176.90 (641.75)	2417.31 (966.45)	2324.83 (1058.36)
Supraliminal				
Sad	2656.98 (752.93)	2415.72 (833.24)	2265.98 (807.53)	2179.34 (1086.46)
Fear	2967.96 (1313.88)	2290.68 (774.57)	2360.44 (818.51)	2164.20 (845.59)
Happy	2554.60 (706.57)	2262.28 (634.62)	2264.81 (993.87)	2107.21 (1087.61)
Neutral	3124.07 (1881.09)	2491.36 (836.23)	2177.29 (775.67)	2293.25 (1397.92)

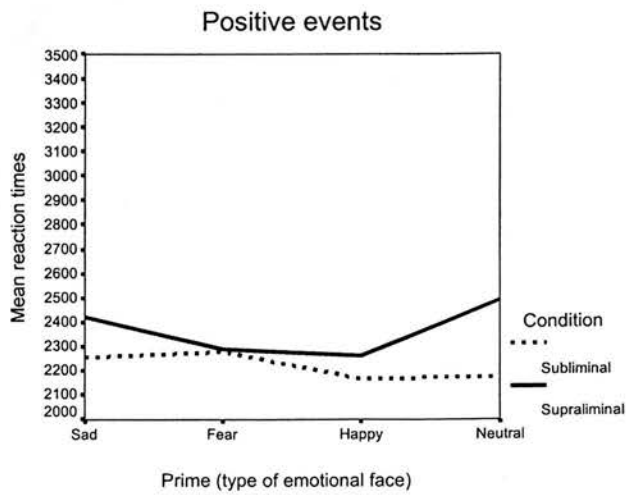
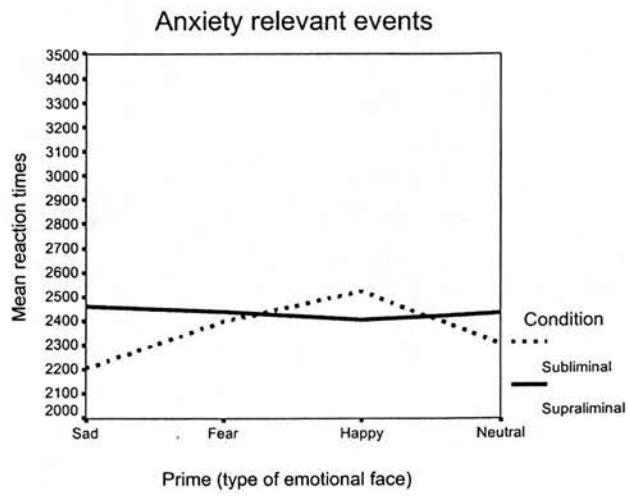
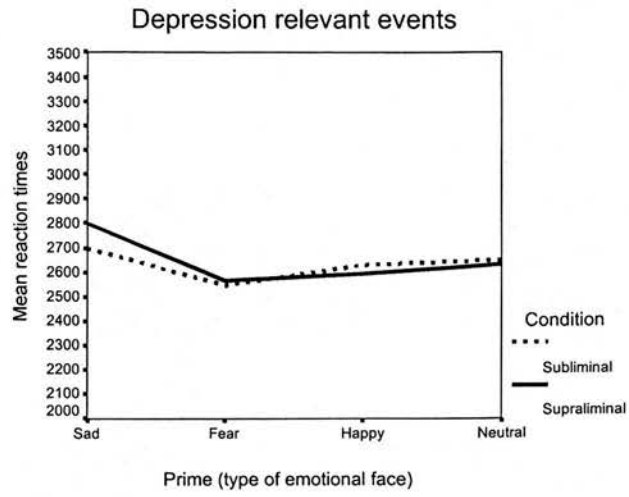
Figure 4. 11. SPJT. Mean reaction times for the depressed group in each condition.



Separate repeated measures ANOVAs were carried out for the subliminal and supraliminal conditions for the depression events in order to look at the effect of Prime in more details. Results showed a main effect of Prime only in the subliminal condition $F(3,12) = 3.51, p < 0.05$ with planned contrasts indicating that depressed participants were slower at judging depression relevant events that were preceded by “sad” primes compared to “neutral” primes $F(1,14) = 6.13, p < 0.05$. Afterwards, separate 2×3 repeated measures ANOVAs with Condition and Event as within-subjects variables were computed for each prime type, in order to explore the main effect of Event in more details. A significant effect of Event was found only in the “sad” prime condition $F(2,13) = 6.99, p < 0.01$, and orthogonal planned contrasts showed that depressed outpatients were significantly slower when judging depression relevant compared to anxiety relevant and positive events preceded by subliminal but not supraliminal “sad” primes $F(1,14) = 10.67, p < 0.01$.

A similar procedure was used for the analyses carried out within the anxious group (see Figure 4. 12. below). The overall $3 \times 4 \times 2$ repeated measures ANOVA with Event, Prime and Condition as within-subjects variables showed only a main effect of Event $F(2,13) = 6.97, p < 0.01$. No significant effects were found when separate 2×4 repeated measures ANOVAs with Condition and Prime as within-subjects factors were carried out for each event type, or for each condition. However, 2×3 repeated measures ANOVAs with Condition and Event as within-subjects variables were computed for each prime type and these showed a main effect of Event for “sad” $F(2,13) = 5.40, p < 0.05$, “happy” $F(2,13) = 6.55, p < 0.01$, and “neutral” primes $F(2,13) = 4.32, p < 0.05$.

Figure 4. 12. SPJT. Mean reaction times for the anxious group in each condition.



Orthogonal contrasts highlighted that these effects were present only in subliminal conditions, and in particular anxious patients were significantly faster at rating anxiety relevant than depression relevant events in the “sad” prime condition $F(1,14) = 8.05, p < 0.01$; they were also faster at rating positive relative to depression and anxiety relevant events in the “happy” prime condition $F(1,14) = 13.09, p < 0.01$; and faster at rating positive events in the “neutral” prime condition but only compared to depression relevant events $F(1,14) = 9.64, p < 0.01$.

In the mixed group the general $3 \times 4 \times 2$ repeated measures ANOVA with Event, Prime and Condition as within-subjects variables did not show any significant effects (see Figure 4. 13. below). However, when separate 2×4 repeated measures ANOVAs with Condition and Prime as within-subjects factors were carried out for each event type, a main effect of Prime emerged for the anxiety relevant events $F(3,17) = 3.34, p < 0.05$, although this was not followed by any significant difference among different prime types in either the subliminal or supraliminal conditions. Finally, 2×3 repeated measures ANOVAs with Condition and Event as within-subjects variables were computed for each prime type and these showed a main effect of Event only in the “sad” prime condition $F(2,18) = 5.12, p < 0.05$ Planned contrasts revealed that the mixed group was significantly faster when rating anxiety compared to depression relevant events in the supraliminal condition $F(1,19) = 8.40, p < 0.01$.

A main effect of Event $F(2,18) = 11.21, p < 0.001$ was found when a $3 \times 4 \times 2$ repeated measures ANOVA with Event, Prime and Condition as within-subjects variables was carried out for the control group (see Figure 4. 14. below).

Figure 4. 13. SPJT. Mean reaction times for the mixed group in each condition.

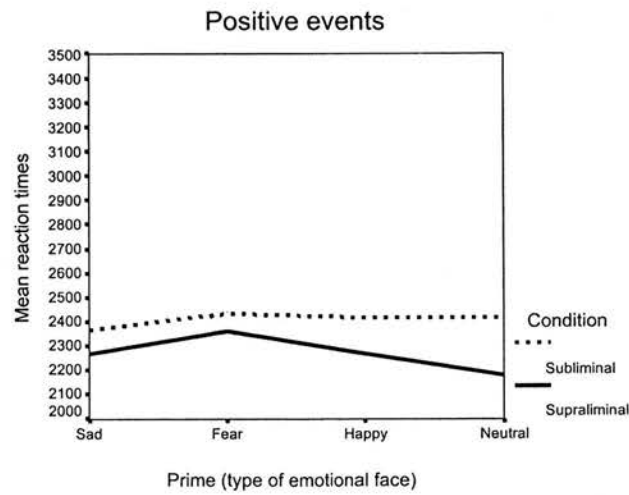
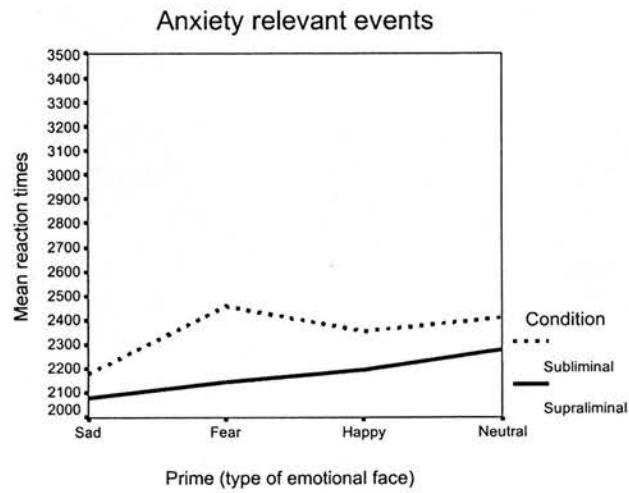
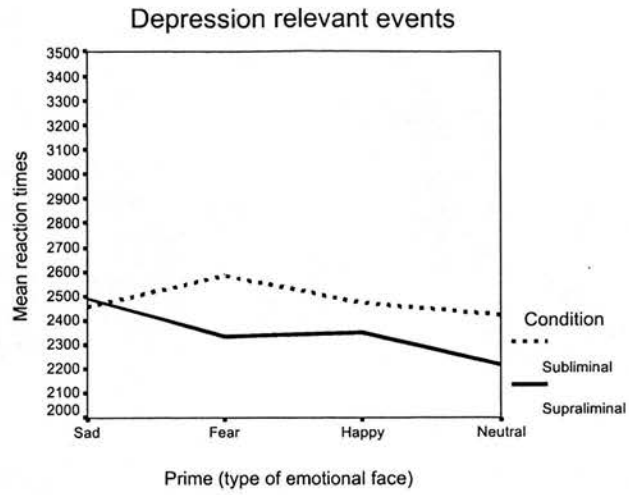
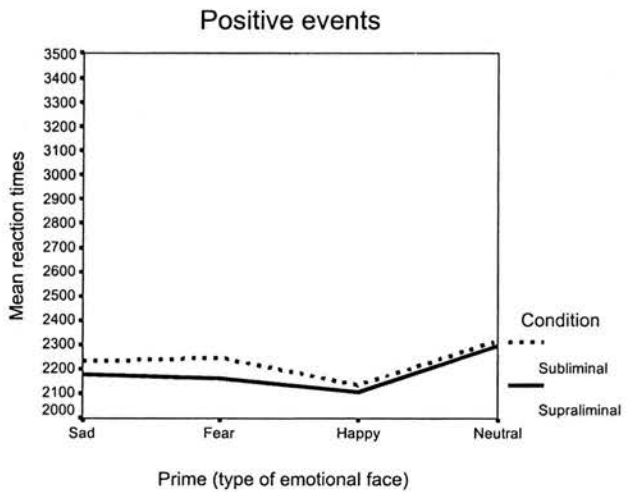
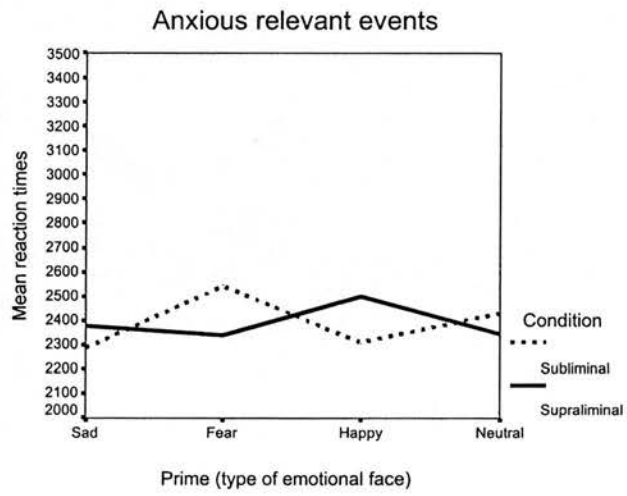
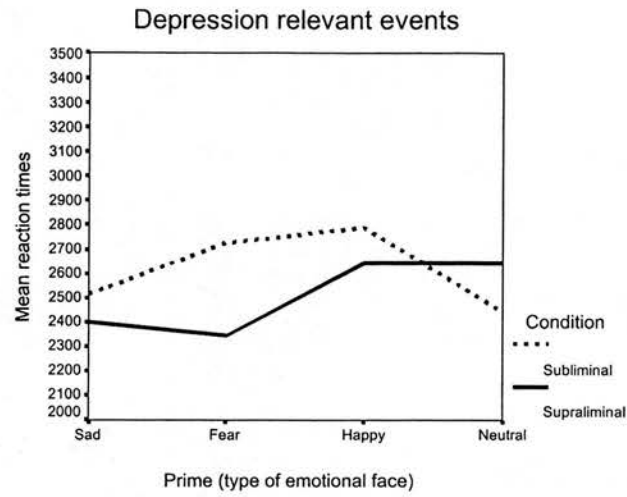


Figure 4. 14. SPJT. Mean reaction times for the control group in each condition.



No significant effects were found when separate 2×4 repeated measures ANOVAs with Condition and Prime as within-subjects factors were carried out for each event type, or for each condition. The only significant main effect of Event was found in the “happy” prime condition $F(2,18) = 8.54, p < 0.01$ when separate 2×3 repeated measures ANOVAs with Condition and Event as within-subjects variables were carried out for each prime type. Orthogonal contrasts showed that the control group was significantly slower when judging depression relevant compared to positive events in both the subliminal $F(1,19) = 9.50, p < 0.01$ and supraliminal $F(1,19) = 7.74, p < 0.01$ conditions when these were preceded by “happy” primes.

No significant difference was found when between-group analyses were performed, which was probably due to the high standard deviations values present in each cell (see Table 4. 7. above).

4. 5. 2. 3. Results summary.

To summarise the results obtained in this experiment, the depressed group gave higher expectancy ratings for depression relevant compared to anxiety relevant and positive events in both subliminal and supraliminal priming conditions. Generally, the anxious group reported higher probability judgements for negative (depression and anxiety relevant) events and lower ratings for positive events, compared to controls, but not in all experimental conditions. Finally, as hypothesised, the mixed group judged both negative (depression and anxiety relevant) events as being more likely to happen and positive events as being less likely to happen. These results will be discussed in detail in the next Section.

4. 5. 3. Discussion.

The experimental hypotheses set out earlier on in this Chapter regarding the performance of the four groups in the SPJT have been mostly confirmed. Specifically, the depressed group was hypothesised to reveal an increased negative expectancy for depression relevant events (mediated by its NA component) and a reduced expectancy for positive events (mediated by its PA component). Both of these predictions were confirmed, in that depressed participants gave higher probability judgements for depression relevant events and lower probability ratings for positive events compared to controls. These findings replicate previous studies carried out with clinical and non-clinical samples (e.g. MacLeod et al., 1997b; MacLeod & Cropley, 1995; Pyszczynski et al., 1987) while strengthening the more inconsistent finding of the relationship between depression and reduced positive expectancy in this task. In addition, we also provide evidence of content specificity since, in most experimental conditions, the depressed group reported higher probability judgements for depression relevant compared to anxiety relevant events. Therefore, in general depressed patients reported higher expectancy for depression relevant compared to anxiety relevant and positive events in both subliminal and supraliminal priming conditions. No significant within-group effect of prime type was found for judgements, however, analyses of reaction times revealed that although primes were unable to affect ratings they were able to affect response latencies. In particular, depressed individuals were significantly slower at deciding the likelihood of depression relevant events when they were preceded by “sad” (subliminal) primes compared to when similar events followed “neutral” primes.

Moreover, this effect was specific to depression relevant events, in that in this condition they were significantly slower compared to equivalent “sad” (subliminal) priming conditions for anxiety relevant and positive events. From a general look at Figure 4. 11. it is easy to observe a unique pattern of reaction times in this group. Explicitly, depressed outpatients were slowed down by supraliminal primes compared to subliminal ones in all conditions. Although these differences did not reach statistical significance probably due to the large variation in reaction times, they show that depressed individuals tend to dwell more on information that has entered their focus of attention as suggested by Mogg and Bradley (1998; 1999a). Consistent with this view is also an interesting effect of Condition (subliminal vs. supraliminal) found in this group when judging the likelihood of anxiety relevant events. In particular, these were rated as being more likely to happen when preceded by supraliminal “fear” primes than when preceded by subliminal “fear” primes. Therefore, depressed individuals were able to perceive relevant subliminally presented primes, as shown by the slowing-down effect of “sad” primes, but these pre-attentive processes were unable to influence their judgements in the way that supraliminal (attentional) primes could. In line with this interpretation, between-group analyses revealed that depressed patients also reported higher probability judgements, compared to the anxious group, for depression relevant events in the “sad” and “fear” supraliminal conditions. Similarly, depressed participants had higher expectancy for anxiety relevant events compared to controls mostly in the supraliminal priming conditions except for “happy” primes.

Results obtained from the anxious group partially confirm our initial hypotheses. It was predicted that anxious patients would show an increased negative expectancy for

anxiety relevant events, mediated by their NA and PH components. Within-group analyses revealed that anxious individuals expected more positive than depression relevant events to happen in all of the priming conditions. Moreover and more interestingly, they gave lower expectancy ratings for anxiety relevant compared to positive events only in supraliminal priming conditions except for “fear” primes, where lower ratings were given in the subliminal condition only. As indicated by the significant interaction of Condition (subliminal vs. supraliminal) by Event type found for “fear” primes, anxious patients show a specific pre-attentive/attentional avoidance pattern. In particular, they indicated that anxiety relevant events were less likely to happen, relative to positive events, when they were preceded by salient “fear” subliminal primes (showing automatic pre-attentive avoidance), but when less salient non-threatening primes were presented that did not require an initial shift of attention towards threat, then avoidance occurred at a later attentional stage (i.e. following the supraliminal presentation of “sad”, “happy” and “neutral” primes). This shows that anxious people are hypervigilant towards threatening information, which can be automatically and selectively detected (e.g. Bradley et al., 1998; 1999; 2000) and acted upon (i.e. avoidance). However, when a longer exposure of primes (2 seconds) was used in the supraliminal condition, anxious patients were unable to avoid the priming effect of “fear” emotional stimuli, which resulted in higher probability judgements. This effect provides an important key also when interpreting the results found in the second part (probability judgements) of Experiment I, in which the same anxious group reported higher expectancy for positive relative to negative events. Specifically, it indicates the specific conditions under which avoidance is or is not likely to occur. Explicitly, cognitive avoidance in anxious

individuals can be prevented under conditions of constraint attention and coercive controlled processing. Consequently, while in Experiment I avoidance took place as a consequence of non-constraining experimental conditions, in this study avoidance was possible under all supraliminal priming conditions except “fear”. An analogous elimination of “attentional deficits” under conditions of focused or constrained attention has been shown in experiments with depressed individuals (Hertel, 1994; Hertel & Rude, 1991), however here the lack of motivation and cognitive initiative typical of depressive task performance was the issue, as opposed to anxious avoidance behaviour.

The effects of pre-attentive vigilance for “fear” primes in the anxious group can be also observed from analyses of reaction latencies. In particular, anxious patients were slower at providing ratings for depression relevant events in the “sad” (compared to anxiety relevant events), “happy” and “neutral” (compared to positive events) prime conditions, but this relative slowness for depression relevant events vanished when “fear” primes were presented, in which case hastier decisions were taken showing increased autonomic activation in this group. Between-group comparisons show that anxious participants are particularly able to avoid, that is to say, judge depression and anxiety relevant events less likely to happen, when these events are preceded by “fear” and “happy” primes, as indicated by no statistical differences from the control group in these conditions. This state of affairs suggests that the avoidance mechanism is not only one that “runs away” from threat, but also one that “pulls towards” to positive aspects of the stimuli, as seen also in Experiment I. Evidence that anxiety is associated with positive as well as negative attentional biases for emotional faces derives from an experiment carried out with GAD patients that used

a dot probe task paradigm (Bradley et al., 1999). In this experiment, anxious participants showed enhanced vigilance for both threatening and happy emotional faces.

Generally, compared to controls, the anxious group reported higher expectancy ratings for negative (depression and anxiety relevant) events, which confirms previous literature findings (e.g. MacLeod et al., 1991; 1997b). However, “given the chance to avoid” with the presentation of “fear” and “happy” primes, anxious participants did not differ from controls in their judgements. Similarly, a decrease in positive expectancy in the anxious group was observed only in some of the experimental conditions, so that their probability ratings for positive events lie somewhere in between that ones reported by the controls and those reported by depressed and mixed patients. Against prediction, no specificity for anxiety relative to depression relevant events was shown, but this could be due to two factors: *a*) our group was prevalently composed by GAD patients and PH specificity may be more strongly related to panic disorder patients; *b*) anxiety event materials were not specifically related to physical threat but they were of a more general nature. Therefore, our findings confirm our initial hypotheses only partially.

In contrast, the predictions made regarding the performance of the mixed group were fully confirmed by our study. Compared to controls, mixed anxious depressed patients judged both negative (depression and anxiety relevant) events as being more likely to happen and positive events as being less likely to happen, thus showing high levels of NA and PH, and low levels of PA. However, within-group analyses show the presence of some specificity for depression relevant compared to anxiety relevant events particularly for “neutral” (subliminal and supraliminal) and “happy”

supraliminal primes. This suggests that while a higher expectancy for depression relevant events is more widespread and occurs under all conditions, the reported higher expectancy for anxiety relevant events is more variable and its magnitude is more subject to moment-to-moment appraisal of the current situation, with higher ratings yielded under negative (“sad” and “fear”) emotional priming conditions. To confirm the strong expectancy for depression relevant events is also the finding that the mixed group provided significantly higher ratings for this event type compared to the anxious group under all experimental conditions. Moreover, mixed participants exhibited a particularly high negative expectancy for anxiety relevant events under the subliminal “fear” priming condition, differing significantly from the other three groups. Lastly, noteworthy is the fact that the mixed group reported lower positive expectancy also compared to the anxious group in most conditions except for subliminal “happy” and supraliminal “fear” priming conditions.

Analyses of reaction times data indicate that the mixed group was particularly fast at judging anxiety relevant events, especially so relative to depression relevant events in the “sad” supraliminal priming condition. A more general observation is the reverse pattern of reaction times obtained by the mixed group compared to the one seen in the depressed group, with relatively longer latencies for subliminal primes across all conditions, although as for the depressed group no statistical difference was found probably because of the large group variance in reaction times.

The results for this group are novel in that, to the best of our knowledge, no previous experimental study has tested a mixed anxious depressed clinical or non-clinical sample on a SPJT. We also extended this task to include event specificity and several emotional priming conditions. The results obtained show that the mixed group differs

in important ways from the other two clinical groups. Compared to the depressed outpatients, the mixed group reported higher expectancy for anxiety relevant events, particularly when subliminal “fear” primes were utilised, suggesting that contrary to depressed individuals, this group is affected by pre-attentive mechanisms in the production of probability judgements and not merely in response latency variations. Moreover, as outlined above, distinct patterns of reaction times appear to distinguish these two groups, with the mixed group appearing generally faster. Relative to the anxious participants, the mixed group reported a general increase in depression relevant events expectancy and a decrease in positive events expectancy, but also and more importantly, it did not use avoidance strategies as indicated by the particularly high expectancy for anxiety relevant events in the subliminal “fear” priming condition. This finding tallies with the results obtained in the explicit memory task reported in Chapter three, where within-group analyses showed that the mixed group but not anxiety patients recalled an increased number of anxiety relevant words, indicating that contrary to what is typically found in anxiety disorders, mixed anxiety depression is not characterised by avoidance.

Finally, as expected our control sample reported higher probability judgements for positive events and low ratings for negative events, replicating the results found in Experiment I. However, some more interesting and atypical effects were also found in the control group’s performance. Specifically, there was a remarkable effect of supraliminal “fear” prime, which resulted in increased probability judgements for anxiety relevant events in this group. This underlines the important influence of specific emotional information on subsequent self-referent judgements as outlined by Power et al. (1996). Moreover, controls appeared to be slowed down when judging

the likelihood of depression relevant events, and significantly so when receiving incongruent (i.e. "happy") emotional information both subliminally and supraliminally.

Earlier in this Chapter it was hypothesised that the two tasks were likely to elicit different results because of key differences in the materials subject to judgement. The PFT can be distinguished for the personal nature and relevance of the self-generated events, whereas the SPJT presents participants with a set of experimentally controlled events, which may or may not be relevant to the person judging them. In addition, the two tasks, in the versions used here, differ considerably in terms of experimental settings. The PFT judgement task is carried out without time limits or other particular constraints and in a relatively normal setting (i.e. there is no use of electronic apparatus apart from a tape recorder and both experimenter and subject sit in a room lit by daylight, with the former writing down the subjects' ratings). Conversely, the SPJT is carried out in less naturalistic conditions: the room lighting is minimal; the experiment is controlled by computer and involves a great deal of electronic equipment including tachistoscopes and millisecond exposure of stimuli; subjects wear a CollarMic around their neck and their responses automatically activate the movement of the slide projectors while they give judgements on a large number of possible life events. Put together, these factors are likely to influence in divergent ways the choice of the mechanisms and processes used by participants to execute the two tasks. We have argued above that participants might be making use of elaborative processes such as the availability heuristic when performing on the PFT probability judgements, which involve controlled retrieval of relevant information. On the other hand, Siemer and Reisenzein (1998) found that under

conditions of reduced processing capacity, induced by time pressure and competing task demands, participants are more likely to make use of a “*feeling heuristic*” (Schwarz & Clore, 1983). In other words they will simplify the task by basing their judgements on the answer they give to the question “How do I feel about this event?”. Indeed this seemed to be the process used by many participants who voluntarily commented on the strategy they had used during the task completion. Consequently, in the SPJT we did not observe equivalent probability judgements for positive and negative life events found in Experiment I in the depressed and mixed groups, and we found different expectancy ratings also within the anxious and control groups depending on the experimental conditions.

Therefore to summarise, our hypotheses were fully confirmed for the depressed group who showed greater expectancy for depression relevant events and lower expectancy for positive events. Results obtained for this group also showed that depressed patients can be generally influenced by pre-attentive emotional information but they are more likely to be affected by attentional information processing of relevant emotional stimuli. In contrast, anxiety patients did not show the predicted specificity in terms of expectancy of negative events, reporting high (non-specific) expectancy of negative life events and lower expectancy for positive events only in some experimental conditions. The specificity in this group emerged as a result of pre-attentional hypervigilance for “fear” stimuli. A distinct pattern of avoidance behaviour emerged in this group, which was particularly facilitated by the presence of “fear” and “happy” primes. Moreover it was possible to eliminate avoidance of threat stimuli processing in anxious participants under specific conditions of focused attention. Finally, the mixed group also confirmed our

hypotheses by presenting higher expectancy for both types of negative events and lower probability judgements for positive events. Moreover, both subliminal (pre-attentive level) and supraliminal (attentional level) relevant emotional information influenced expectancy ratings in this group. Thus, the mixed group differed quantitatively but also, and more importantly, qualitatively from the depressed and anxious groups respectively, in that pre-attentive attentional processes affect its expectancy ratings, but no use of avoidance strategies were apparent under these testing conditions, which provides further evidence of discriminant group validity for the mixed anxiety depression group.

4. 6. Summary and conclusions.

In this Chapter we have compared the performance of depressed, anxious, mixed anxious depressed outpatients, and normal controls on tasks measuring future-directed thinking. We have dealt with the issue of prospective cognitions in anxiety and depression in some detail and have modified and extended experimental paradigms that would enable us to address apparent inconsistencies present in the current literature; to widen the existing knowledge in this relatively unexplored area of cognition and emotion; and to provide an experimental platform on which a comparative study of mixed anxiety depression could be carried out.

Results from Experiments I and II show that the direction of future expectancy for positive and negative life events varies considerably depending on a number of factors. We have seen that the main factor responsible for this variability lies in the

differential use of mechanisms and strategic processes by participants depending on the nature of the task at hand. Moreover, we have shown that concurrent pre-attentive and attentional processing of emotional information has a substantial influence on probability judgements. In particular, the extent of their magnitude in one or the opposite direction can be facilitated or inhibited according to the specific self-reference of the emotional primes and the condition under which these primes are perceived (subliminally vs. supraliminally). Finally, the particular circumstances under which these effects occur and the resulting cognitive processes used are specific for each of the groups examined here. Consequently, consistent with our hypothesis, an individual cognitive pattern has been identified for the mixed anxious depressed outpatients also in future-directed thinking, strengthening the position that this group differs not only quantitatively but also qualitatively from anxiety or depression.

In the next Chapter we will look at some issues that are directly related to prospective cognitions, such as the accuracy of predicted life events, as well as some associated questions regarding autobiographical memory biases for previous attitudes, in this case predictions of future positive and negative events, and reality monitoring.

CHAPTER 5

WHEN THE PAST MEETS THE FUTURE: AN INVESTIGATION OF ACCURACY OF PREDICTION, REALITY MONITORING AND PERCEPTION OF CONSISTENCY AND CHANGE.

“Because I know that time is always time
and place is always and only place
and what is actual is actual only for one time
and only for one place”

(T. S. Eliot, “Ash-Wednesday”)

5. 1 Introduction.

In the previous two Chapters we have addressed issues related to attentional, mnemonic and prospective cognitive processes. We have used the terms *present*, *past*, and *future* respectively to stress the temporal orientation of each of these processes in relation to one’s perspective. Although these three dimensions have been depicted as in temporal antithesis with each other, from a more functional point of view, such distinction is of course artificial since individuals are inclined to make use of their past in the selection of future goals and plans and therefore bridge the

past and the future together (e.g. Karniol & Ross, 1996). The resulting synthesis is set to guide individuals in their present behaviour.

In the present Chapter we will concentrate on this bridging process and will report an empirical follow-up investigation that attempts to explore some of the features that characterise the way in which the individual's perspective functions in linking past, present, and future. We shall start by examining the accuracy of prediction of life events in psychopathology, which is directly related to the issue of prospective cognitions in general, and to future probability judgements in particular, both addressed in the previous Chapter. We will then turn to some other questions regarding reality monitoring – i.e. the capacity to distinguish between internally generated events from externally presented events – and the individual's perception of consistency and change over time – i.e. memory and memory biases for previous mental states and attitudes – both of which are specific aspects related to autobiographical memory. However, before the presentation of the research report we shall review some relevant literature that covers key concepts for each of these three areas of study.

5. 2. Review of relevant research and experimental hypotheses.

There is evidence to suggest that people are generally overconfident in predicting their own behaviour (Vallone, Griffin, Lin & Ross, 1990) and the behaviour of other people (Dunning, Griffin, Milojkovic & Ross, 1990), although self-predictions tend to be more accurate compared to judgements of knowledgeable others (Shrauger,

Ram, Greninger & Mariano, 1996). In a study that took valence of events into account, Pulford and Colman (1996) asked a normal student sample to predict whether or not they would experience a set of positive and negative life events over the next week and also to rate their confidence in their predictions. Results gathered a week later indicated that students were generally overconfident, but also that this overconfidence was greater for positive compared to negative outcome events. However, the phenomenon of overconfidence is not only confined to the normal population. In fact, in a study that compared mildly depressed students with non-depressed peers, Dunning and Story (1991) found that both groups of participants exhibited overconfidence by overestimating the probability that their predictions about occurrence would be accurate. However, mildly depressed individuals were less accurate in their predictions in that, although they had made more pessimistic predictions, follow-up showed that they had actually overpredicted the occurrence of positive events and underpredicted negative events. Comparable results derive from a study that compared dysphoric and non-dysphoric students in their accuracy of prediction (Kapçi & Cramer, 1998). Results indicated that, relative to controls, dysphorics were more accurate when predicting negative life events they would experience, but less accurate for negative events they would not experience. Moreover, non-dysphorics were found to be more realistic about positive life events that they would not experience. Using a similar sample, Shrauger, Mariano and Walter (1998) found that dysphoria was unrelated to overall accuracy, but also that dysphorics tended to be more accurate in making pessimistic predictions, whereas non-dysphorics were more accurate when making optimistic predictions. Another study that looked at the correspondence of recall, prediction, and accuracy for

positive and negative life events in a dysphoric and non-dysphoric student sample, found that normal controls recalled, predicted and later reported more positive than negative events; whereas, dysphoric participants recalled, predicted and later reported an equivalent amount of negative and positive events (Dowse & McClure, 1996).

In the case of anxiety there is considerable literature showing the phenomenon of overprediction of fear in this population, that is, anxious individuals tend to overestimate how frightened they will be when faced by fear-provoking situations (e.g. see Rachman, 1994; Marks & De Silva, 1994, for reviews). However, the only literature that explicitly refers to the accuracy of prediction of life events in anxiety, regards the accuracy of predicted performance in test-anxiety. Results suggest that highly test-anxious subjects show greater levels of accuracy compared to non-anxious peers (Lusk, 1981), but also that, although predicting poorer performance, anxious students still tend to be overoptimistic (Spence, Duric & Roeder, 1996), even if self-evaluation or appraisal of personal performance has been found to enhance accuracy levels in the anxious but not in the non-anxious group.

Therefore, although not many experimental investigations have addressed the issue of accuracy of prediction of life events in normal subjects and in anxiety and depression, all in all it would appear that normal subjects tend to be overoptimistic and generally more accurate in their predictions; mild levels of depression or dysphoria are related to a more pessimistic point of view and generally lower accuracy levels (although slightly higher for negative compared to positive life events); whereas, anxiety is associated to relatively accurate predictions especially if preceded by self-appraisal.

Turning to the issue of *reality monitoring*, this process refers to the ability to discriminate between memories of internally generated information and memories of externally derived information and represents a special case of the broader domain of *source monitoring*, which refers to those processes involved in making attributions about the origins of memories, knowledge and beliefs (e.g. Johnson, Kounios & Reeder, 1994). Other aspects of source monitoring include *internal source monitoring* (e.g. the ability to discriminate between memories of what one said and what one merely thought) and *external source monitoring* (e.g. the ability to discriminate between statements that were made by person *X* and statements that were made by person *Y*) (Johnson, Hashtroudi & Lindsay, 1993). It is generally found that internal-external source monitoring is more efficient than either internal-internal or external-external source monitoring and that all types of source monitoring decisions are based on certain characteristics of the memories being judged, such as perceptual, contextual, and affective information, strength (familiarity) of memories, amount of cognitive operations that were established during encoding of the memory traces (e.g. Bink, Marsh & Hicks, 1999; Buehler & Ross, 1993; Hicks & Marsh, 1999; Hoffman, 1997; Johnson et al., 1993). Thus, the more distinct and the greater the amount of the above characteristics, the more accurate reality monitoring decisions will be (e.g. Henkel, Franklin & Johnson, 2000; Kahan, 1996; Kahan, Mohsen, Tandez & McDonald, 1999).

The study of reality monitoring in psychopathology has mainly concentrated on the impairment found in schizophrenia in discriminating actual experiences from imagined ones. Several studies have repeatedly shown reality monitoring failure in schizophrenics (e.g. Brebion, Smith, Gorman & Xavier, 1996; 1997; Brebion,

Xavier, David, Malaspina, Sharif & Gorman, 2000). However, little or no research has been conducted in anxiety and depressive disorders. For instance, a deficit in source monitoring has recently been found in PTSD and non-PTSD traumatised individuals, compared to controls (Zoellner, Foa, Brigidi & Przeworski, 2000). A limited number of other studies have investigated reality monitoring in obsessive-compulsive disorder patients but findings have been inconsistent. For example, McNally and Kohlbeck (1993) found no evidence of reality monitoring deficit in OCD participants, although they tended to be less confident in their memories relative to controls, suggesting that OCD might be associated with deficits in memory confidence rather than memory deficits *per se*. However, in a later study, Ecker and Engelkamp (1995) found that OCD checkers showed a specific motor memory deficit, that is, the inability to distinguish actual motor performance from imagined motor performance. More recently, Merckelbach and Wessel (2000) found no evidence to suggest that OCD patients in general or checkers in particular suffer from poor reality monitoring of memory for action. The authors investigated the role of dissociation as a possible mediating factor, but again found no significant relationship between levels of dissociation and reality monitoring performance although OCD patients did report higher dissociation and this was negatively correlated with confidence ratings. Dissociation, as measured by the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986) has been closely associated with reality monitoring. In particular, DES has been thought to measure individual differences of difficulties in reality monitoring, so that individuals with high levels of dissociation are hypothesised to be prone to reality monitoring deficits (e.g. Hyman & Pentland, 1996). The association between reality monitoring and dissociation has

been investigated in undergraduate student samples. Some studies have found that dissociative tendencies in college students have reality monitoring deficiencies at their core (e.g. Kunzendorf & Karpen, 1997; Wilkinson & Hyman, 1998; Winograd, Peluso & Glover, 1998), whereas some other studies have found no evidence of such association (e.g. Van den Hout, Merckelbach & Pool, 1996; Koppenhaver, Kumar & Pekala, 1997). Finally, a more recent study also found that DES scores were not related to reality monitoring failures, but these scores were significantly associated with positive response biases on a life events inventory (Merckelbach, Muris, Horselenberg & Stougie, 2000). Therefore, there seems to be very little evidence of reality monitoring problems in anxiety and a general scarcity of investigations of such deficits in depressive disorders, whilst evidence of its presumed association with levels of dissociation has been so far mixed.

The last aspect of autobiographical memory relevant to this Chapter concerns memory for previous attitudes and mental states. There exists ample empirical and theoretical evidence that suggests that remembering personal events and beliefs is a creative process and that people reconstruct their memories for previous attitudes based on their current perspective, goals, knowledge and attitudes, and on their implicit theories of stability and change, that is to say, their belief concerning whether or not they have changed over time (e.g. Conway, 1996; Hyman & Loftus, 1998; Karniol & Ross, 1996; Levine, 1997; Levine, Prohaska, Burgess, Rice & Laulhere, 2001; McFarland, Ross & Giltrow, 1992; Robinson, 1996). People's implicit theories regarding consistency and change may be accurate and lead to recollections of current attitudes that correspond relatively well with their previous views, however, systematic memory biases may arise when the theory used does not

reflect the actual degree of change that has occurred over time. Specifically, people tend to overestimate their stability and similarity between their past and present states if they adopt an implicit theory of consistency in the face of actual change and, conversely, they can exaggerate the amount of change over time if they adopt an implicit theory of change in a context in which they have actually remained relatively stable or little change has occurred (e.g. Ross, 1989). Moreover, there is evidence to suggest that people tend to view their past, present and future in qualitatively different ways. In particular, individuals are inclined to give their pasts mixed reviews, being particularly critical for personally important attributes (e.g. self-confidence, coping skills), whereas their views of current and future selves are evaluated more favourably (e.g. Ross & Newby-Clark, 1998; Wilson & Ross, 2001). A theory of temporal self-appraisal, according to which these results are interpreted, has been recently put forward (Ross & Wilson, 2000). This theory proposes that individuals tend to evaluate their past selves in a way that makes them feel good about themselves at present and about their future prospects. Consequently, despite the absence of actual improvement people seem to be inclined to present their current selves in a better light than they do with their previous selves. Particularly relevant for the present study are some investigations that have examined memory biases for previous emotional states. In these studies, individuals are typically asked to recall their emotional states either when they were anticipating or when they were coping with a negative life event, and their reports are then compared to their actual previous ratings. Using this prospective paradigm, depressed psychiatric inpatients have been found to overestimate the intensity of their past depression (Schrader, Davis, Stefanovic & Christie, 1990); chronic pain patients overestimated their pre-treatment

levels of anxiety and depression as well as pain (Bryant, 1993); blood donors exaggerated the intensity of their pre-donation anxiety (Breckler, 1994); and students recalled being more anxious than what they had reported prior to their exam, and especially so if at the time of recall they knew they had passed (Keuler & Safer, 1998). Therefore, these studies found that people tend to show a memory bias for previous mental states in that they recall more intense negative emotional levels compared to what they had initially reported, which suggests that they adopt an implicit theory of change to an extent that goes beyond the actual degree of change. In other words, the *perceived* amount of change is greater than the *actual* amount of change.

Overall, the psychopathological aspects of the three areas of study reported above have been relatively unexplored. In the present study we will report a follow-up investigation of the relationship between the issues of accuracy of prediction, reality monitoring, and memory biases for previous mental states on the one side, and anxiety and depression on the other. Unfortunately, due to the high drop out rate on the part of the outpatients we were unable to follow up a sufficiently large number of participants to preserve our original tripartite clinical group subdivision (i.e. mainly depressed, mainly anxious, and mixed anxious and depressed), so that our clinical sample includes outpatients from the three initial groups. However, since also our original depressed and anxious groups showed moderate levels of anxiety and depression respectively, the resulting clinical sample will be a mixed anxious depressed group composed by outpatients who at the time of initial assessment could be located within Goldberg and Huxley's (1992) two-dimensional space defined in Chapter 2 (Section 2. 6. 2.) and represented graphically in Figure 2. 6. Therefore, in

the present investigation a newly formed mixed anxious-depressed group and control participants will be followed up and tested on measures of accuracy of prediction, reality monitoring, and memory biases for previous attitudes. These measures will be based on, and related to, the participants' initial probability judgements of generated and presented future life events assessed in Chapter 4. Specifically, participants will be asked to indicate whether or not such events occurred (estimating accuracy of prediction), whether each event was internally generated (PFT) or externally presented (SPJT) (assessing reality monitoring), to re-judge each event for future probability and also recall their previous ratings (measuring memory bias for previous attitudes). This will allow us to extend these three areas of study to a clinical sample with mixed anxious and depressive symptomatology.

In accordance with the background literature reviewed above, it is expected that:

- a) outpatients will tend to be generally less accurate in their prediction of life events relative to normal controls;
- b) outpatients will exhibit poorer reality monitoring compared to controls and this will be mediated by levels of dissociation;
- c) outpatients will display a memory bias for previous probability judgements that will go in a direction consistent with positive change over time (i.e. overestimation of previous ratings for negative events and underestimation of previous ratings for positive events), whilst the control group will not show any memory bias indicating no significant change over time.

5. 3. Method.

5. 3. 1. Experimental design.

Two separate experimental designs were employed depending on whether generated or presented life events were considered. The first, regarding generated events, was a 2×2 mixed design with one within-subjects variable – Event (2: positive, negative) – and one between-subjects variable – Group (2: mixed, control). When the presented events were taken into account, a 3×2 experimental design with one within-subjects variable – Event (3: depression relevant, anxiety relevant, positive) – and one between-subjects variable – Group (2: mixed, control) was used. The dependent variables were: the actual occurrence of the events, the estimated source of events, prospective and retrospective judgements.

5. 3. 2. Participants.

There were two groups of participants who were recruited from the outpatients and control subjects who took part in the studies described in the previous Chapter. The first group comprised of 22 outpatients from the three clinical groups described in Chapter 4 (Section 4. 4. 1. 2.). Of these, 7 were originally included in the depressed group at which point in time they had met DSM-IV-TR diagnostic criteria for major depression (MD) and: dysthymic disorder (DD) (1); sub-threshold GAD (2); DD and sub-threshold GAD (1); DD and sub-threshold GAD and social phobia (SP) (1); DD and sub-threshold GAD and panic disorder (PD) (1); and DD and sub-threshold PD

and OCD (1). Six more outpatients had originally been included in the anxious group since they had initially met criteria for GAD (1) or GAD and: PD with agoraphobia (AP) (1); PD with AP and sub-threshold OCD (1); sub-threshold PD with AP (1); PD, SP, and sub-threshold MD (1); and sub-threshold DD (1). Finally, 9 outpatients were originally included in the mixed group because they had met criteria for: MD and GAD (2); MD, DD, and GAD (1); MD, GAD, and PD with AP (2); MD, PD with AP, and SP (1); DD, GAD, and sub-threshold MD and PD (1); MD, DD, GAD, PD with AP, and SP (1); and MD, GAD PD with AP, SP, and OCD (1).

In order to ensure that the group of outpatients who took part in this study did not differ from the group of outpatients who did not return at follow-up (i.e. dropouts), between group comparisons were carried out on basic demographics, self-report measures, and experimental control tasks used in the studies reported in the previous Chapter, which provide some general measures of education and cognitive functioning. The results of these analyses, reported in Table 5. 1. below, show no significant group differences for any of the measures.

The control group was composed of 17 out of 20 of the original control sample with no known history of emotional disorder.

Table 5. 1. Group comparisons of clinical participants vs. clinical dropouts at follow-up.

Variable	Patient Group		Test	<i>p</i> <
	Participants (<i>n</i> = 22)	Dropouts (<i>n</i> = 31)		
Gender (M/F)	10/12	13/18	$\chi^2(1) = 0.65$	.80
Age	35.82 (10.20)	33.42 (11.90)	$t(51) = 0.77$	.45
Initial measures				
BDI-II	28.59 (9.98)	29.16 (14.35)	$t(51) = 0.16$	.87
STAI				
State	49.86 (13.54)	48.48 (12.72)	$t(51) = 0.38$	.71
Trait	61.09 (8.27)	59.58 (12.75)	$t(51) = 0.52$	.60
MASQ				
GD	44.68 (10.82)	44.06 (11.82)	$t(51) = 0.19$	.85
N-SA	30.45 (6.68)	28.81 (7.30)	$t(51) = 0.84$	.41
AA	35.73 (11.77)	30.87 (10.84)	$t(51) = 1.55$	.13
N-SD	37.09 (10.35)	38.48 (12.72)	$t(51) = 0.42$	.67
AD	82.95 (11.63)	80.06 (17.68)	$t(51) = 0.72$	.48
BHS	12.64 (3.72)	12.42 (6.00)	$t(51) = 0.16$	.87
PSWQ	67.64 (8.42)	64.84 (12.19)	$t(51) = 0.93$	.36
Self-Esteem	-5.91 (8.11)	-6.26 (8.13)	$t(51) = 0.15$	.88
MHVS	20.36 (4.17)	20.74 (4.55)	$t(51) = 0.31$	.76
FAS-Test	37.59 (10.30)	41.84 (12.14)	$t(51) = 1.33$	.19
SPRT	2559.73 (1006.49)	2294.61 (733.27)	$t(51) = 1.11$	.27

Note: BDI-II = Beck Depression Inventory-II; STAI = State-Trait Anxiety Inventory; MASQ = Mood and Anxiety Symptom Questionnaire; GD = General Disturbance; N-SA = Non-Specific Anxiety; AA = Anxious Arousal; N-SD = Non-Specific Depression; AD = Anhedonic Depression; BHS = Beck Hopelessness Scale; PSWQ = Penn State Worry Questionnaire; MHVS = Mill Hill Vocabulary Scale; FAS-Test = Verbal Fluency Test; SPRT = Subject-Paced Reading Task. Standard Deviations in parentheses.

5. 3. 3. Apparatus and materials.

Questionnaires. The following self-report questionnaires were used and administered in the given order (see Appendix 2.): Beck Depression Inventory-II

(BDI-II; Beck et al., 1996); State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983); Mood and Anxiety Symptoms Questionnaire (MASQ; Watson et al., 1995a; 1995b); Beck Hopelessness Scale (BHS; Beck et al., 1974); Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990); Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986); Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965).

Experimental task. The experimental task used in this study consisted of a “paper-and-pencil” questionnaire (see Appendix 3. for an example). Each questionnaire was individually prepared for each participant and contained the positive and negative life events the person had generated during the PFT and all of the 72 depression relevant, anxiety relevant and positive life events every participant was presented during the SPJT. Therefore, each questionnaire was composed of a common set of events, equal for all participants, and a personal set of events, specific to each participant, so that the final number of events contained in each questionnaire varied depending on the number of events each participant was able to generate during the PFT. Participants had been previously exposed to both types of events, presented and generated, twice: in the PFT during the generation and judgement phases, and in the SPJT during the course of the two experimental conditions (subliminal and supraliminal). All generated sentences were changed slightly to fit the format of the presented events in order to make a homogeneous set of life events and to prevent easy recognition of the generated events. For example, if a participant generated the event “My husband (*name*) will leave me”, this sentence would be changed into “Your partner will leave you”. Questionnaires were prepared so that both types of events (generated and presented) were randomised and different random orders were used for each

participant's task. The only restriction to the randomisation process was the presentation of a positive event at the beginning of the task and 2 positive events at the end, in order to minimise the risk of a final negative mood induction. Participants were asked to consider each of the events in turn and indicate whether they had happened since the first experimental session, whether they had been generated by themselves or presented to them during the previous experimental session, and also rate each event on 10-point scales (1 = Not at all likely, 10 = Extremely likely) for probability of the event happening, or happening again, in the next 12 months and finally to recall what their original probability rating was.

5. 3. 4. Procedure.

All participants to the experiments described in Chapter 4 were informed that a second and final research session would follow in a few months time. Thus, approximately 4 months after the first session participants were invited to attend, individually, a second time. Participants were administered the questionnaires and, after a brief reminder of what the first research session had involved, they were introduced to the task. Subjects were given the exact date of the first session to be used as time frame and were informed about the formatting of the generated events. Moreover, they were encouraged to answer and guess if necessary all the questions asking whether the events had been generated or presented and about their previous probability ratings. After the completion of task, participants were debriefed and the Structured Clinical Interview for DSM-IV Axis I Disorders – Research Version

(SCID-I; First et al., 1996) was used to ascertain the participants' current clinical status.

5. 4. Results.

5. 4. 1. Subject characteristics.

Following clinical interviews with the outpatients it became clear that whilst the majority of our clinical sample had undergone Cognitive Behaviour Therapy (CBT; e.g. Hawton, Salkovskis, Kirk & Clark, 1989) or was in process of receiving psychological treatment, a smaller group had declined or had not yet received such treatment. Therefore we collected data from people who had improved somewhat their mental state and people whose condition had remained relatively stable over time. Since severity of symptomatology is likely to affect performance on the task administered and one of the main aims was to look at memory biases for previous mental states and attitudes following change, it was decided to split our clinical sample into two groups. The majority of outpatients ($n = 16$), who had shown clear signs of improvement, were included in our main clinical sample referred to as "recovery" group. Outpatients in this group had either received or were in process of receiving CBT treatment. A smaller sample of outpatients ($n = 6$) who had either declined or not yet commenced CBT treatment and who showed no sign of improvement over time was referred to as "stable" group. Outpatients in the stable group met DSM-IV-TR criteria for: MD and sub-threshold GAD (2); MD, DD, and

sub-threshold GAD and PD (1); MD, GAD, and PD with AP (1); MD, GAD, PD with AP, and SP (1); and MD, GAD, PD with AP, SP and OCD (1). In the recovery group, outpatients met criteria for: MD and GAD (1); MD and sub-threshold OCD (1); sub-threshold GAD (1); sub-threshold MD and GAD (2); sub-threshold MDE, GAD and PD (1); sub-threshold MD, PD and SP (1); sub-threshold MD, GAD, PD with AP (1); and only very mild or no anxious or depressive symptomatology for the remaining 8 outpatients. Important for the present study is the fact that also where (in two cases) full criteria were met for an anxiety or depressive disorder, the severity of such disorders was reduced compared to what was registered during the initial assessment approximately four months previously, thus indicating that a certain amount of change had occurred. This subdivision was supported by results obtained on the self-report measures.

Table 5. 2. Participant characteristics.

Variable	Group			Test	p <
	Stable (n = 6)	Recovery (n = 16)	Controls (n = 17)		
Gender (M/F)	4/2	6/10	8/9	$\chi^2(2) = 1.50$	.47
Age	41.17 (10.17)	34.50 (9.91)	33.65 (10.17)	$F(2,36) = 1.30$	.29
Follow-up time (No. of days)	157.83 (69.55)	169.81 (86.92)	118.18 (38.35)	$F(2,36) = 2.58$	.09
Initial measures					
BDI-II	33.33 _a (8.87)	26.81 _a (10.04)	3.59 _A (4.30)	$F(2,36) = 50.52$	.001
STAI					
State	56.50 _a (17.31)	47.38 _a (11.52)	27.82 _A (5.74)	$F(2,36) = 22.52$	.001
Trait	63.67 _a (8.80)	60.13 _a (8.14)	31.59 _A (7.32)	$F(2,36) = 67.54$	.001
MASQ					
GD	50.33 _a (11.04)	42.56 _a (10.28)	24.06 _A (5.53)	$F(2,36) = 29.12$	.001
N-SA	32.17 _a (9.11)	29.81 _a (5.76)	15.88 _A (4.90)	$F(2,36) = 28.60$	.001
AA	43.33 _{ab} (14.65)	32.88 _{ab} (9.52)	18.88 _A (2.78)	$F(2,36) = 22.52$	.001
N-SD	38.17 _a (7.96)	36.69 _a (11.32)	17.00 _A (5.55)	$F(2,36) = 25.58$	.001
AD	87.17 _a (9.22)	81.38 _a (12.30)	48.18 _A (11.70)	$F(2,36) = 43.31$	.001
BHS	13.33 _a (3.72)	12.38 _a (3.81)	2.35 _A (2.57)	$F(2,36) = 46.64$	.001
PSQW	70.67 _a (8.02)	66.50 _a (8.52)	38.06 _A (12.93)	$F(2,36) = 37.29$	.001
Self-Esteem	-7.00 _a (7.80)	-5.50 _a (8.44)	13.82 _A (4.42)	$F(2,36) = 40.00$	.001

Table 5. 2. Participant characteristics (continued *i*).

Variable	Group			Test	<i>p</i> <
	Stable (<i>n</i> = 6)	Recovery (<i>n</i> = 16)	Controls (<i>n</i> = 17)		
Follow-up measures					
BDI-II	32.33 _{ab} (9.85)	13.88 _{ab} (10.63)	4.12 _A (5.04)	<i>F</i> (2,36) = 24.96	.001
STAI					
State	52.00 _a (14.14)	38.81 (10.48)	30.00 _A (11.68)	<i>F</i> (2,36) = 8.33	.001
Trait	61.50 _a (9.40)	49.75 _a (12.09)	30.35 _A (7.32)	<i>F</i> (2,36) = 28.37	.001
MASQ					
GD	51.00 _{ab} (9.27)	33.69 _{ab} (10.47)	24.76 _A (8.95)	<i>F</i> (2,36) = 16.58	.001
N-SA	34.17 _{ab} (6.79)	22.81 _{ab} (7.05)	16.06 _A (5.34)	<i>F</i> (2,36) = 18.74	.001
AA	44.50 _{ab} (12.66)	25.88 _{ab} (7.32)	18.71 _A (2.82)	<i>F</i> (2,36) = 30.67	.001
N-SD	38.83 _{ab} (6.24)	26.00 _{ab} (9.00)	17.94 _A (6.26)	<i>F</i> (2,36) = 17.66	.001
AD	90.00 _{ab} (8.39)	63.31 _{ab} (17.17)	45.29 _A (14.61)	<i>F</i> (2,36) = 20.32	.001
BHS	15.00 _{ab} (4.34)	7.06 _{ab} (5.12)	2.35 _A (3.37)	<i>F</i> (2,36) = 19.60	.001
PSQW	68.50 _a (7.97)	61.19 _a (12.16)	36.59 _A (10.30)	<i>F</i> (2,36) = 29.85	.001
DES	32.53 _A (24.61)	13.58 _a (16.03)	4.40 _a (2.74)	<i>F</i> (2,36) = 9.10	.001
Self-Esteem	-6.00 _a (7.82)	0.00 _a (8.66)	13.29 _A (5.59)	<i>F</i> (2,36) = 21.41	.001

Note: BDI-II = Beck Depression Inventory-II; STAI = State-Trait Anxiety Inventory; MASQ = Mood and Anxiety Symptom Questionnaire; GD = General Disturbance; N-SA = Non-Specific Anxiety; AA = Anxious Arousal; N-SD = Non-Specific Depression; AD = Anhedonic Depression; BHS = Beck Hopelessness Scale; PSQW = Penn State Worry Questionnaire; DES = Dissociative Experiences Scale. Within each row, means that share a subscript letter in lowercase differ significantly from the mean reporting the same letter in uppercase (*p* < .05, at least). Standard Deviations in parentheses.

Table 5. 2. shows that the three groups did not differ in terms of gender, age and number of days between the initial research session and the second follow-up session, although the time gap between the two tended to be slightly longer for the clinical samples due to a general tendency on the part of the patients to procrastinate their follow-up appointment for personal reasons. The top half of Table 5. 2. shows that the control group scored lower than both clinical groups on the questionnaires administered during the first research session, and also that the two clinical groups did not differ from each other on these measures apart from a higher Anxious Arousal component in the stable group. The bottom half of Table 5. 2., which refers to the measures administered at follow-up, also shows that the control group scored significantly lower compared to the other two groups, however, the recovery and stable groups differed from each other with the former obtaining intermediate scores. In order to quantify the amount of change occurred over time separate t-tests were carried out for each of the repeated measures within the three groups. Consistent with the hypotheses, results indicated that no significant change had occurred in the control group, and that only a negligible amount of change had occurred in the stable group, that is slightly lower scores at follow-up for two of the repeated measures: STAI-T $t(5) = 2.60, p < .05$ and PSWQ $t(5) = 3.31, p < .05$, although these may be due to the small number of cases in this group. However, in the recovery group there was a substantial change as measured by large reductions on self-report scores obtained at follow-up. Specifically, this decrease was evident for scores on BDI-II $t(15) = 5.98, p < .001$; STAI-T $t(15) = 4.99, p < .001$; STAI-S $t(15) = 3.51, p < .01$; MASQ-GD $t(15) = 4.02, p < .001$; MASQ-NSA $t(15) = 3.54, p < .01$; MASQ-AA $t(15) = 2.43, p < .05$; MASQ-NSD $t(15) = 5.11, p < .001$; MASQ-AD $t(15) = 5.87, p$

< .001; BHS $t(15) = 5.86, p < .001$; RSES $t(15) = 4.41, p < .001$; and a nearly significant trend for PSWQ $t(15) = 2.06, p < .057$.

Therefore, results so far support our group division in terms of stability and change, and suggest that the two clinical groups identified could be thought of individuals varying in their levels of mixed anxious and depressive symptomatology who could be positioned somewhere within the two-dimensional space suggested by Goldberg and Huxley (1992).

5. 4. 2. Experimental task.

Data reduction. Participants' original probability judgements on the PFT and mean probability judgements on the SPJT (since in this task each event was rated twice) were recoded as indicating a positive probability judgement (i.e. "Yes, it will happen") if the original rating was > 5 , and as a negative probability judgement (i.e. "No, it will not happen") if the rating was ≤ 5 . Then, for two of the three parts of this study, accuracy of prediction and reality monitoring, indexes were computed for each participant. An Accuracy Index (AI) was calculated by subtracting the number of incorrect predictions from the number of correct predictions and dividing the difference by the total number of predictions (i.e. $[(\text{correct} - \text{incorrect}) / N]$). Consequently, -1 would be the lowest possible accuracy score and +1 the highest possible accuracy index score. A similar procedure was followed for the reality monitoring data, so that a Reality Monitoring Index (RMI) was computed for each participant by subtracting the number of incorrect source estimates from the number of correct source estimates and dividing the difference by the total number of

estimates (i.e. $[(\text{correct} - \text{incorrect}) / N]$). Consequently, -1 would be the lowest possible RMI score and +1 the highest possible RMI score. In both cases indexes were calculated separately for generated (positive and negative) and presented (depression relevant, anxiety relevant, and positive) events. Finally, for the third part of the study regarding memory biases, retrospective judgements were subtracted from prospective judgements to gain a measure of *perceived change* (+ve number = now more likely to happen, and -ve number = now less likely to happen); previous or original judgements were subtracted from prospective judgements to obtain a measure of *actual change* (+ve number = now more likely to happen, and -ve number = now less likely to happen); and retrospective judgements were subtracted from previous judgements to get a measure of *memory bias* for previous attitudes (-ve number for negative events and +ve number for positive events = negative memory bias for previous mental states: "It was really bad", worse than it actually was; whereas, +ve number for negative events and -ve number for positive events = positive memory bias for previous mental states: "It wasn't that bad"). As for the indexes described above, these measures were calculated separately for generated (positive and negative) and presented (depression relevant, anxiety relevant, and positive) events and for each participant. These newly computed measures were then used for the statistical analyses described below.

Accuracy of prediction. A summary of the descriptive statistics (means and standard deviations) regarding AI for the generated and presented events in each group is shown in Table 5. 3. and Table 5. 4. respectively.

Table 5. 3. Accuracy of prediction. Mean AI for each group in the negative and positive conditions of the generated events. (Standard deviations in parentheses.)

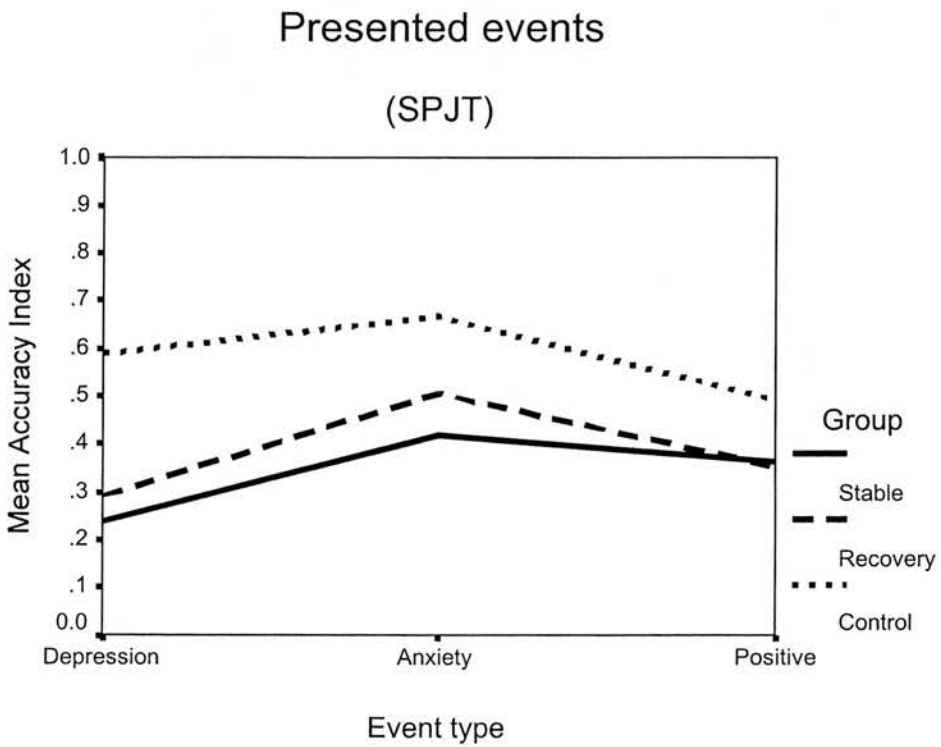
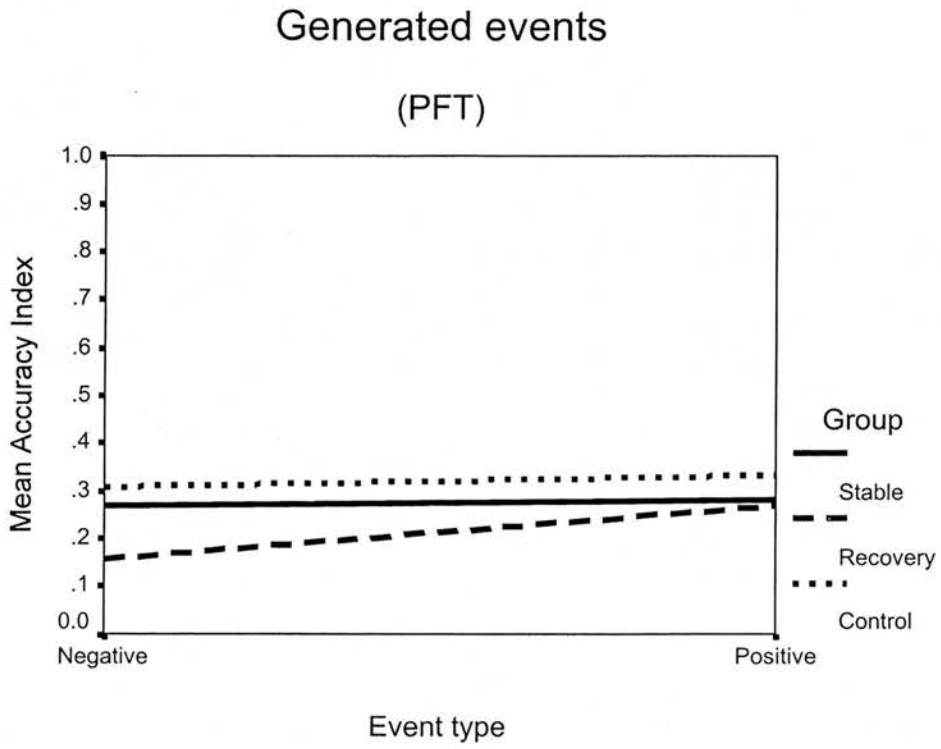
Event type	Group		
	Stable	Recovery	Control
Negative	.27 (.27)	.16 (.40)	.31 (.40)
Positive	.28 (.69)	.27 (.34)	.33 (.32)

Table 5. 4. Accuracy of prediction. Mean AI for each group in each of the three conditions of the presented events. (Standard deviations in parentheses.)

Event type	Group		
	Stable	Recovery	Control
Depression relevant	.24 (.19)	.29 (.35)	.59 (.23)
Anxiety relevant	.42 (.20)	.51 (.22)	.67 (.25)
Positive	.36 (.45)	.35 (.23)	.49 (.18)

When generated events were considered, a 2×3 ANOVA with Event (positive vs. negative) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable showed no significant effects of any of the factors, indicating that none of the groups was particularly accurate for generated negative or positive events (see top half of Figure 5. 1. below). Conversely, a 3×3 ANOVA with Event (depression, anxiety, and positive) as a within-subjects factor and Group (stable, recovery, and control) as a between-subjects factor carried out for the presented events revealed significant main effects of Event $F(2,35) = 4.36, p < 0.05$ and Group $F(2,36) = 8.12, p < 0.001$ (see bottom half of Figure 5. 1. below).

Figure 5. 1. Accuracy of prediction. Mean AI for generated and presented events in each condition for each group.



Within-group analyses indicated no difference in accuracy in the stable group $F(2,4) = 4.04$, *ns*. On the other hand, the recovery group was more accurate for anxiety relevant compared to depression relevant events $F(1,15) = 6.11$, $p < 0.05$. The control group was also more accurate for anxiety events but compared to positive ones $F(1,16) = 5.83$, $p < 0.05$. Between-group analyses showed a main effect of depression events $F(2,36) = 6.00$, $p < 0.01$ with Scheffé's *post hoc* analyses indicating that contrary to prediction the control group was more accurate than the clinical groups ($p < 0.05$) in this condition. A main effect of anxiety events was also found $F(2,36) = 3.41$, $p < 0.05$ indicating some group variability but no two groups differed from each other significantly.

Reality monitoring. Table 5. 5. and Table 5. 6. show descriptive statistics for RMI in the three groups for generated and presented events respectively.

Table 5. 5. Reality monitoring. Mean RMI for each group in the negative and positive conditions of the generated events. (Standard deviations in parentheses.)

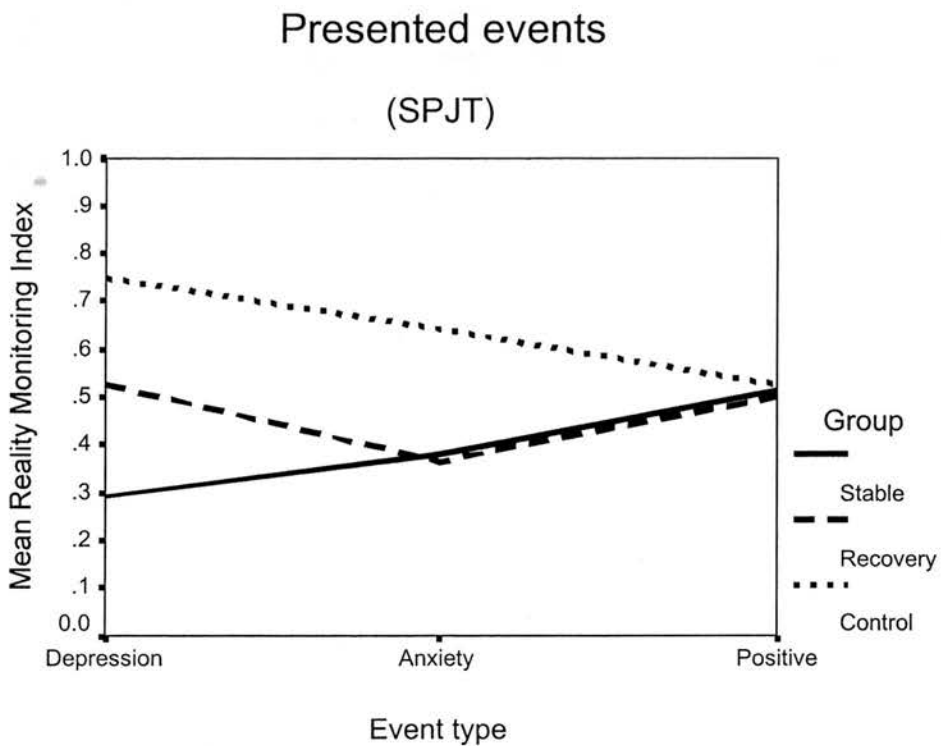
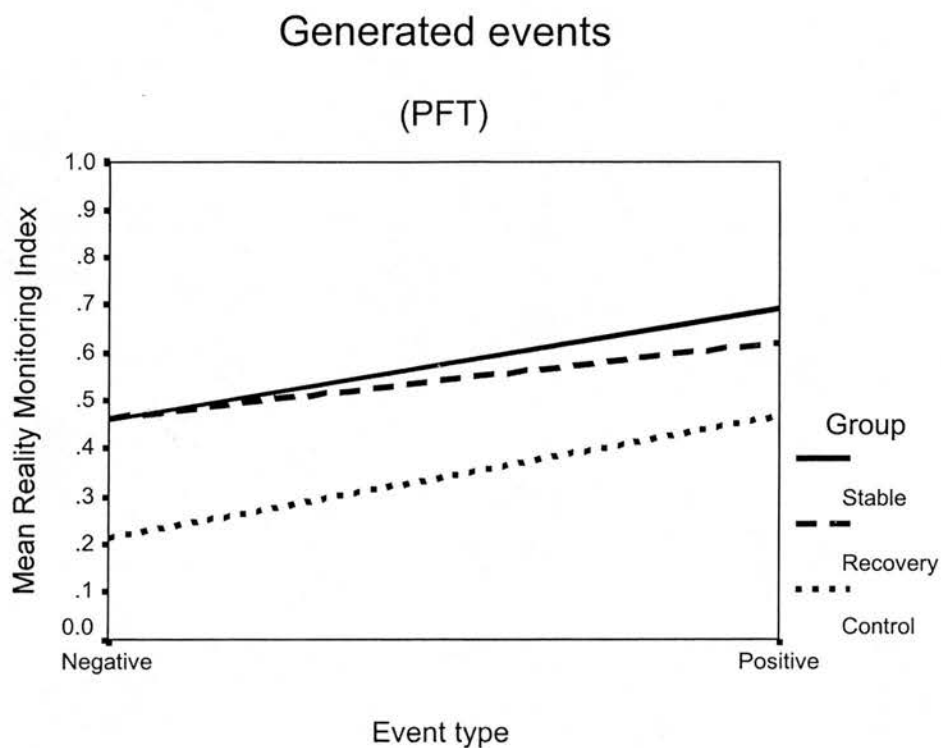
Event type	Group		
	Stable	Recovery	Control
Negative	.46 (.40)	.46 (.44)	.21 (.53)
Positive	.69 (.24)	.62 (.38)	.47 (.43)

Table 5. 6. Reality monitoring. Mean RMI for each group in each of the three conditions of the presented events. (Standard deviations in parentheses.)

Event type	Group		
	Stable	Recovery	Control
Depression relevant	.29 (.38)	.53 (.36)	.75 (.21)
Anxiety relevant	.38 (.21)	.36 (.41)	.64 (.26)
Positive	.51 (.20)	.50 (.40)	.52 (.19)

The results of a 2×3 ANOVA with Event (positive vs. negative) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable for generated events, revealed a significant main effect of Event $F(1,36) = 4.44, p < 0.05$, but no other within or between-groups differences were found indicating that generally all groups had better reality monitoring for positive compared to negative events (see top half of Figure 5. 2.). Turning to presented events, a 3×3 ANOVA with Event (depression, anxiety, and positive) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable showed a significant interaction Event \times Group $F(4,72) = 4.12, p < 0.01$ (see bottom half of Figure 5. 2.). Within-group analyses showed that the stable group yielded a higher RMI score for positive than anxiety and depression events $F(1,5) = 7.43, p < 0.05$; whereas, the recovery group obtained a higher RMI score for depression relevant and positive events compared to anxiety relevant events $F(1,15) = 9.02, p < 0.01$. In contrast, the control group showed better reality monitoring for depression and anxiety relevant than for positive events $F(2,15) = 27.04, p < 0.001$.

Figure 5. 2. Reality monitoring. Mean RMI for generated and presented events in each condition for each group.



Between group analyses showed a main effect of depression events $F(2,36) = 5.33, p < 0.01$ with *post hoc* tests indicating a significantly higher RMI score for control group compared to the stable group ($p < 0.05$) in this condition. Also for anxiety events a main effect was found $F(2,36) = 3.42, p < 0.05$ but no group differences were significant.

In order to test the hypothesis that levels of dissociation would mediate reality monitoring, separate linear regressions were computed for each RMI with DES scores as the independent variable. Results revealed the DES scores significantly predicted RMI levels only in the depression relevant condition of the presented events $R = 0.36, R^2 = 0.13, F(1,36) = 5.33, p < 0.05$.

Previous probability judgements. Although previous probability judgements have been dealt with in Chapter 4, since the group formation has changed and these ratings will be used to look at memory biases, below is a summary of the ratings for presented (Table 5. 7.) and generated events (Table 5. 8.) for the three groups in each condition.

Table 5. 7. Previous probability judgements. Mean probability judgements for each group in the negative and positive conditions of the generated events. (Standard deviations in parentheses.)

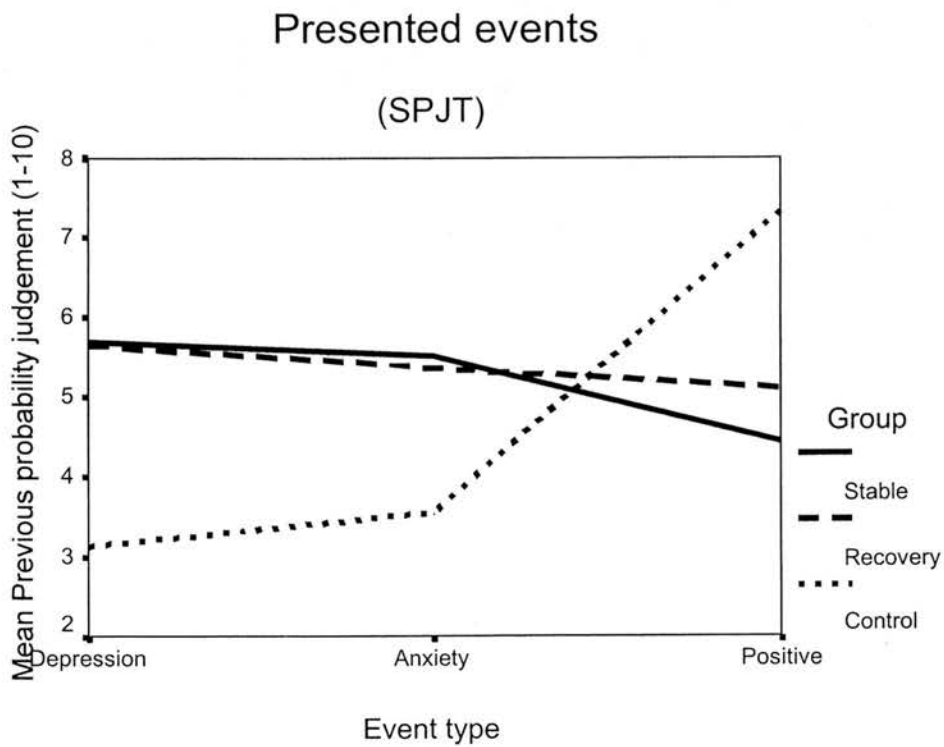
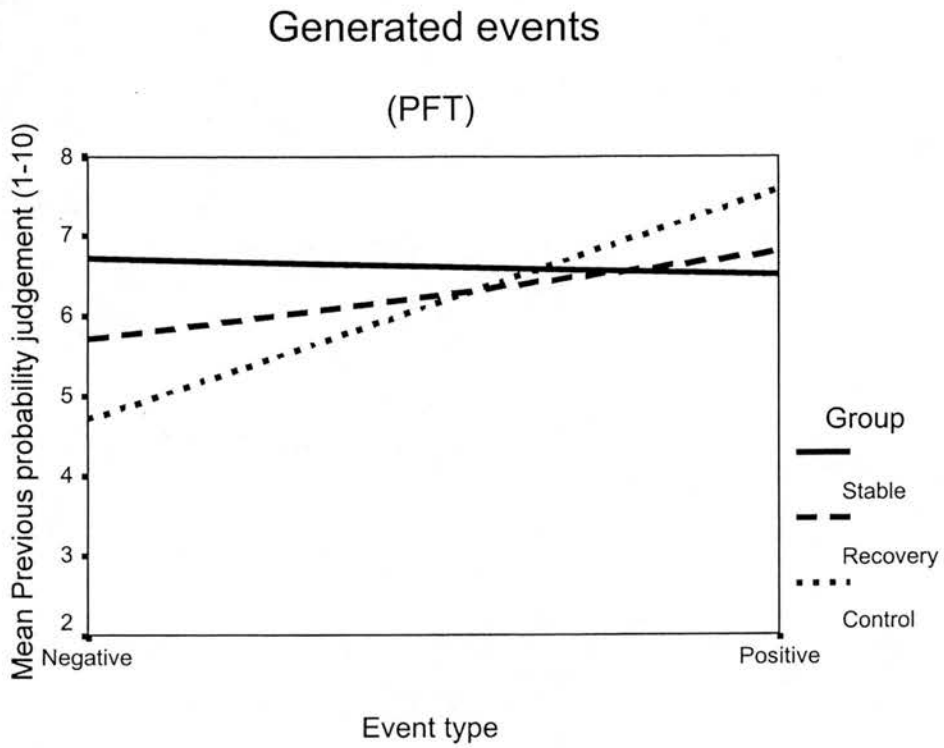
Event type	Group		
	Stable	Recovery	Control
Negative	6.74 (2.10)	5.72 (0.76)	4.71 (2.15)
Positive	6.52 (2.36)	6.81 (1.41)	7.58 (1.69)

Table 5. 8. Previous probability judgements. Mean probability judgements for each group in each of the three conditions of the presented events. (Standard deviations in parentheses.)

Event type	Group		
	Stable	Recovery	Control
Depression relevant	5.71 (0.94)	5.65 (1.36)	3.13 (0.85)
Anxiety relevant	5.52 (1.14)	5.36 (0.87)	3.55 (0.84)
Positive	4.43 (1.13)	5.10 (1.31)	7.33 (1.09)

A 2×3 ANOVA with Event (positive vs. negative) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable for generated events, revealed a significant main effect of Event $F(1,36) = 12.40, p < 0.001$ and a significant interaction Event \times Group $F(2,36) = 6.55, p < 0.01$ (see top half of Figure 5. 3.). Moreover, both the recovery and control groups had lower expectancy for negative compared to positive events $t(15) = 2.49, p < .05$ and $t(16) = 6.35, p < .001$ respectively, but not the stable group $t(5) = 0.19, ns$. Between-group analyses revealed a main effect of negative events $F(2,36) = 3.49, p < 0.05$ indicating a certain degree of variability in this condition but no groups differed significantly from each other. A 3×3 ANOVA with Event (depression, anxiety, and positive) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable was carried out to look at ratings for presented events. This showed a significant main effect of Event $F(2,35) = 4.89, p < 0.01$, Group $F(2,36) = 4.90, p < 0.01$ and a interaction Event \times Group $F(4,72) = 9.59, p < 0.001$ (see bottom half of Figure 5. 3.). No within-group effects were found for the two clinical groups, but the control group showed higher expectancy for positive compared to depression relevant and anxiety relevant events $F(2,15) = 71.33, p < 0.001$.

Figure 5. 3. Previous probability judgements. Mean judgements for generated and presented events in each condition for each group.



Finally, between-groups main effects were found for depression relevant $F(2,36) = 25.41, p < 0.001$, anxiety $F(2,36) = 20.39, p < 0.001$ relevant and positive events $F(2,36) = 20.39, p < 0.001$, with *post hoc* analyses showing that, compared to the two clinical groups, the control group reported lower expectancy for depression and anxiety events and higher expectancy for positive events ($p < 0.05$).

Prospective probability judgements. A summary of means and standard deviations for prospective probability ratings for generated and presented events is given below on Table 5. 9. and Table 5. 10.

Table 5. 9. Prospective probability judgements. Mean probability judgements for each group in the negative and positive conditions of the generated events. (Standard deviations in parentheses.)

Event type	Group		
	Stable	Recovery	Control
Negative	6.80 (1.43)	4.75 (1.50)	4.31 (1.93)
Positive	5.80 (2.94)	7.27 (1.49)	7.54 (1.54)

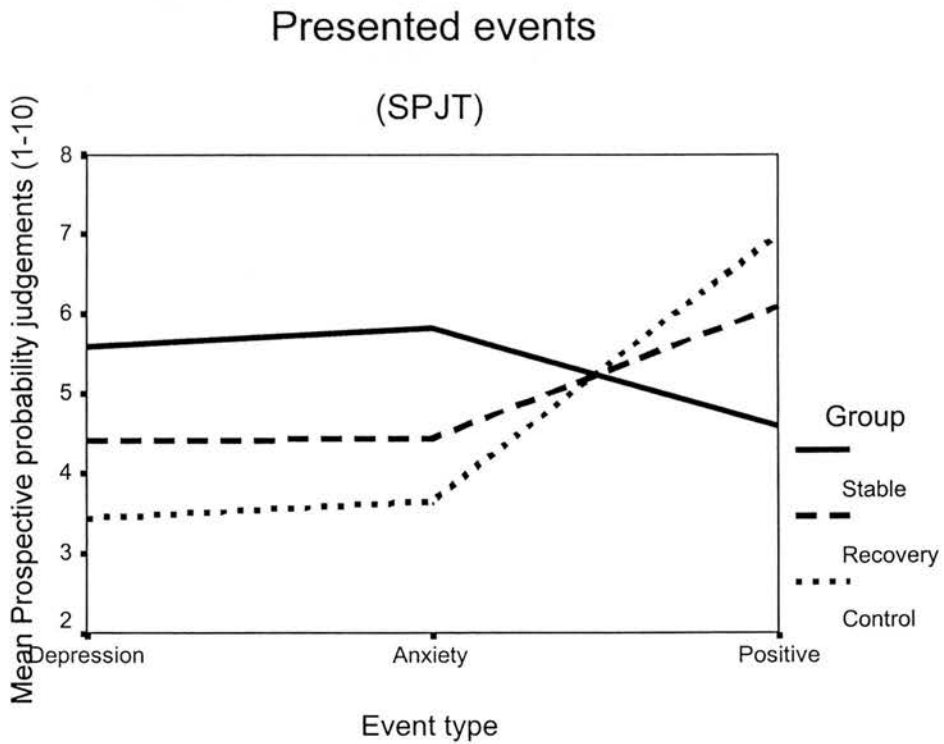
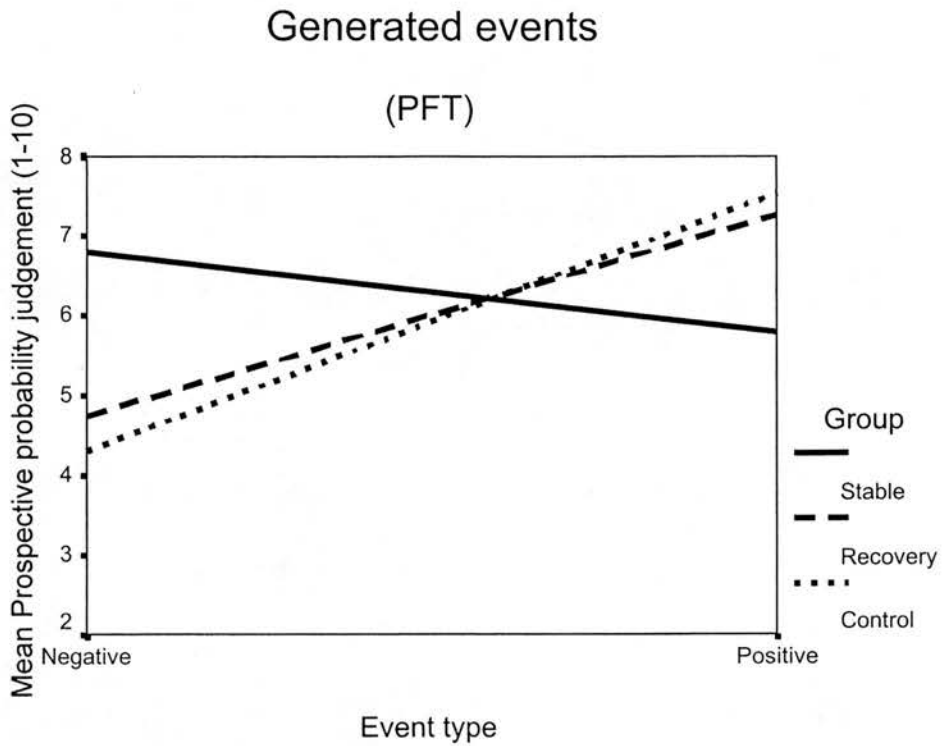
Table 5. 10. Prospective probability judgements. Mean probability judgements for each group in each of the three conditions of the presented events. (Standard deviations in parentheses.)

Event type	Group		
	Stable	Recovery	Control
Depression relevant	5.60 (0.98)	4.40 (1.17)	3.43 (1.53)
Anxiety relevant	5.82 (1.21)	4.44 (1.01)	3.65 (1.37)
Positive	4.58 (0.98)	6.09 (1.26)	7.00 (1.06)

The 2×3 ANOVA with Event (positive vs. negative) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable carried out

for generated events, showed a significant main effect of Event $F(1,36) = 12.89, p < 0.001$ and a significant interaction Event \times Group $F(2,36) = 6.60, p < 0.01$ (see top half of Figure 5. 4.). Further within-group tests revealed that both the recovery and the control group had higher expectancy for positive than negative events $t(15) = 4.45, p < .001$ and $t(16) = 6.38, p < .001$ respectively, but no difference was found in the stable group $t(5) = 0.64, ns$. Between-groups analyses indicated a main effect in the negative events condition $F(2,36) = 4.82, p < 0.05$, with *post hoc* tests showing that the stable group rated negative events as being more likely to happen compared to the control group ($p < 0.05$) and recovery group (trend approaching significance, $p < 0.054$). When presented events were considered, a 3×3 ANOVA with Event (depression, anxiety, and positive) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable showed a significant main effect of Event $F(2,35) = 10.19, p < 0.001$, and a interaction Event \times Group $F(4,72) = 6.56, p < 0.001$ (see bottom half of Figure 5. 4.). Within-group analyses indicated that both the recovery and the control groups had higher expectancy for positive than depression or anxiety relevant events $F(2,14) = 6.45, p < 0.01$ and $F(2,15) = 46.53, p < 0.001$ respectively, but no difference within the stable group $F(2,4) = 1.85, ns$. Finally, between-groups analyses showed the presence of significant main effects in the three conditions of depression relevant $F(2,36) = 6.39, p < 0.01$, anxiety relevant $F(2,36) = 7.33, p < 0.01$, and positive events $F(2,36) = 10.24, p < 0.001$, with *post hoc* analyses showing that in both the depression and anxiety relevant events conditions the control group had lower expectancy compared to the stable group, and that in the positive events condition the both recovery and control groups reported higher expectancy ratings than the stable group ($p < 0.05$).

Figure 5. 4. Prospective probability judgements. Mean judgements for generated and presented events in each condition for each group.



Retrospective probability judgements. Table 5. 11. and Table 5. 12. below summarise the retrospective probability judgements for generated and presented events reported by the three groups.

Table 5. 11. Retrospective probability judgements. Mean probability judgements for each group in the negative and positive conditions of the generated events. (Standard deviations in parentheses.)

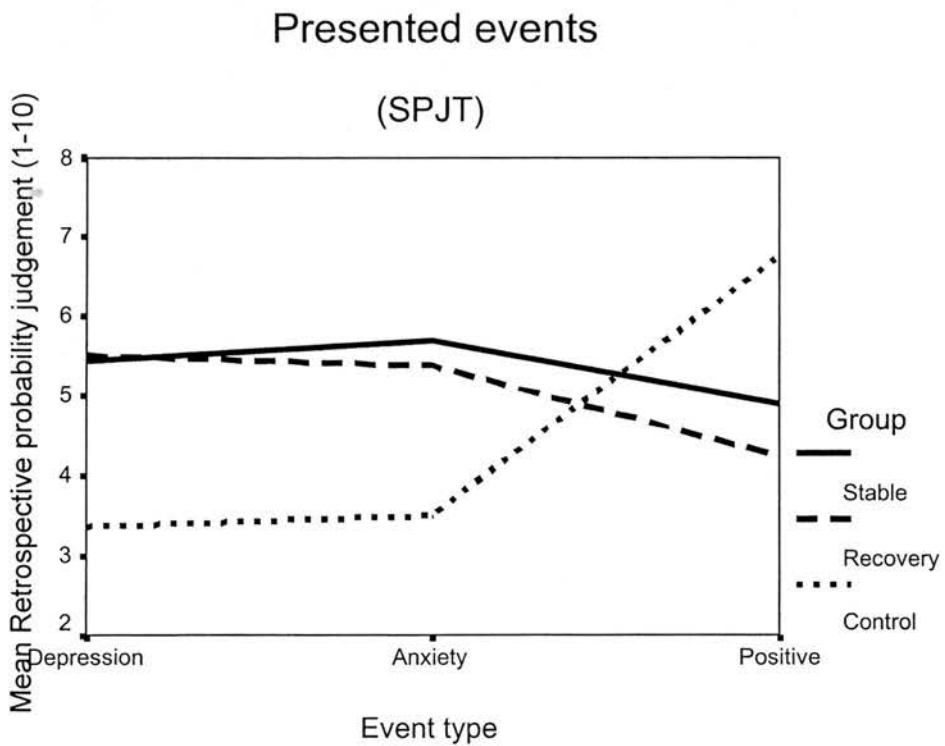
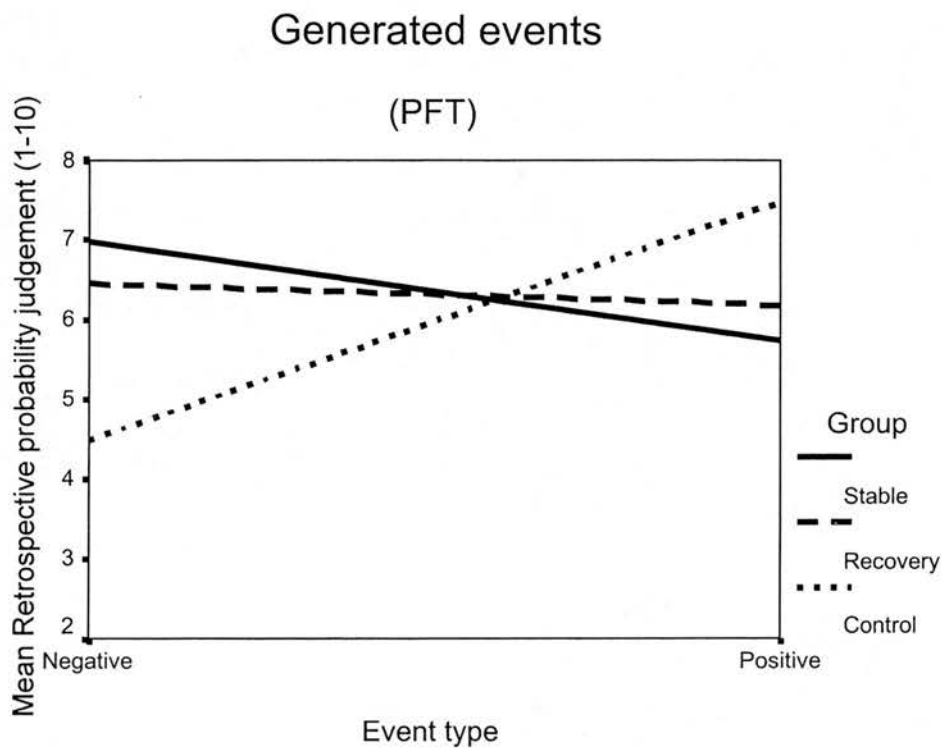
Event type	Group		
	Stable	Recovery	Control
Negative	7.00 (1.39)	6.46 (1.48)	4.49 (1.86)
Positive	5.74 (2.72)	6.19 (2.00)	7.48 (1.40)

Table 5. 12. Retrospective probability judgements. Mean probability judgements for each group in each of the three conditions of the presented events. (Standard deviations in parentheses.)

Event type	Group		
	Stable	Recovery	Control
Depression relevant	5.43 (1.05)	5.51 (1.44)	3.36 (1.52)
Anxiety relevant	5.70 (1.24)	5.38 (1.25)	3.50 (1.19)
Positive	4.90 (0.76)	4.25 (1.22)	6.76 (1.12)

A 2×3 ANOVA with Event (positive vs. negative) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable carried out for generated events, showed a significant interaction of Event \times Group $F(2,36) = 11.23$, $p < 0.001$ (see top half of Figure 5. 5.). T-tests indicated that the control group rated positive events as being more likely to happen than negative ones $t(16) = 5.94$, $p < .001$, whilst no within-group differences were found for the other two groups.

Figure 5. 5. Retrospective probability judgements. Mean judgements for generated and presented events in each condition for each group.



Also when presented events were considered, a 3×3 ANOVA with Event (depression, anxiety, and positive) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable showed a significant interaction Event \times Group $F(4,72) = 9.16, p < 0.001$ (see bottom half of Figure 5. 5.). Within-group analyses indicated that whilst the stable group did not differ significantly in its ratings across conditions $F(2,4) = 1.23, ns$, the recovery group provided higher ratings for depression and anxiety events compared to positive ones $F(1,15) = 4.84, p < 0.05$, and the control group showed the opposite pattern by giving higher probability ratings for positive events compared to depression or anxiety relevant events $F(1,16) = 70.73, p < 0.001$. Between-groups analyses showed significant main effects for all the conditions: depression events $F(2,36) = 10.63, p < 0.001$, anxiety events $F(2,36) = 12.55, p < 0.001$, and positive events $F(2,36) = 21.52, p < 0.001$. As expected, Scheffé's *post hoc* tests indicated that, compared to the two clinical groups, the control group reported lower expectancy ratings for depression and anxiety events and higher ratings for positive events ($p < 0.05$).

Perceived change. A summary of the amount of change perceived by each group for generated and presented events is given below on Table 5. 13. and Table 5. 14.

Table 5. 13. Perceived change. Mean perception of change for each group in the negative and positive conditions of the generated events. (Standard deviations in parentheses.)

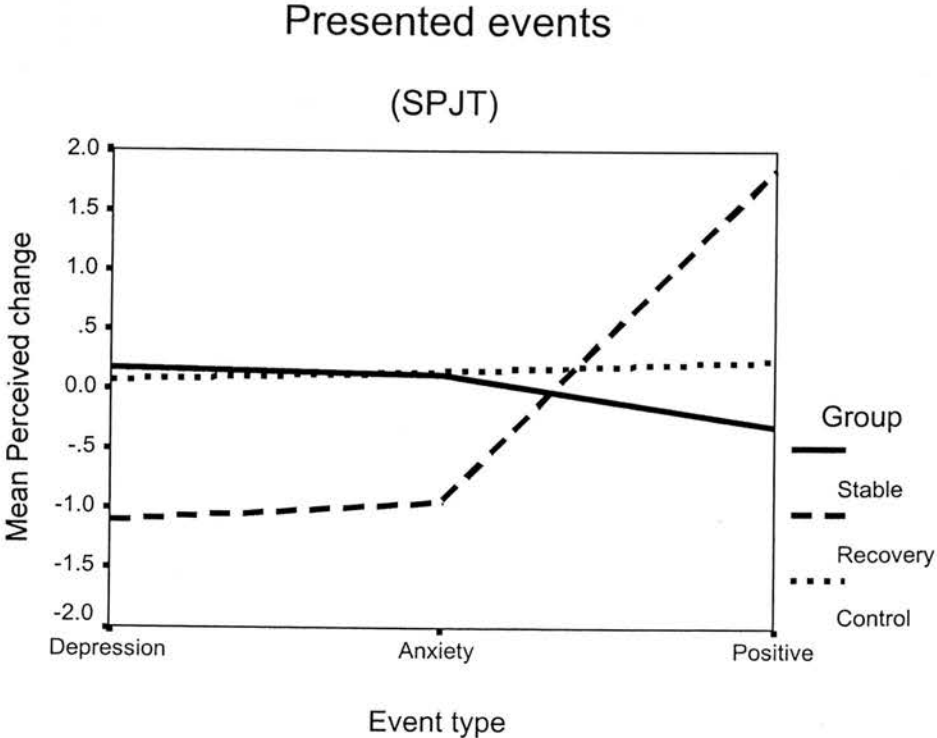
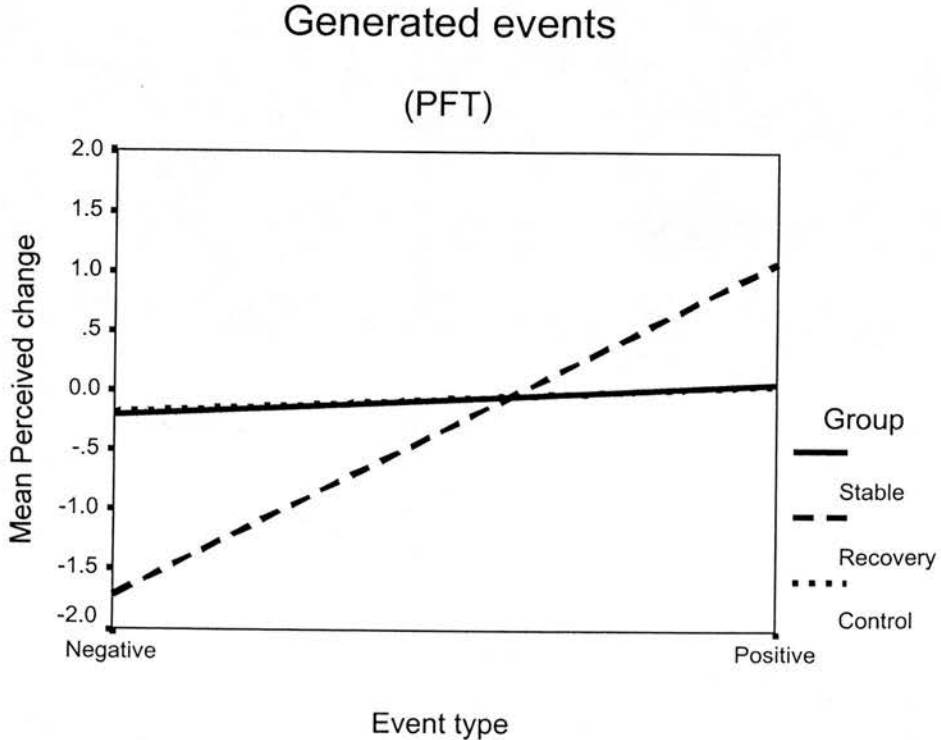
Event type	Group		
	Stable	Recovery	Control
Negative	-0.20 (0.50)	-1.71 (1.66)	-0.18 (0.88)
Positive	0.07 (0.77)	1.08 (1.87)	0.06 (0.95)

Table 5. 14. Perceived change. Mean perception of change for each group in each of the three conditions of the presented events. (Standard deviations in parentheses.)

Event type	Group		
	Stable	Recovery	Control
Depression relevant	0.17 (0.42)	-1.11 (1.10)	0.07 (0.50)
Anxiety relevant	0.12 (0.21)	-0.94 (1.13)	0.15 (0.31)
Positive	-0.31 (0.47)	1.85 (0.92)	0.24 (0.43)

When a 2×3 ANOVA with Event (positive vs. negative) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable was carried out for generated events, it showed a significant main effect of Event $F(1,36) = 11.93, p < 0.001$ and a significant interaction Event \times Group $F(2,36) = 9.67, p < 0.001$ (see top half of Figure 5. 6.). As predicted, t-tests indicated a reduction in negative expectancy only in the recovery group $t(15) = 4.33, p < .001$, whereas the other two groups remained relatively constant over time. Between-groups analyses also revealed a significant main effect in the negative events condition $F(2,36) = 7.26, p < 0.01$, with *post hoc* tests indicating that, compared to the stable and control groups, the recovery group reported a reduction in expectancy ratings for negative events ($p < 0.05$). Similarly, when a 3×3 ANOVA with Event (depression, anxiety, and positive) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable was carried out for presented events, it showed a significant main effect of Event $F(2,35) = 8.22, p < 0.001$, and a interaction Event \times Group $F(4,72) = 8.28, p < 0.001$ (see bottom half of Figure 5. 6.). As predicted, within-group analyses showed a significant increase in expectancy for positive events and a decrease for depression and anxiety events in the recovery group $F(2,14) = 22.69, p < 0.001$.

Figure 5. 6. Perceived change. Mean perception of change for generated and presented events in each condition for each group.



Conversely, the stable group showed a reduction of expectancy for positive events compared to anxious relevant ones $F(1,5) = 7.41, p < 0.05$, and no change was evident for the control group $F(2,15) = 0.49, ns$. Finally, between-groups analyses revealed significant main effects for the depression $F(2,36) = 10.64, p < 0.001$, anxiety $F(2,36) = 9.40, p < 0.001$ and positive events conditions $F(2,36) = 32.65, p < 0.001$, with *post hoc* tests indicating that, compared to the stable and control groups, the recovery group reported reduced expectancy ratings for depression and anxiety events and increased ratings for positive events ($p < 0.05$).

Actual change. Means and standard deviations for the amount of actual change in probability ratings for generated and presented events in the three groups are reported on Table 5. 15. and Table 5. 16. below.

Table 5. 15. Actual change. Mean actual change for each group in the negative and positive conditions of the generated events. (Standard deviations in parentheses.)

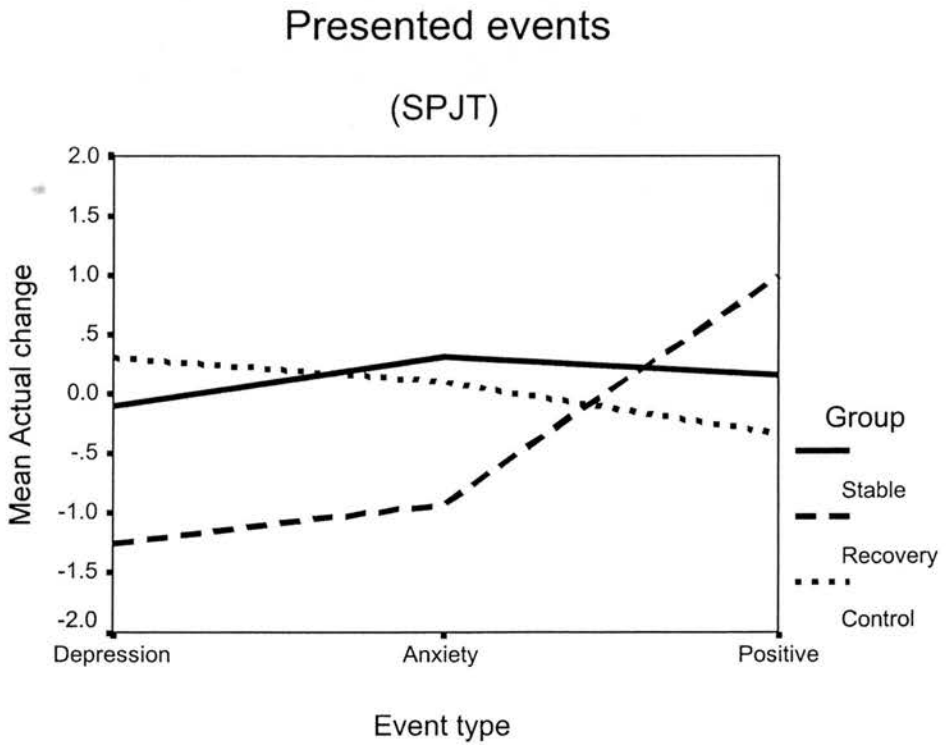
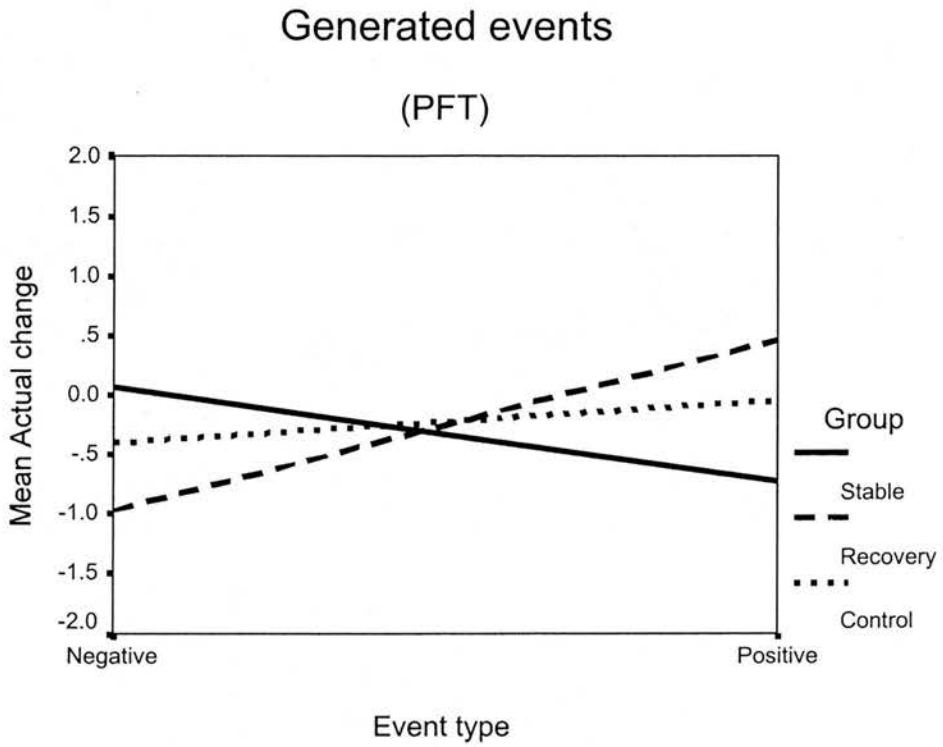
Event type	Group		
	Stable	Recovery	Control
Negative	0.06 (1.71)	-0.97 (1.63)	-0.40 (2.15)
Positive	-0.71 (4.41)	0.47 (1.51)	-0.04 (1.29)

Table 5. 16. Actual change. Mean actual change for each group in each of the three conditions of the presented events. (Standard deviations in parentheses.)

Event type	Group		
	Stable	Recovery	Control
Depression relevant	-0.11 (0.54)	-1.25 (1.30)	0.30 (1.47)
Anxiety relevant	0.30 (0.83)	-0.93 (1.14)	0.10 (1.10)
Positive	0.15 (0.57)	0.99 (1.12)	-0.34 (0.70)

The results of a 2×3 ANOVA with Event (positive vs. negative) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable carried out for generated events, showed no significant effects. However, as predicted within-group analyses indicated that the recovery group reported a decrease in expectancy ratings for negative compared to positive events $t(15) = 2.55$, $p < .05$ (see top half of Figure 5. 7.). No between-groups differences were found. On the other hand, when a 3×3 ANOVA with Event (depression, anxiety, and positive) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable was carried out for presented events, it showed a significant interaction of Event \times Group $F(4,72) = 5.82$, $p < 0.001$ (see bottom half of Figure 5. 7.). Once again, the recovery group reported a decrease in expectancy ratings for depression and anxiety events and an increased expectancy for positive events $F(2,14) = 10.94$, $p < 0.001$, whereas the other two groups did not show significant within-group effects. Between-groups analyses revealed main effects for the depression $F(2,36) = 5.96$, $p < 0.01$, anxiety $F(2,36) = 4.74$, $p < 0.05$ and positive events conditions $F(2,36) = 9.27$, $p < 0.001$, and *post hoc* tests indicated that the recovery group reported a reduction in expectancy ratings for depression and anxiety events and an increase in ratings for positive events compared to controls ($p < 0.05$).

Figure 5. 7. Actual change. Mean actual change for generated and presented events in each condition for each group.



Memory bias. The amount of memory bias exhibited by the three groups in their probability ratings for generated and presented events are reported below on Table 5. 17. and Table 5. 18.

Table 5. 17. Memory bias. Mean memory bias for each group in the negative and positive conditions of the generated events. (Standard deviations in parentheses.)

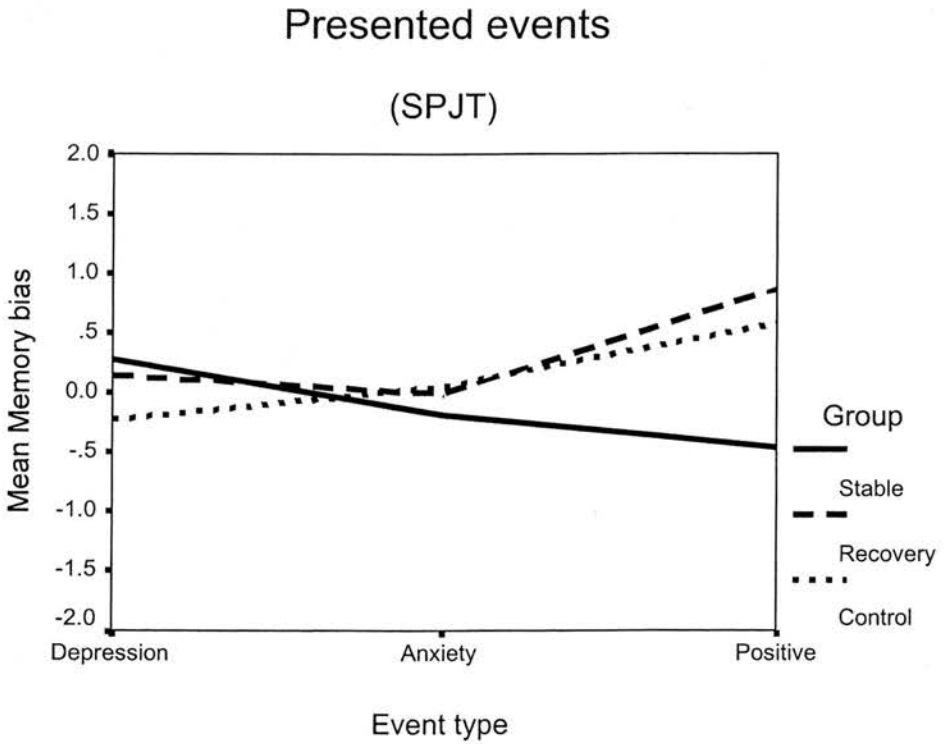
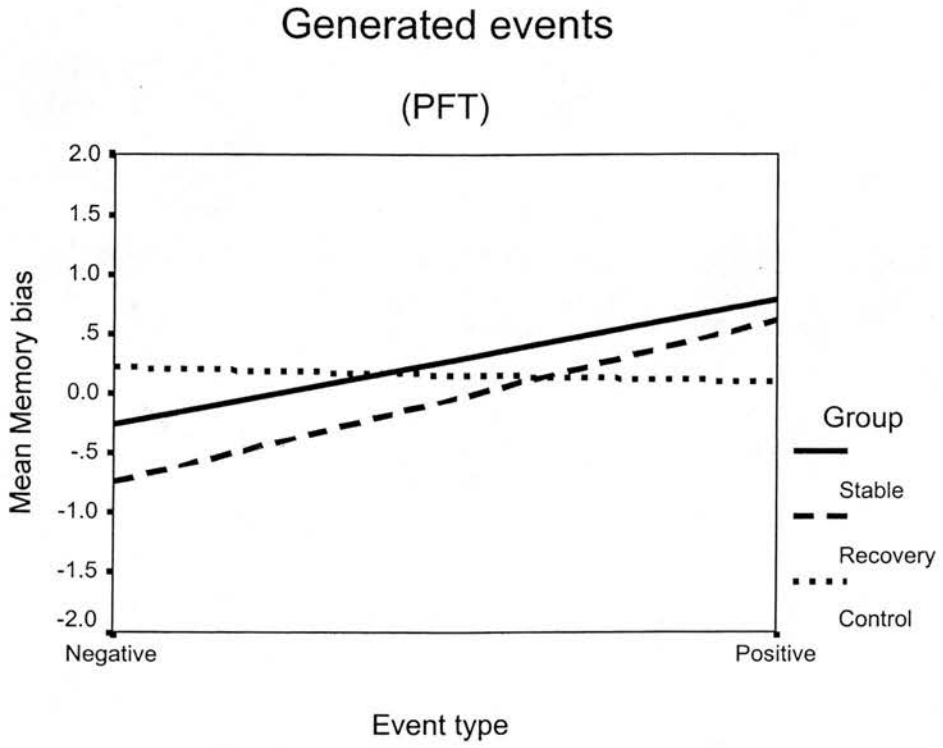
Event type	Group		
	Stable	Recovery	Control
Negative	-0.26 (1.58)	-0.74 (1.30)	0.22 (2.06)
Positive	0.78 (4.14)	0.62 (1.44)	0.10 (1.21)

Table 5. 18. Memory bias. Mean memory bias for each group in each of the three conditions of the presented events. (Standard deviations in parentheses.)

Event type	Group		
	Stable	Recovery	Control
Depression relevant	0.28 (0.49)	0.14 (1.34)	-0.23 (1.42)
Anxiety relevant	-0.18 (0.74)	-0.01 (1.03)	0.05 (0.93)
Positive	-0.47 (0.78)	0.86 (0.79)	0.57 (0.64)

A 2×3 ANOVA with Event (positive vs. negative) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable carried out for generated events showed a significant main effect of Event $F(1,36) = 4.43, p < 0.05$ (see top half of Figure 5. 8.). As hypothesised, within-group analyses indicated that only the recovery group showed a negative memory bias for presented events $t(15) = 3.82, p < .01$, whilst no between-groups differences were found.

Figure 5. 8. Memory bias. Mean memory bias for generated and presented events in each condition for each group.



When a 3×3 ANOVA with Event (depression, anxiety, and positive) as a within-subjects variable and Group (stable, recovery, and control) as a between-subjects variable was carried out for presented events, no significant main effects were found. However, as expected, only the recovery group exhibited a negative memory bias for positive events compared to depression and anxiety relevant $F(1,15) = 5.51, p < 0.05$ (see bottom half of Figure 5. 8.). Finally, between-groups analyses showed a significant main effect in the positive events condition $F(2,36) = 7.30, p < 0.01$, with *post hoc* tests indicating that the recovery and control groups reported a negative memory bias in this condition compared to the stable group ($p < 0.05$).

5. 4. 3. Results summary.

To summarise the results of this study, outpatients were less accurate in their prediction of future negative (depression and anxiety relevant) events, and had poorer reality monitoring for the same negative events compared to controls. Moreover, only the recovery group exhibited a negative memory bias for previous mental states and attitudes. This was due to the fact that their perception of positive change was greater than the actual amount of change, resulting in the patients overestimating their expectancy for prior negative events and underestimating their past expectancy for positive events. These results will be discussed in detail in the next Section.

5. 5. Discussion.

The results of this follow-up study are mainly consistent with the experimental hypotheses put forward earlier in this Chapter. Starting from accuracy of prediction in psychopathological and normal states, it was hypothesised that outpatients would be less accurate than controls. Although all groups were found to be moderately accurate, in that accuracy index (AI) values in all conditions were positive, no within or between-groups differences were found for the generated events. However, when comparing groups' performance on accuracy of prediction results from a predetermined set of life events (i.e. presented) may be more precise in that it is possible to control for idiosyncratic features of events that might interfere directly with the probability of such events happening. For example, if outpatients had the tendency to generate events that were over-general (e.g. Williams et al., 1996) or unrealistic, such as "I will stop worrying about things" then the probability of them happening would be lower than a specific event such as "I will go to a dinner party in three weeks time". Conversely, when presented events were considered, the two clinical groups were generally less accurate in their predictions of future life events, and significantly so for depression relevant ones. These results are consistent with previous research findings that showed lower levels of accuracy of prediction in mildly depressed students and greater accuracy in controls (e.g. Dunning & Story, 1991), but are inconsistent with studies that have found dysphorics being more accurate for pessimistic predictions (e.g. Dowse & McClure, 1996; Shrauger et al., 1998). In fact, outpatients in our sample did make more pessimistic predictions compared to the control group by showing greater expectancy for depression and

anxiety events and lower expectancy for positive events, but showed no improved accuracy for such events. The only sign in this direction was the greater accuracy for anxiety compared to depression events in the recovery group, but this seems to be circumscribed to this type of event and does not reflect a general increase in accuracy level for negative events in this group, especially because it is unaccompanied by an equivalent tendency in the stable group. Given the considerable group difference between the two clinical groups and the control group for anxiety and, especially so, for depression events, these results seem to suggest that outpatients were generally less accurate for negative life events. On the other hand, the control group exhibited relatively less accuracy for positive events, which is consistent with literature showing overconfidence in predicting positive compared to negative events (Pulford & Colman, 1996). The main limitation of this investigation of accuracy of prediction regards the timeframe. Specifically, original predictions referred to a time frame of twelve months, whereas the follow-up session took place approximately four months later. Therefore, is it plausible that some of the predicted events had not yet happened at the time of testing. However, the timeframe was equivalent for all participants and mean AI ranged from .24 to .67 on a scale ranging from -1 to +1, indicating that most events had already taken place (at least once) and that predicting life events over longer periods of time did not interfere with accuracy levels. Consistent with this view are results that indicate that the use of different timeframes does not affect individuals' expectancy for future positive and negative events (MacLeod et al., 1997a; 1998). Hence, this investigation extends the assessment of accuracy of prediction to a clinical population with varying severity of mixed anxious and depressive symptomatology.

Turning our attention to reality monitoring, participants were found to be generally able to distinguish between internally generated and externally presented events, as the positive reality monitoring index (RMI) values indicate. Analyses of RMI for generated events showed only a general tendency for all groups to be more accurate in their source attribution for positive than negative events, and although controls seem to have poorer RMI, no within or between-groups differences were found. However, when we considered presented events, control subjects were found to possess better reality monitoring than outpatients for depression and anxiety events as hypothesised, but, contrary to expectation, not for positive events. For presented events, a lower RMI indicates that participants are endorsing events of a particular type erroneously, since all events have in fact an external source. Conversely, a higher RMI indicates that the person is attributing the source of events of a particular type correctly to an external source. As a result, compared to controls, outpatients tended to think that more negative events had an internal origin (i.e. "I must have thought that"), whereas controls tended to distance themselves from such negative events. Interestingly, the recovery group yielded an intermediate RMI score for the depression relevant events compared to the other two groups, which might reflect their improved condition. The phenomenon of endorsement of negative events or attributes (e.g. Dozois & Dobson, 2001; Lawson & MacLeod, 1999) is therefore held responsible for the poorer reality monitoring in the outpatients groups.

Another factor implicated in the ability to discriminate internally generated from externally presented events was the level of dissociation. DES scores were found to significantly predict part of the variance observed in the depression relevant events condition. The stable group obtained DES scores significantly higher compared to

controls, and the recovery group yielded intermediate scores. This pattern resembles closely the one obtained in the RMI depression relevant condition, and is consistent with recent evidence that DES scores were significantly associated with positive response biases on a life events inventory (Merckelbach et al., 2000). Therefore it would appear that outpatients had the tendency to endorse the generation of negative life events and that levels of dissociation mediated this process.

The analyses of previous probability judgements showed an interesting effect in the negative condition of the generated events indicating that not only the control group but also the recovery group (although not as strongly) had reported lower probability ratings for negative relative to positive life events. Thus, the performance of the recovery group resembles our anxious group's performance on the PFT judgements. However, this similarity disappears when presented events were considered. In this case, in fact, both the stable and recovery groups showed comparable probability ratings for all of the event types (i.e. depression, anxiety, and positive) unlike any of the original three clinical groups. This effect is plausibly due to the fact that our current outpatient sample comprises individuals deriving from the original depressed, anxious and mixed groups, so that the distinguishing features among the three clinical groups have been here levelled out. However, for the present investigation these previous judgements constitute only a baseline against which accuracy of prediction and memory biases following change were compared. Moreover, following treatment, any original group distinction would only hold a nominal value, since, as argued by Goldberg and Huxley (1992) (see Chapter 2, Section 2. 6. 2.), individuals do not occupy a fixed position within the two dimensional axes of anxiety and depression, but move around in response to environmental stresses and,

to say it with the authors, “restitution” processes. Consequently, our present clinical groups, divided following current clinical interview and self-report measures, reflect well a sample with mixed anxious and depressive symptomatology varying in terms of severity and of its perceived/actual change.

Consistent with our hypothesis, when retrospective judgements were analysed, the recovery group showed important changes, in that the original “optimism” registered in the negative condition of the PFT events vanished with an equivalent rating being reported for positive and negative events, and its even-handed attitude exhibited in the original judgements of SPJT events turned into a more pessimistic view with lower expectancy ratings given to positive events. On the other hand, the prospective judgements of the recovery group did show a brighter view of the future with expectancy ratings very similar to the ones given by the control subjects. As a result, the magnitude of *perceived change* was greater than the amount of *actual change*. In fact, analyses of perception of change in attitudes towards future events (i.e. prospective judgements – retrospective judgements) revealed that the recovery group had lower expectancy for negative events (both generated and presented depression and anxiety relevant) and increased expectancy for positive events (especially presented ones) differing significantly from the other two groups. However, when the extent of actual change (i.e. prospective judgements – previous judgements) was examined, the magnitude of such change was reduced so that no group differences were found for the generated events, and the recovery group did not differ from the stable group in their change of attitudes for presented events. Therefore, in line with our predictions, the recovery group exhibited a *memory bias* (i.e. previous judgements – retrospective judgements; or perceived change – actual change) for

previous attitudes and mental states. Specifically, for generated life events the recovery group remembered having greater expectancy for negative events and lower expectancy for positive events than it actually did; and for presented events, it showed relative accuracy for negative (depression and anxiety relevant) events, but again reported having had lower expectancy for positive events than it actually did. All in all, these results are consistent with previous studies that demonstrated that individuals who are asked to remember their emotional states of either when they were anticipating or when they were coping with a negative life event, typically overestimate the intensity of prior negative emotional levels (e.g. Breckler, 1994; Bryant, 1993; Schrader et al., 1990) and, as in our case, underestimate the degree of positive emotions. Moreover, since our group was recovering from a past anxious and/or depressive episode, our findings confirm that this memory bias is especially evident when people are in a better position than they were previously (Keuler & Safer, 1998). These results are also consistent with the theory of temporal self-appraisal mentioned earlier in this Chapter (Ross & Wilson, 2000). In fact, by recalling past selves as possessing a particularly bad view of the future (i.e. "Things looked really bad then"), outpatients in the recovery group can feel better about their present mental states and their future prospects. However, instead of considering memory biases as some sort of self-deceptive mood-regulatory system devised to make us feel better about ourselves, it might be more valuable to regard them as the result of overoptimistic estimates of positive change. In other words, outpatients try to quantify and integrate the amount of positive change in their reconstruction of past selves, but since their perception of change is greater than the actual change (probably due to the fact that a relatively small reduction in symptomatology is

accompanied by a larger perceived improvement of their quality of life), they need to reconstruct a worse picture of their past in order to explain and incorporate their current mental state and preserve a coherent view of their selves (e.g. Greenwald, 1980).

In summary, we have seen that outpatients with mixed anxious and depressive symptomatology are less accurate in their predictions of future personal life events. This lack of accuracy is even more evident when judging the probability that negative events might occur, which suggests the presence of an unrealistic negative expectation in this group. In addition, our clinical group was also found to have poorer reality monitoring compared to controls, and once again this was manifest for negative (depression and anxiety relevant) events but not positive ones, indicating that outpatients endorsed the source of more negative events relative to the control group, but that their ability to discriminate the origin of positive items remains accurate. Moreover, it was found that levels of dissociation mediated in part the presence of this strong false-positive bias for negative materials, especially for depression relevant events, suggesting that its effect might not be extended to reality monitoring in general, but only to reality monitoring for specific self-referent materials. Finally, results also showed the presence of memory biases for past mental states: outpatients in the recovery group who had experienced change in their personal condition depicted a negatively biased view of their previous attitudes by reporting higher expectancy for negative events and lower expectancy for positive events compared to their actual original probability judgements.

5. 6. Conclusions.

In this study we made use of a prospective design to investigate the way individuals with varying severity of mixed anxious and depressive symptomatology bridge together their past and future depending on their current perspective. We have found that the whole of our clinical sample revealed problems with accuracy of prediction and reality monitoring. However, memory biases for previous mental states and attitude were a function of the perception of change occurred over time in patients who were recovering from their episode of anxiety and/or depression. We observed that a more pessimistic view of previous attitudes emerged in these outpatients in an attempt to accommodate their overoptimistic perception of change and maintain a coherent sense of self over time. It is assumed that such reconstructive processes in autobiographical memory occur continually on a smaller scale and that individuals use their implicit theories of consistency and change to evaluate possible mutations and adjust accordingly. As a result, we have also seen that our clinical sample cannot be considered a group of individuals with fixed symptomatology. In Chapter 2 we emphasised the fact that anxiety and depressive symptomatology and disorders tend to wax and wane in the same individuals and that the way in which this occurs constitutes one of the main features of overlap. It is therefore the temporal relationship between anxiety and depression that we will address in the next Chapter.

CHAPTER 6

AN EXPERIMENTAL INVESTIGATION OF THE TEMPORAL RELATIONSHIP BETWEEN ANXIETY AND DEPRESSION.

“There are no conditions of life to which a man cannot get accustomed”

(Leo Tolstoy, “Anna Karenina”)

6. 1. Introduction.

Earlier in this thesis (Chapter 2, Section 2. 5. 1.) we have seen that the temporal relationship between anxiety and depression represents one of the most important features of the overlap between the two disorders. Anxious and depressive symptomatologies often overlap both within and across episodes. Within a single episode, symptoms of anxiety are more likely to precede symptoms of depression and, across episodes, a depressive disorder is more likely to follow an anxiety disorder than vice versa. Moreover, both at symptomatic and diagnostic levels it is more likely that someone with a depressive disorder will show levels of anxiety than the reverse. Consequently, it is more common to come across “pure” anxiety disorders than mood disorders (e.g. Alloy et al., 1990; Mineka et al., 1998).

In this final experimental Chapter we shall address the temporal relationship of anxiety and depression in order to shed some light on the possible mechanisms

behind such common sequential pattern between the two disorders. This relationship will be examined on a non-clinical student sample with the deployment of a variety of mood induction procedures and neuropsychological testing.

6. 2. Review of relevant research and experimental hypotheses.

In an attempt to clarify the mechanisms behind the temporal relationship between anxiety and depression, Alloy et al. (1990) extended the Hopelessness theory of depression (Abramson et al., 1989) to the Helplessness-Hopelessness model of anxiety and depression. According to this model, the interaction of three cognitive components – helplessness expectancy, negative outcome expectancy and certainty of these expectancies – will affect the types of symptoms an individual will experience (see Table 2. 2., Chapter 2, Section 2. 6. 1.). In particular, a state of pure anxiety will be experienced when an individual is uncertain about his/her ability to control the outcome of important life events (uncertain helplessness expectancy). When a person becomes certain about his/her helplessness, but still uncertain about the occurrence of a negative outcome, a state of mixed anxiety-depression will be the result (certain helplessness expectancy + uncertain negative outcome expectancy). Finally, if an individual becomes certain also about the negative outcome of a valued life event, a state of hopelessness depression will arise (certain helplessness expectancy + certain negative outcome expectancy). Thus, the sequential development from anxiety to depression (both within and across episodes) is

accounted for by the progression through the cognitive continuum from helplessness to hopelessness.

This line of thought is also consistent with previous findings that anxiety and depression are associated with different types of life events. Specifically, anxiety may emerge as a response to anticipated “threat or danger”, resulting in increased hyper-vigilance and autonomic arousal in preparation for future life events. Whereas, depression may be seen as a reaction to a major past “loss”, which results in rumination about past events and pervasive negativity. The coupling of a “threat” with a “loss” event would lead to a mixed anxiety-depression (MAD) syndrome (e.g. Brown et al., 1993; Finlay-Jones & Brown, 1981). Therefore, “threat” events would cause a sense of uncertainty about the future, helplessness and anxiety. On the other hand, “loss” events would lead to hopelessness and depression. An analogous discrimination between the roles played by future threat in the development of anxiety and by past loss in depression, has also been put forward by Beck and his associates, and it is referred to as the “content-specificity” hypothesis (e.g. Beck, 1976; Beck, Brown, Steer, Eidelson & Riskind, 1987; Beck et al., 1985).

However, the pre-morbid occurrence of negative life events in depression and anxiety is a subject of controversy (e.g. Monroe, 1990 for a review) and indeed Alloy et al. (1990) stated explicitly that the chain of events postulated by their model, leading to hopelessness depression, is only one possible causal pathway to depression but it is not a necessary cause. Additionally, the percentage of MAD patients who report at least one severe loss or danger event prior to the onset of anxiety or depressive symptoms can vary widely between 30 and 80%, which leaves a large percentage of cases unaccounted for (Brown et al., 1993; Finlay-Jones &

Brown, 1981). Moreover, at odds with the conceptualisation of the relationship between anxiety and depression in terms of subsequent negative (danger and loss) life events is also some evidence derived from clinical practice with MAD patients. During clinical interview, many MAD patients report being anxious first (e.g. "I have always been an anxious person") and becoming depressed later on in life – which is consistent with Alloy et al.'s (1990) view – but also that the appearance of the depressive symptomatology is often unrelated to a particular life event (negative outcome or loss event). Rather, it seems to be the result of being in a prolonged (more or less acute) state of anxiety. Similarly, Tyrer (1985; 1989) posited that in the general neurotic syndrome (equivalent to MAD), symptoms of anxiety, as its core feature, are manifest even in the absence of major life events but can occur in the presence of underlying personality disorders (e.g. dependent, avoidant). Thus, although the critical role of severe negative life events in the emergence of anxiety and depression is undisputed, they seem to be contributory rather than a necessary cause.

Metalsky and colleagues investigated some of the mediating factors implicated in the differential reaction to negative life events within a stress-diathesis theoretical framework (Metalsky, Abramson, Seligman, Semmel & Peterson, 1982; Metalsky, Halberstadt & Abramson, 1987; Metalsky, Joiner, Hardin & Abramson, 1993). They carried out a series of prospective experiments with undergraduates who were tested before and after they received their midterm grades and found that students with a stable and global attributional style for negative events (attributional diathesis) showed a more enduring depressive mood reaction after receiving low grades (specially if their self-esteem was also low) than did students with no attributional

diathesis style. However, contrary to prediction, there was no difference in the initial depressive reaction to low grades in the two groups, which was predicted solely by the exam outcome. Although these results offer some support for the Hopelessness theory of depression (Abramson, et al., 1989), they do not address the main issue of the extended Helplessness-Hopelessness model of anxiety and depression (Alloy et al., 1990).

To date, to the best of our knowledge, only one experimental study has been carried out that explicitly investigates the temporal relationship between anxiety and depression (Whittal & Dobson, 1991). In their study, the authors classified a group of undergraduate psychology students as being either high or low in cognitive vulnerability to interpersonal evaluation. Participants were told that they would be meeting another student for the first time and then rating each other on a number of personality characteristics. After a brief social interaction, subjects received false negative feedback indicating social disapproval. Self-report questionnaires indicated an increase in anxiety, depression and hostility scores only in the high vulnerability group, who were more anxious before the experimental manipulation. However, the design included only two measurements (before and after a negative event) testing for changes from anxiety to depression as the threat event changed from future to past oriented. Moreover, self-report questionnaires were here used as the only measure, which may be susceptible to bias or distortion (e.g. Cronbach, 1990). Although this study seems to support Alloy et al.'s (1990) Helplessness-Hopelessness model of anxiety and depression, it might be possible that alongside the "*pre/post-critical event*" *modus operandi*, a separate "*pre-critical event*" mechanism may also be in operation.

In order to test the possibility that a depressive state may occur prior to any valued life event taking place as a result of a long-lasting and sustained period of anxiety, the following experiment was designed. First year undergraduate psychology students were invited to take part in this study, during which the handing back of their marked first essay (critical event) would take place. A variety of anxiety mood induction techniques were also used to ensure that an appropriate level of anxiety necessary to test our hypothesis was reached. A number of self-report questionnaires and performance on a modified version the Chimeric Faces Task (CFT) (Levy et al., 1983) were used as the dependent measures. To probe the possibility that a shift from an anxiety to a depressive state may occur as an effect of a prolonged state of anxiety, two separate measurements (Time 1 and Time 2) were taken on the CFT under mood induction before the marked essay was returned to the students. A third part (Time 3) of the CFT, without mood induction, followed the critical event to test for the effects of a valued real life event on mood.

In its original form, the CFT is a free-vision chimeric face perception task and consists of a booklet of 36 pages with pairs of human faces. Each face is composed of half neutral and half happy expression of the same person. On each page the pairs of faces are mounted one above the other and are the mirror image of one another.

Typically, when asked to decide which of the two faces looks happier, normal subjects (both right and left handed) judge as happier the face with the smile appearing to the left hemispace. The presence of this strong perceptual asymmetry has been regarded as evidence that the posterior region of the right hemisphere of the brain (the parieto-temporal lobe) is specialised in the processing of emotional faces (Levy et al., 1983). This neuropsychological test has also been used to differentiate

anxiety and depression and different patterns of perceptual asymmetry have been identified. Specifically, anxiety (Trait anxiety, in particular) is associated with a larger left hemispatial bias (reflecting increased cortical activation), whereas depressed individuals are less lateralised compared to controls, indicating a possible decrease in brain activity of the right posterior regions (Heller, Etienne & Miller, 1995; Jaeger, Borod & Peselow, 1987; Keller, Nitschke, Bhargava, Deldin, Gergen, Miller & Heller, 2000).

A modified computerised version of the CFT, which included different emotional faces (angry, disgusted, fearful, happy and sad), was employed in this experiment as a reliable candidate for the provision of a sensitive measure of mood shifts from anxiety to depression. In accordance with our experimental hypothesis we expected to observe a higher level of lateralisation on the CFT at Time 1 (in general and specially for mood-congruent emotions) and a general decrease of the amount of bias at Time 2. No specific predictions were made regarding the magnitude of biases at Time 3, because these would depend on the personal appraisal of the critical event outcome.

6. 3. Method.

6. 3. 1. Experimental design.

The design was a repeated measures design (5×3) with two within-subjects variables – Emotion (5: angry, disgusted, fearful, happy, sad) and Time (3: Time 1, Time 2, Time 3). The dependent variables were the lateralisation scores and reaction times.

6. 3. 2. Participants.

A group of 41 first year undergraduate psychology students were recruited as participants. Of these, 28 were female (reflecting the higher proportion of females in the undergraduate psychology population) $\chi^2(1) = 5.48, p < .05$. However, as Levy et al. (1983) found similar asymmetry scores in males and females, this was not explored further. The group's mean age was 18.71 ($SD = 1.89, Range = 17-28$ yrs). All participants were informed that they were to receive their marked first essay at some point during the experiment.

6. 3. 3. Apparatus and materials.

Questionnaires. The following self-report questionnaires were administered (see Appendix 2.): Edinburgh Handedness Inventory (EHI; Oldfield, 1971); Beck Depression Inventory-II (BDI-II; Beck et al., 1996); State-Trait Anxiety Inventory

(STAI; Spielberger et al., 1983); Positive Affect Negative Affect Scales – State version: “Moment” (PANAS; Watson, Clark & Tellegen, 1988); Visual Analogue Mood Scale (VAMS; e.g. McCormack, Horne & Sheather, 1988). The VAMS used in this study was composed of nine scales, 10 cm horizontal lines, anchored from 0% (*Not at all*) to 100% (*Extremely*). Above each scale was written “How *xxx* do you feel right now?” The nine adjectives used were: *disgusted, anxious, energetic, sad, angry, happy, tense, tired, and confused*. Subjects were asked to place a mark across the line at the point that best described how they were feeling at that particular moment. The scores on each scale were the number of millimetres rounded to the nearest integer.

Mood Induction. A combination of three different mood induction techniques was used in order to enhance their effectiveness: mood-descriptive self-referent statements (e.g. Velten, 1968) music (e.g. Slyker & McNally, 1991) and video clips (e.g. Gross & Levenson, 1995). Twenty self-referent statements were used: 10 cognitive and 10 somatic (see Table 6. 1. below). These were divided into two sets (A and B) each containing 5 cognitive and 5 somatic sentences. Sets A and B were matched for length and were used in counterbalanced order for the CFT either during Time 1 or Time 2.

Table 6. 1. List of self-referent statements used for the Velten's mood induction.

Cognitive
<p><i>Set A</i></p> <p>I am terrified about what is happening to me. I'm finding it difficult to concentrate because of uncontrollable thoughts. I'm worrying too much over something that doesn't really matter. My thoughts are racing. The tension is so oppressive I feel like I will snap.</p> <p><i>Set B</i></p> <p>I am uneasy about something that seems about to happen. I feel like I am losing out on things because I can't make up my mind soon enough. I feel worried and on edge. I can't get these nervous thoughts out of my mind. I'm noticing every little unimportant thing around me.</p>
Somatic
<p><i>Set A</i></p> <p>I feel my muscles twitching and shaking even though I try to relax. I feel my palms sweating with my growing uneasiness. I feel restless and highly-strung. My breathing is very shallow. I'm feeling immobilized.</p> <p><i>Set B</i></p> <p>All the tension is collecting in my neck and shoulders. My mouth is dry. I'm feeling more and more jittery in my body. My heart is pounding so fast it feels like it will give out. My face feels flushed as if I were blushing.</p>

Two audio tracks served as musical mood induction: these were edited compilations of several soundtracks (e.g. extracts from “X-Files”, “The Shining”), and were also used in counterbalanced order during the CFT at Time 1 or 2.

Finally, two short video clips were also used to induce anxiety: these were sequences from “The Silence Of The Lambs” (chase in the basement of the house) – slightly longer version than the one used by Gross and Levenson (1995) – and “The Blair

Witch Project” (final part: searching around the house), which provided two equivalent video clips in terms of setting and dynamics. These were shown in counterbalanced order either before Time 1 or before Time 2 of the CFT.

The self-referent statements were taken from previous research (Slyker & McNally, 1991), whilst the audio tracks and video clips were rated by seven independent judges on a series of 16 emotional scales so as to match Gross and Levenson’s (1995) procedure. The ratings obtained compared very closely with those reported by Gross and Levenson (1995) for fearful materials. Audio tracks were played on a minidisk player (Sharp MD – MT821H (GL)) and the video clips were presented by computer (RM – Pentium III, 800MHz) and shown on a 17” CTX – PR705F computer monitor, full screen, with the Creative SoundBlaster Live “Stone room” (reverb 50 %) sound effect. In both cases, subjects used headphones (Sony – MDR-15).

Chimeric Faces Task. Each of the three CFTs consisted of 60 pairs of chimeric faces (12 pairs for each of the 5 emotions: angry, disgusted, fearful, happy and sad). The photographs used here were taken from standardised material (Ekman & Friesen, 1976). Half of the posers were male faces and half were female. On constructing the chimeras, the neutral emotion derived always from the right half of each of the original photos, whereas, the other emotional expressions were always taken from the left half of the original photos. All original photographs were first digitised and then, for each poser, chimeric faces were formed by collating the half neutral face with each of the 5 half emotional faces. Once these were ready, each photo was duplicated and rotated so as to create a mirror image of the original

chimera. Finally, each pair of faces was mounted one above the other twice, so that the emotional side would be the left for the top face and right for the bottom face, and then vice versa. The size of the each chimeric face was 90 mm (H) × 60 mm (W) and each pair was separated by 50mm (see Appendix 6. for example of chimera used). The CFT was carried out by computer (see above) and programmed with the E-Prime experiment generator package version 1.0 (Schneider, 2000).

6. 3. 4. Procedure.

In order to provide good vision of the stimuli and video clips, participants were tested individually in a laboratory room softly illuminated by a 40W desk lamp. They were told that the aim of the study was to look at the judgement of emotional faces, and also that the task was divided into three parts and that they would be given their marked essay after the second part of the task. At the beginning of the experimental session participants were administered the following questionnaires: EHI, BDI-II, STAI (Trait and State), PANAS, VAMS to check for handedness, levels of anxiety, depression, positive and negative affect, and other current mood states. Then the main instructions for the CFT were given by computer and rephrased by the experimenter (these also included the handing back of the marked essay after the second part), and a short practice followed. The practice consisted of the presentation of a practice self-referent sentence for 15 sec in the middle of the screen (red colour font on light grey background) followed by six pairs of chimeric faces covering all the different emotions once, apart from “fear” which was presented twice. The pairs appeared randomly one at a time in the middle of the screen (light grey background)

and each was preceded by a fixation point, also at the centre of the screen, for 1 sec. As each of the pairs of chimeric faces appeared, subjects were instructed to press either the "9" (top face) or the "3" (bottom face) key on the numeric pad of the keyboard to indicate which of the two faces looked more emotional. Since the CFT is a free viewing perception task, no time restriction was given, and throughout the practice, subjects listened to the beginning of one of the audio tracks (used also during the first part of the task). Then, one of the video clips was shown and another mood rating (VAMS-T₂) checking for the efficacy of the induction was taken, followed by the first part of the CFT (Time 1). The format of the first part of the CFT was essentially the same as for the practice. Participants listened to one of the audio tracks whilst completing the task, which included the random presentation of 60 pairs of chimeric faces (12 for each emotion, 6 male and 6 female, and 6 with the emotional side on the top left and right bottom faces, and 6 vice versa) each preceded by a fixation point for 1 sec. Ten self-referent sentences (either set A or B) were also used and presented randomly one at the time for 15 sec before the presentation of every 6 pairs of faces. This way the mood induction continued throughout the task. After the CFT at Time 1 was completed, another mood check was taken (VAMS-T₃), before the next video clip was shown. After this, subjects re-rated their mood (VAMS-T₄) and then carried out the CFT at Time 2, with a different audio track and set of sentences. At that point, the marked essay was handed back, a rating of satisfaction with the mark obtained was taken (0 to 100 %), and some time was given to the subjects to have a brief look at the comments on their work. Then, the following questionnaires were re-administered: STAI (State only), PANAS-T₂, and VAMS-T₅, before the CFT at Time 3 took place. In order to test the effects of the

critical event, no mood induction of video, music or sentences was used for the last part of the task. Thus, only 60 pairs of randomly presented chimeric faces constituted the CFT. Finally, another VAMS-T6 was filled in. During the execution of the different parts of the task, participants sat at a distance of approximately 50 cm from the computer screen for the CFT and approximately 80 cm when watching the video clips. At the end, subjects were debriefed as to the nature of the experiment and were given the opportunity to ask questions on the study itself or educational methodological questions whilst listening to some pleasant pop music in order to induce a positive mood state.

6. 4. Results.

Data Reduction. Following the Levy et al. (1983) procedure, general asymmetry scores for each CFT were computed for each participant by subtracting the number of faces judged to be more emotional when the emotion was on the left side of the face, from the number of faces judged to be more emotional when the emotion was on the right side and dividing the difference by 60, the total number of face pairs (i.e., $[(R - L) / 60]$). Consequently, -1 would be the highest possible leftward bias score and +1 the highest possible rightward bias score. Twelve of the 41 participants showed a positive (rightward) bias. Since we were interested in changes in the size of the biases in a within-subject design, indicating shifts in the amount of lateralisation over time, and not in the side of the lateralisation *per se*, we inverted the sign of the general bias scores (from positive to negative) for these participants so as to obtain a

uniformly lateralised group and facilitate analyses. As we distinguished among five types of emotions (angry, disgusted, fearful, happy, sad), we also calculated for each subject separate bias scores for every emotion (i.e., $[(R - L) / 12]$). Again, biases belonging to the 12 positively lateralised participants were inverted in sign.

Out of 41 participants, 5 were left-handed and 1 ambidextrous. However, all of these subjects showed a leftward bias of a size comparable to the rest of the group.

Because the hypothesis is twofold and assumes the presence of two different mechanisms operating at different times during the course of our experiment – that is between Time 1 and 2 (*pre-critical event*), and after Time 3 (*post-critical event*) – we will consider the two sets of results separately.

Pre-critical event. For this part of the analyses the following inclusion criteria were used: *a*) general biases at either Time 1 or Time 2 should deviate statistically from 0 (no bias); *b*) different amounts of general biases at Time 1 and 2. The first criterion was achieved by calculating the standard error using the following formula: $SE = \sqrt{[(R + L) / N^2]}$ (Levy et al., 1983). Because in our task subjects were not given the option of deciding that the two faces looked equally emotional, the $SE = 0.129$ for every subject. *Z scores* were then calculated and used to establish whether subjects were lateralised at least to some extent. A value of $p < 0.1$ (1-tailed), was used here in order to allow for the possibility that the mood manipulation might have reduced the amount of bias to a certain degree already at Time 1. Two participants did not show any significant lateralisation at any point (including Time 3) during the experiment and were therefore excluded from these and later analyses. Eight more subjects were excluded from this first set of analyses because they did not meet the

inclusion criterion *a*. Finally, one subject (although significantly lateralised) failed to meet the inclusion criterion *b*, showing no change in the amount of bias between Time 1 and 2 as a result of the mood induction. Of the remaining thirty subjects, 18 showed a smaller bias at Time 2 compared to Time 1 (Group 1), and 12 showed the opposite pattern (Group 2). Consequently, they were treated as two separate groups. It was hypothesised that subjects in Group 1 might have been more anxious to begin with, and therefore had experienced a more prolonged and sustained (during Time 1) state of anxiety, which was effective enough to caused the shift towards a depressive asymmetry pattern at Time 2. On the other hand, if participants in Group 2 were less anxious at the outset, it might have taken them longer to reach the necessary conditions for this presumed mechanism to operate. Analyses of the self-report measures confirmed that Group 1 had a significantly higher level of Trait anxiety $t(28) = 1.84, p < .05$ (1-tailed) compared to participants in Group 2. Previous research has shown that Trait anxiety is more likely to show asymmetric activity of the right posterior regions of the brain, because it is more stable than State anxiety (e.g. Heller, 1993; Heller, Etienne & Miller, 1995). Group 1 reported also lower scores on the Happy scale of the VAMS- T_3 $t(28) = 2.40, p < .05$ and VAMS- T_4 $t(28) = 2.83, p < .01$ (both 2-tailed), which provides more support and validation of the distinction between the two groups. No more between groups significant differences were found on the self-report measures, although generally Group 1 scored higher on negative scales and lower on positive ones compared to Group 2 (see Table 6. 2. and Table 6. 3. below).

Table 6. 2. Participant characteristics.

Variable	Group1 (n = 18)	Group 2 (n = 12)	Group 3 (n = 9)	Test	p <
Gender (M/F)	6/12	5/7	2/7	$\chi^2(2) = 0.87$	.65
Age	18.44 (1.46)	19.25 (2.86)	18.56 (1.13)	$F(2, 36) = 0.65$	.53
EHI (LQ)	84.02 (21.10)	74.98 (19.76)	90.51 (11.60)	$F(2, 36) = 1.80$	.18
BDI-II	9.11 (4.65)	10.58 (7.84)	8.11 (6.35)	$F(2, 36) = 0.43$	.65
STAI					
Trait	42.83 (8.75)	37.42 (6.36)	42.78 (7.81)	$F(2, 36) = 1.95$	.16
State _{T1}	36.33 _A (9.32)	32.83 _B (4.51)	40.89 _C (6.72)	$F(2, 36) = 2.91$	.06
State _{T2}	47.00 _a (11.93)	41.58 _b (10.15)	49.89 _c (9.35)	$F(2, 36) = 1.64$	.21
PANAS					
PA _{T1}	27.72 (7.49)	28.17 (8.61)	29.44 (5.70)	$F(2, 36) = 0.16$	.85
PA _{T2}	28.22 (5.02)	29.33 (8.88)	28.33 (7.18)	$F(2, 36) = 0.10$	.90
NA _{T1}	13.11 _D (3.95)	13.17 (3.46)	13.11 _E (4.08)	$F(2, 36) = 0.00$	.99
NA _{T2}	18.94 _d (7.34)	16.33 (7.10)	16.89 _e (5.51)	$F(2, 36) = 0.59$	.56
Essay					
Mark	66.00 (8.15)	61.58 (7.84)	61.11 (9.45)	$F(2, 36) = 1.48$	.24
Satisfaction	73.61 (14.02)	67.08 (17.51)	72.56 (14.36)	$F(2, 36) = 0.70$	.50

Note: Group 1 = High Trait Anxiety; Group 2 = Low Trait Anxiety; Group 3 = Lateralised only at Time 3; EHI (LQ) = Edinburgh Handedness Inventory (Laterality Quotient); BDI-II = Beck Depression Inventory-II; STAI = State-Trait Anxiety Inventory; PANAS = Positive Affect Negative Affect Scales. Standard Deviations in parentheses. Within each column, means with a subscript letter in lowercase differ significantly from means reporting the same letter in uppercase ($p < .05$, at least).

Table 6. 3. Mean scores of Visual Analogue Mood Scale (VAMS) across time for each group.

VAMS Subscales and Groups (G)	Time					
	1	2	3	4	5	6
<i>Disgusted</i>						
G 1	8.06 _A (16.53)	41.61 _{AB} (31.29)	27.33 _{AC} (21.52)	35.39 _{AD} (25.60)	17.89 _{ABDE} (16.12)	14.56 _{ABCDE} (14.07)
G 2	3.42 _A (5.14)	31.33 _{AB} (18.03)	19.50 _{AC} (16.87)	38.42 _{ACD} (27.06)	15.50 _{ABD} (13.30)	9.83 _{ABD} (8.74)
G 3	6.89 _A (11.25)	44.33 _{AB} (23.84)	24.89 _{ABC} (17.72)	50.78 _{ACD} (33.96)	17.00 _{BCD} (14.68)	12.11 _{BCD} (10.12)
<i>Anxious</i>						
G 1	18.83 _A (24.33)	48.67 _{AB} (29.93)	47.94 _{AC} (29.04)	59.44 _{ABD} (25.42)	41.33 _{AD E} (27.26)	27.22 _{BCDE} (25.29)
G 2	19.58 _A (20.27)	47.67 _{AB} (19.95)	40.58 _{AC} (17.44)	49.25 _{AD} (19.23)	28.92 _{BD} (18.42)	17.83 _{BCD} (8.62)
G 3	25.89 _A (29.87)	57.11 _{AB} (24.27)	44.44 _{AC} (16.88)	57.67 _{ACD} (19.59)	32.22 _{BCDE} (15.39)	19.89 _{BCDE} (17.40)
<i>Energetic</i>						
G 1	38.00 (26.87)	43.83 (26.68)	38.56 (25.43)	46.22 (27.28)	36.56 (23.86)	40.22 (25.94)
G 2	51.75 (21.84)	54.50 (24.22)	44.00 (27.21)	50.83 (23.04)	50.17 (23.22)	42.17 (24.14)
G 3	38.22 (16.26)	35.33 (27.69)	27.44 _A (20.59)	32.00 _A (23.37)	34.33 (19.14)	26.44 (16.17)

Table 6. 3. Mean scores of Visual Analogue Mood Scale (VAMS) across time for each group (continued *i*).

VAMS Subscales and Groups (G)	Time					
	1	2	3	4	5	6
<i>Sad</i>						
G 1	9.39 _A (15.53)	18.78 (23.04)	24.94 _a (21.35)	23.89 _a (20.20)	19.89 (23.04)	19.17 _a (21.72)
G 2	12.00 _A (11.26)	33.25 _a (26.20)	24.33 (24.20)	21.83 (16.37)	19.58 (15.07)	16.58 (19.38)
G 3	8.22 (7.17)	19.11 (14.90)	15.56 (17.53)	20.56 (19.48)	19.78 (14.96)	8.78 (7.55)
<i>Angry</i>						
G 1	6.17 _A (8.86)	21.50 _a (20.91)	27.06 _{aB} (21.43)	27.94 _{aC} (23.15)	21.44 _{aD} (20.54)	13.00 _{abcd} (12.32)
G 2	9.50 (11.30)	18.42 (19.97)	13.17 (14.10)	19.50 (18.88)	15.25 (15.67)	11.50 (11.43)
G 3	11.00 (13.39)	19.33 (16.23)	12.44 (21.29)	21.78 (23.67)	16.67 (15.48)	9.56 (10.61)
<i>Happy</i>						
G 1	55.72 _A (22.78)	26.67 _{aB} (21.82)	25.50 _{aC} (16.25)	19.94 _{abcd} (12.71)	40.06 _{abcd} (21.51)	42.11 _{abcd} (20.44)
G 2	64.83 _A (13.35)	40.00 _{aB} (24.88)	41.83 _{aC} (20.91)	38.92 _{aD} (24.01)	58.75 _{bcd} (17.22)	52.92 _{abd} (20.02)
G 3	53.44 _A (14.17)	31.89 _a (15.93)	30.00 _{aB} (12.29)	31.22 _a (14.40)	45.00 (25.23)	44.11 _b (16.96)

Table 6. 3. Mean scores of Visual Analogue Mood Scale (VAMS) across time for each group (continued ii).

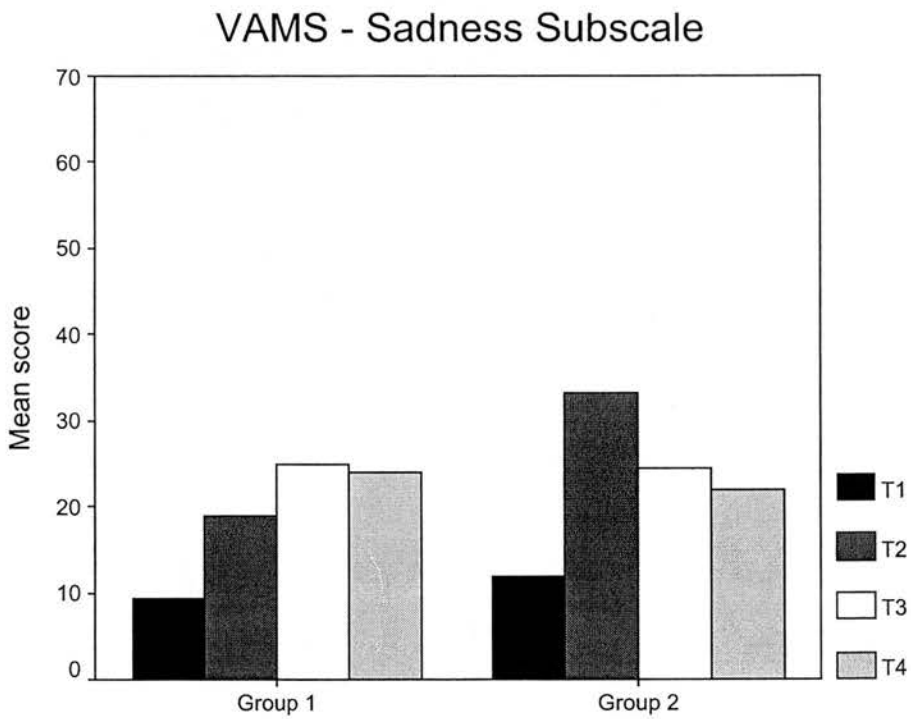
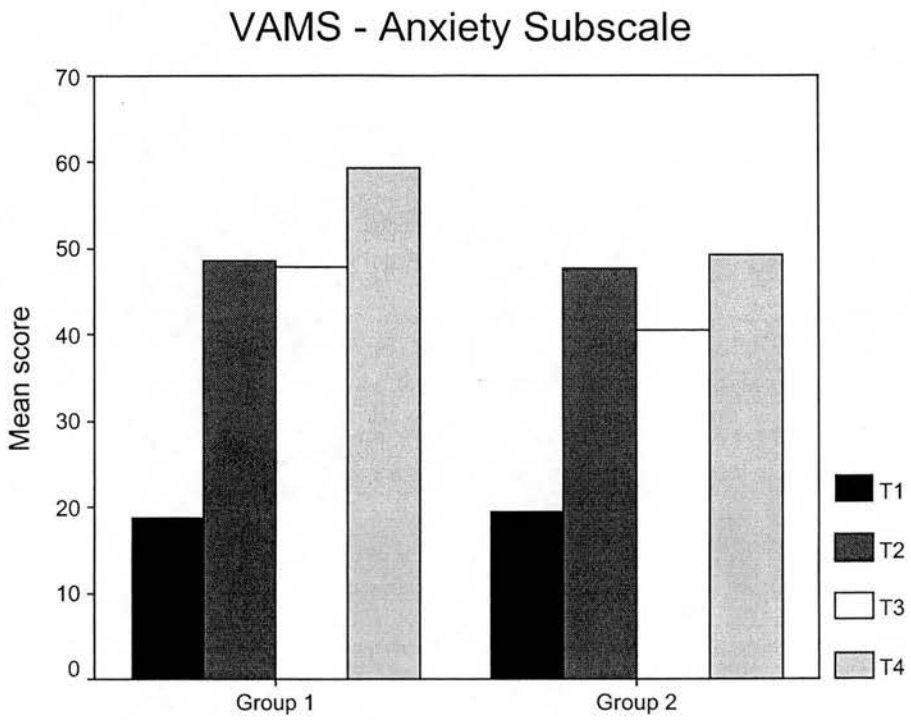
VAMS Subscales and Groups (G)	Time					
	1	2	3	4	5	6
<i>Tense</i>						
G 1	22.67 _A (24.84)	54.17 _{AB} (33.07)	53.22 _{AC} (26.85)	64.11 _{ABCD} (27.43)	48.22 _{AD} (27.21)	38.17 _{ACD} (24.94)
G 2	20.25 _A (22.05)	58.42 _{AB} (23.54)	50.92 _{AC} (19.85)	58.17 _{ACD} (15.24)	32.83 _{BCD} (18.57)	26.08 _{BCD} (16.24)
G 3	31.33 _A (30.03)	58.89 _{AB} (20.93)	56.00 _{AC} (19.28)	59.11 _{AD} (21.35)	45.78 (18.34)	31.00 _{BCD} (18.98)
<i>Tired</i>						
G 1	60.56 _A (24.88)	39.39 _A (27.80)	49.78 (29.44)	50.33 (33.81)	49.39 (25.45)	46.78 _A (24.64)
G 2	46.50 (28.01)	32.17 (19.10)	41.58 (27.44)	33.42 (25.25)	33.75 (22.81)	39.00 (18.94)
G 3	39.78 (35.70)	31.78 (29.55)	41.56 (35.36)	31.00 (24.40)	26.89 (25.38)	37.33 (22.92)
<i>Confused</i>						
G 1	26.28 _A (26.57)	30.61 _B (23.07)	40.67 _{ABC} (22.60)	37.17 (26.16)	34.33 (27.54)	25.94 _C (20.78)
G 2	26.50 _A (15.31)	35.25 _B (17.51)	37.83 _{AC} (17.13)	35.75 _B (21.13)	16.75 _{ABCD} (9.53)	23.67 _{BCD} (20.36)
G 3	23.00 (34.00)	22.11 (24.41)	26.11 (25.93)	24.33 (25.26)	29.67 (29.80)	19.78 (21.78)

Note: Group 1 = High Trait Anxiety; Group 2 = Low Trait Anxiety; Group 3 = Lateralised only at Time 3. Within each row, means that share a subscript letter in lowercase differ significantly from the mean reporting the same letter in uppercase ($p < .05$, at least). Standard Deviations in parentheses.

Table 6. 3. also shows the effectiveness of the mood induction procedure with participants being significantly more anxious and tense during the CFT at Time 1 and 2 with higher peaks following the presentation of the video clips (see also top half of Figure 6. 1. – VAMS- T_2 and T_4 –, below). On the other hand, a reverse pattern is observed for the Happy-VAMS subscale.

Figure 6. 1. also shows that, as hypothesised, the increase in anxiety levels in the two groups corresponds to an increase in dysphoric mood (i.e. sadness) in the same groups. However, only in Group 1 the Sad-VAMS- T_3 and T_4 , which indicate sadness levels present between the CFT at Time 1 and 2, are significantly higher compared to the baseline levels (VAMS- T_1) – see Table 6. 3. for within-groups statistical significance ($p < .05$, at least). This finding corroborates further the distinction between the two groups based on both Trait anxiety and direction of CFT bias at Time 2.

Figure 6. 1. Bar charts of Anxiety and Sadness VAMS-Subscales: "pre-critical event" (VAMS-T₁, T₂, T₃, and T₄) mean scores for Groups 1 and 2.



The results of a 2×2 ANOVA with Group (1 and 2) as a between-subjects factor and General Bias (Time 1 and 2) as a within-subjects factor showed a significant interaction of Group \times General Bias $F(1,28) = 52.18, p < 0.001$. Groups 1 and 2 were similarly lateralised at Time 1 ($M = -.372, SD = .216$ and $M = -.311, SD = .290$ respectively) but differed significantly in the amount of bias attained at Time 2 ($M = -.187, SD = .292$ and $M = -.497, SD = .249$ respectively) $t(28) = 3.01, p < .01$. As predicted, Group 1 showed a substantial reduction in lateralisation score from Time 1 to Time 2 $t(17) = 5.84, p < .001$ whereas Group 2, reported a significant increase $t(11) = 4.50, p < .001$ (see Figure 6. 2. below).

Figure 6. 2. Bar charts of mean lateralisation scores (biases) in general and for each emotion (angry, disgusted, fearful, happy, sad), on the Chimeric Faces Task (CFT) for each Group at Time 1, 2, and 3.

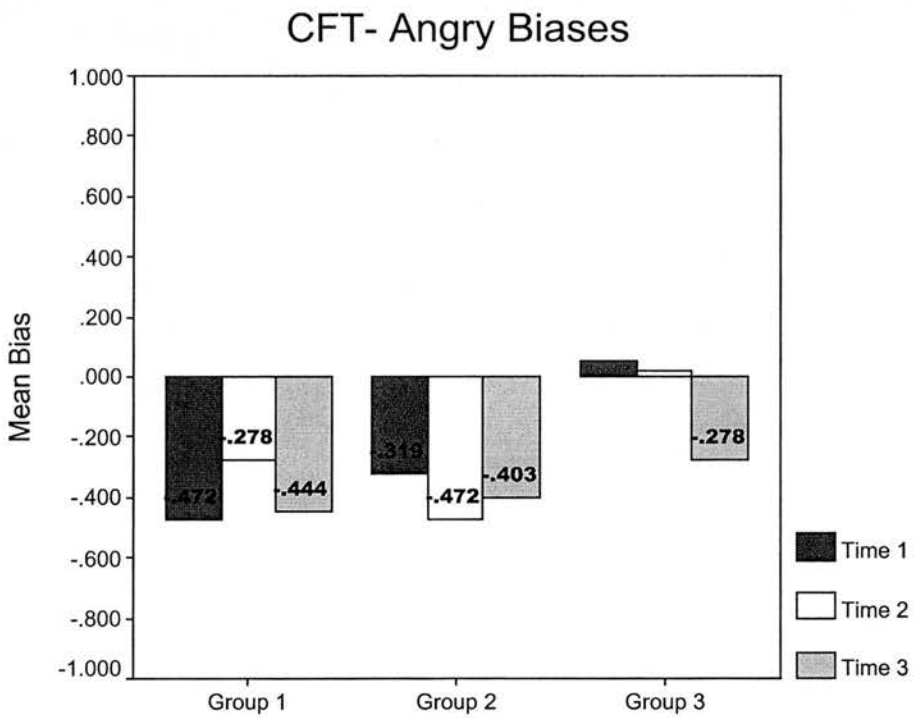
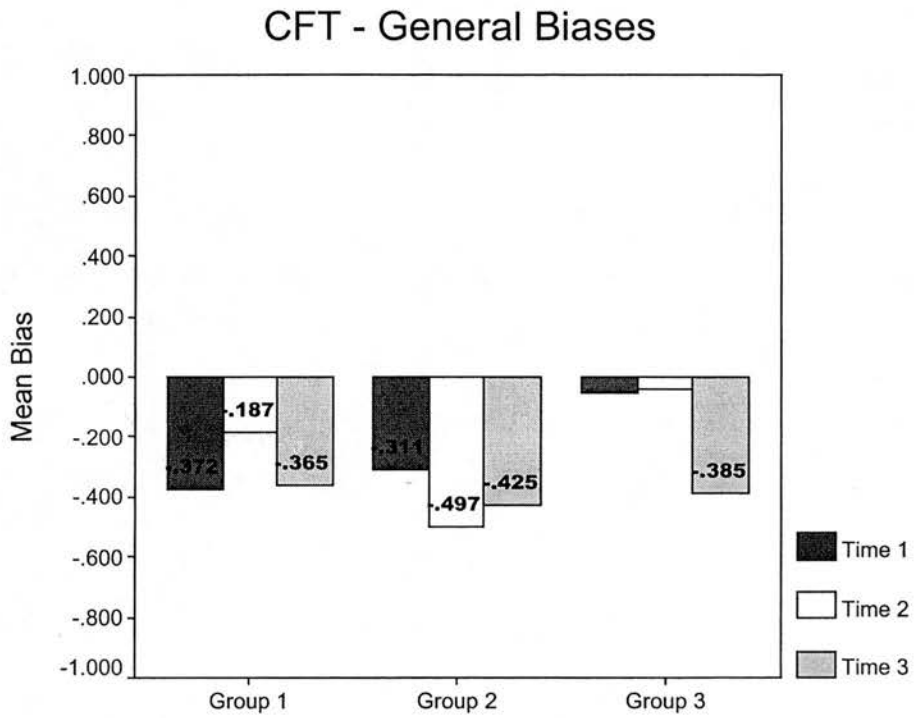


Figure 6. 2. Bar charts of mean lateralisation scores (biases) in general and for each emotion (angry, disgusted, fearful, happy, sad), on the Chimeric Faces Task (CFT) for each Group at Time 1, 2, and 3 (continued *i*).

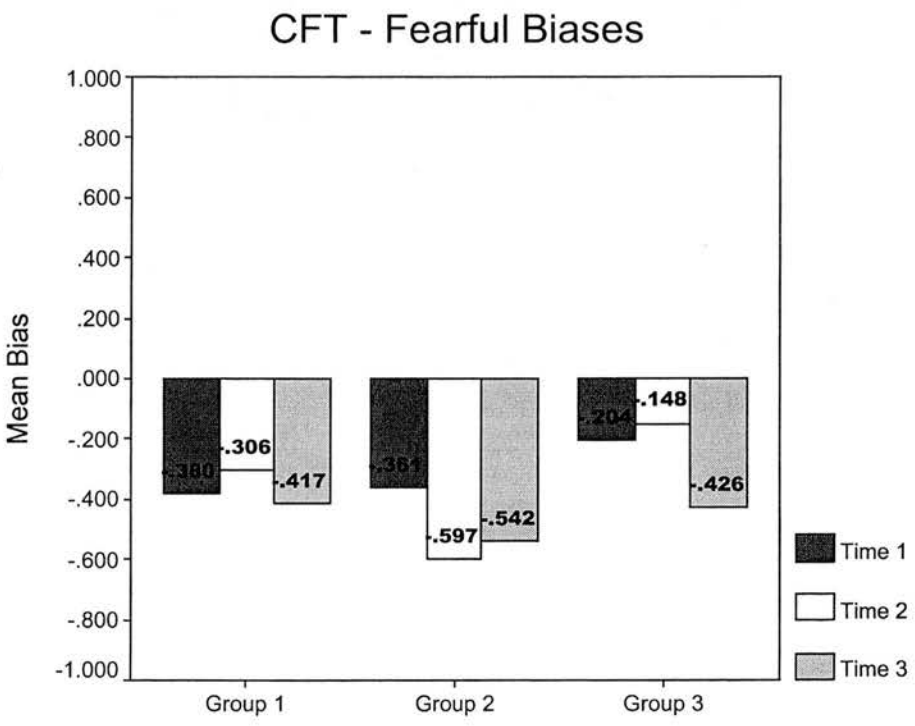
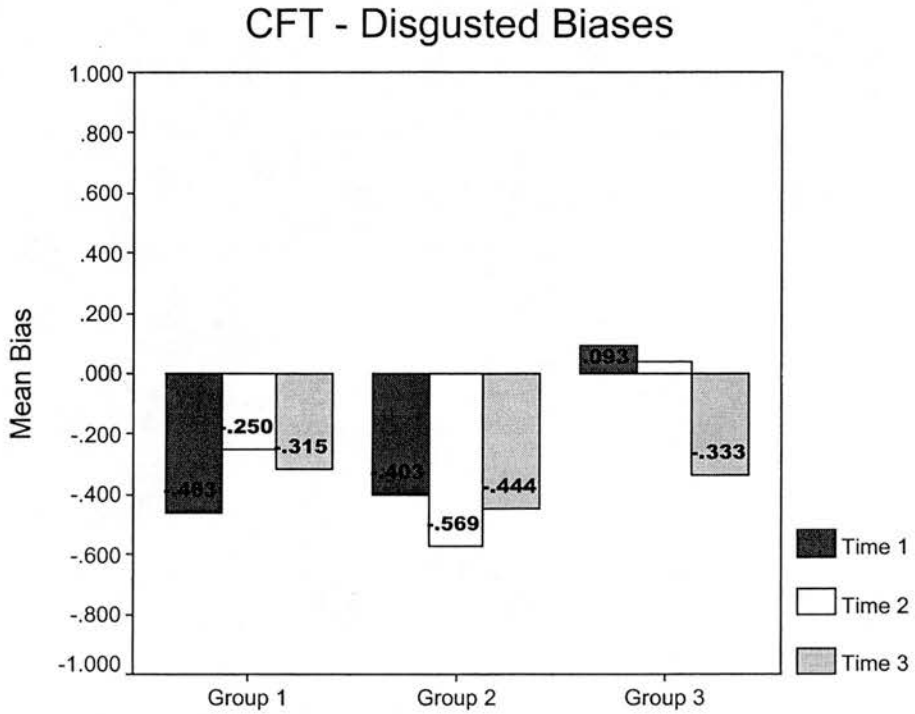


Figure 6. 2. Bar charts of mean lateralisation scores (biases) in general and for each emotion (angry, disgusted, fearful, happy, sad), on the Chimeric Faces Task (CFT) for each Group at Time 1, 2, and 3(continued *ii*).

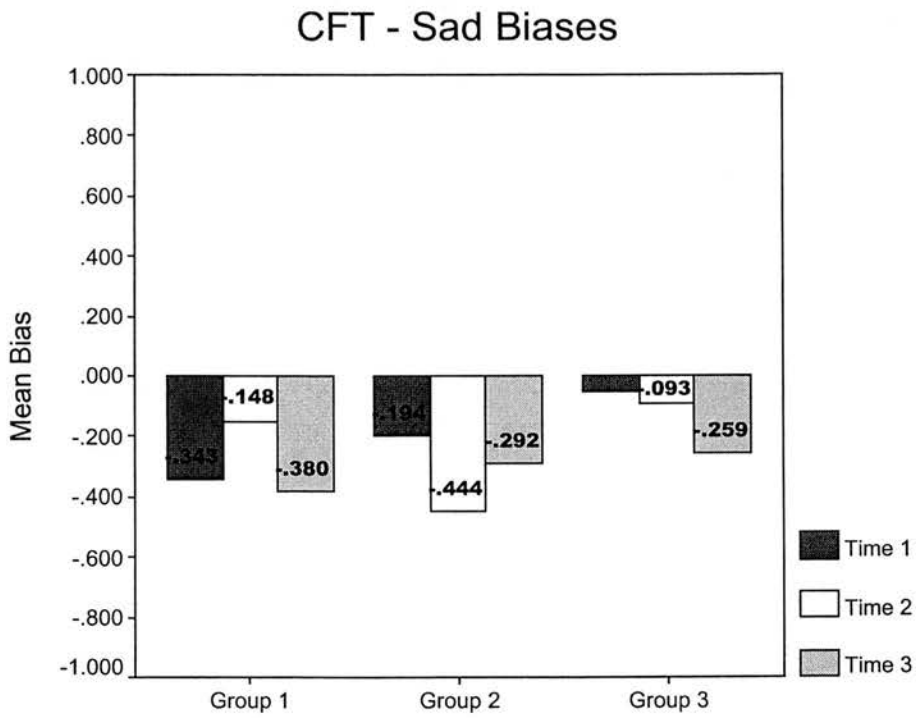
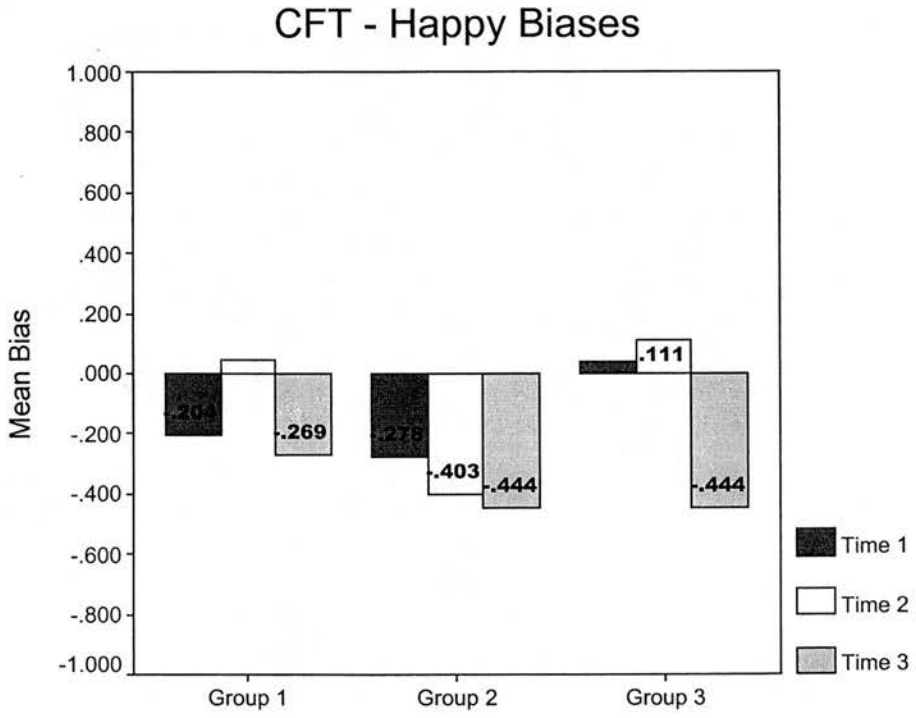


Table 6. 4. Mean reaction times (general and for each of the 5 emotions) on the CFT at Time 1, 2, and 3 for each group.

CFT Emotions and Groups (G)	CFT - Time		
	1	2	3
<i>General</i>			
G 1	3055 _A (1074)	2372 _a (716)	2219 _a (776)
G 2	3507 _A (1407)	3042 (2018)	2961 _a (1653)
G 3	3305 _A (1204)	2937 (1411)	2534 _a (1083)
<i>Angry</i>			
G 1	2949 _A (1055)	2364 _a (825)	2181 _a (788)
G 2	3226 (1260)	2831 (1720)	2816 (1505)
G 3	3186 _A (1065)	2876 (1293)	2498 _a (1087)
<i>Disgusted</i>			
G 1	3018 _A (1105)	2524 _a (786)	2350 _a (994)
G 2	3469 (1479)	3117 (2238)	2933 (1716)
G 3	3333 _A (1150)	3098 (1537)	2452 _a (915)
<i>Fearful</i>			
G 1	2754 _A (941)	2021 _a (649)	1991 _a (698)
G 2	3208 (1331)	2861 (2020)	2783 (1708)
G 3	3116 _A (1146)	2559 _a (1295)	2377 _a (1138)
<i>Happy</i>			
G 1	3340 _A (1385)	2480 _a (753)	2329 _a (823)
G 2	3686 _A (1714)	3321 (2330)	2935 _a (1969)
G 3	3381 _A (1447)	3071 (1365)	2822 _a (1453)
<i>Sad</i>			
G 1	3215 _A (1148)	2470 _a (888)	2244 _a (881)
G 2	3944 _A (1546)	3082 _a (1952)	3338 _a (1677)
G 3	3512 _A (1490)	3084 (1703)	2521 _a (971)

Note: Group 1 = High Trait Anxiety; Group 2 = Low Trait Anxiety; Group 3 = Lateralised only at Time 3. Within each row, means that share a subscript letter in lowercase differ significantly from the mean reporting the same letter in uppercase ($p < .05$, at least). Standard Deviations in parentheses.

Table 6. 4. shows that reaction times decreased significantly as participants performed across from CFT at Time 1 to 2 and 3 indicating a general increase in

speed with practice. This was especially true for Group 1 which also appeared to be faster in all conditions, although none of the between groups differences reached statistical significance.

An overall 3-way ANOVA ($2 \times 2 \times 5$) with Group (1 and 2) as a between-subjects factor and Time (1 and 2) and Emotional Biases (angry, disgusted, fearful, happy, sad) as within-subjects variables revealed a significant main effect of Emotional Biases $F(4,25) = 3.34, p < 0.05$ and interaction of Group \times Time $F(1,28) = 52.18, p < 0.001$.

In order to clarify the nature of these effects, separate 2×2 ANOVAs were computed for each of the five emotions with Group (1 and 2) as a between-subjects variable and Emotional Bias (Time 1 and 2) as a within-subjects variable. They all showed significant interactions of Group \times Emotional Bias ($p < 0.05$, at least). Between groups comparisons confirmed effects similar to those seen for General Bias. That is, also for each of the separate emotions Group 1 and 2 were likewise lateralised at Time 1 but diverged significantly at Time 2 ($p < 0.05$) except for “angry” biases (see Figure 6. 2.). In particular, at Time 2 Group 1 became significantly less lateralised ($p < 0.05$, at least) apart for “fearful” stimuli, whilst Group 2 became generally more lateralised, and significantly so for “fearful” ($p < 0.01$) and “sad” ($p < 0.05$) stimuli.

In addition, we carried out analyses of variance of Emotional Biases (angry, disgusted, fearful, happy, sad) by Time (1 and 2) for each group. These showed significant main effects of Time both for Group 1 $F(1,17) = 34.17, p < 0.001$ and Group 2 $F(1,11) = 20.28, p < 0.001$ indicating that lateralisation scores for the different emotions varied in the two parts of the CFT. Separate repeated measures

ANOVAs were then calculated for Emotional Bias within each Time and for each group to test for the “mood-congruent” hypothesis. For Group 1, results indicated no notable change in lateralisation scores across the five emotions at Time 1 $F(4,14) = 1.38$, ns. However, a main effect of Emotional Bias was found at Time 2 $F(4,14) = 3.85$, $p < 0.05$. Planned orthogonal contrasts pointed out lower scores for “happy” faces compared to “angry”, “disgusted” and “fearful” ($p < 0.05$, at least) and also lower scores for “sad” compared to “fearful” stimuli $F(1,17) = 5.36$, $p < 0.05$, supporting our hypothesis. On the other hand, no main effect of Emotional Bias was found for Group 2 at either Time 1 or 2.

Further analyses of reaction times with Group (1 and 2) as a between-subjects variable and Time (1 and 2) and Emotional RTs (angry, disgusted, fearful, happy, sad) as within-subjects variables showed significant main effects of Emotional RTs $F(4,25) = 6.53$, $p < 0.001$ and Time $F(1,28) = 17.70$, $p < 0.001$. Within Group 1 these main effects were confirmed ($p < 0.01$, at least) and separate ANOVAs for Time 1 and 2 were performed. At Time 1, a main effect of Emotional RTs was found $F(4,14) = 3.58$, $p < 0.05$ and planned orthogonal contrasts showed that participants were significantly faster for “angry” and “fearful” stimuli compared to “happy” and “sad” ($p < 0.01$, at least). At Time 2, a main effect of Emotional RTs was also found $F(4,14) = 9.00$, $p < 0.001$ and contrasts indicated that “fearful” stimuli elicited reaction times which were significantly faster than for any other emotional material ($p < 0.01$, at least). Within Group 2 a main effect of Emotional RTs was only found at Time 1 $F(4,8) = 4.58$, $p < 0.05$ with contrasts showing faster reaction times for “angry” and “fearful” material in comparison to “sad” stimuli ($p < 0.01$, at least).

Post-critical event. The only inclusion criterion for this part of the analyses was the presence of a significant amount of lateralisation at Time 3 ($p < 0.1$, 1-tailed, as above). Thus, as well as Groups 1 and 2, a third group was composed of those individuals who did not meet inclusion criteria for the previous set of analyses. As already mentioned above, 8 of the participants did not show a significant bias at Time 1 and 2, but they did show a dramatic increase in lateralisation at Time 3 in response to the critical event taking place. Another subject, although lateralised at Time 1 and 2, did not meet inclusion criterion *b* (see above), but was included in Group 3 as he also presented a further increase in bias at Time 3, which resembles the general pattern of the rest of the group. The three groups did not differ in terms of essay marks obtained nor degree of satisfaction with their marks; however, as it might have been expected, they exhibited a significant increase in their STAI-State and PANAS-Negative Affect scores compared to those reported at the beginning of the experiment (see Table 6. 2.).

No significant between groups differences were found for either the amount of bias (in general and for each emotion) or their respective reaction times at Time 3.

Within groups analyses showed that, at Time 3, Group 1 returned to lateralisation levels similar to those reached at Time 1. The increase in bias from Time 2 was significant in general $F(1,17) = 8.63$, $p < 0.01$ and for “happy” $F(1,17) = 6.83$, $p < 0.05$ and “sad” material $F(1,17) = 8.64$, $p < 0.01$. Of interest, also at Time 3 Group 1 was faster for “fearful” stimuli, particularly compared to “disgusted”, “happy” and “sad” emotional material ($p < 0.05$, at least). Group 2 reported a general decrease in lateralisation scores at Time 3, although not substantially different from Time 2. However, in this last part of the CFT a differential emotional bias emerged.

Specifically, participants in this group showed a greater bias for “fearful” stimuli compared to “angry” and “sad” material ($p < 0.05$, at least) and for “disgusted” compared to “sad” stimuli $F(1,11) = 6.56$, $p < 0.05$. Analyses of reaction times indicated that Group 2 was significantly faster when rating “angry” stimuli compared to “sad” faces $F(1,11) = 10.27$, $p < 0.01$.

The magnitude of lateralisation scores at Time 3 for Group 3 differed substantially from either Time 1 or 2, generally and in each of the individual emotional conditions except “sad” ($p < 0.05$, at least). No other within group comparison reached significance levels.

6. 5. Discussion.

The main findings of this study seem to support the hypothesis that a sustained period of intense anxiety alone can lead to a significant shift towards a depressive performance on a modified version of the CFT, a neuropsychological test that well discriminates anxious from depressive states. They also provide further evidence that a dysphoric state can occur in the absence of negative life events. This is not only evident from the groups’ performance on the CFT, but also from the change in mood as measured by the VAMS. Specifically, participants (Group 1 in particular) showed an increase in disgust, anger and sadness, and a decrease in levels of happiness, as a result of the combined anxiety mood-induction procedures alone (see Table 6. 3. and Figure 6. 1.).

For the first part of the study (*pre-critical event*) we distinguished between two groups based on their initial anxiety levels, Trait in particular (see Results: Section 6.4., page 320). Group 1 (high in Trait anxiety) was significantly more anxious at the beginning of the experiment indicating that participants experienced a longer and more persistent anxiety state before and during Time 1. This allowed a depressive pattern to emerge at Time 2 as a consequence of the anxiety mood induction. On the other hand, Group 2 (low in Trait anxiety) arrived to Time 1 less anxious so that, presumably, it would have taken them longer (Time 2) to reach the necessary conditions before any decrease in lateralisation scores would become visible.

At Time 1, which represents our baseline, both groups reported similar lateralisation biases across all conditions, and differential effects of emotional materials were observable only from reaction times. Consistent with our hypothesis, participants were faster when rating anxiety relevant stimuli (i.e. angry and fearful) than when rating depression relevant faces (i.e. happy and sad), indicating clear mood-congruent biases.

However as expected, Group 1 showed a substantial decrease in lateralisation scores from Time 1 to Time 2. Noticeably, at Time 2 ($M = -.187$, $SD = .292$) they performed similarly to high-depression students ($M = -.117$, $SD = .441$; Heller et al., 1995) and clinically depressed patients ($M = -.238$, $SD = .380$; Jeager et al., 1987). Moreover, participants were significantly less lateralised when rating “happy” and “sad” emotional faces which is in tune with the presence of a depressive state. On the other hand, the decrease in biases at Time 2 was evident in all emotional conditions apart from “fearful”, to indicate that participants were able to maintain a certain degree of lateralisation but only for selective threat stimuli, which were still able to

elicit a stronger bias. Additionally, participants were significantly faster for “fearful” stimuli than for any other emotional material suggesting that although their general performance moved towards a depressive pattern, the ongoing anxiety mood induction still reflected in the concurrent anxious biases.

In contrast, Group 2 became significantly more lateralised at Time 2 with a particular increase for “fearful” and “sad” stimuli, however subjects did not exhibit any mood-congruent effect either in terms of emotional bias scores or reaction times. As hypothesised, this would indicate a general increase in anxiety and tension levels and their effects on the participants’ performance on the CFT at Time 2 ($M = -.497$, $SD = .249$) which is comparable to that obtained by high-anxiety students in Heller et al.’s (1995) study ($M = -.517$, $SD = .445$).

For the second part of the study (*post-critical event*), Groups 1 and 2 were also compared to a third group of participants who were excluded from the first part because they were not lateralised at Time 1 and 2, but who showed a significant increase in lateralisation scores generally and across the emotional conditions at Time 3.

Table 6. 2. shows that students were on the whole satisfied their marks which implies a predominantly positive appraisal of the critical event. No between groups differences were found in the mean essay mark obtained, degree of satisfaction with the mark, amount of lateralisation or reaction times. However, within group analyses at Time 3 revealed a significant general increase in lateralisation scores in Group 1 with similar levels to those reached at Time 1. This increase was particularly large for “happy and “sad” emotional faces, which were most affected by lower scores at Time 2. Interestingly, subjects did not show any particular emotional bias for any of

the conditions, but they were still faster at rating “fearful” stimuli compared to the other emotional faces except “angry”. Altogether, this shows a performance comparable to that at Time 1 and a return to higher anxiety levels following the appraisal of a real and valued personal life event.

As anticipated, Group 2 showed a general decrease in lateralisation scores, but not substantially different from Time 2. It was thought that this group was “a step behind” Group 1 and this was confirmed by the changes at Time 2 as the group displayed a general increase in biases. The decrease at Time 3 is another indication that Group 2 was now “ready” for its shift towards a depressive state, had it not been for two important factors. The first is the absence of anxiety mood induction and the second factor is the appraisal following the receiving of the marked essay, which conceivably had a similar “lifting” effect on lateralisation scores as for participants in Group 1 and Group 3 (lateralised only at Time 3). Therefore, we plausibly assisted to a clash of counteracting forces, which resulted in only a slight decrease in lateralisation scores. This conflict of emotions is expressed by significantly lower lateralisation scores for “sad” faces and higher scores for “fearful” stimuli on the one hand, and by slower reaction times for “sad” material compared to “angry” faces on the other.

Adding together both parts of the experiment, one reasonable explanation that might account for the patterns of results obtained in this study is the following. Given the presence of unremitting psychological/environmental stressors that cause the emergence of (and maintain) an anxiety state, the shift towards a depressive state may have an adaptive function. That is, give the individual the opportunity to recover from an exhausting state of continuous heightened vigilance (although this was not

possible when the stimuli were threatening in valence). In evolutionary terms, disengagement under these circumstances might have the scope of preserving energy for a more necessary (or valued) pursuit, in our case, receiving the marked essay (see Costello, 1976 for a similar account).

Therefore, Group 1 (high in Trait anxiety) was anxious at Time 1, showing a consistent left hemifield bias, but it was unable to keep a high level of activation at Time 2. At this point, the proposed mechanism entered in operation allowing the students to “disengage” from the continuous anxiety mood induction (stressor) and save important resources for the impending critical event. This resulted in a general decrease in lateralisation biases in all conditions, except for threatening stimuli, for which an automatic deployment of extra resources was “necessary”. Following the critical event and the mainly positive appraisal of its outcome, students returned to high levels of hypervigilance similar to those seen at Time 1. Here the use of the available resources, set aside at Time 2, was required as the students were to confront the outcome of a personal valued event. Also in Group 2 an analogous process took place, but in this case the series of events was delayed due to the fact that this group was less anxious at the outset.

Strong evidence of physiological correlates for this adaptive mechanism comes from neuropharmacological studies of anxiety and depression. As reviewed in Chapter 2 (Section 2. 3. 2.), the general view is that the shift from anxiety to depression is reflected by the depletion of neurotransmitters such as noradrenaline and serotonin typically associated in opposite fashions to anxiety and depression. Serotonin (5-HT), in particular, would appear to be implicated with adaptive responses to aversive stimuli. 5-HT₂ receptors mediate *acute* adaptive responses (e.g. avoidance of

aversive stimuli), whereas 5-HT_{1A} receptors are thought to be involved in *long-term* adaptation to chronic stress and are therefore related to resilience. When this resilience system breaks down a depressive state will be the consequence (e.g. Deakin, 1998; Stahl, 1997).

Since Group 3 was able to lateralise similarly to Groups 1 and 2 at Time 3, one possible justification for the small lateralisation scores attained at Time 1 and 2 might be that this group was “one step ahead” of Group 1. As Table 6. 2. and Table 6. 3. show, this group of participants was more anxious (Trait and State anxiety) and tense than the other two groups before the beginning of the experiment. This state of affairs might have led them to give a depressive performance throughout Time 1 and 2, under the continuous influence of the anxiety mood induction, until a more valued event took place, for which more activation was necessary. Another similarity with the other two groups is the increase in lateralisation for “fearful” stimuli at Time 1 and 2, for which the employment of some extra attentional resources was unavoidable (see Figure 6. 2.).

Therefore, altogether the present findings support the hypothesis that a depressive state may arise in the absence of certainty of negative outcome expectancy (e.g. as a reaction to a “loss” event). Closely related to this view is the information-processing model of learned helplessness (Kofta & Sedek, 1998; Sedek & Kofta, 1990; Sedek, Kofta & Tyszka, 1993; von Hecker & Sedek, 1999). The authors provide evidence that prolonged exposure to an uncontrollable situation such as inconsistent task information (i.e. cognitive effort without cognitive gain) in the absence of negative outcome or evaluative feedback is sufficient for the appearance of a psychological state termed *cognitive exhaustion*. This is essentially a transitory state of generalised

impairment of constructive information-processing with equivalent cognitive, behavioural and motivational symptoms of learned helplessness and depression. Compellingly, a strong analogy can be noticed between the “emotional exhaustion” (or prevention of) seen in our study and the state of “cognitive exhaustion” put forward by Sedek and colleagues (1990; 1993). They both appear to take place before the occurrence of any negative outcome and they seem to describe a twin phenomenon from different angles (i.e. emotional and cognitive).

The presence of a *pre*-critical event mechanism that might operate alternatively or alongside a *pre/post*-critical event one is not taken into account by the Helplessness-Hopelessness model of anxiety and depression (Alloy et al., 1990). This model attempts an explanation of the sequential relationship of anxiety and depression within a framework based on expectancy of negative life events (or non-occurrence of positive events) and the person’s attributional and control styles over these valued events. Thus, the shifting from anxiety into depression coincides with the helplessness expectancy becoming hopelessness. However, the authors emphasise that fact that the model only takes into account one subtype of depression (hopelessness depression) and that other factors may be responsible for the development of a depressive state. Moreover, although the original Hopelessness theory of depression is based on previous formulations that have much empirical support, the extended Helplessness-Hopelessness model of anxiety and depression still awaits empirical verification. For example, the model does not predict any negative outcome expectancy (certain or uncertain) in anxiety, whilst predicting certain negative outcome expectancy in depression. Conversely, as we have demonstrated in Chapter 4, research in prospective cognitions shows that, depending

on the task employed, anxious individuals report an increased anticipation of negative events (especially on SPJT), whereas depression may be associated with a decreased expectancy for positive events but an equal anticipation of negative life events compared to controls (especially on PFT). Other recent studies have also failed to find the predicted association between anxiety and helpless causal attributions (Swendsen, 1997; Waikar & Craske, 1997). On the contrary, the findings of this study provide support for neuropsychological models of emotional disorders and regional brain specialisation described in Chapter 1 (Section 1. 4. 2.) (e.g. Davidson, 1999; Heller et al., 1998). Moreover, a key point has emerged as we found evidence of mood-congruent lateralisation biases; that is, the importance of discriminating among different types of emotional information processing in neuropsychological testing such as the CFT.

It might be argued that anxious patients may perceive the experience of uncontrollable anxiety symptoms as a loss of self-functioning or autonomy and subsequently develop depression, but this was certainly not the case with the students in our study. Moreover, such cognitive appraisal does not preclude a “restoring-economical” mechanism to become operative after a negative outcome. Following the occurrence of a negative event, an individual will have to reconsider his/her goals and reformulate a plan of action before employing resources. A compatible perspective is the view that depression is a period of disengagement from goals that are perceived to be unobtainable (Klinger, 1993). Subjects in our study seemed to have moved back to a state of anxiety/activation, following the outcome (perceived mostly as positive) of the critical event. Presumably, had the outcome been negative, an initial period of autonomic activation would have given way to a period of

depressive state during which a reappraisal of the event would have taken place in terms of the students' goal (i.e. pass the Psychology course). This would account for the unexpected findings in Metalsky et al.'s (1982; 1987; 1993) studies that both student groups, high and low in cognitive vulnerability, reported an initial depressive reaction after receiving low exam grades. In this sense the individual's appraisal of a valued negative outcome event would allow the organism to recover and save important resources for a more favourable time or vital goal. For this reason, *pre* and *post* event factors are not seen as mutually exclusive.

Consequently, what is proposed here is a more general mechanism that might explain some of the basic aspects of the temporal relationship between anxiety and depression in terms of evolutionary adaptation. This mechanism may be in operation both before and in concomitance with the occurrence of a valued life event. Its double function is to prevent the organism from exhaustion prior to an important event and to restore (and not dissipate), especially after negative outcome, necessary resources whilst a more beneficial and advantageous use, aimed to achieve a valued goal, is found.

In conclusion, in this study we have seen a good example of emotion regulation in healthy individuals and their employment of a basic coping mechanism when facing a valued real life event. Clinically, this adaptive mechanism seems to be still in operation in those cases of spontaneous recovery (most of which are probably unknown, as they are less likely to come in contact with psychological services) but it breaks down in the clinical population that requires therapeutic intervention presumably for the presence of vulnerability factors. The obvious issue that needs further analysis therefore relates to the identification of the specific factors that might

be directly involved in the malfunctioning of this evolutionary useful coping mechanism. Another important question regards the investigation of the temporal relationship between anxiety and depression both within and across episodes in the clinical population. The present study only used students as participants with a combination of mood induction and real life events within a neuropsychological framework of cognition and emotion. As a result, any generalisation of these findings to clinical levels of anxiety and depression should be made with extreme caution.

6. 6. Conclusions.

In this final experimental Chapter we have addressed one of the central issues in the study of mixed anxiety and depression, namely their sequential relationship. Using a small scale prospective design with a non-clinical sample we have demonstrated that a dysphoric state can emerge in the absence of the occurrence of a negative outcome (or feedback indicating the lack of positive outcome) as a result of a prolonged state of anxiety. Although in the present investigation we used a student sample and results cannot be generalised to clinical levels of anxiety and depression, our findings suggest that at a symptomatological level the overlap between the two disorders might be caused by the mere presence of an anxiety state. Even though the importance of the occurrence of negative life events (or non-occurrence of positive life events) in the development of mood and anxiety disorders is unquestioned, their causal role may be contributory rather than necessary. In this sense it has been proposed that the development of a depressive state following a prolonged state of

severe anxiety may serve an evolutionary adaptive mechanism primarily devoted to the prevention of exhaustion.

Chapter 7

Summary and conclusions.

“The past has gone, the future is uncertain, and the present is a mess!”

(A. J. Richards)

7. 1. Introduction.

In the first part of this thesis we have introduced one of the most topical current issues in psychopathology: the co-occurrence of anxiety and depressive disorders. The issue of mixed anxiety depression has important implications for theories, empirical research, diagnostic classification and treatment (e.g. Maser & Cloninger, 1990; Mineka et al., 1998). The main intention behind the work reported in this thesis has been that of clarifying what the qualitative features of overlap between the two disorders might be and the resulting consequences in terms of cognitive functioning for individuals affected by mixed anxiety depression.

A major aim was to provide evidence of discriminant group validity among three clinical groups of outpatients with depression, anxiety, and mixed anxiety depression. This was achieved by investigating the specific ways in which the three groups responded to experimental tasks that examined fundamental areas of cognition: attentional, mnemonic, and prospective processes. As a corollary

investigation of these mental processes, a follow-up study examined the dynamic integration of the above-mentioned basic processes and their impact on accuracy of prediction, reality monitoring, and memory biases for previous attitudes and mental states in a clinical sample of recovered and non-recovered outpatients with mixed anxious and depressive symptomatology varying in severity. A final intention was to provide a clearer understanding of some of the mechanisms that might be involved in the typical manifestation of the two disorders. With this aim we addressed experimentally – in a non-clinical sample, within a mood-induction paradigm – one of the central features of overlap: the temporal relationship between anxiety and depression.

In the next Sections we shall summarise the main findings of the empirical work carried out and evaluate the extent of its contribution in addressing the question of mixed anxiety depression.

7. 2. Summary of the main findings.

The encouraging results of our preliminary investigation, a comparative study of depression, anxiety and mixed anxiety depression, showed qualitatively different patterns in the performance of the three clinical groups on tests of implicit and explicit memory. On the word identification task – with depression relevant, anxiety relevant, emotional positive, and neutral words – measures of priming effects (i.e. percentage of primed words - the percentage of unprimed words correctly identified) in the three groups revealed that the depressed outpatients exhibited an overall

positive implicit memory bias (but also a mood-congruent bias for depression relevant primed words) supporting the view that depression is associated with the maintenance of attention (and not its automatic initial shift) towards self-referent information, which results in a greater difficulty in disengaging from negative material once patients have focussed on it (e.g. Mogg & Bradley, 1998; 1999a). On the other hand, anxious individuals presented an overall higher priming effect in the implicit memory test compared to the other groups, suggesting that anxiety is associated with hypervigilance for any kind of information coming from the external environment (Eysenck, 1992; 1997). Lastly, opposite results were observed in the mixed group, which showed no implicit memory bias and no difference from the control group in the amount of priming effect for any word type. These surprising results were interpreted as an indication that mixed anxiety depression might reflect a dysfunctional adaptive mechanism devoted to the protection from the *hyperactive engagement* with the external environment typical of anxiety states, and the *passive disengagement* from the external environment characteristic of depression, so that a more adequate level of interest can be maintained.

Also on the incidental free recall, used as a measure of explicit memory, the three groups exhibited different cognitive profiles with the depressed patients showing the predicted mood-congruent memory bias for depression relevant words (e.g. Bradley et al., 1995); the anxious patients showing no bias (e.g. MacLeod & McLaughlin, 1995) and the mixed group recalling a higher number of anxiety relevant words relative to any other word type and also in comparison with the depressed group, which indicates that more controlled cognitive processes in the mixed group are laden with worrisome concerns.

Similarly, when prospective cognitions were assessed, individuals with mixed anxiety depression presented a performance that distinguished them from the other two clinical groups (i.e. depressed and anxious). Two modified experimental tasks were used to test future-directed thinking: the personal future task (PFT) and the subjective probability judgement task (SPJT). In the first task participants were asked to generate possible positive and negative future life events, and then to provide probability judgements for the same events. Although the depressed and mixed groups behaved similarly by generating more negative than positive events (e.g. MacLeod et al., 1997c; MacLeod & Byrne, 1996), but judging the likelihood of them happening as equal, their performance differed on two fronts. Firstly, the difference in the generation of positive vs. negative events was more pronounced (i.e. statistically significant) in the mixed group; and secondly, the probability judgements of the two groups differed in their relation to the control participants' ratings. Specifically, the depressed group reported lower expectancy for positive events, whilst the mixed group showed higher expectancy for negative future events. On the other hand, the higher generation and expectancy ratings for negative events reported elsewhere (e.g. MacLeod et al., 1997c; MacLeod & Byrne, 1996) in the anxious group was not observed in this study, suggesting the use of cognitive avoidance in this group.

For the SPJT participants were asked to judge the probability that a number of depression relevant, anxiety relevant, and positive events – preceded by subliminal or supraliminal primes: sad, fearful, happy and neutral faces – might happen to them in the next twelve months. Results showed that in general depressed patients reported higher expectancy for depression relevant compared to anxiety relevant and positive

events (e.g. MacLeod et al., 1997b; MacLeod & Cropley, 1995; Pyszczynski et al., 1987) in both subliminal and supraliminal priming conditions. Moreover, depressed individuals were able to perceive relevant subliminally presented primes, as shown by reaction times, but these pre-attentive processes were unable to influence their judgements, which could only be significantly modified by supraliminal (attentional) primes, providing further evidence that depressed individuals tend to dwell more on information that has entered their focus of attention as suggested by Mogg and Bradley (1998; 1999a). Generally, the anxious group reported higher probability judgements for negative (depression and anxiety relevant) events, replicating previous research in this field (e.g. MacLeod et al., 1991; 1997b). However, anxious participants exhibited a unique pattern mediated by avoidance strategy acting differentially for subliminal and supraliminal relevant primes. Specifically, they rated the likelihood that anxiety relevant events might happen as being less likely, relative to positive events, only when they were preceded by salient “fear” subliminal primes (showing automatic hypervigilance towards threatening information), or following the presentation of supraliminal “sad”, “happy” and “neutral” primes, suggesting that avoidance did not take place when less salient stimuli were presented subliminally, and could not take place when salient “fear” stimuli were presented supraliminally, as a result of the experimental constraining attentional condition. Finally, as predicted the mixed group judged both negative (depression and anxiety relevant) events as being more likely to happen and positive events as being less likely to happen. Moreover, this group differed also in other important ways from the depressed and anxious groups. In fact, contrary to depressed individuals, the mixed group was influenced by subliminal relevant primes in its probability judgements and

was found to be generally faster in its response latencies, which corroborates also the hypothesis that the mixed group is more adequately engaged with the environment. Contrary to anxious participants, the mixed group reported a general increase in depression relevant events expectancy and a decrease in positive events expectancy, and did not exhibit cognitive avoidance as indicated by the particularly high expectancy for anxiety relevant events in the subliminal “fear” priming condition, which is also consistent with the finding that the mixed group recalled an increased number of anxiety relevant words in the explicit memory task.

In addition to the differential performance of the three clinical groups on all of the experimental tasks used in our research, we have also been able to identify some of the specific circumstances (e.g. types of prime and their presentation conditions) under which the observed performances occur and some of the common mechanisms and processes (e.g. types of heuristics, automatic vs. controlled) that are used differentially by the three groups of participants. Therefore, taken together the results reported above suggest that mixed anxiety depression represents a distinct clinical group.

We also investigated some other important issues that have received relatively little attention, particularly in reference to anxiety and depression. Accuracy of prediction, reality monitoring, and memory biases for previous attitudes and mental states were examined in a follow-up study linked to the previous investigation on prospective cognitions. Recovered and non-recovered outpatients with mixed anxious and depressive symptomatology were asked to indicate whether or not the previously judged events had happened, whether those were events generated by themselves during the PFT or presented to them during the SPJT, and also to rate the likelihood

that such events might happen (or happen again) in the next twelve months as well as to estimate their previous probability judgements. As predicted, results indicated that outpatients with mixed symptomatology were less accurate in their prediction of future negative (depression and anxiety relevant) events (Dunning & Story, 1991), and that they have poorer reality monitoring for the same negative events compared to controls. Such deficit reflects a tendency to endorse incorrectly negative materials and seems to be partly mediated by levels of dissociation (Merckelbach et al., 2000). Moreover, only outpatients who had recovered or were recovering from their episodes of anxiety and/or depression exhibited a negative memory bias for previous mental states and attitudes. Specifically, this bias was due to the fact that their perception of positive change was greater than the actual amount of change, resulting in the patients overestimating their expectancy for prior negative events (e.g. Schrader et al., 1990) and underestimating their past expectancy for positive events. Therefore, this investigation has extended the assessment of important cognitive processes that integrate past and future within the individual's current perspective to a mixed anxious depressed sample, and has shown that outpatients with mixed symptomatology are less accurate in their predictions of future personal life events, have poorer reality monitoring for negative but not for positive events compared to controls, and that during or after recovery tend overestimate the intensity of prior negative emotional levels and underestimate the degree of positive emotions.

Finally, an experimental investigation of the temporal relationship between anxiety and depression was undertaken in a non-clinical student sample by assessing mood shifts from anxiety towards depression during the performance on a neuropsychological test – a modified version of the Chimeric Faces Task, CFT (Levy

et al., 1983) – under anxiety mood-induction. Participants were asked to rate half-neutral/half-emotional (i.e. angry, disgusted, fearful, happy and sad) chimera for emotionality and their perceptual asymmetry scores were measured twice under mood-induction and a third time (without mood-induction procedure) following the outcome of a personal valued event. Consistent with the experimental hypotheses, results showed a significant mood shift in the predicted direction (i.e. from anxiety towards depression), as measured by changes in lateralisation scores, due to a prolonged exposure to sustained levels of anxiety and prior to the occurrence of any negative outcome (or non-occurrence of positive outcome). This study addressed a central question about the overlap between anxiety and depression and results suggest that the development of depression following the presence of an anxiety state may serve an evolutionary useful mechanism devoted to the prevention of exhaustion (cf. Sedek et al., 1990; 1993), which underlines an important theme that has emerged at various points, namely, the role of anxiety and depression as adaptive emotions (cf. Costello, 1976). If these findings were to be confirmed by future studies carried out with clinical samples they would have deep implications for our current understanding of the phenomenon of overlap between anxiety and mood disorders.

7. 3. Theoretical evaluation and implications for future research.

In Chapter 2 the issue of overlap between anxiety and depression was addressed. From a more general perspective, three competing conceptual models that define the relationship between the two disorders were presented. A first classic dichotomous

position views anxiety and depression as discrete disorders, qualitatively different (e.g. The Newcastle Group: Gurney et al., 1972; Mountjoy & Roth, 1982a; 1982b; Roth et al., 1972). A second unitary position views anxiety and depression as quantitatively different symptomatic stages of a single continuum of affective disorder (e.g. Gulley & Nemeroff, 1993; Lesse, 1982; Paul, 1988). A third intermediate mixed standpoint views anxiety and depression as qualitatively and quantitatively different, when both present, from either pure anxiety or depression (e.g. Boulenger & Lavallée, 1993; Lydiard, 1991; Stahl, 1993). Within this last conceptual position we have also identified a comorbid, and a less strict sub-threshold approach, which emphasises the additive nature of mixed states, and a more flexible sub-syndromal approach, which highlights the phenomenological uniqueness of sub-syndromal mixed states as a chronic lifetime vulnerability factor for an anxiety, depressive or mixed anxiety depressive disorder.

The scientific evidence reviewed throughout this thesis, coupled with our own findings, propend towards the validity of the mixed sub-syndromal approach. This is not to say that either the dichotomous or the unitary positions are less valid, but the mixed approach appears to provide a more useful perspective since it is more able than its opponent models to explain both clinical and experimental data. In fact, on the one hand it is more flexible in its predictions about the development of clinical anxiety, depression, or mixed anxiety depression in accordance with dimensional models, such as Goldberg's (1994; 1996; Goldberg & Huxley, 1992) biosocial model, and Clark and Watson's (1991) tripartite model. On the other hand, it is able to accommodate most of the evidence reviewed in Chapter 2, and also our findings that mixed anxiety depression outpatients could be distinguished both quantitatively

(in terms of symptoms severity) and qualitatively (in terms of task performance) from the depressed and anxious groups. Moreover, the qualitative differences found in our investigation did not resemble a mere additive phenomenon as implied by the comorbid view, but reflected distinct cognitive profiles.

In Chapter 2, three theoretical models were also put forward that explicitly addressed the issue of overlap between anxiety and depression from different angles. According to one of these models, the helplessness-hopelessness model (Alloy et al., 1990), the relationship among the three cognitive components of helplessness expectancy, negative outcome expectancy, and certainty of these expectancies, will determine the relationship between anxiety and depression. Specifically, it is predicted that cognitively vulnerable individuals will experience “pure” anxiety if they are uncertain of whether or not they will be helpless in trying to control important future outcomes; if they become certain of their helplessness but they are still uncertain about whether a negative outcome will occur, they will experience mixed anxiety depression; and if they become certain also about the occurrence of an important negative outcome (or non-occurrence of a positive outcome), they will experience hopelessness depression. However, in Chapter 4 we found data that goes contrary to most of these predictions. In particular, the anxious group reported high negative expectancy in the SPJT and the mixed group reported both a clear reduction in positive expectancy and also high expectancy for negative events (both in the PFT and SPJT), compared to controls. Therefore, although the depressed group gave expectancy ratings that are in line with the predictions of this model, the conceptualisation of anxiety, depression, and mixed anxiety depression in terms of helplessness expectancy, negative outcome expectancy, and certainty of these

expectancies is not confirmed in our study. Another limitation of this model, still related to the outcome of negative events (or non-occurrence of positive events), regards its predictions about the temporal relationship between anxiety and depression. According to this model, the sequential development from anxiety to depression is entirely accounted for by the correspondent progression from helplessness to hopelessness due to the occurrence of adverse life events. However, in Chapter 6 we provided evidence that a dysphoric state can arise without the occurrence of an important negative outcome, but can follow a prolonged and intense state of anxiety. Thus, although the helplessness-hopelessness model can account for the temporal relationship of anxiety and depression in those cases in which unfavourable actual life events occur, it does not consider the possibility of an alternative route for this sequence, which is plausibly linked to less acute but more persistent and chronic states.

This last aspect is better accommodated by the second of the models put forward: Goldberg's (1994; 1996; Goldberg & Huxley, 1992) biosocial model. This represents a wider perspective that incorporates biological and social factors and explains the overlap between anxiety and depression by arguing the commonality of both types of variables, responsible for the "vulnerability", "destabilisation", and "restitution" processes, in the two disorders. This model offers a more flexible view of the temporal relationship between anxiety and depression, compared to the helplessness-hopelessness model, in that, their sequence is not solely dependent on the actual occurrence of negative life events (although this also plays a major part) but can be explained by resorting to the reciprocal inhibition between the reward and punishment systems, and the neurobiological correlates of BIS/BAS (Gray, 1982;

1987) and neurotransmitters (e.g. Deakin, 1998). However, even if this model can accommodate both kinds of sequential mechanisms, it does not provide any explanation for the more common progression of anxiety to depression rather than the reverse. In fact, according to Goldberg (1994) “whichever is released first, the other is likely as a secondary consequence” (p. 67). Therefore, given the rather general predictions (note also the absence of any predictions regarding expectancy) this model is more resilient to empirical falsification.

The last of the three theoretical models is Clark and Watson’s (1991) tripartite model of anxiety and depression. This model provides a phenotypic structure of depressive and anxious symptomatology with the proposal that they can be divided into three factors. The first factor, negative affect (NA), is responsible for the overlap between anxiety and depression and includes non-specific symptoms common to both types of disorders, such as dysphoria, poor concentration, irritability, and sleep disturbance. The second factor, low positive affect (PA), is relatively specific to depression and includes symptoms such as, anhedonia, lack of energy, disinterest. The last factor, physiological hyperarousal (PH), is relatively unique to anxiety and encompasses autonomic symptoms, such as feeling dizzy or light-headed, difficulty breathing, racing heart. Generally, we found good correspondence between this symptomatic structure and our group subdivision with high scores of general disturbance (MASQ-GD non-specific subscale) reflecting high levels of NA in the three clinical groups; high scores of anhedonic depression (MASQ-AD depression specific subscale) reflecting low levels of PA reported by the depressed and mixed groups; and high scores of anxious arousal (MASQ-AA anxiety specific subscale) reflecting high levels of PH found in the anxious and mixed groups.

Although this model does not make any explicit predictions regarding the association between the three factors and expectancy ratings for future positive and negative life events, in Chapter 4 we were able to test this indirectly by utilising specific types of life events in the SPJT (i.e. depression relevant, anxiety relevant, and positive). In line with predictions, we found that the depressed group gave higher probability ratings for depression compared to anxiety relevant events (reflecting NA) and low ratings for positive events (reflecting low PA); the mixed group showed high expectancy for both depression and anxiety events (reflecting high levels of NA and PH) and low expectancy for positive life events compared to controls (reflecting low PA); whereas our anxious group, prevalently composed by GAD outpatients, did not show specificity for anxiety relative to depression relevant events, probably due to PH being more specific to panic disorder than to GAD, and showed low expectancy for positive events only in some experimental conditions, confirming that low PA is not a characteristic feature of anxiety.

All in all, the three theoretical models considered provided a useful framework and a practical guide in the generation of our experimental hypotheses. Given the evidence gathered in this thesis it would be unfair to deem any of these models as being right or wrong. As stated above, it is more fruitful to say that there are models that are more or less useful and models that fit the data more or less well. Unfortunately, these two criteria often move in opposite directions, in that, the more specific a model is and the more experimentally testable predictions it makes, the more useful it is for the advancement of our understanding. Conversely, as we have seen above, the more general and the less falsifiable a model is, the better it can fit the available evidence.

By definition, good experimental hypothesis need to be precise while the level of specificity can vary considerably. However, since the level of specificity of a hypothesis has been here related to its usefulness, it is recommended that future research concentrate on testing the specific predictions made by models. Nonetheless, to a certain extent it is possible to deduct specific experimental hypotheses from more general models either by inferential reasoning or by complementing them with predictions that derive from affined models.

In more practical terms, at least two steps seem necessary when undertaking future research in anxiety and depression: *a)* distinguish between common and specific features of anxiety and depression in the definition of research groups; *b)* distinguish between types of stimuli specific to anxiety and depression, and the differential relevance and impact of specific types of emotional information.

We have provided evidence that the three clinical groups differ in terms of mnemonic, attentional, and prospective cognitive processes. Although these novel findings will need to be replicated by future studies, it would be particularly fruitful to consider more complex and dynamic aspects that characterise anxiety, depression and their relationship as we have done with the investigations reported in Chapters 5 and 6. In particular, a clinical investigation of the temporal relationship between anxiety and depression, both within and across episodes, would be useful to further investigate the proposal that the intertwining of anxiety and depression might have an evolutionary adaptive function. A follow-up investigation would allow not only the observation of the shift from an anxiety towards a depressive state, but also the possibility of a reverse mechanism and the analysis of the conditions under which

they both occur. Moreover, it would allow monitoring of the resulting changes in terms of information processing that might operate at different stages.

A final proposal is the comparative therapeutic intervention of depressed, anxious, and mixed anxious depressed outpatients, which would incorporate the use of a number of experimental tasks, and would allow structural equation modelling of whether or not similar models of maintenance/recovery apply in the different groups, with obvious potential implications for the design of optimal therapeutic programmes for the mixed anxiety depression group.

7. 4. Conclusions.

In the course of this thesis we have presented the ongoing theoretical debate regarding the conceptualisation of the overlap between anxiety and depression and its implications for clinical and other empirical experimental research. We have focused on fundamental cognitive functions, such as attention, memory and prospective cognitions and have provided evidence that depression, anxiety and mixed anxiety depression can be distinguished not only quantitatively (i.e. symptomatological severity) but also, and more importantly, in terms of qualitatively distinct features that characterise the cognitive profile of the three clinical groups.

Until recent years, empirical research and resultant theoretical models have concentrated on the study of anxiety and depression in isolation. Our findings suggest that future comparative studies involving anxious and depressed patients in a variety of experimental tasks should discriminate more in depth between common

and specific factors, assess the integration of basic cognitive functions, examine their dynamic sequential relationship and, possibly, include a mixed anxious depressed sample.

The theoretical approaches considered in this thesis have provided a good framework on which to base our experimental hypotheses. However we had to resort to one or another model to explain particular results, and none of them can entirely accommodate our data. Also the theoretical models that specifically consider the phenomenon of overlap between anxiety and depression have been unable to account for many aspects of our findings, either because these models are too specific or too general to include those instances or because their predictions are simply inaccurate or incomplete; hence, the need of more comprehensive frameworks.

Is mixed anxiety depression a genuine disorder in its own right? Although one might propend for a positive answer to this question, it would be premature and certainly fallacious to arrive to such conclusion at this stage. The provision of discriminant group validity, as a subtype of construct validity, does not grant the inference of a definite answer. However, it is believed we have gone a considerable way towards the identification of key cognitive processes specific to mixed anxiety depression that will hopefully aid the reaching of a more conclusive pronouncement on this issue.

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APPENDICES

Appendix 1. List of primed and unprimed words used as stimuli divided by category and their mean Length (*L*) and Frequency (*F*).

Depression Relevant				Anxiety Relevant			
<i>Primed words</i>		<i>Unprimed words</i>		<i>Primed words</i>		<i>Unprimed words</i>	
AWFUL		ALONE		ACCIDENT		CANCER	
CRYING		DEATH		AFRAID		COFFIN	
DISAPPOINTED		DEPRIVED		AMBULANCE		DANGER	
EXHAUSTED		DESERTED		ATTACK		DISASTER	
FAILURE		DESPAIR		CASUALTY		DISEASE	
GRIEF		DISCOURAGED		COLLAPSE		DISGRACE	
GUILTY		DISMAL		CRITICISM		EMBARRASSED	
HOPELESS		DREADFUL		EMERGENCY		FEAR	
ISOLATED		DULL		HARM		NERVOUS	
LOST		GLOOMY		MISTAKE		PAIN	
MISERY		HORRIBLE		MURDER		PERSECUTED	
REJECTED		PESSIMISTIC		PANIC		STRANGLED	
TERRIBLE		SAD		PARALYSED		SUFFOCATE	
TORTURED		SUFFERING		TRAGEDY		TERRIFIED	
UNFORTUNATE		SUICIDE		UNEASY		VICTIM	
UPSET		WORTHLESS		URGENT		WORRY	
<i>L</i> =7.25	<i>F</i> =33.53	<i>L</i> =7.19	<i>F</i> =36.31	<i>L</i> =7.06	<i>F</i> =32.16	<i>L</i> =7.19	<i>F</i> =30.72
Emotional Positive				Neutral			
<i>Primed words</i>		<i>Unprimed words</i>		<i>Primed words</i>		<i>Unprimed words</i>	
AFFECTION		BEAUTY		BRANCH		BAG	
APPLAUSE		DEAR		CHAIR		BOWL	
ART		FANTASY		FORK		CHIN	
CHARM		FESTIVITY		GARAGE		CORNER	
COMFORT		FREEDOM		INK		CURTAINS	
DREAM		FRIEND		KETTLE		ELBOW	
JOYFUL		FUN		MATERIAL		FURNITURE	
KIND		HAPPY		OATS		GLASS	
KISS		HEAVEN		PAPER		HAT	
LAUGH		HOPE		POLE		ITEM	
LUCKY		HUG		POTATO		PENCIL	
MIRACLE		LOVELY		SEAT		PIPE	
PEACE		MUSIC		STOVE		PRODUCT	
SPRING		PLEASANT		TABLE		SHOES	
TICKLE		SUNSET		UMBRELLA		STREET	
VICTORY		WARMTH		WINDOW		STRING	
<i>L</i> =5.75	<i>F</i> =57.88	<i>L</i> =5.69	<i>F</i> =64.81	<i>L</i> =5.31	<i>F</i> =54.28	<i>L</i> =5.31	<i>F</i> =53.88

Appendix 2. Self-report questionnaires used in this thesis.

Date:

Name: _____ Marital Status: _____ Age: _____ Sex: _____

Occupation: _____ Education: _____

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

- 0 I do not feel sad.
- 1 I feel sad much of the time.
- 2 I am sad all the time.
- 3 I am so sad or unhappy that I can't stand it.

2. Pessimism

- 0 I am not discouraged about my future.
- 1 I feel more discouraged about my future than I used to be.
- 2 I do not expect things to work out for me.
- 3 I feel my future is hopeless and will only get worse.

3. Past Failure

- 0 I do not feel like a failure.
- 1 I have failed more than I should have.
- 2 As I look back, I see a lot of failures.
- 3 I feel I am a total failure as a person.

4. Loss of Pleasure

- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from the things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

6. Punishment Feelings

- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

7. Self-Dislike

- 0 I feel the same about myself as ever.
- 1 I have lost confidence in myself.
- 2 I am disappointed in myself.
- 3 I dislike myself.

8. Self-Criticalness

- 0 I don't criticize or blame myself more than usual.
- 1 I am more critical of myself than I used to be.
- 2 I criticize myself for all of my faults.
- 3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes


- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

10. Crying

- 0 I don't cry anymore than I used to.
- 1 I cry more than I used to.
- 2 I cry over every little thing.
- 3 I feel like crying, but I can't.

_____ Subtotal Page 1

Continued on Back

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11. Agitation

- 0 I am no more restless or wound up than usual.
- 1 I feel more restless or wound up than usual.
- 2 I am so restless or agitated that it's hard to stay still.
- 3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

- 0 I have not lost interest in other people or activities.
- 1 I am less interested in other people or things than before.
- 2 I have lost most of my interest in other people or things.
- 3 It's hard to get interested in anything.

13. Indecisiveness

- 0 I make decisions about as well as ever.
- 1 I find it more difficult to make decisions than usual.
- 2 I have much greater difficulty in making decisions than I used to.
- 3 I have trouble making any decisions.

14. Worthlessness

- 0 I do not feel I am worthless.
- 1 I don't consider myself as worthwhile and useful as I used to.
- 2 I feel more worthless as compared to other people.
- 3 I feel utterly worthless.

15. Loss of Energy

- 0 I have as much energy as ever.
- 1 I have less energy than I used to have.
- 2 I don't have enough energy to do very much.
- 3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

- 0 I have not experienced any change in my sleeping pattern.

- 1a I sleep somewhat more than usual.

- 1b I sleep somewhat less than usual.

- 2a I sleep a lot more than usual.

- 2b I sleep a lot less than usual.

- 3a I sleep most of the day.

- 3b I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

- 0 I am no more irritable than usual.
- 1 I am more irritable than usual.
- 2 I am much more irritable than usual.
- 3 I am irritable all the time.

18. Changes in Appetite

- 0 I have not experienced any change in my appetite.

- 1a My appetite is somewhat less than usual.

- 1b My appetite is somewhat greater than usual.

- 2a My appetite is much less than before.

- 2b My appetite is much greater than usual.

- 3a I have no appetite at all.

- 3b I crave food all the time.

19. Concentration Difficulty

- 0 I can concentrate as well as ever.
- 1 I can't concentrate as well as usual.
- 2 It's hard to keep my mind on anything for very long.
- 3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

- 0 I am no more tired or fatigued than usual.
- 1 I get more tired or fatigued more easily than usual.
- 2 I am too tired or fatigued to do a lot of the things I used to do.
- 3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than I used to be.
- 2 I am much less interested in sex now.
- 3 I have lost interest in sex completely.

NOTICE:

_____ Subtotal Page 2

_____ Subtotal Page 1

3 4 5 6 7 8 9 10 11 12 ABCDE

SELF-EVALUATION QUESTIONNAIRE

Developed by Charles D. Spielberger
 in collaboration with
 R. L. Gorsuch, R. Lushene, P. R. Vagg, and G. A. Jacobs

STAI Form Y-1

Name _____ Date _____ S _____
 Age _____ Sex: M _____ F _____ T _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

VERY MUCH SO
 MODERATELY SO
 SOMEWHAT
 NOT AT ALL

- | | | | | |
|--|---|---|---|---|
| 1. I feel calm | ① | ② | ③ | ④ |
| 2. I feel secure | ① | ② | ③ | ④ |
| 3. I am tense | ① | ② | ③ | ④ |
| 4. I feel strained | ① | ② | ③ | ④ |
| 5. I feel at ease | ① | ② | ③ | ④ |
| 6. I feel upset | ① | ② | ③ | ④ |
| 7. I am presently worrying over possible misfortunes | ① | ② | ③ | ④ |
| 8. I feel satisfied | ① | ② | ③ | ④ |
| 9. I feel frightened | ① | ② | ③ | ④ |
| 10. I feel comfortable | ① | ② | ③ | ④ |
| 11. I feel self-confident | ① | ② | ③ | ④ |
| 12. I feel nervous | ① | ② | ③ | ④ |
| 13. I am jittery | ① | ② | ③ | ④ |
| 14. I feel indecisive | ① | ② | ③ | ④ |
| 15. I am relaxed | ① | ② | ③ | ④ |
| 16. I feel content | ① | ② | ③ | ④ |
| 17. I am worried | ① | ② | ③ | ④ |
| 18. I feel confused | ① | ② | ③ | ④ |
| 19. I feel steady | ① | ② | ③ | ④ |
| 20. I feel pleasant | ① | ② | ③ | ④ |



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SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name _____ Date _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

ALMOST NEVER
SOMETIMES
OFTEN
ALMOST ALWAYS

- | | | | | |
|--|---|---|---|---|
| 21. I feel pleasant | ① | ② | ③ | ④ |
| 22. I feel nervous and restless | ① | ② | ③ | ④ |
| 23. I feel satisfied with myself | ① | ② | ③ | ④ |
| 24. I wish I could be as happy as others seem to be | ① | ② | ③ | ④ |
| 25. I feel like a failure | ① | ② | ③ | ④ |
| 26. I feel rested | ① | ② | ③ | ④ |
| 27. I am "calm, cool, and collected" | ① | ② | ③ | ④ |
| 28. I feel that difficulties are piling up so that I cannot overcome them | ① | ② | ③ | ④ |
| 29. I worry too much over something that really doesn't matter | ① | ② | ③ | ④ |
| 30. I am happy | ① | ② | ③ | ④ |
| 31. I have disturbing thoughts | ① | ② | ③ | ④ |
| 32. I lack self-confidence | ① | ② | ③ | ④ |
| 33. I feel secure | ① | ② | ③ | ④ |
| 34. I make decisions easily | ① | ② | ③ | ④ |
| 35. I feel inadequate | ① | ② | ③ | ④ |
| 36. I am content | ① | ② | ③ | ④ |
| 37. Some unimportant thought runs through my mind and bothers me | ① | ② | ③ | ④ |
| 38. I take disappointments so keenly that I can't put them out of my
mind | ① | ② | ③ | ④ |
| 39. I am a steady person | ① | ② | ③ | ④ |
| 40. I get in a state of tension or turmoil as I think over my recent concerns
and interests | ① | ② | ③ | ④ |

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Name/ID# _____

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MASQ

Below is a list of feelings, sensations, problems, and experiences that people sometimes have. Read each item and then mark the appropriate choice in the space next to that item. Use the choice that best describes how much you have felt or experienced things this way during the past week, including today. Use this scale when answering:

- | 1 | 2 | 3 | 4 | 5 |
|------------|-----------------------|------------|--|-----------|
| not at all | a little bit | moderately | quite a bit | extremely |
| _____ | 1. Felt cheerful | _____ | 23. Felt like I was having a lot of fun | |
| _____ | 2. Felt afraid | _____ | 24. Blamed myself for a lot of things | |
| _____ | 3. Startled easily | _____ | 25. Felt numbness or tingling in my body | |
| _____ | 4. Felt confused | _____ | 26. Felt withdrawn from other people | |
| _____ | 5. Slept very well | _____ | 27. Seemed to move quickly and easily | |
| _____ | 6. Felt sad | _____ | 28. Was afraid I was going to lose control | |
| _____ | 7. Felt very alert | _____ | 29. Felt dissatisfied with everything | |
| _____ | 8. Felt discouraged | _____ | 30. Looked forward to things with enjoyment | |
| _____ | 9. Felt nauseous | _____ | 31. Had trouble remembering things | |
| _____ | 10. Felt like crying | _____ | 32. Felt like I didn't need much sleep | |
| _____ | 11. Felt successful | _____ | 33. Felt like nothing was very enjoyable | |
| _____ | 12. Had diarrhea | _____ | 34. Felt like something awful was going to happen | |
| _____ | 13. Felt worthless | _____ | 35. Felt like I had accomplished a lot | |
| _____ | 14. Felt really happy | _____ | 36. Felt like I had a lot of interesting things to do | |
| _____ | 15. Felt nervous | _____ | 37. Did not have much of an appetite | |
| _____ | 16. Felt depressed | _____ | 38. Felt like being with other people | |
| _____ | 17. Felt irritable | _____ | 39. Felt like it took extra effort to get started | |
| _____ | 18. Felt optimistic | _____ | 40. Felt like I had a lot to look forward to | |
| _____ | 19. Felt faint | _____ | 41. Thoughts and ideas came to me very easily | |
| _____ | 20. Felt uneasy | _____ | 42. Felt pessimistic about the future | |
| _____ | 21. Felt really bored | _____ | 43. Felt like I could do everything I needed to do | |
| _____ | 22. Felt hopeless | _____ | 44. Felt like there wasn't anything interesting or fun to do | |

MASQ (cont.)

1	2	3	4	5
not at all	a little bit	moderately	quite a bit	extremely
_____	45. Had pain in my chest	_____	68. Felt confident about myself	
_____	46. Felt really talkative	_____	69. Muscles twitched or trembled	
_____	47. Felt like a failure	_____	70. Had trouble making decisions	
_____	48. Had hot or cold spells	_____	71. Felt like I was going crazy	
_____	49. Was proud of myself	_____	72. Felt like I had a lot of energy	
_____	50. Felt very restless	_____	73. Was afraid I was going to die	
_____	51. Had trouble falling asleep	_____	74. Was disappointed in myself	
_____	52. Felt dizzy or lightheaded	_____	75. Heart was racing or pounding	
_____	53. Felt unattractive	_____	76. Had trouble concentrating	
_____	54. Felt very clearheaded	_____	77. Felt tense or "high-strung"	
_____	55. Was short of breath	_____	78. Felt hopeful about the future	
_____	56. Felt sluggish or tired	_____	79. Was trembling or shaking	
_____	57. Hands were shaky	_____	80. Had trouble paying attention	
_____	58. Felt really "up" or lively	_____	81. Muscles were tense or sore	
_____	59. Was unable to relax	_____	82. Felt keyed up, "on edge"	
_____	60. Felt like being by myself	_____	83. Had trouble staying asleep	
_____	61. Felt like I was choking	_____	84. Worried a lot about things	
_____	62. Was able to laugh easily	_____	85. Had to urinate frequently	
_____	63. Had an upset stomach	_____	86. Felt really good about myself	
_____	64. Felt inferior to others	_____	87. Had trouble swallowing	
_____	65. Had a lump in my throat	_____	88. Hands were cold or sweaty	
_____	66. Felt really slowed down	_____	89. Thought about death or suicide	
_____	67. Had a very dry mouth	_____	90. Got tired or fatigued easily	

Name:

Date:

DIRECTIONS: This questionnaire consists of 20 statements. Please read the statements carefully one by one. If the statement describes your attitude for the **past week including today**, mark the 'T' indicating TRUE in the column next to the statement. If the statement does not describe your attitude, mark the 'F' indicating FALSE in the column next to the statement. **Please be sure to read each statement carefully.**

- | | | |
|--|---|---|
| 1. I look forward to the future with hope and enthusiasm. | T | F |
| 2. I might as well give up because there is nothing I can do about making things better for myself. | T | F |
| 3. When things are going badly, I am helped by knowing that they cannot stay that way forever. | T | F |
| 4. I can't imagine what my life would be like in ten years. | T | F |
| 5. I have enough time to accomplish the things I want to do. | T | F |
| 6. In the future, I expect to succeed in what concerns me most. | T | F |
| 7. My future seems dark to me. | T | F |
| 8. I happen to be particularly lucky, and I expect to get more of the good things in life than the average person. | T | F |
| 9. I just can't get the breaks, and there's no reason I will in the future. | T | F |
| 10. My past experiences have prepared me well for the future. | T | F |
| 11. All I can see ahead of me is unpleasantness rather than pleasantness. | T | F |
| 12. I don't expect to get what I really want. | T | F |
| 13. When I look ahead to the future, I expect I will be happier than I am now. | T | F |
| 14. Things just don't work out the way I want them to. | T | F |
| 15. I have great faith in the future. | T | F |
| 16. I never get what I want, so it's foolish to want anything. | T | F |
| 17. It's very unlikely that I will get any real satisfaction in the future. | T | F |
| 18. The future seems vague and uncertain to me. | T | F |
| 19. I can look forward to more good times than bad times. | T | F |
| 20. There's no use in really trying to get anything I want because I probably won't get it. | T | F |

Name:

Date:

Penn State Worry Questionnaire

Please indicate how typical you feel each of the statements below are of you, from 1 = not at all typical of you, to 5 = very typical of you.

	Not at all typical of me			Very typical of me	
	1	2	3	4	5
1. If I do not have enough time to do everything, I do not worry about it.	1	2	3	4	5
2. My worries overwhelm me.	1	2	3	4	5
3. I do not tend to worry about things.	1	2	3	4	5
4. Many situations make me worry.	1	2	3	4	5
5. I know I should not worry about things, but I just cannot help it.	1	2	3	4	5
6. When I am under pressure I worry a lot.	1	2	3	4	5
7. I am always worrying about something.	1	2	3	4	5
8. I find it easy to dismiss worrisome thoughts.	1	2	3	4	5
9. As soon as I finish one task, I start to worry about everything else I have to do.	1	2	3	4	5
10. I never worry about anything.	1	2	3	4	5
11. When there is nothing more I can do about a concern, I do not worry about it any more.	1	2	3	4	5
12. I have been a worrier all my life.	1	2	3	4	5
13. I notice that I have been worrying about things.	1	2	3	4	5
14. Once I start worrying, I cannot stop.	1	2	3	4	5
15. I worry all the time.	1	2	3	4	5
16. I worry about projects until they are all done.	1	2	3	4	5

DAS - 24

This scale lists different attitudes or beliefs which people sometimes hold.

Please read each statement carefully and decide how much you agree or disagree with what it says.

For each of the attitudes, please indicate your answer by placing a tick (✓) under the column that best describes how you think. Be sure to choose only one answer for each attitude. But please note that because people are different, there is no 'right' or 'wrong' answer to these statements.

To decide whether a given attitude is typical of your way of looking at things, simply keep in mind what you are like most of the time.

Attitudes	Totally Agree	Agree Very Much	Agree Slightly	Neutral	Disagree Slightly	Disagree Very Much	Totally Disagree
1. If I fail partly, it is as bad as being a complete failure.							
2. If others dislike you, you cannot be happy.							
3. I should be happy all the time.							
4. People will probably think less of me if I make a mistake.							
5. My happiness depends more on other people than it does on me.							
6. I should always have complete control over my feelings.							
7. My life is wasted unless I am a success.							
8. What other people think about me is very important.							
9. I ought to be able to solve my problems quickly and without a great deal of effort.							
10. If I don't set the highest standards for myself, I am likely to end up a second rate person.							
11. I am nothing if a person I love doesn't love me.							

Attitudes	Totally Agree	Agree Very Much	Agree Slightly	Neutral	Disagree Slightly	Disagree Very Much	Totally Disagree
12. A person should be able to control what happens to him/her.							
13. If I am to be a worthwhile person, I must be truly outstanding in at least one major respect.							
14. If you don't have other people to lean on, you are bound to be sad.							
15. It is possible for a person to be scolded and not get upset.							
16. I must be a useful, productive, creative person or life has no purpose.							
17. I can find happiness without being loved by another person.							
18. A person should do well at everything he/she undertakes.							
19. If I do not do well all the time, people will not respect me.							
20. I do not need the approval of other people in order to be happy.							
21. If I try hard enough, I should be able to excel at anything I attempt.							
22. People who have good ideas are more worthy than those who do not.							
23. A person doesn't need to be well liked in order to be happy.							
24. Whenever I take a chance or risk I am only looking for trouble.							

Name:

Date:

PERSONAL ATTITUDES

Here are some questions about how you feel about yourself **at the present time**.

Please read each question carefully and decide if you agree or disagree with it. There are no right or wrong answers.

For each question please put a circle around one number from -2 to +2 to indicate the extent to which you agree or disagree.

Remember it's how you feel at the present time that's important.

	Disagree Strongly	Disagree	Neutral	Agree	Strongly Agree
1. On the whole I am satisfied with myself.	-2	-1	0	+1	+2
2. I feel that I have a number of good qualities.	-2	-1	0	+1	+2
3. At times I feel I am no good at all.	-2	-1	0	+1	+2
4. I am able to do things as well as most other people.	-2	-1	0	+1	+2
5. I feel I do not have much to be proud of.	-2	-1	0	+1	+2
6. I certainly feel useless at times.	-2	-1	0	+1	+2
7. I feel that I am a person of worth, at least on an equal plane with others.	-2	-1	0	+1	+2
8. I wish I could have more respect for myself.	-2	-1	0	+1	+2
9. All in all I am inclined to feel that I am a failure.	-2	-1	0	+1	+2
10. I take a positive attitude toward myself.	-2	-1	0	+1	+2

THE BASIC EMOTIONS SCALE

The purpose of this scale is to find out about how much or how often you experience certain emotions and then to ask some questions about how you feel actually during particular emotions themselves.

The first part of the scale is designed to explore how you have felt **DURING THE LAST WEEK**. For each emotion, please circle **ONE** number only between 1 and 7, to indicate how you have felt.

OVER THE PAST WEEK I HAVE FELT :

	not at all						all of the time
ANGER	1	2	3	4	5	6	7
SADNESS	1	2	3	4	5	6	7
DISGUST	1	2	3	4	5	6	7
FEAR	1	2	3	4	5	6	7
HAPPINESS	1	2	3	4	5	6	7
FRUSTRATION	1	2	3	4	5	6	7
DESPAIR	1	2	3	4	5	6	7
SHAME	1	2	3	4	5	6	7
ANXIETY	1	2	3	4	5	6	7
JOY	1	2	3	4	5	6	7
IRRITATION	1	2	3	4	5	6	7
MISERY	1	2	3	4	5	6	7
GUILT	1	2	3	4	5	6	7
NERVOUSNESS	1	2	3	4	5	6	7
ELATION	1	2	3	4	5	6	7
AGGRESSION	1	2	3	4	5	6	7
DEFEATED	1	2	3	4	5	6	7
REPULSION	1	2	3	4	5	6	7
TENSE	1	2	3	4	5	6	7
PRIDE	1	2	3	4	5	6	7
JEALOUSY	1	2	3	4	5	6	7
GLOOMINESS	1	2	3	4	5	6	7
HUMILIATED	1	2	3	4	5	6	7
WORRIED	1	2	3	4	5	6	7
LOVING	1	2	3	4	5	6	7
RESENTFUL	1	2	3	4	5	6	7
MOURNFUL	1	2	3	4	5	6	7
BLAMEWORTHY	1	2	3	4	5	6	7
SHY	1	2	3	4	5	6	7
CHEERFUL	1	2	3	4	5	6	7

In the second part of this questionnaire we would like to know about how you feel **IN GENERAL**.

The question asks about **HOW OFTEN** you feel the emotion.

Again, for each question please circle **ONE** number only between 1 and 7 to indicate how you feel.

IN GENERAL, I FEEL THIS EMOTION:

	never			sometimes			very often
	1	2	3	4	5	6	7
ANGER	1	2	3	4	5	6	7
SADNESS	1	2	3	4	5	6	7
DISGUST	1	2	3	4	5	6	7
FEAR	1	2	3	4	5	6	7
HAPPINESS	1	2	3	4	5	6	7
FRUSTRATION	1	2	3	4	5	6	7
DESPAIR	1	2	3	4	5	6	7
SHAME	1	2	3	4	5	6	7
ANXIETY	1	2	3	4	5	6	7
JOY	1	2	3	4	5	6	7
IRRITATION	1	2	3	4	5	6	7
MISERY	1	2	3	4	5	6	7
GUILT	1	2	3	4	5	6	7
NERVOUSNESS	1	2	3	4	5	6	7
ELATION	1	2	3	4	5	6	7
AGGRESSION	1	2	3	4	5	6	7
DEFEATED	1	2	3	4	5	6	7
REPULSION	1	2	3	4	5	6	7
TENSE	1	2	3	4	5	6	7
PRIDE	1	2	3	4	5	6	7
JEALOUSY	1	2	3	4	5	6	7
GLOOMINESS	1	2	3	4	5	6	7
HUMILIATED	1	2	3	4	5	6	7
WORRIED	1	2	3	4	5	6	7
LOVING	1	2	3	4	5	6	7
RESENTFUL	1	2	3	4	5	6	7
MOURNFUL	1	2	3	4	5	6	7
BLAMEWORTHY	1	2	3	4	5	6	7
SHY	1	2	3	4	5	6	7
CHEERFUL	1	2	3	4	5	6	7

In the third part of this questionnaire we would like to ask you for some information about **HOW YOU FEEL** when you experience that emotion. **Please note:** even if you **never** experience a particular emotion, please answer the question by imagining how you think you would feel if you did experience that emotion.

Again, for each part of the question, please circle **ONE** number between 1 and 7 to indicate how you feel.

A. How much in control do you feel ?

B. Do you ever lose a sense of who you are - as if you were no longer yourself?

	completely in control					completely out of control		never							sometimes					always									
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	
ANGER																													
SADNESS																													
DISGUST																													
FEAR																													
HAPPINESS																													
FRUSTRATION																													
DESPAIR																													
SHAME																													
ANXIETY																													
JOY																													
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WORRIED																													
LOVING																													
RESENTFUL																													
MOURNFUL																													
BLAMEWORTHY																													
SHY																													
CHEERFUL																													

Thank You Very Much For Your Help With This Questionnaire

Patient:
Ward:
Date:

DIRECTIONS: This questionnaire consists of 28 questions about experiences that you may have in your daily life. We are interested in how often you have these experiences. It is important, however, that your answers show how often these experiences happen to you when you were not under the influence of alcohol or drugs. To answer the questions, please indicate how often each experience applies to you by marking the line in the appropriate place, for example:

0% | _____ | 100%
Never Always

1. Some people have the experience of driving a car and suddenly realising that they do not remember what has happened during all or part of the journey. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

2. Some people find that sometimes they are listening to someone talk and they suddenly realise that they did not hear part or all of what was said. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

3. Some people have the experience of finding themselves in a place and having no idea how they got there. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

4. Some people have the experience of finding themselves dressed in clothes that they don't remember putting on. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

5. Some people have the experience of finding new things among their belongings that they do not remember buying. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

6. Some people sometimes find that they are approached by people that they do not know who call them by another name or insist that they have met them before. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

7. Some people sometimes have the experience of feeling as though they are standing next to themselves or watching themselves do something, and they actually see themselves as if they were looking at another person. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
8. Some people are told that they sometimes do not recognise friends or family members. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
9. Some people find that they have no memory for some important events in their lives (for example, a wedding). Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
10. Some people have the experience of being accused of lying when they do not think they have lied. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
11. Some people have the experience of looking in a mirror and not recognising themselves. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
12. Some people sometimes have the experience of feeling that other people, objects and the world around them are not real. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
13. Some people sometimes have the experience of feeling that their body does not seem to belong to them. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
14. Some people have the experience of sometimes remembering a past event so vividly that they feel as if they were reliving that event. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
15. Some people have the experience of not being sure whether things that they remember happening really did happen or whether they just dreamed them. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always

16. Some people have the experience of being in a familiar place but finding it strange and unfamiliar. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
17. Some people find that when they are watching television or a film they become so absorbed in the story that they are unaware of other events happening around them. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
18. Some people sometimes find that they become so involved in a fantasy or daydream that it feels as though it were really happening to them. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
19. Some people find that they sometimes are able to ignore pain. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
20. Some people find that they sometimes sit staring off into space, thinking of nothing, and are not aware of the passage of time. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
21. Some people sometimes find that when they are alone they talk out loud to themselves. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
22. Some people find that in one situation they may act so differently compared with another situation that they feel almost as if they were two different people. Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always
23. Some people sometimes find that in certain situations they are able to do things with amazing ease and spontaneity that would usually be difficult for them (for example, sports, work, social situations, etc.). Mark on the line to show what percentage of the time this happens to you.
- 0% | _____ | 100%
Never Always

24. Some people sometimes find that they cannot remember whether they have done something or have just thought about doing that thing (for example, not knowing whether they have actually posted a letter or have just thought about posting it). Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

25. Some people sometimes find evidence that they have done something but cannot remember having done it. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

26. Some people sometimes find writings, drawings or notes among their belongings that they must have done but cannot remember doing. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

27. Some people sometimes find that they hear voices inside their head that tell them to do things or comment on things that they are doing. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

28. Some people sometimes feel as if they are looking at the world through a fog so that people and objects appear far away or unclear. Mark on the line to show what percentage of the time this happens to you.

0% | _____ | 100%
Never Always

EDINBURGH HANDEDNESS INVENTORY

Surname Given Names

Date of Birth Sex

Please indicate your preferences in the use of hands in the following *activities by putting + in the appropriate column*. Where the preference is so strong that you would never try to use the other hand unless absolutely forced to, *put + +*. If in any case you are really indifferent *put + in both columns*.

Some of the activities require both hands. In these cases the part of the task, or object, for which hand preference is wanted is indicated in brackets.

Please try to answer all the questions, and only leave a blank if you have no experience at all of the object or task.

		LEFT	RIGHT
1	Writing		
2	Drawing		
3	Throwing		
4	Scissors		
5	Toothbrush		
6	Knife (without fork)		
7	Spoon		
8	Broom (upper hand)		
9	Striking Match (match)		
10	Opening Box (lid)		

L. Q.

Leave these spaces blank

DECILE

PANAS (T_1)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way *right now*, that is, *at the present moment*. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

_____ interested

_____ irritable

_____ distressed

_____ alert

_____ excited

_____ ashamed

_____ upset

_____ inspired

_____ strong

_____ nervous

_____ guilty

_____ determined

_____ scared

_____ attentive

_____ hostile

_____ jittery

_____ enthusiastic

_____ active

_____ proud

_____ afraid

VAMS (T_1)

DIRECTIONS: Below are nine sets of scales. For each scale, place a mark across the line at the point which best describes **how you are feeling right now**.

1. How *disgusted* do you feel right now?

0 % | _____ | 100 %
Not at all | | Extremely

2. How *anxious* do you feel right now?

0 % | _____ | 100 %
Not at all | | Extremely

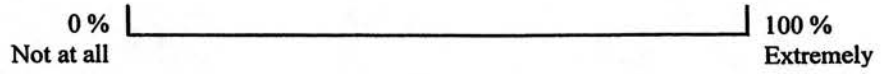
3. How *energetic* do you feel right now?

0 % | _____ | 100 %
Not at all | | Extremely

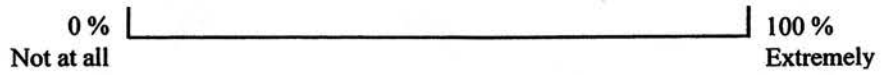
4. How *sad* do you feel right now?

0 % | _____ | 100 %
Not at all | | Extremely

5. How *angry* do you feel right now?



6. How *happy* do you feel right now?



7. How *tense* do you feel right now?



8. How *tired* do you feel right now?



9. How *confused* do you feel right now?



Appendix 3. "Paper-and-pencil" tasks used in this thesis.

RECORD
of
The Mill Hill Vocabulary Scale, Form I Senior

In each group of six words below underline the word which means the same as the word in heavy type above the group, as it has been done in the first example:

- 1 **CONNECT**
accident join
lace bean
flint field
- 2 **PROVIDE**
harmonize commit
hurt supply
annoy divide
- 3 **STUBBORN**
obstinate steady
hopeful hollow
orderly slack
- 4 **SCHOONER**
building man
ship singer
plant scholar
- 5 **LIBERTY**
worry freedom
rich serviette
forest cheerful
- 6 **COURTEOUS**
dreadful proud
truthful short
curtsey polite
- 7 **RESEMBLANCE**
attendance fondness
assemble repose
likeness memory
- 8 **THRIVE**
flourish try
thrash reap
think blame
- 9 **PRECISE**
natural stupid
faulty grand
small exact
- 10 **ELEVATE**
revolve move
raise work
waver disperse
- 11 **DWINDLE**
swindle pander
diminish wheeze
linger compare
- 12 **LAVISH**
unaccountable selfish
romantic lawful
extravagant praise
- 13 **WHIM**
complain noise
tonic fancy
wind rush
- 14 **SURMOUNT**
mountain descend
overcome concede
appease snub
- 15 **BOMBASTIC**
democratic pompous
bickering cautious
destructive anxious
- 16 **RECUMBENT**
fugitive cumbersome
unwieldy repelling
reclining penitent
- 17 **ENVISAGE**
contemplate activate
surround estrange
enfeeble regress
- 18 **TRUMPERY**
worthless heraldry
etiquette highest
amusement final
- 19 **GLOWER**
extinguish shine
disguise gloat
aerate scowl
- 20 **PERPETRATE**
appropriate commit
propitiate deface
control pierce
- 21 **LEVITY**
parsimony velleity
salutary frivolity
alacrity tariff
- 22 **LIBERTINE**
missionary rescuer
profligate canard
regicide farrago
- 23 **AMULET**
savoury jacket
flirtation crest
cameo charm
- 24 **QUERULOUS**
astringent fearful
petulant curious
inquiring spurious
- 25 **TEMERITY**
impermanence rashness
nervousness stability
punctuality submissiveness
- 26 **FECUND**
esulent optative
profound prolific
sublime salic
- 27 **ABNEGATE**
contradict decry
renounce execute
belie assemble
- 28 **TRADUCE**
challenge attenuate
suspend establish
misrepresent conclude
- 29 **VAGARY**
vagabond caprice
obscurity vulgarity
evasion fallacy
- 30 **SPECIOUS**
fallacious coeval
palatial typical
nutritious flexible
- 31 **SEDULOUS**
rebellious dilatory
complaisant diligent
seductive credulous
- 32 **NUGATORY**
inimitable adamant
sublime contrary
numismatic trifling
- 33 **ADUMBRATE**
foreshadow protect
detect eradicate
elaborate approach
- 34 **MINATORY**
implacable diminutive
belittling quiescent
depository threatening

Name:

AMT

Date:

Directions: Below is a list of events that were either generated by yourself or presented to you during the first part of the study. Please read each event and then answer the four questions by ticking the appropriate boxes and by circling the numbers that best describe your probability judgements.

1. You will get on well with your family.

- Did it happen? Yes No
- Was this an event you generated or presented to you? Generated Presented
- How likely is it that this event will happen again in the next 12 months?
Not at all likely 1 2 3 4 5 6 7 8 9 10 Extremely likely
- How likely did you think this event was to happen when you first rated it?
Not at all likely 1 2 3 4 5 6 7 8 9 10 Extremely likely

2. Your job will be under threat.

- Did it happen? Yes No
- Was this an event you generated or presented to you? Generated Presented
- How likely is it that this event will happen again in the next 12 months?
Not at all likely 1 2 3 4 5 6 7 8 9 10 Extremely likely
- How likely did you think this event was to happen when you first rated it?
Not at all likely 1 2 3 4 5 6 7 8 9 10 Extremely likely

3. A close friend will move away.

- Did it happen? Yes No
- Was this an event you generated or presented to you? Generated Presented
- How likely is it that this event will happen again in the next 12 months?
Not at all likely 1 2 3 4 5 6 7 8 9 10 Extremely likely
- How likely did you think this event was to happen when you first rated it?
Not at all likely 1 2 3 4 5 6 7 8 9 10 Extremely likely

Appendix 4. Passage used for the Subject-Paced Reading Task (SPRT),
broken into 15 sentences.

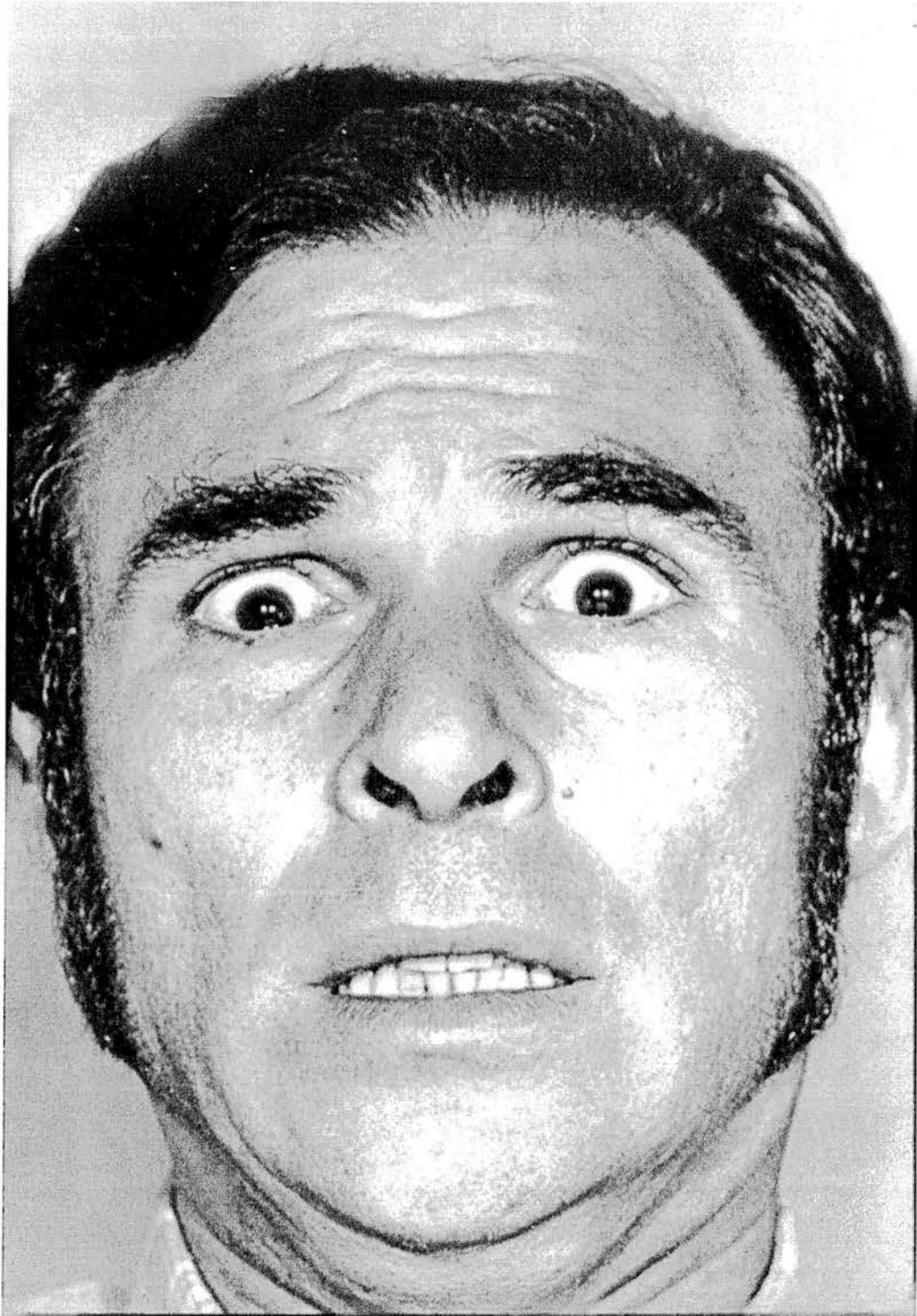
Edinburgh is the historic capital of Scotland
and one of the most beautiful cities in Europe.

Along with its famous castle,
medieval Old Town and stunning panoramic views,
it is also surrounded by beautiful coast and countryside.

With a wide choice of places to visit
- castles, palaces, historic towns and villages,
museums and galleries, including the Royal Museums
and the National Galleries of Scotland –
visitors are assured of a varied and enjoyable stay in the area.

Add to this an all-year round programme
of top quality events and entertainment,
excellent accommodation, restaurants and shopping
and you will discover that Edinburgh and the surrounding area
has something for everyone.

Appendix 5. Example of emotional face used as prime for the Subjective Probability Judgement Task (SPJT).



Appendix 6. Example of chimera used for the Chimeric Faces Task (CFT).

