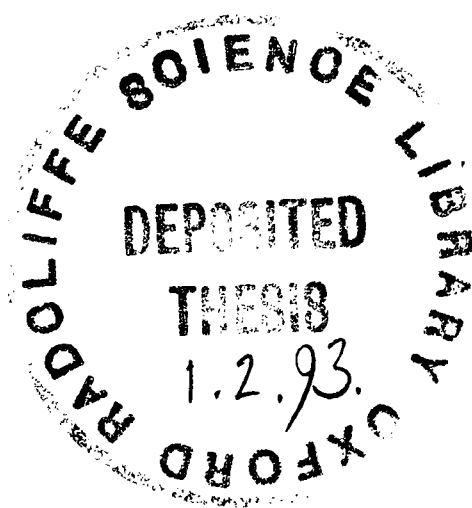


Cognitive processes in anorexia nervosa and bulimia nervosa

Myra Jane Cooper



D. Phil.

Wolfson college

Michaelmas term

1991

Acknowledgments

I would like to thank Christopher Fairburn and David Clark for their support and supervision. I also had useful discussions with Pavlos Anastasiades.

Keith Hawton, David Julier, Catherine Oppenheimer, Pepe Catalan, Gerald Russell, Joan Kirk, Antony Wakeling and staff of the Warneford Hospital (Oxford), Ashhurst Clinic (Oxford), Elms Clinic (Banbury), Royal Free Hospital (London) and the Maudsley Hospital (London) kindly allowed me to see patients in their care.

Sarah Beglin, Jenny Burton and Pat Norman provided reliability ratings for the Eating Disorder Examination in Chapter 3. Selena Elcombe, Nancy Cooper and Dorothy Oldman provided reliability ratings for the concurrent verbalisation data collected in Chapters 3 and 9. Marianne O'Connor and Jenny Burton tested the patients in Chapter 4 and Chapters 6 to 8.

The Medical Research Council provided me with a Studentship and the Wellcome Trust funded the treatment study in which the patient data in Chapter 4 and Chapters 6 to 8 were collected.

I would also like to thank all the patients and other volunteers who were kind enough to take part in the studies.

Finally, my warmest thanks go to two very special people, Gillian Butler and Nigel Wellman, with whom I had endless discussions and from whom I received exceptionally generous amounts of time and encouragement.

Abstract

Cognitive processes in anorexia nervosa and bulimia nervosa

Myra Jane Cooper, D. Phil., Wolfson college, Michaelmas term, 1991

The series of studies reported in this thesis aimed to improve our knowledge of the cognitive disturbance in anorexia nervosa and bulimia nervosa. Techniques from experimental cognitive psychology were used to test predictions made by cognitive theories of eating disorders. In the first study, subjects performed three tasks related to eating, weight and shape and self-statements were measured using concurrent verbalisation and a self-report questionnaire. Compared to dieters and non-dieting controls, patients with bulimia nervosa showed greater concern with weight and appearance while patients with anorexia nervosa showed greater concern with eating. In the second study, using an adaptation of the Stroop colour-naming task, patients with eating disorders showed greater selective processing of information related to eating, weight and shape than normal, non-dieting controls and normal dieters. In the third study it was found that this disturbance was more closely related to measures of the specific psychopathology of eating disorders rather than to measures of general psychopathology. In the fourth study information processing before and after treatment was compared. As predicted by cognitive theories, selective processing appeared to be related to the emotional salience of the colour-named words rather than to patients' familiarity with the issues represented by these words. In the fifth study information processing before and after three different psychological treatments for bulimia nervosa was measured. No support was found for the hypothesis that cognitive behaviour therapy operates through mechanisms specific to this treatment. Contrary to predictions, in the sixth study, when colour-naming was measured at the end of treatment and at 12 month follow-up, selective information processing did not predict relapse in symptoms of bulimia nervosa. Finally, a seventh study, which manipulated attitudes to eating, weight and shape experimentally, found evidence for a causal relationship between these attitudes and disturbed eating behaviour. Methodological issues, and the clinical and theoretical relevance of the research findings, are discussed.

Contents

	Page
Acknowledgments	ii
Abstract	iii
Chapter 1 Introduction	1
Chapter 2 Review of the literature	5
Chapter 3 A study of thoughts about eating, weight and shape in patients with anorexia nervosa, patients with bulimia nervosa, two groups of dieters and one group of non-dieting female controls	54
Chapter 4 Selective processing of information about eating, weight and shape in patients with bulimia nervosa and female controls	116
Chapter 5 Selective processing of information about eating, weight and shape in patients with anorexia nervosa, patients with bulimia nervosa, two groups of dieters and one group of non-dieting female controls	136
Chapter 6 Relationship of selective processing of eating, weight and shape related information to demographic and clinical features in patients with bulimia nervosa	151
Chapter 7 Changes in the processing of eating, weight and shape related information with three different psychological treatments for bulimia nervosa	167
Chapter 8 The role of selective information processing in predicting outcome at 12 month follow-up in patients treated for bulimia nervosa	192
Chapter 9 An experimental study of the relationship between thoughts about eating, weight and shape and eating behaviour in	

	patients with bulimia nervosa	209
Chapter 10	Discussion	233
	References	264
	Appendices	286
Appendix 1	Selection criteria for the five groups of subjects assessed in Chapter 3 and Chapter 5	288
Appendix 2	Reliability of coding the Eating Disorder Examination in the five groups studied in Chapter 3	292
Appendix 3	The Thoughts Checklist used in Chapter 3	293
Appendix 4	Example of transcribed thoughts prior to coding and breaking up into idea units	298
Appendix 5	Reliability of breaking the transcripts into units in Chapter 3	299
Appendix 6	The manual used for classifying thoughts in Chapters 3 and 9	300
Appendix 7	Reliability of coding the transcripts in Chapter 3 into immediately relevant positive and negative thoughts, content, reference and valence	334
Appendix 8	Items contributing to the five subscales of the Eating Disorder Examination	336
Appendix 9	Mean length and word frequency scores for the stimuli used in Chapter 9	337
Appendix 10	The four sets of stimuli as they were presented to subjects in Chapter 9	338
Appendix 11	Visual analogue scales used to measure mood and eating behaviour in Chapter 9	343
Appendix 12	Brands and caloric values of the stimuli used in the taste test in Chapter 9	345

Appendix 13	Visual analogue scales used to assess the four basic tastes in Chapter 9	346
Appendix 14	Food diary and instructions used in Chapter 9	347
Appendix 15	Reliability of breaking the transcripts into units in Chapter 9	350
Appendix 16	Criteria for classifying thoughts relevant to the taste test in Chapter 9	351
Appendix 17	Reliability of coding the transcripts in Chapter 9 into immediately relevant positive and negative thoughts, content, reference and valence	353
Appendix 18	Results from the analyses of variance of the questionnaire and semi-structured interview measures used in Chapter 3	355
Appendix 19	Paper accepted for publication in the Journal of Abnormal Psychology	356

Chapter 1

Introduction

The two classical "eating disorders", anorexia nervosa and bulimia nervosa, are the subject of this thesis. The former has a long history, with first descriptions by Sir William Gull and Ernest Lasègue in the nineteenth century. The latter has only come to the attention of psychiatry and the general public during the last fifteen years.

Anorexia nervosa is characterised by pronounced self-induced weight loss, amenorrhoea (in females who are not taking an oral contraceptive drug) and intense fear of gaining weight. Bulimia nervosa is characterised by recurrent episodes of overeating which are accompanied by a sense of loss of control over eating (referred to as binges) and by great distress. These episodes are followed by self-induced vomiting, abuse of laxatives, vigorous exercising or strict dieting to prevent weight gain. As in anorexia nervosa, patients with bulimia nervosa are extremely concerned with food, eating, weight and shape.

The diagnostic criteria most frequently used in recent work are those of DSM-III-R (American Psychiatric Association, 1987). To qualify for a diagnosis of anorexia nervosa, patients must refuse to maintain their body weight above 15% below that expected for their age and height, have an intense fear of gaining weight or becoming fat even though underweight, experience disturbed perception of body weight and shape, for example, feeling fat even when emaciated, and have missed at least three consecutive menstrual cycles. To meet the criteria for a diagnosis of bulimia nervosa, patients must experience recurrent episodes of binge eating, have a feeling of loss of control over eating behaviour during the binge episodes, regularly engage in self-induced vomiting, use of laxatives/diuretics, strict dieting

or fasting or vigorous exercise to prevent weight gain, have a minimum average of two binge episodes per week for at least three months and show evidence of a persistent overconcern with body weight and shape.

Both disorders occur mainly in young women (The Mayo Clinic study, Lucas, Beard, O'Fallon & Kurland, 1988; King, 1986, 1989). They occur more frequently in industrialised western countries (Buhrich, 1981; Nasser, 1986), are more common in those from the upper social classes (Hsu, 1990, Chapter 3) and are probably less common amongst the ethnic minorities (Nevo, 1985; Gray, Ford & Kelly, 1987). Studies suggest a prevalence of anorexia nervosa amongst adolescents and young women of less than 1%, with higher rates being found in those groups most at risk of developing the disorder. Bulimia nervosa is more common, with an estimated prevalence in the region of 1-2% in adolescent and young adult women (Fairburn & Beglin, 1990). Again the prevalence is probably greater in certain "at risk" populations. Several case register studies indicate that the incidence of anorexia nervosa has increased over the last 20 to 30 years (Lucas, Beard, O'Fallon & Kurland, 1991) and the clinical impression is that of an increasingly widespread population distribution.

Both disorders are difficult to treat. Anorexia nervosa has a varied course and in a minority it is a chronic and unremitting disorder. Bulimia nervosa also has a varied course, and like anorexia nervosa, it is sometimes unremitting. A recent review of outcome (Herzog, Keller & Lavori, 1988) concluded that at least one third of patients with either disorder were still ill at several years follow up. Follow up studies also reveal high rates of morbidity and significant mortality (Herzog et al., 1988; Hsu, 1990, Chapter 7). Symptoms of depression and anxiety, poor social functioning and concern with eating, weight and shape may persist, even after weight has been restored in anorexia nervosa. In bulimia nervosa outcome is better. Follow

up studies of anorexia nervosa suggest a significant crude mortality rate with estimates ranging from 0-20% (for example, a recent study, Ratnasuriya, Eisler, Szmuckler & Russell, 1991, of outcome over 20 years reported a mortality rate of 15%). No comparable data exist for bulimia nervosa.

There has been recent interest in cognitive approaches to the treatment of eating disorders in view of the clinical impression that distorted attitudes to eating, weight and shape play an important role in maintaining these disorders (Fairburn, Cooper & Cooper, 1986). Cognitive behavioural treatments have produced encouraging results in the treatment of bulimia nervosa (Fairburn, Agras & Wilson, in press). However, there is little empirical or experimental work on the precise nature of the cognitive disturbance and the mechanisms involved in its maintenance and change. Greater understanding of these is likely to be important for further development of what appears to be a promising treatment for bulimia nervosa and for progress in extending its application to anorexia nervosa.

In other disorders, (for example, depression and anxiety), methodology from experimental cognitive psychology has been used to provide useful information on the precise nature of the cognitive disturbance (for example, Teasdale, 1983; Mathews & MacLeod, 1985). These studies have benefited treatment by leading to increased understanding of the characteristic cognitive content, disturbance in information processing and mechanisms involved both in maintaining disturbed mood and behaviour and in promoting change with treatment.

The aim of the studies described in this thesis is to improve our knowledge of the cognitive disturbance in eating disorders. Three main themes unite the experimental studies. The first involves the examination of several different aspects of the cognitive disturbance, including differences at the level of self-statements, information processing and in the meanings

attached to certain key concepts. These map onto existing cognitive formulations which emphasise the importance of negative self-talk, disturbed information processing and self-schema organised around weight and shape. Intertwined with this theme is the second theme, that of methodology, with several different techniques from experimental cognitive psychology being used to examine the cognitive disturbance. The relationship between cognition and behaviour is the third theme. It is investigated initially in a series of correlational studies, and finally in an experimental paradigm allowing more definite conclusions to be drawn about the hypothesis that disturbance in thinking is responsible for the disturbance in eating behaviour seen in patients with eating disorders.

Research in several areas has contributed to the present project, including evidence for the existence and importance of disturbed thinking in anorexia nervosa and bulimia nervosa, the use of cognitive behavioural treatments for eating disorders and the development of techniques for cognitive assessment in experimental cognitive psychology. These areas of interest will form the basis for the following literature review.

Chapter 2

Review of the Literature

2.1

Introduction

This review of the literature will focus initially on evidence for the existence and importance of a cognitive disturbance in the eating disorders. This evidence comes from several sources, including clinical and anecdotal observations, cognitive behavioural treatment studies and a small number of research studies. Each of these sources of evidence will be discussed in turn. Approaches to assessing cognitive disturbance in psychological disorders using techniques from experimental cognitive psychology will then be considered, including their preliminary application to eating disorders. This review will, therefore, be divided into six parts, clinical and anecdotal evidence for a cognitive disturbance in the eating disorders including review of related cognitive theories, cognitive behavioural treatments for eating disorders, research evidence for a cognitive disturbance, approaches of experimental psychologists to cognitive assessment of psychological disorders and a review of the application of these approaches to eating disorders.

2.2 The cognitive disturbance in eating disorders and related cognitive theories

The first source of evidence for the existence and importance of a cognitive disturbance in eating disorders comes from clinical observations and anecdotal reports. These observations and reports have provided the basis for cognitive theories of eating disorders which will, therefore, also

be discussed in this section.

2.21 The cognitive disturbance in anorexia nervosa

Reports by clinicians of widely differing theoretical orientations frequently mention the presence of unusual beliefs and attitudes in patients with anorexia nervosa (e.g. Bliss and Branch, 1960; Selvini-Palazzoli, 1974). From a psychodynamic perspective Galdston (1974, p.247) remarked that "attitudes to food and eating often bordered on the delusional". Crisp (1967, p.117) described the characteristic set of distorted attitudes by noting that "primary anorexia nervosa is almost invariably a state of weight phobia". Russell (1970, p.134) described them as a "morbid fear of becoming fat".

From the perspective of ego psychology, Bruch's conceptualisation of anorexia nervosa, and recommendations for treatment, have much in common with that of cognitive theorists. Her observations provide the most detailed source of evidence for the presence of unusual beliefs and attitudes in anorexia nervosa. She describes three fundamental psychological deficits (Bruch, 1973, pp.251-254). These are "a disturbance of delusional proportions in the body image and body concept", "a disturbance in the accuracy of the perception or cognitive interpretation of stimuli arising in the body" (particularly signs of hunger and satiety) and "a paralysing sense of ineffectiveness which pervades all thinking and activity". She describes distorted attitudes and beliefs about food, eating, weight, body image, perfectionism, achievement and the value of exercise. She notes that the central belief in the desirability of thinness is often experienced as an obsession and may become a fixed idea. (McKenna, 1984, also discusses overvalued ideas in anorexia nervosa). In addition, Bruch (1979) reports that patients with anorexia nervosa often have a distorted sense of reality

and are unable to reason in an abstract, logical way. In Piagetian terms they remain at the level of preconceptual, concrete operations rather than at the formal operational level characteristic of adolescence (Inhelder & Piaget, 1955). Bruch's aetiological model forms the basis for Guidano & Liotti's cognitive theory of anorexia nervosa (Guidano & Liotti, 1983) which will be discussed later.

2.22 The cognitive disturbance in bulimia nervosa

Similar attitudes and beliefs have been described in patients with bulimia nervosa. Russell (1979, p.432) describes a "morbid fear of becoming fat" and notes that common to anorexia nervosa and bulimia nervosa is "the characteristic psychopathology whereby the patients were abnormally concerned with their body size, fearing fatness which they described in excessively harsh terms out of keeping with sensible standards". Later on in the same paper (Russell, 1979, p.348) he remarks that "the preoccupation with body size and fatness consisted of overvalued ideas rather than obsessional ruminations, for the patients usually remained convinced of the danger and odiousness of fatness". Mitchell & Pyle (1982, p.61), in a review of studies of bulimia nervosa, note that "these patients are very concerned about their weight" while Fairburn et al. (1986a, p.394) note that "perhaps the most striking feature of bulimia nervosa is the intensity and prominence of these patients' concerns with their shape and weight". In addition (p.395), they note that "accompanying the concerns over shape and weight are certain strongly held values that are extremes of widely held attitudes. These concern the importance of having an attractive appearance and the desirability of self control". Patients also have strong views about food and eating, for example they see a variety of foods as "bad" or "fattening" and may be convinced that if they eat meals or snacks without vomiting they

will gain weight. DSM-III-R (American Psychiatric Association, 1987) recognises the importance of unusual attitudes and beliefs by requiring that there be "a persistent overconcern with body shape and weight" for a diagnosis of bulimia nervosa to be made.

Clinical observations and anecdotal reports such as these provide support for the existence and importance of a characteristic cognitive disturbance in eating disorders. They have encouraged the development of cognitive theories of anorexia nervosa and bulimia nervosa. These theories will be discussed below. Cognitive theories of anorexia nervosa, which have formed the basis for cognitive theories of bulimia nervosa, will be discussed first.

2.23 Cognitive theories of anorexia nervosa

Two cognitive theories of anorexia nervosa have been described in detail. One (Guidano & Liotti, 1983) is based on Bruch's aetiological model (Bruch, 1973) while the other (Garner & Bemis, 1982) has applied Beck's model of the emotional disorders, particularly depression (Beck, 1976; Beck, Rush, Shaw & Emery, 1979). The theories will be described and then commented upon. Garner & Bemis. Garner & Bemis' theory takes as its fundamental premise the patients' belief "I must become thin". This belief makes their behaviours and beliefs comprehensible, just as granting the validity of a paranoid delusion makes the schizophrenics' bizarre acts understandable. Garner & Bemis limit themselves to an account of the proximal sources of this belief, unlike Guidano & Liotti who offer a detailed account of possible childhood influences on it. The potential anorexia nervosa patient is typically introverted, sensitive and isolated and tries to live up to the expectations of others. She becomes withdrawn, feels helpless and perhaps depressed. Family and cultural influences give her the idea that losing weight will

alleviate her distress. Initial successful weight loss results in feelings of self-control and is positively reinforced by others. Soon it is followed by a fear of weight gain and her behaviour becomes increasingly controlled by bizarre internal contingencies until neither the beliefs nor the behaviour are affected, even by extremely punishing environmental consequences. Isolation from experience that might alter the beliefs increases vulnerability to the influence of self-generated distorted perceptions.

Therapy follows lines suggested by Beck for the treatment of depression, with some adaptations to help develop initial motivation for change. This includes tackling the belief that thinness is a value of inestimable worth. Like Beck they recommend the provision of didactic information and the use of behavioural as well as cognitive techniques to elicit and alter cognitions. They emphasise the discovery of distortions in the processing and interpretation of events, the evaluation of automatic thoughts or self-statements and then of underlying assumptions, which can be inferred from self-statements. Some of these support avoidance of weight gain and eating while others support the desirability of weight loss and of dieting. Body image misinterpretation also needs to be reinterpreted. Garner & Bemis give examples of distorted information processing and typical assumptions. For example, patients tend to assume that events are black or white, right or wrong, good or bad. Typical assumptions include the belief that a perfect balance can and should be sought between disparate elements, that weight, shape or thinness can serve as the sole referent for inferring personal value and self-worth and that complete self-control is desirable. They also note that the use of cognitive techniques should not be confined to specific eating and weight problems although their analysis is primarily concerned with these. Other distortions tend to become more prominent once weight is gained and it is said to be important to deal with these too.

Guidano & Liotti. For Guidano & Liotti the three fundamental deficits which Bruch sees as characteristic of the disorder are all expressions of problems in cognitive structures relating to personal identity. Cognitive structures are beliefs and rules under which individuals operate and around which they organise their lives. Specific issues of food and eating such as fears of weight gain, continuous thoughts about food and eating and fears of loss of control also reflect attitudes about the self and reality and can also be understood in terms of the cognitive structures that constitute personal identity. Personal identity is characterised by beliefs in general ineffectiveness and failure, rather than in low self-worth or by belief in lack of abilities as in depression. Also typical is the belief that it is dangerous or useless to tell others about feelings or opinions and the expectation of rejection or criticism. This belief system explains patients' negativism, lack of commitment in personal relationships and susceptibility to criticism. Like Bruch, Guidano & Liotti remark on patients' infrequent use of abstract concepts, especially in relation to themselves and interpersonal relationships. Patients also seem to have an imprecise attributional style.

Comment. Unlike Garner & Bemis, Guidano & Liotti provide a detailed account of developmental factors. These involve a failure to develop autonomy, individuality and self-expression in childhood. This leads to beliefs about the impossibility of defining responsibility for one's own actions. Early disappointment in the child's emotional bond with her father leads to later reluctance to become involved in relationships for fear of similar rejection. The basis of the cognitive organisation in anorexia nervosa is what Ellis would call a "dire need for love". Love is the saving idea, but as well as being a source of safety in the past it has also been a source of disappointment. To guard against disappointment those with anorexia nervosa

demand that others be perfect before making any commitment. Equally they themselves must also be perfect to live up to the idealised other. Reality will, however, always prove disappointing. Because of the imprecise attributional style patients have difficulty identifying the real nature of the problem and this, combined with the particular personal identity structures results in a maladaptive solution - dieting and weight loss. In therapy weight gain and the alteration of eating patterns is only a superficial goal. The deeper personal identity structures, the attitudes to reality, need to be corrected. Certain key structures, especially expectations of rejection, criticism and general distress will be corrected implicitly by drawing up an honest therapeutic contract. Direct challenging of beliefs will also be necessary and the authors recommend using techniques developed by Mahoney & Mahoney (1976) for dealing with distorted beliefs in obesity. Finally it is necessary to tackle the "dire need for love" by retracing its' developmental path and correcting the imprecise attributional style.

Guidano & Liotti's model emphasises intervention at the level of underlying beliefs and rules rather than at the level of self-statements. In contrast, Garner & Bemis address these as a prelude to dealing with underlying assumptions and use them to provide data for inferring the presence of such assumptions. Guidano & Liotti pay little attention to issues of food, eating and weight or to the specific problems encountered in anorexia nervosa. This is consistent with their assumption that all eating problems, whether diagnosed as primary anorexia nervosa or secondary to schizophrenia, share the same underlying cognitive structure. The theories do not explain how patients arrive at the idea that dieting and losing weight will solve their problems and why they develop an eating disorder as opposed to some other kind of disorder. Garner & Bemis's theory mentions the role of

family and cultural influences but does not provide details of how they might operate. Neither of the two models pays any attention to the question of why some patients develop episodes of binge eating while others do not.

2.24 Cognitive theories of bulimia nervosa

Fairburn et al. (1986a) have described the only detailed cognitive behavioural theory of bulimia nervosa. Their theory is also based on Beck's cognitive theory of depression and is similar to that described by Garner & Bemis for anorexia nervosa. Like Garner & Bemis, Fairburn and colleagues provide no detailed account of aetiology and, as in Garner & Bemis's account, patients' attitudes toward their shape and weight are held to be central to the maintenance of the disorder. Like patients with anorexia nervosa, patients with bulimia nervosa tend to evaluate their self-worth in terms of their shape and weight, which has the advantage of providing a simple and immediate measure of personal strengths and weaknesses. They view fatness negatively and thinness and self-control positively. These attitudes are implicit and are based on unarticulated rules by which patients assign meaning and value to their experiences. They are dysfunctional because they are rigid and extreme and hold excessive personal significance.

These typical beliefs and values reflect the operation of certain dysfunctional styles of reasoning or disturbances in information processing, similar to those observed in depression and to those described by Garner & Bemis for anorexia nervosa. They include dichotomous thinking, overgeneralisation and errors of attribution, for example the belief that foods can be simply categorised as "fattening" or "nonfattening". Beliefs and values are reflected in thoughts which explain patients' behaviour such as the frequent weighing or, alternatively, active avoidance of weighing. The reduction in food intake may also be directly attributed to thoughts

concerning shape and weight. Fairburn and colleagues describe a cognitive link between strict dieting and episodes of overeating in which intense concern with shape and weight leads patients to adopt extreme dieting rules that are impossible to obey. Inevitable minor deviations from these self-imposed rules are seen as catastrophic and evidence of weakness, so as a result patients temporarily abandon all controls over their eating and episodes of binge-eating occur.

Only one research finding is relevant to the central prediction of this theory, i.e. that the cognitive disturbance is responsible for the maintenance of the disturbed behaviour. This is a study conducted by Freeman and colleagues (Freeman, Beach, Davis & Solyom, 1985) which found that relapse after treatment for bulimia nervosa was predicted best by body image disturbance.

Fairburn and colleagues's model explains why bulimia nervosa is maintained but it does not explain why some patients with overvalued ideas concerning their shape and weight successfully maintain control over their eating and develop "restricting" anorexia nervosa while others experience episodes of bulimia, either as bulimia nervosa or in the context of anorexia nervosa. Also missing from this account is why do these patients develop an eating disorder rather than another disorder? Family, individual, social and cultural factors are mentioned in this context but their relationship to the development of the disorder is not specified in detail.

Wilson (1989a) extends Fairburn and colleagues's cognitive behavioural theory of bulimia nervosa by providing it with a social context. This goes some way towards constructing an explanation of why some people, particularly women, are more likely to develop an eating disorder as opposed to any other kind of disorder. Although Wilson does not consider the question it is easy to hypothesise that there are also differences between families as well as

between cultures in the transmission of values conducive to the development of an eating disorder. However, while his theory explains why women in some cultures are more likely to become restrained eaters than those in others, and why they might find it particularly difficult to achieve their desired weight, it does not explain why some restrained eaters develop bulimia nervosa and others do not, or why some develop "restricting" anorexia nervosa (i.e. they do not binge) as opposed to an eating disorder with episodes of bulimia.

2.25 Conclusion

Considerable clinical and anecdotal evidence exists for the presence of unusual beliefs and attitudes in both anorexia nervosa and bulimia nervosa. Cognitive and cognitive behavioural models, which assign these beliefs and attitudes a causal role in the maintenance of the disordered behaviour, have been developed for both disorders. Although differing terminology may be used, and models also differ in relative emphasis placed on different aspects of the model, taken together they highlight the importance of three features. These are:

1. Self-statements or thoughts
2. Dysfunctional styles of reasoning or disturbance in information processing
3. Underlying assumptions, attitudes, identity structures or rules.

The rules which are present govern the perception of experience and affect behaviour, both in relation to patients' specific concerns with eating, weight and shape and in relation to other problems which may be present.

Cognitive models do not offer an adequate explanation of aetiology. Personal, familial, biological, psychological, social and cultural factors may all be implicated, singly or jointly, via mechanisms that have yet to be

determined. None of these would be incompatible with existing cognitive views, most of which are largely concerned with the maintenance rather than the development of eating disorders.

Conclusion. To conclude, cognitive theories of anorexia nervosa and bulimia nervosa are based on clinical observations and anecdotal reports of cognitive features and not on empirical evidence. The next section of this review will discuss some of the problems that arise from relying on these sources as a basis for developing cognitive theories. The following section will then discuss cognitive behavioural treatment for eating disorders since this provides the second source of evidence for the importance of a cognitive disturbance in anorexia nervosa and bulimia nervosa.

2.26 Limitations of clinical evidence for cognitive theories

Clinical observations and anecdotal reports provide only limited support for cognitive theories of eating disorders. For example, there are no control groups which makes it impossible to determine which aspects of the cognitive disturbance are unique to patients with eating disorders and which may also be reported by normal young women, particularly those who are dieting. Reports based on clinical interviews are also inherently reactive, the questions asked depend on the therapists' or interviewers' conception of the problem and these questions are likely to influence the specific cognitions reported. This means that relevant cognitions may be missed. In addition, such reports are usually obtained retrospectively, thus they may be distorted accounts of what really happened. They do not provide evidence to support or disconfirm the fundamental assumption made by cognitive theorists that cognitions have a causal role in the development or maintenance of the disturbed behaviour. Recently clinicians have emphasised the similarity of

the cognitive disturbance in the two disorders. However, it is also important to identify differences, not simply to explain why some may develop "restricting" anorexia nervosa while others develop a disorder with bulimic episodes, but also as a basis for developing more effective treatments for each disorder.

The second source of evidence for the existence and importance of a cognitive disturbance in anorexia nervosa and bulimia nervosa comes from cognitive behavioural treatment studies for eating disorders. These will now be considered.

2.3

Cognitive behavioural treatments

Recent years have seen increasing interest in cognitive behavioural therapies for eating disorders. In so far as these are effective treatments, they provide one source of evidence for the existence and importance of a cognitive disturbance in anorexia nervosa and bulimia nervosa. What is the evidence that cognitive behaviour therapy is an effective treatment for these two disorders?

The majority of cognitive behavioural treatment studies in eating disorders have been carried out using patients with bulimia nervosa. Surprisingly few studies have investigated cognitive behaviour therapy for anorexia nervosa. No purely cognitive treatment has been attempted, with the exception of two studies in bulimia nervosa (Rossiter and Wilson, 1985; Wilson, Rossiter, Kleifield & Lindholm, 1986). Thus cognitive techniques have generally been combined with various behavioural techniques, including in some studies exposure and response prevention. The studies in the two disorders will be reviewed separately, with the bulimia nervosa studies being considered first. Uncontrolled and single or multiple case studies will be

reviewed before controlled studies and individual and group therapy will be considered separately.

2.31 Bulimia nervosa - uncontrolled studies

Two uncontrolled studies have reported on the use of cognitive restructuring or cognitive techniques as part of treatment involving many other components, with the primary emphasis being on an insight oriented approach (Roy-Byrne, Lee-Benner & Yager, 1984; Stevens & Salisbury, 1984). The remaining 14 studies have used cognitive behavioural techniques as their main intervention although they differ in their relative emphasis on cognitive restructuring and in the way in which it this is integrated with behavioural methods.

Individual treatment. Nine studies have used individual therapy (Welch, 1979; Fairburn, 1981; Grinc, 1982; Long & Cordle, 1982; Leitenberg, Gross, Peterson & Rosen, 1984; Giles, Young & Young, 1985; Rossiter & Wilson, 1985; Hsu & Holder, 1986; Johnson, Schlundt & Jarrell, 1986). These studies have used various types of cognitive treatment. Fairburn (1981), for example, adapted techniques from Beck's cognitive therapy for the emotional disorders (Beck, 1976) and from Meichenbaum's self-instructional training (Meichenbaum, 1977). Grinc (1982) used Ellis's Rational-Emotive model while Long & Cordle (1982) adapted techniques from those used by Mahoney & Mahoney (1976) for weight reduction. Two studies (Leitenberg et al., 1984; Giles et al., 1985) added exposure and response prevention to cognitive and cognitive behavioural techniques respectively. All these studies reported success in reducing binge-eating and/or vomiting with treatment. Some studies also reported improvement in general psychopathology, including depression and self-esteem (Giles et al., 1985; Johnson et al., 1986) and improvement in social adjustment (Giles et al., 1985; Hsu & Holder, 1986; Johnson et al., 1986).

It has been claimed that cognitive aspects of the disorder also improve (Welch, 1979; Fairburn, 1981) although these were not measured. Eight studies report follow-up data, with follow-ups ranging from three to 35 months (Welch, 1979; Fairburn, 1981; Grinc, 1982; Long & Cordle, 1982; Giles et al., 1985; Rossiter & Wilson, 1985; Hsu & Holder, 1986; Johnson et al., 1986). The findings indicate that the gains are largely maintained.

Group treatment. Seven studies have used group treatments (Connors, Johnson & Stuckey, 1984; Pyle, Mitchell, Eckert, Hatsukami & Goff, 1984; Roy-Byrne et al., 1984; Stevens & Salisbury, 1984; Schneider & Agras, 1985; Dedman, Numa & Wakeling, 1988; Williamson, Prather, Bennett, Davis, Watkins & Grenier, 1989). Again, different types of cognitive techniques have been used although several studies have used an approach similar to that used by Fairburn for individual cognitive behavioural treatment (Pyle et al., 1981; Schneider & Agras, 1985; Dedman et al., 1988; Williamson et al., 1989). These studies all report significant reductions in the rate of binge-eating and/or vomiting although the amount of improvement seems to be rather less marked than in studies using individual treatment. General psychopathology, including depression, self-esteem, assertiveness and anxiety is also reported to improve (Connors et al., 1984; Schneider & Agras, 1985; Dedman et al., 1988; Williamson et al., 1989). Although follow-up periods tend to be shorter than they have been for individual therapy, ranging from ten weeks to six months, like those for individual therapy they suggest that gains made during treatment are maintained (Connors et al., 1984; Stevens & Salisbury, 1984; Schneider & Agras, 1985; Dedman et al., 1988).

Conclusion. Results from the uncontrolled studies of the use of cognitive behavioural techniques in the treatment of bulimia nervosa are encouraging and suggest that these may be an effective approach to the treatment of

bulimia nervosa. Symptoms specific to the disorder, binge-eating and vomiting, decline and a few studies show that symptoms of general psychopathology also fall with treatment. Individual therapy is possibly more effective than group therapy although individual and group versions of the same treatment have yet to be compared. Several studies also show that the gains made during treatment are maintained at follow up. However, the obvious limitations of uncontrolled studies mean that they do not provide convincing evidence for the existence and importance of a cognitive disturbance in eating disorders. For example, it is possible that the changes observed may simply reflect natural fluctuations in the symptoms over time rather than change attributable to the use of cognitive techniques. Even if this is not the case it is still possible that changes in symptoms are due to nonspecific elements common to all psychological therapies or to the inclusion of behavioural techniques. Controlled studies, comparing different treatments or treatments with waiting list/no treatment are needed to test these possibilities.

2.32 Bulimia nervosa - controlled studies

Seventeen controlled studies of cognitive behavioural treatment for bulimia nervosa, including studies of exposure and response prevention, have been conducted and published in English. Some studies have compared cognitive behavioural treatment with waiting list or no treatment conditions. These test the hypothesis that the changes in symptoms observed in uncontrolled studies are simply the result of natural fluctuations in symptoms over time. Other studies have compared two or more active treatments to see whether cognitive behaviour therapy is more effective than other treatments. These comparisons provide data relevant to the possibility that changes in symptoms are due to nonspecific elements of treatment. The

third group of studies have compared different components of cognitive behavioural treatment to determine which of the many components of the standard cognitive behavioural programmes are crucial to the process of change. These studies provide information to test the hypothesis that improvement is due to the inclusion of behavioural techniques rather than to the use of techniques specific to cognitive behavioural treatment. The controlled studies will be grouped into these three categories for review with the individual treatment studies in each category being considered separately from those in which treatment was conducted in groups.

Cognitive-behaviour therapy vs waiting list/no treatment. Eight studies have compared cognitive behavioural treatment with a waiting list or no treatment group. Two of these used individual therapy (Freeman, Barry, Dunkeld-Turnbull & Henderson, 1988; Agras, Schneider, Arnow, Raeburn & Telch, 1989) and six used group therapy (Lacey, 1983; Dixon & Kiecolt-Glaser, 1984; Huon & Brown, 1985; Lee & Rush, 1986; Wolchik, Weiss & Katzman, 1986; Leitenberg, Rosen, Gross, Nudelman & Vara, 1988). Both individual treatments showed a significant decrease in vomiting when the treated group was compared with a waiting list control group. The study by Freeman and colleagues also found a significant decrease in bingeing, which remained unchanged in the waiting list control group. Studies comparing group cognitive behavioural treatment with a waiting list or no treatment condition have also found significant reductions in bingeing and/or vomiting in the treated group while symptoms remain unchanged in those who are not treated. In addition, scores on measures of general psychopathology including depression, anxiety and self-esteem seem to improve only in those who have been treated (Dixon & Kiecolt-Glaser, 1984; Lee & Rush, 1986; Leitenberg et al., 1988).

Conclusion. The conclusion which may be drawn from these studies is that the

encouraging results of the uncontrolled studies are supported; individual and group cognitive behaviour therapy for bulimia nervosa is more effective than allocation to a waiting list or no treatment at all. Specific and general psychopathology appears to improve in those who receive treatment but not in those who remain untreated. Since symptoms do not change in those who are not treated, the improvement in the treated group is unlikely to be simply the result of natural fluctuations in symptoms over time. However, it is still possible that nonspecific elements of treatment or the inclusion of behavioural techniques rather than the use of techniques specific to cognitive behavioural treatments account for these changes in symptoms. Several studies comparing two or more active treatments, or the components of cognitive behaviour therapy, have now been conducted and the results of these studies provide some information which may help to decide between these possible explanations.

Comparisons with other active treatments. Four studies have compared cognitive behavioural techniques with treatments containing few cognitive behavioural techniques. This comparison is important for practical as well as theoretical reasons. Practically it may be that cognitive behavioural techniques are not needed to achieve change in the symptoms of bulimia nervosa. From a theoretical perspective if cognitive behavioural treatment results in a better outcome than other treatments it is unlikely that the changes observed in those treated with cognitive behaviour therapy are due to nonspecific elements of treatment. Three of these studies have used individual therapy (Fairburn, Kirk, O'Connor & Cooper, 1986; Agras, Schneider, Arnow, Raeburn & Telch, 1989; Fairburn, Jones, Peveler, Carr, Solomon, O'Connor, Burton & Hope, 1991) and one has used group treatment (Kirkley, Schneider, Agras & Bachman, 1985). The comparison treatments have varied. Two studies used non directive psychotherapy as their comparison

treatment (Kirkley et al., 1985; Agras et al., 1989) while Fairburn and colleagues used short-term focal psychotherapy (Rosen, 1976) in their first study (Fairburn et al., 1986b) and interpersonal psychotherapy (Klerman, Weissman, Rounsaville & Chevron, 1984) in their second study (Fairburn et al., 1991a).

Inconsistent results have been obtained. The findings of two studies suggest that cognitive behavioural treatment was more effective than the comparison treatment in reducing bingeing and vomiting (Kirkley et al., 1985; Agras et al., 1989) while the other two find no differences between the treatments being compared on these measures with both groups improving to an equal extent (Fairburn et al., 1986b; Fairburn et al., 1991a). Similar mixed findings emerge for measures of general psychopathology. Two studies suggest that depression improves more in those treated with cognitive behaviour therapy (Fairburn et al., 1986b; Agras et al., 1989) and two find that both groups improve equally on measures of general psychopathology, including depression, anxiety and overall measures of general clinical state (Kirkley et al., 1985; Fairburn et al., 1991a). The one study to include a measure of social adjustment found that it appeared to improve equally in the two treatment groups (Fairburn et al., 1986b). At follow up, ranging from three to 12 months, three of the studies in which differences had been observed on some measures at the end of treatment found that these differences were no longer present.

These inconsistent findings suggest that nonspecific elements of cognitive behavioural treatments may be responsible for producing the changes in symptoms. Alternatively, since none of the comparison treatments were designed to be an inactive treatment, it is possible that factors and processes addressed by these other treatments may be just as responsible for the maintenance of bulimia nervosa as those addressed by cognitive

behavioural techniques. It is important to note that three of the four studies (Kirkley et al., 1985; Fairburn et al., 1986b; Agras et al., 1989) used some behavioural techniques, including self-monitoring of eating, in both of the treatments being compared. This means that the rather similar outcomes could be due simply to the use of similar behavioural techniques. However, the results of one study could not be explained in this manner since no behavioural techniques were used in one of the comparison treatments, yet the groups improved equally on measures of bingeing, vomiting and general psychopathology (Fairburn et al., 1991a). In addition this study, unlike the other studies, included measures of attitudes to shape and weight and extreme dieting. It found that these improved more in the group receiving cognitive behavioural therapy than they did in those receiving interpersonal psychotherapy, a treatment with no behavioural techniques and which made little reference to issues of eating, weight and shape. Although the results need replication, these findings suggest that cognitive behavioural treatment may have a specific beneficial effect beyond that which can be attributed to nonspecific elements of treatment. They also suggest that cognitive behavioural therapy may operate through mechanisms specific to that treatment. However, it still remains possible that the changes, including changes in the cognitive disturbance, are due to the use of behavioural rather than cognitive techniques. Although this is not necessarily inconsistent with the hypothesis that the cognitive disturbance is primary, theoretically it means that it is possible that cognitive aspects may simply be epiphenomenal or secondary to the behavioural disturbance. Studies which have attempted to determine the active ingredients of cognitive behaviour therapy provide data relevant to these possibilities.

Comparisons of the components of cognitive behaviour therapy. Five studies have attempted to determine the active ingredients of cognitive behavioural

treatments for bulimia nervosa. They include studies which have been designed to see whether or not formal exposure with response prevention adds anything to conventional cognitive behaviour therapy. Again these comparisons, particularly that of behavioural techniques with the full cognitive behavioural package, have practical and theoretical importance. From a practical perspective it may be that the more sophisticated cognitive techniques are unnecessary and that equivalent change in symptoms can be achieved using behavioural techniques, which arguably require less skill and training to administer. Theoretically, if it is the case that lasting change in cognitive aspects of eating disorders can be achieved using behavioural techniques that do not focus directly on cognitions this might be thought to call into question the assumption of the cognitive theories of eating disorders that cognitions have a primary role in the development and/or maintenance of these disorders. Only one study has addressed this question empirically by measuring cognitive, as well as behavioural, aspects directly (Fairburn et al., 1991a).

Two studies have compared behavioural treatments with a full cognitive behavioural intervention (Freeman et al., 1988; Fairburn et al., 1991a). Both studies used individual treatments and both found that binge-eating, vomiting and general psychopathology improved equally in the two treatments being compared. However, Fairburn et al., (1991a) found that cognitive behaviour therapy was better than behaviour therapy at altering disturbed attitudes to shape and weight and in decreasing dietary restraint. This suggests that cognitive behaviour therapy may have a specific beneficial effect beyond that attributable to the use of behavioural techniques and may, therefore, operate through cognitive rather than behavioural mechanisms. Practically this is important because it has been suggested that failure to alter attitudes to shape and weight may make patients vulnerable to relapse.

Behavioural treatment might, therefore, result in a greater relapse rate than cognitive behavioural therapy even when the level of specific and general psychopathology in the two groups at the end of treatment has fallen to comparable, low levels. Theoretically, since attitudes changed less in those treated with behavioural techniques alone, the findings also provide some support, albeit weak, for the theoretical assumption that cognitive distortions are of primary importance rather than epiphenomenal or secondary to behavioural disturbance.

The remaining studies which have attempted to determine the active ingredients of cognitive behaviour therapy have practical rather than theoretical implications. All provide further evidence for the effectiveness of cognitive behaviour therapy although it is not clear from these studies whether improvement is due to nonspecific elements of treatment, to the use of behavioural techniques or to techniques specific to cognitive behaviour therapy. Two studies have examined the possible beneficial effect of adding exposure with response prevention to cognitive behaviour therapy (Wilson et al., 1986; Leitenberg et al., 1988). Both used group therapy. Both types of treatment in the two studies resulted in significant reductions in bingeing and vomiting but the results of neither study suggests that structured exposure with response prevention adds anything to conventional cognitive behaviour therapy when treating bulimia nervosa. A third study added specific behavioural self-instruction derived from Goldfried & Davison (1976) to cognitive behaviour therapy (Yates & Sambrailo, 1984). Patients were treated in groups. Patients in both treatment conditions improved equally on measures of bingeing and vomiting, in symptoms of depression and anxiety, and in self-esteem. There was some suggestion that patients who had received the cognitive behavioural treatment with specific self-instruction had a greater reduction in bingeing and purging at six week follow-up than those who had

received the cognitive behavioural treatment alone.

Miscellaneous studies. Four other studies have used cognitive behaviour therapy in controlled treatment studies. These provide further evidence for the effectiveness of cognitive behaviour therapy although once again it is not clear whether nonspecific, behavioural or cognitive elements are responsible for improvement. Two studies have compared individual cognitive behaviour therapy with unspecified forms of individual psychotherapy (Dixon & Kiecolt-Glaser, 1984; Ordman & Kirschenbaum, 1985) and two have compared individual cognitive behaviour therapy with drug treatment and with cognitive behaviour therapy and drug treatment combined (Agras, Rossiter, Arnow, Schneider, Telch, Raeburn, Bruce, Perl & Koran, in press; Mitchell, Pyle, Eckert, Hatsukami, Pomeroy & Zimmerman, 1990). Dixon & Kiecolt-Glaser suggest that group cognitive therapy is a promising form of treatment for bulimia nervosa, since they found that binge-eating and general psychopathology improved more in those receiving this treatment than in those receiving individual psychotherapy. However their results are difficult to interpret because several patients were also receiving individual psychotherapy or drug treatment. The study by Ordman & Kirschenbaum found a better outcome in a group which had received a full cognitive behavioural intervention than in a group which had received a brief three session intervention which appeared to focus largely on behavioural techniques. Both studies comparing cognitive behavioural treatments with drug interventions found that there was no advantage in adding an antidepressant to cognitive behaviour therapy and that cognitive behaviour therapy was more effective than drug treatment alone.

2.33 Anorexia nervosa

Only four studies have reported on the use of cognitive behaviour

therapy in anorexia nervosa. All have used individual therapy and all, except one, have been uncontrolled single or multiple case studies.

Hauseiman & Lavin (1977) reported on the use of cognitive restructuring in a case of anorexia nervosa. Beliefs were identified and disputed and the patient made good progress with weight gain which was maintained at a two year follow-up. Hautzinger (1980) reported on two cases. In one of these cognitive techniques, reattribution and reality testing were used to deal with a patients' distorted view of her ideal image and intrusive thoughts about eating and digestion. Again the patient made good progress in terms of weight gain.

Cooper & Fairburn (1984) reported on five cases in which cognitive behaviour therapy was used to treat anorexia nervosa. Two patients did well, one showed some improvement and two remained unchanged after treatment of varying lengths (seven to 40 weeks). Patients seemed to do better if they experienced bulimic episodes. Overcoming these appeared to provide a collaborative basis from which to proceed with the rest of treatment whereas with the other patients it was difficult to overcome the lack of motivation to change.

Channon, de Silva, Helmsley & Perkins (1989) have conducted the only controlled trial using cognitive behavioural techniques to treat anorexia nervosa. They compared cognitive behaviour therapy with behaviour therapy in a small number of subjects (eight in each condition). Patients in the cognitive behavioural treatment received 18 sessions over six months. Compliance with treatment was greater and drop out was less in the cognitive behaviour group but there were no differences between the two groups on any outcome measure after the intensive treatment phase. This may be due to the small sample size. Patients improved irrespective of group on weight, nutritional, psychosexual functioning, preferred weight, depression and

several subscales of the Eating Disorder Inventory (EDI; Garner, Olmsted & Polivy, 1983). None, however, were clinically recovered at the end of treatment or at 12 month follow-up.

Since it is impossible to draw any conclusions when there have been so few and such small studies of cognitive behaviour therapy for anorexia nervosa these studies will not be discussed further.

2.34 Conclusion

The results of the uncontrolled and controlled treatment studies in bulimia nervosa suggest that cognitive behavioural treatments are promising treatments for this disorder. Significant reductions in specific symptoms and associated general psychopathology can be achieved with quite brief interventions. These gains appear to be maintained at follow-up, although the follow-up periods have usually been short. However, cognitive behaviour therapy is not the only effective treatment for bulimia nervosa. Four studies have found that treatments containing few or no cognitive behavioural techniques also produced significant improvement in bingeing, vomiting and general psychiatric symptoms. Nevertheless, the one study to include empirical measures of attitudes to weight and shape and a measure of dieting (Fairburn et al., 1991a) suggests that cognitive behaviour therapy may have a specific beneficial effect since it altered these features more than a treatment making no reference to the patients' eating disorder and more than that of a purely behavioural intervention. This study provides some support for the hypothesis that cognitive behaviour therapy operates through mechanisms specific to that treatment and is also consistent with the hypothesis that cognitive aspects are of primary importance in the maintenance of the disorder.

How effective are cognitive behavioural treatments for bulimia nervosa?

Table 2.1 is an updated summary of the table found in Garner, Fairburn & Davis (1987). It shows the mean percentage reduction in bingeing and vomiting at the end of treatment, together with mean abstinence rates at the end of treatment and at follow-up, for those studies which have included a follow-up. Results from uncontrolled as well as controlled studies are combined, including only studies which have more than five patients.

Table 2.1

Summary of the effect of cognitive behavioural treatment on bingeing and vomiting

	N	Pre to post treatment				Follow-up	
		% reduction		% abstinent*		% abstinent*	
		B	V	B	V	B	V
All studies	26 ¹	81.7	72.2	38.0	34.3	45.2	44.3
Individual treatment	9	88.1	81.7	49.2	50.5	41.7	47.5
Group treatment	18	78.8	69.0	35.8	31.2	46.9	41.2
Group treatment							
- advertisement	7	71.5	68.2	30.7	26.8	46.2	50.3
- referrals	8	84.5	70.5	51.1	41.7	47.7	30.2

N = Number of studies. B = Bingeing, V = Vomiting.

*Percent abstinent refers to percent abstinent in the final week of treatment or in the week preceding follow-up assessment.

It can be seen that percentage reductions in rates of bingeing and vomiting

¹One study compared individual and group treatment

are high. However, from the abstinence rates, it can also be seen that many patients remain with some symptoms at the end of treatment, and at follow-up, even though the severity of their disorder has been reduced. Results for individual and group treatment are shown separately. Group therapy seems to be less effective than individual therapy in reducing episodes of bingeing and vomiting and in producing abstinence at the end of treatment but these differences have disappeared by follow-up. However, many studies of group therapy have recruited their subjects using advertisements whereas those of individual therapy have tended to rely on referrals from clinical sources. This means that those treated in groups may be less severely ill and so the figures presented here may overestimate the efficacy of group treatment for clinical referrals. Although there are only a few studies with which to make the comparison, studies in which clinical referrals have been treated in groups suggest that while the outcome at the end of treatment for bingeing and vomiting may be as good as, or better than, outcome for those recruited through advertisement, this is not true for vomiting at follow-up. Figures at the bottom of Table 2.1 give group therapy details for clinical referrals and for those recruited through advertisement. Those recruited through advertisements appear to continue to improve while clinical referrals just maintain or lose the gains they have made. Clinical referrals also tend to have been treated more intensively and for longer periods of time. Finally, drop out rates are higher and initial acceptability less for group treatment than for individual therapy.

Conclusion. In so far as cognitive behavioural treatments are effective treatments for eating disorders and may have a specific beneficial effect on patients' characteristic cognitive concerns, they provide one source of evidence for the importance of cognitive aspects of eating disorders without

telling us precisely what these are. However, as Fairburn points out (Fairburn, 1988), while cognitive behaviour therapy is promising it is not a panacea for bulimia nervosa and there appears to have been surprisingly little interest in applying cognitive behavioural techniques to the treatment of anorexia nervosa. The results of treatment in both disorders suggest that there is considerable scope for improvement. How might this be achieved? From the brief descriptions in research papers and the use of widely differing terminology it is difficult to be certain exactly what aspects of the cognitive disturbance have been targeted in therapy. Different studies appear to have focused on different aspects. For example, some appear to have restricted their use of cognitive techniques to concerns about eating, weight and shape, e.g. Welch (1979), Fairburn et al. (1986b), while others have also attempted to alter distorted cognitions in other areas of patients' lives, e.g. Stevens & Salisbury (1984), Yates & Sambrailo (1984). Some studies have clearly addressed attitudes or underlying assumptions as well as self-statements or automatic thoughts, e.g. Lee & Rush (1986), Fairburn et al. (1991a), while others appear to have confined their interventions to self-statements, e.g. Leitenberg et al. (1988); Agras et al. (1989), which do not necessarily contain explicit information about underlying assumptions. Further research into the cognitive disturbance in eating disorders should help to clarify which levels of functioning and which aspects of content (at the level of self-statements and attitudes) and information processing are disturbed and which, therefore, it might be useful to address in treatment. This will help to develop and refine the application of cognitive behaviour therapy to bulimia nervosa and will, hopefully, facilitate its extension to the treatment of anorexia nervosa.

A few research studies have used techniques other than clinical observation and anecdotal reports to assess aspects of the cognitive

disturbance in eating disorders. These studies provide the third source of evidence for the existence and importance of a cognitive disturbance in eating disorders. The information which they have provided and the strengths and weaknesses of the techniques used will be considered below.

2.4 **Assessment of the cognitive disturbance in anorexia nervosa and bulimia nervosa**

2.41 Experimental work derived from Bruch's theory

Bruch's description of perceptual and conceptual disturbances in anorexia nervosa has inspired some experimental work. This has sought to measure cognitive disturbances in two main areas, body image and interoception. However, the studies have only measured cognition indirectly. Although they have generally included some comparison groups, the evidence they have provided fails to answer the question of direction of causality. Only one group of researchers inspired by Bruch's descriptions has made an attempt to measure cognitions (attitudes) directly. They used Kelly's Repertory Grid technique (Crisp & Fransella, 1972; Ben-Tovim, Hunter & Crisp, 1977). Their work lacks comparison groups although their method has been used to demonstrate how attitudes change with treatment. The importance of Bruch's work lies mainly in the inspiration which her detailed clinical reports of disturbed attitudes and beliefs in patients with eating disorders gave to those interested in cognitive aspects of these disorders.

2.42 Evidence from studies inspired by cognitive behavioural theories

More recently research has been inspired by theories of eating disorders based on Beck's analysis of cognition. Most of the evidence for the cognitive disturbance described by the models proposed comes from

questionnaire data although there is also evidence from self-monitoring and semi-structured interviews.

Self-monitoring

One study has used self-monitoring to collect information on cognitions in patients with anorexia nervosa (Larson & Johnson, 1981). This study used the Experience Sampling Technique, developed by Csikszentmihalyi, Larson & Prescott (1977), to record information on experience in daily living, including thoughts, in two patients with anorexia nervosa. The technique uses random signals to cue subjects to record their thoughts. The study compared the patients with normal female controls. It found some evidence for an abnormal preoccupation with food in one subject while in the other self-control appeared to be the predominant preoccupation. Being an immediate report it is more likely to be accurate than a retrospective report but it only provides a partial record and may not capture features of interest, especially if these are infrequent. Negative reactions have also been reported in which the signal becomes the discriminative stimulus for the undesirable thoughts (Hurlburt & Sipprelle, 1978).

Semi-structured interviews

One group of researchers has developed a standardised assessment procedure, a semi-structured interview, to measure disturbed attitudes to shape and weight, amongst other features, in eating disorders (Cooper & Fairburn, 1987). The measure, the Eating Disorder Examination (EDE), provides a means of comparing groups. It uses a standardised, reliable coding system. It allows more detailed examination of what are complex attitudes and beliefs than a structured self-report questionnaire, in which items may not be interpreted in the same way by all subjects. However, it is still likely to be reactive, the questions asked may determine the replies received, and it may miss features of interest which are not covered by the

questions asked. Discriminant validity has been established by administering the interview to 100 patients with eating disorders and to 42 controls selected for the absence of a history of an eating problem. (Cooper, Cooper & Fairburn, 1989). Items covering attitudes to shape and weight discriminated well between the two groups. Wilson & Smith (1989) also found that items discriminated well between patients with an eating disorder and a group of restrained eaters. In this study the two groups differed on all subscales, except for the restraint subscale.

Self-report questionnaires

Self-report questionnaires have been used to measure cognitive aspects of general and specific psychopathology. Most studies have been conducted using patients with bulimia nervosa rather than anorexia nervosa. Studies concerned with general psychopathology will be considered first.

Measures of general psychopathology. Most of these studies have examined the presence of the type of cognitive disturbance found in depression or common to all psychiatric problems. Two studies have investigated self-statements (Franko, Zuroff & Rosenthal, 1986; Schlesier-Carter, Hamilton, O'Neil, Lydiard & Malcolm, 1989), four have looked at disturbed styles of reasoning (Fremouw & Heyneman, 1983; Ruderman, 1986; Goebel, Spalthoff, Schulze & Florin, 1989; Schlesier-Carter et al., 1989) and a further seven have studied underlying assumptions, beliefs or attitudes (Katzman & Wolchik, 1984; Ruderman, 1986; Schulman, Kinder, Powers, Prange & Gleghorn, 1986; Butterfield & LeClair, 1988; Goebel et al., 1989; Schlesier-Carter et al., 1989, Steiger, Goldstein, Mongrain & Van der Feen, 1990). Some studies have assessed more than one aspect.

A variety of measures have been used. The Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980) has been used to assess negative self-statements characteristic of depression (Franko et al., 1986; Schlesier-

Carter et al., 1989). The Attributional Style Questionnaire (ASQ; Peterson, Semmel, von Baeyer, Abramson, Metalsky & Seligman, 1982) has been used in two studies to assess disturbed styles of reasoning typically found in depressed patients (Goebel et al., 1989; Schlesier-Carter et al., 1989) while Ruderman (1986) used the Cognitive Bias Questionnaire (CBQ; Krantz & Hammen, 1979), also a measure of depressive type distortions in reasoning. A general tendency towards dichotomous reasoning was evaluated by Fremouw & Heyneman (1983) using the Semantic Differential method. Three studies have used the Dysfunctional Attitude Scale (DAS; Weissman, 1980) to assess underlying assumptions characteristic of depression (Goebel et al., 1989; Schlesier-Carter et al., 1989; Steiger et al., 1990) and beliefs and attitudes typical of general psychopathology have been assessed using subscales of the Irrational Beliefs Test (IBT; Jones, 1968) in two studies (Katzman & Wolchik, 1984; Schulman et al., 1986), using the Common Beliefs Survey III (CBS III; Bessai, 1977) in one study (Butterfield & LeClair, 1988) and the Rational Beliefs Inventory (RBI; Shorkey & Whiteman, 1977) in another (Ruderman, 1986).

Conclusions. These studies invariably find high levels of cognitions characteristic of depression and general psychopathology in patients with bulimia nervosa. However, where the relationship has been examined, those measures developed to assess depressive features are related to level of depression and not to eating behaviour, at least in bulimia nervosa. While those measures developed to assess aspects of cognitive disturbance common to all psychiatric disorders appear to be related to eating behaviour, the distortions assessed are unlikely to be uniquely related to symptoms of eating disorders. No study has reported the extent to which these measures may also relate to other measures of psychopathology in these patients.

However, since other studies have found that high levels of cognitive distortions, as measured by the questionnaires described here, characterise many different types of psychiatric disorders, it seems likely that these distortions will also be related to many other symptoms typically found in patients with eating disorders, such as depression and anxiety. With respect to treatment, since cognitive behavioural treatment of eating disorders is usually accompanied by improvement in general psychopathology, including depression, it seems that it may not be necessary to tackle these distortions directly, at least in bulimia nervosa, as they will be corrected by correcting the specific distortions associated with eating, weight and shape. However, as mentioned earlier, it is not always clear to what extent depressive type cognitions as well as cognitions to do with eating, weight and shape have also been targeted in therapy.

Measures of specific psychopathology. Self-report questionnaire measures have also been used to measure cognitive aspects of the specific psychopathology of eating disorders. Eight measures have been reported in the literature. Three measure self-statements (Franko et al., 1986; Phelan, 1987; Clark, Feldman & Channon, 1989) one assesses styles of reasoning (Paine, 1982), one appears to measure a mixture of styles of reasoning and underlying assumptions or distorted attitudes (Schulman et al., 1986) and three assess distorted attitudes (ReynaMcGlone, Ollendick & Hart, 1986; Scanlon, Ollendick & Bayer, 1986; Mizes, 1988). Most of these measure aspects of the cognitive disturbance in bulimia nervosa, only one study has examined aspects of the cognitive disturbance in patients with anorexia nervosa (Clark et al., 1989).

These studies have invariably found high levels of cognitive features assumed to be specific to patients with eating disorders in those with bulimia nervosa when compared with normal controls. Where patients with

anorexia nervosa have been studied, similar findings have been obtained.

However, several methodological problems need to be mentioned.

Limitations of measures of specific psychopathology. The studies described above have all used control groups, usually normal female controls. However, they have not studied restrained eaters, those who are dieting to lose weight or those who show some symptoms of an eating disorder but who do not meet full diagnostic criteria. While the inclusion of a normal control group in these studies is an improvement on the clinical and anecdotal reports, which lack control groups, it still leaves open the possibility that the cognitive disturbance studied might not be unique to patients with eating disorders but might also be reported by other groups. Future studies must include the various relevant control groups if they are to identify aspects uniquely characteristic of those with eating disorders.

Although it is not a necessary feature of self report questionnaires, all the measures described here have been highly structured, i.e. they require endorsement of predetermined items. This means that they are economical in terms of time to complete and score and provide an easy basis for comparison across studies. However, because they are highly structured they may miss features of interest which the investigator has not thought to ask about. They may also be reactive and, as such, confirm the investigators' hypotheses. In addition, they invariably ask for retrospective reports, at least when self-statements and distorted styles of reasoning are being investigated. This means that the accuracy of the response is unclear. These three features become particularly problematic when it is realised that not one of the measures described above has been developed on the basis of empirical research. The items used have generally been derived from clinical experience, interviews with patients or knowledge of the literature. The latter is, of course, also based on clinical

experience and interviews. This means that questionnaires derived from these sources not only have their own problems but that they have inherited the problems associated with the use of clinical and anecdotal sources as evidence for the existence and importance of a cognitive disturbance.

One study used an alternative source of data (Phelan, 1987), thoughts diaries kept by patients with bulimia. However, self-monitoring also has problems when used as a source of evidence for a cognitive disturbance. In practice, most recording is probably retrospective and, although widely used in clinical practice, the reliability and validity of the technique is unknown (Hollon & Kendall, 1981). Many of the problems encountered in behavioural self-monitoring are probably equally applicable to cognitive self-monitoring (Nelson, 1977). For example, report will be affected by the salience of the target, the number of competing thoughts and the salience of the monitoring system. Subjects also need to understand the category of behaviours and thoughts which they are being asked to monitor yet it is impossible to determine the accuracy of their ability to identify certain classes of cognitions. Reactivity is likely and the particular thoughts recorded may be influenced by the instructions given. This means that relevant thoughts may be missed. Phelan's study also lacked control groups so it is not possible to determine whether the thoughts recorded are found in other groups of young women.

It should also be noted that most of the measures developed have been concerned with attitudes or underlying assumptions. Since these may not be explicitly articulated by subjects, the extent to which subjects are able to complete such questionnaires accurately is unclear. The same applies to errors in reasoning. Beliefs, attitudes and errors in reasoning may all be inferred from self-statements, as they are may be in cognitive therapy, yet there have been relatively few studies of self-statements and not one has an

empirical basis.

Two other shortcomings are also of note. With the exception of two (Clark et al., 1989; Scanlon et al., 1986), most studies have only measured frequency of cognitions and do not consider the possibility that other response dimensions, for example, duration and degree of belief, may also be important. In addition, while studies have identified the presence of distorted attitudes and dysfunctional assumptions in eating disorders, no studies have examined the direction of causality between these attitudes and the disturbance in eating behaviour.

Conclusions. Existing research work on the assessment of the cognitive disturbance in eating disorders provides a third source of evidence for the importance of this disturbance. Most evidence comes from questionnaire data. However, the evidence provided is of limited value, largely because the measures used have not been developed on the basis of empirical research and the studies have not used appropriate comparison groups.

In a relatively new area of research, such as the study of the cognitive disturbance in eating disorders, detailed, empirically collected information is needed. With respect to aspects of the cognitive disturbance that are directly accessible to self-report it would be desirable if this were achieved with relatively unstructured techniques in order to avoid problems of reactivity, i.e. using techniques with minimum instructions and few or no probe questions. It is also desirable to collect the data as soon as possible after it occurs in consciousness. Complete records of thoughts are to be preferred to partial records and appropriate comparison groups should be included to identify aspects of the cognitive disturbance uniquely characteristic of patients with eating disorders. Attention to these methodological features would ensure comprehensive and valid coverage of all

aspects of cognition likely to be of interest. If required, this information could then provide a rational basis for the development of more structured measures. With respect to aspects of the cognitive disturbance that are not readily available to self report, such as distorted styles of reasoning, an objective measure would be particularly useful since this would avoid the problems of reactivity and accuracy associated with self-report measures. Again, appropriate comparison groups need to be included.

One advantage of detailed, empirically based analyses is that they may help to identify aspects of the cognitive disturbance that discriminate between anorexia nervosa and bulimia nervosa and which, therefore, may need to be given differential emphasis in treatment. This is particularly important since existing forms of cognitive behaviour therapy for eating disorders, in which the similarity of the cognitive disturbance in the two disorders is emphasised, do not appear to be as effective in the treatment of anorexia nervosa as they are in the treatment of bulimia nervosa.

How might the kind of evidence outlined above be obtained? There are techniques available for describing and studying the cognitive disturbance which could provide this kind of empirical evidence. These techniques have been developed by experimental cognitive psychologists and some seem particularly suitable for investigating the cognitive disturbance in eating disorders although they have rarely been used for this purpose. In the study of other disorders such techniques have been used to provide information on cognitions or self-statements and on styles of reasoning or information processing. Their use in other disorders and preliminary application to eating disorders will be discussed in the last two sections of this chapter.

2.5 Paradigms used in to assess self-statements and information processing in experimental cognitive psychology

Two basic paradigms have been used by experimental cognitive psychologists to provide the type of detailed information on self-statements that is needed in a new area of research. These are thought listing and concurrent verbalisation or "thinking aloud". Experimental techniques have also been devised for assessing information processing and these avoid the difficulty of relying on subjective report of cognitive aspects that may not be readily available to self report. Studies using the techniques for assessing self-statements will now be described followed by those using techniques for assessing information processing.

2.51 Assessment of self-statements

Thought listing. In this method of assessing self-statements subjects are asked to perform a task and then list all the thoughts which they had during the task. Although instructions can be varied to suit individual needs subjects are usually asked to list all their thoughts. The technique has been used mainly by social psychologists in response to the need for direct measures of self-statements and it has been reviewed in detail by Cacioppo & Petty (1981). The technique has been used with non-clinical populations to study persuasion and attitude change (Brock, 1968; Greenwald, 1968), heterosocial anxiety (Cacioppo, Glass & Merluzzi, 1979), anxiety (Glass & Arnkoff, 1983), test anxiety (Galassi, Frierson & Siegel, 1984; Blankstein & Toner, 1989), maths anxiety (Blackwell, Galassi, Galassi & Watson, 1985) and thoughts experienced during a depressed mood induction (Ellis, Seibert & Herbert, 1990). One group of researchers has conducted a series of studies using the technique in a clinical population. This group, Last and

colleagues, used thought listing to study cognitions in patients suffering from agoraphobia with panic attacks (Last, Barlow & O'Brien, 1984a, 1984b, 1985).

The method generates data that must be broken into units for categorisation and which must then be categorised. Cacioppo & Petty (1981) suggest several different ways in which this might be achieved. Adequate reliability for breaking up the data into units and for categorisation must also be obtained. The studies mentioned above indicate that this is possible. Compared with more structured measures the technique is very time consuming for the investigator. However, the method avoids some of the problems of other techniques. One advantage is that subjects can be asked to list all their thoughts. This reduces the possibility of reactivity, which is associated with the other measures described. It also increases the possibility of discovering relevant thoughts that might not be included amongst the questions asked in an interview or on a self-report questionnaire. This is particularly useful when investigating a new field. However, as with these other measures, thoughts are still obtained retrospectively, after the task has been completed. Thus the extent to which they are an accurate reflection of the thoughts actually experienced is unknown. One study, Blackwell, Galassi, Galassi & Watson (1985), has attempted to address this issue by comparing thought listing with concurrent verbalisation, a method which collects information on thoughts at the time they occur. It was found that the two methods did not produce exactly the same results.

Concurrent verbalisation or "thinking aloud". This technique usually requires subjects to verbalize all their thoughts during a particular task or over a certain period of time during ordinary activity. The thoughts collected are recorded on audiotape. Like thought listing it has been

largely used by social psychologists. It has been used to investigate problem solving (Gagné & Smith, 1962; Dansereau & Gregg, 1966; Gilhooly & Gregory, 1989), creativity (Goor & Sommerfield, 1975), thoughts in everyday life (Klinger, 1974) and the possible sources of influence on them (Pope, 1978). Last and colleagues have also used the method, together with thought listing, to investigate cognitions in agoraphobics with panic attacks (Last, Barlow & O'Brien, 1984a, 1984b, 1985; Last, O'Brien & Barlow, 1985).

The method usually generates more data than thought listing and considerably more than structured assessment measures. As with thought listing the data need to be broken up into units and these units must then be categorised. Genest & Turk (1981) suggest ways in which this might be achieved. Adequate reliability for breaking the data into units and for categorisation needs to be obtained. The studies mentioned above suggest that this is possible. Like thought listing, concurrent verbalisation is time consuming for the investigator when compared with more structured techniques. However, it has several advantages. As with thought listing subjects can be asked to report all thoughts, thus minimising problems of reactivity and inadequate sampling of thoughts. However, unlike thought listing, self-statements are collected soon after the thoughts occur. This means that the thoughts obtained are more likely to be an accurate representation of the thoughts that were actually experienced. In addition, since concurrent verbalisation provides a continuous record, it is likely to provide a more complete record of all relevant thoughts than thought listing.

How reliable and valid are verbal reports as data? Some investigators have doubted whether verbal reports can be assessed with any reliability or validity. Watson (1913), for example, considered it irrelevant to obtain data on covert processes. Nisbett and colleagues argue that covert data are misleading as well as irrelevant (Nisbett & Wilson, 1977; Nisbett & Bellows,

1977; Wilson & Nisbett, 1978). However, as Ericsson & Simon (1981) point out, Nisbett and colleagues confuse knowledge of causes with access to cognitions as 'private facts', or subjects' ability to report accurately on their focus of attention. Ericsson & Simon (1981) note that most of the evidence Nisbett cites to support his case is trivial and it seems that we must assume that people have unique access to some data. If this is true, then the only useful question that remains to be asked is how far do subjects' self report of covert data reflect what actually happens in the real situation. Ericsson & Simon (1981) outline three conditions which must be fulfilled to ensure maximum reliability and validity when verbal reports are used as data. These are minimum time lapse after the cognitive event has occurred, minimum probe (to reduce the likelihood of inferential processes) and request for subjects to report cognitive experiences rather than motives. Concurrent verbalisation fulfils these three conditions.

2.52 Assessment of information processing

Measures of information processing developed by experimental cognitive psychologists have been used to increase understanding of the cognitive disturbance in depression and anxiety. (See, for example, Teasdale 1983, 1985; Mathews & MacLeod, 1985, 1986; Mathews, Mogg, May & Eysenck, 1989). It seems likely that such measures will also be useful for improving our understanding of the cognitive disturbance in eating disorders.

One measure that has been used by several investigators to study information processing in clinical populations is the Stroop colour-naming task (Stroop, 1935). In the original version of this task subjects are required to name the colour of the ink in which an item is printed while ignoring the item itself. Colour-naming is impaired when the items are the names of colours rather than rows of Xs, presumably because subjects allocate

some of their attention to the names of the colours. Subsequent studies have shown that interference with colour-naming occurs when other words are used as stimuli, for example, if the words to be colour-named are related to colours (Scheibe, Shaver & Carrier, 1967) or if they are common rather than rare words (Klein, 1964). Based on Klein's adaptation of the original version (Klein, 1964), this task has been used to demonstrate that people are slower to colour-name words related to current cognitive and/or emotional states. For example, Watts and colleagues found that people with spider phobias were slower to colour-name words related to spiders than were matched control subjects (Watts, McKenna, Sharrock & Trezise, 1986). Similar findings, presumably demonstrating interference of cognitive or emotionally relevant stimuli with colour-naming, have emerged from studies of generalised anxiety disorder (Mathews & MacLeod, 1985), depression (Gotlib & McCann, 1984), post traumatic stress disorder (McNally, Kaspi, Riemann & Zeitlin, 1990) and those who have attempted suicide (Williams & Broadbent, 1986). Studies conducted with non-clinical populations suggest that interference with colour-naming may occur in patients because their concerns act as a natural priming task. In a series of studies Warren (1972, 1974) showed that interference with colour-naming occurs if the word to be colour-named has previously been presented to subjects in a priming task. Subjects are also slower if the word comes from the same semantic category or if it is strongly associated with the word to be colour-named in some meaningful way. These findings suggest that the Stroop colour-naming task may be a useful measure of the extent to which subjects allocate processing resources to, i.e. selectively process, information related to their current cognitive and/or emotional concerns.

The Stroop colour-naming task also has the advantage of being easy to use and economical in terms of equipment needed. It provides an objective

measure of one aspect of cognitive disturbance, selective information processing, that is not easily available to self-report. Because it is an objective measure it is less likely to be reactive and more likely to give an accurate reflection of reality than self-report measures.

2.6 The use of concurrent verbalisation and the Stroop colour-naming task in patients with eating disorders

There has been little interest in applying techniques from experimental cognitive psychology to eating disorders or, indeed, to the study of eating behaviour. A survey of the literature on eating behaviour revealed only one study which has used concurrent verbalisation and none which has used thought listing. The study using concurrent verbalisation was published after the studies described in this thesis were begun. A survey of the eating disorders literature also uncovered only one (unpublished) study which has used the full version of concurrent verbalisation to investigate self-statements in patients with eating disorders and none which has used thought listing. However, it did find a series of studies by a group of researchers which used an abbreviated version of concurrent verbalisation in patients with bulimia nervosa. All but one of these studies was published after the current research was started. Since the research here was begun there has been one study using the Stroop colour-naming task to investigate selective processing in normal, fasting subjects. There have been three studies using the Stroop colour-naming task in patients with eating disorders. The results of only one of these were available when the studies reported here were begun.

2.61 Concurrent verbalisation

Jansen, Merckelbach, Osterlaan, Tuiten & Van den Hout (1988) studied self-statements in restrained eaters. Restrained and unrestrained subjects spoke their thoughts aloud while tasting and rating ice cream in one of two conditions, with or without a milkshake preload. As predicted, restrained eaters failed to regulate their food intake after a preload while unrestrained eaters succeeded. However, contrary to predictions, restrained eaters who received a preload did not report more disinhibitive self-statements than restrained eaters who did not receive a preload. Data were obtained only for one response dimension, frequency of thoughts, and no information was provided on how the thoughts were divided up into units for categorisation or on the reliability of the method used. However, the study did find that disinhibitive self-statements could not be reliably categorised. Another problem with the study is that the category of disinhibitive self-statements also contained other types of self-statements. This may have masked real differences between the groups in disinhibitive self-statements and it may also have contributed to some of the low inter-rater reliability ratings.

Cooper (1984) investigated self-statements in patients with anorexia nervosa, patients with major depression and normal controls. Self-statements were collected during a meal and were categorised along four dimensions, type of thought, valence, reference and reality. The study found that thoughts could be reliably broken up into units and reliably categorised along all four dimensions. Numbers in each group were small but differences between the patients with anorexia nervosa and the normal controls were observed as well as between the two patient groups. Although patients with anorexia nervosa were compared with patients with major depression, they were not compared with dieters and data were collected only on the frequency of

thoughts.

Leitenberg and Rosen's research team have used an abbreviated version of concurrent verbalisation to collect information on self-statements during test meals. These meals were designed to assess the quantity of food that patients with bulimia nervosa could comfortably eat without vomiting. This group have used their version of concurrent verbalisation in a number of studies, although some of the studies appear to refer to the same subjects (Leitenberg, Gross, Peterson & Rosen, 1984; Rosen, Leitenberg, Gross & Willmuth, 1985; Rosen, Leitenberg, Fondacaro, Gross & Willmuth, 1985; Gross, Rosen, Leitenberg & Willmuth, 1986; Leitenberg, Rosen, Gross, Nudelman & Vara, 1988). During the thinking aloud period subjects were instructed to say out loud everything that they were thinking. No information has been provided on how the data were broken up into units for coding or on the reliability of the method used. In all the studies data were coded into positive, negative and neutral food related thoughts and positive, negative and neutral non-food related thoughts and only frequency of thoughts was assessed. It was reported that the thoughts could be reliably coded into these categories. These investigators were not primarily interested in identifying thoughts that characterise patients with eating disorders when compared with other relevant comparison groups but simply in using the technique as an assessment tool to see how thoughts change with treatment. It is not clear, therefore, whether or not the thoughts they have identified would also be found in other groups of women such as dieters. All their studies have used the same procedure with the data being collected only for two minutes every six minutes during the meal. This means that it only provides a partial record of all the possible thoughts that subjects might have experienced. From their reports, it also appears that eating and thinking was interrupted while "thinking aloud" took place, thus self-

statements were not obtained while the subjects were actually eating. These two departures from standard practice, using a limited sampling period and interrupting subjects during the task, mean that thoughts relevant to the distinction between patients with eating disorders and other comparison groups may well have been missed.

Conclusion. The cognitive content uniquely characteristic of patients with anorexia nervosa or bulimia nervosa has not been adequately studied using detailed, empirically based techniques designed to reduce the problems of reactivity and inadequate sampling of thoughts which are associated with existing measures.

2.62 The Stroop colour-naming task

Three studies have adapted the Stroop colour-naming task for use with patients with eating disorders. Channon and colleagues (Channon, Helmsley & de Silva, 1988) devised two versions of the Stroop task. One was composed of words related to food and the other was composed of words related to body size. Compared to matched female control subjects, they found that patients with anorexia nervosa were slower to colour-name words related to food, but not slower to colour-name words related to body size. Using the same words they also found that a group of normal fasting subjects, compared with a group of non-fasting subjects, were slower to colour-name words related to food but not words related to body size. Ben-Tovim and colleagues (Ben-Tovim, Walker, Fok & Yap, 1989) also devised two versions, one using words related to food and one using words related to shape. The words used were different from those used by Channon and colleagues, and these investigators included patients with bulimia nervosa as well as patients with anorexia nervosa. They reported that, compared to age-matched female controls, both

groups were slower to colour-name food words but only the bulimia nervosa patients were slower to colour-name shape words. However, their results are difficult to interpret because the data analysis relied on separate one-way analyses of variance for each card, i.e. set of stimuli. This makes it impossible to determine whether the cards, group or their interaction are the source of the differences found.

A third study has been conducted in our laboratory (Fairburn, Cooper, Cooper, Anastasiades & McKenna, 1991). This compared three groups of subjects, patients with bulimia nervosa, female controls and male controls. Two comparisons were made, one comparing the bulimia nervosa patients with the female controls, and one comparing the female controls with the male controls. It was found that the patients with bulimia nervosa were slower than the female control subjects to colour-name words related to eating, weight and shape, but that the male controls were no slower than female controls. These findings suggest that interference with colour-naming may be restricted to those with an eating disorder of clinical severity. However, other relevant comparison groups, such as women who are dieting, were not included in the study. More importantly, this finding needs to be replicated with an improved methodology since, as in Channon and colleagues' study, the cards used for the colour-naming tasks were presented in the same fixed order with each subject colour-naming the target card last, i.e. the card with the stimuli related to eating, weight and shape. This design was chosen because it seemed possible that subjects might get better at colour-naming with practice. Were this to be the case, this order of presentation would provide a stringent test of the hypothesis that patients with bulimia nervosa would be slower than female controls to colour-name the words on the target card. However, as noted, it is possible that certain subjects, particularly the patient group, might tire and be less able to concentrate by the time that

they reach the third card and that this, rather than selective processing, could account for their relative difficulty colour-naming the target card. To eliminate this explanation for the findings it is necessary to counterbalance the order in which the cards are presented.

Conclusion. Three studies have been conducted using the Stroop colour-naming task to assess information processing in patients with eating disorders. In one the results are difficult to interpret because of the method used to analyse the data and the other two suffer from a methodological flaw. The findings suggest that patients with bulimia nervosa selectively process information related to eating, weight and shape although further research is clearly necessary to confirm that the same results are obtained when these flaws are removed.

2.7

Conclusion

This review of the literature has examined evidence for the existence and importance of a cognitive disturbance in anorexia nervosa and bulimia nervosa. Evidence from three sources has been presented.

Firstly, evidence from clinical observations and anecdotal reports suggests that there is a characteristic and important cognitive disturbance in eating disorders. These observations and reports have encouraged the development of cognitive theories of eating disorders which assign beliefs and attitudes a causal role in the maintenance and/or development of the disordered behaviour seen. The theories highlight the importance of three aspects, (1) self-statements or thoughts, (2) dysfunctional styles of reasoning or disturbance in information processing and (3) the existence of underlying assumptions, attitudes, identity structures or rules. However,

these theories remain untested and without an adequate empirical basis.

Secondly, recent years have seen considerable interest in cognitive behavioural treatments for eating disorders. In so far as they are effective treatments and may have a beneficial effect on patients' characteristic cognitive concerns they provide some support for the importance of a cognitive disturbance in these disorders. However, these studies do not indicate precisely what levels of functioning, i.e. which aspects of cognitive content (at the level of self-statements and attitudes) and of information processing are disturbed and which, therefore it might be useful to address in treatment.

Thirdly, research studies have begun to appear which attempt to assess the general and specific cognitive disturbance in eating disorders. They also provide some evidence for the existence and importance of a characteristic cognitive disturbance. However, most of the measures which have been devised have not been developed on the basis of empirical research and most of the studies do not include appropriate comparison groups. Nearly all the measures are highly structured and ask for retrospective reports. This means that they may be reactive, inaccurate and miss aspects of interest. Only one study has considered response dimensions other than frequency of response and none have examined the causal relationship assumed by cognitive theories to link attitudes and the disturbance in eating behaviour.

Thus, although there is some evidence for the existence and importance of a characteristic cognitive disturbance in eating disorders and recent years have seen increasing interest in cognitive theories and cognitive behavioural treatments for bulimia nervosa and anorexia nervosa, there is little empirical or experimental work on the precise nature of the disturbance implied by the theories.

It has been suggested that, with respect to those aspects of the cognitive disturbance that are directly accessible to self-report, it is most useful to obtain this information using relatively unstructured techniques that avoid problems of reactivity, and that it is better to collect information on cognitions as soon as possible after they occur in consciousness. With respect to cognitive aspects that may not be readily available to self-report, such as disturbed information processing, it has been suggested that an objective measure would be particularly useful. This would avoid some of the problems of reactivity and accuracy associated with highly structured self-report measures.

This review has also discussed some of the techniques which have been developed by experimental cognitive psychologists for investigating cognition in non-clinical populations and which appear to be particularly suitable for collecting empirical information on the nature of the cognitive disturbance in a clinical populations. Methods for investigate self-statements and information processing have been discussed together with their preliminary application to the study of eating behaviour and eating disorders.

The aim of the studies to be reported in this thesis is to apply a carefully selected set of techniques developed by experimental psychologists to patients with eating disorders, using appropriate comparison groups, in order to investigate self-statements (Chapter 3), information processing (Chapters 4 to 8) and the causal relationship between attitudes and eating behaviour implied by cognitive theories of eating disorders (Chapter 9). The findings should increase our understanding of the nature of the cognitive disturbance implied by the theories. If so, they may have implications for the development of more effective treatments. This point will be taken up in the final discussion (Chapter 10).

Chapter 3

A study of thoughts about eating, weight and shape in patients with anorexia nervosa, patients with bulimia nervosa, two groups of dieters and one group of non-dieting female controls

3.1 Introduction

3.11 Context

As described in the previous chapter evidence from several sources suggests that cognitive aspects of anorexia nervosa and bulimia nervosa are important. Recent years have seen an increasing interest in cognitive theories and cognitive behavioural treatments for eating disorders. Cognitive behavioural treatments appear to be effective for bulimia nervosa but there is little empirical work investigating the nature of the cognitive disturbance implied by the theories. The main aim of this thesis, therefore, is to provide a detailed empirical investigation of the cognitive disturbance. This involves studying several different levels of the cognitive disturbance using methodology derived from experimental cognitive psychology. Attempts are also made to identify the relationship between these cognitive disturbances and behaviour. The investigation of different levels of the cognitive disturbance is characterised by three main themes, examination of disturbances in cognition at the level of self-statements, in information processing and in underlying beliefs. This study takes up the first theme by examining the content and specificity of self-statements in patients with anorexia nervosa and bulimia nervosa.

3.12 Aim

The main aim of the study was to provide a detailed, empirically based

description of the content of cognitive concerns characteristic of patients with eating disorders. Because the thoughts of patients with eating disorders could also be typical of women who are dieting two groups of dieters were included in the study. Since there is no agreement on the best method to use to collect data on thoughts one of the most popular methods was used together with a technique developed by experimental cognitive psychologists which seemed particularly suitable for exploring self-statements in a relatively new field of research.

3.13 Overview

The study to be reported here made use of two very different techniques for assessing thoughts. One is known as concurrent verbalisation or "thinking aloud". The other was a self-report questionnaire devised especially for this study. As discussed in the literature review in Chapter 2, both have their advantages and disadvantages. Ecological validity was maintained by collecting the concurrent verbalisation data during three tasks designed to represent three situations commonly encountered in the lives of patients with eating disorders and by collecting the questionnaire data immediately after the tasks had been completed. The situations were chosen to elicit cognitions most relevant to patients with eating disorders. Two different methods of categorising the concurrent verbalisation data were used to provide a detailed description of the content of subjects' concerns. One of the methods permitted comparison of the two techniques used to collect the data.

3.14 Predictions

Since cognitive theorists argue that thoughts concerned with eating, weight and shape have a causal role in eating disorders it was predicted that

these thoughts would differentiate the groups. It was predicted that the patients with anorexia nervosa and bulimia nervosa would have more of these thoughts than the non-dieting controls and that the two groups of dieters would occupy an intermediate position, sharing some of the same thoughts as the patients with eating disorders and some with the non-dieting controls. It was predicted that these differences would be present in both the "thinking aloud" data and on the self-report questionnaire.

3.2 Method

3.21 Design

Five groups of subjects were investigated, two groups of patients, two groups of dieters and a non-dieting control group. All subjects were female. Each subject completed three tasks. These were weighing themselves, eating an "After Eight" mint and looking at themselves in a full-length mirror.

3.22 Subjects

Patients with anorexia nervosa. These were 12 patients who fulfilled DSM-III-R criteria for anorexia nervosa (American Psychiatric Association, 1987). Details of these criteria can be seen in Appendix 1. Nine had been referred for the treatment of anorexia nervosa and were recruited through their therapist. Three were recruited through a local self-help group for eating disorders. Seven were receiving treatment in hospital at the time they took part in the study.

Patients with bulimia nervosa. These were 12 patients who fulfilled DSM-III-R criteria for bulimia nervosa (American Psychiatric Association, 1987). Details of the criteria used can be found in Appendix 1. In addition patients also fulfilled a strict operational definition of bulimia nervosa

based on these criteria (Fairburn, 1987). All had been referred for the treatment of bulimia nervosa and were recruited through their therapist. All were outpatients at the time they took part in the study.

Normal dieters. These subjects were 12 volunteers who fulfilled a strict operational definition of dieting. They were recruited by placing posters on a local Polytechnic campus and in University departments and colleges asking for female volunteers, under the age of 35, who had been making an attempt to lose weight for at least four weeks. They were invited to take part in a study investigating "thoughts about eating, weight and shape". No reference was made to eating disorders. The age limit was specified in order to obtain a group similar in age to the two patient groups. To be included in this group the volunteers had to have been making a serious attempt to lose weight over the preceding four weeks. The diet followed and their success in adhering to it were irrelevant, provided a serious attempt to lose weight had been made. A serious attempt was defined as following a standard reducing diet and/or the setting of definite and rigid rules such as a definite calorie limit, preset quantities of food or rules about what should be eaten. Details of these criteria can be found in Appendix 1. Subjects were excluded if they had a psychiatric history or if they had ever met DSM-III-R criteria for anorexia nervosa or bulimia nervosa. They were also excluded if they had shown any behavioural symptoms of either eating disorder, i.e. objective episodes of binge-eating, actual or attempted self-induced vomiting to lose weight, weight below the 85% mean population matched weight recommended by DSM-III-R when diagnosing anorexia nervosa.

Symptomatic dieters. These were 12 volunteers who fulfilled exactly the same criteria for inclusion as the normal dieters but who, in addition, had either currently or in the past experienced behavioural symptoms of anorexia nervosa and/or bulimia nervosa as described above, i.e. objective episodes of binge-

eating, actual or attempted self-induced vomiting to lose weight, weight below the 85% mean population matched weight recommended by DSM-III-R when diagnosing anorexia nervosa. Details of the criteria used can be found in Appendix 1. As in the normal diet group subjects were excluded if they had ever met DSM-III-R criteria for a diagnosis of anorexia nervosa or bulimia nervosa or if they had ever received treatment for a psychiatric disorder. Subjects were recruited using the same procedure as that used to recruit the normal diet group. Subjects in the two diet groups were allocated to the appropriate group after details of their eating and dieting behaviour had been recorded. Reliability of this allocation was determined by asking an independent judge to assign the 24 subjects to two groups. Detailed criteria were provided together with brief descriptions of each subjects' eating history. Complete agreement was reached in all 24 cases.

Normal controls. These were 12 volunteers who had not been attempting to lose weight over the previous four weeks. They were recruited by placing posters asking for female volunteers under the age of 35, who had not been attempting to lose weight during the previous four weeks, to take part in a study investigating "thoughts about eating, weight and shape". No reference was made to eating disorders. Details of the criteria used can be seen in Appendix 1. Subjects were excluded if they had ever met DSM-III-R criteria for anorexia nervosa or bulimia nervosa or if they had received treatment for any other psychiatric disorder. They were also excluded if they reported any of the behavioural symptoms of an eating disorder described above.

3.23 Measures

Information was obtained on demographic and background features, including age, years in full-time education, weight and height. Each subject was assessed using the Eating Disorder Examination (EDE; Cooper & Fairburn,

1987), a semi-structured interview measure of the specific psychopathology of eating disorders. A report of the reliability of coding this measure can be found in Appendix 2. Five subscales may be derived from the EDE. These are Restraint, Bulimia, Eating Concern, Shape Concern and Weight Concern.

In addition subjects completed the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979), a self-report measure of the symptoms of eating disorders; the Eating Disorder Inventory (EDI; Garner, Olmsted & Polivy, 1983; Garner, Polivy & Olmsted, 1983), which has eight subscales, Drive for Thinness, Bulimia, Body Dissatisfaction, Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness and Maturity Fears, and is a measure of behavioural and attitudinal dimensions of eating disorders; and the Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper & Fairburn, 1987), a measure of behavioural and attitudinal dimensions of body weight and shape. Subjects also completed the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965), a global measure of self-esteem; the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch & Lushene, 1970), a measure of the symptoms of anxiety; and the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock & Erbaugh, 1961), a measure of the symptoms of depression. In addition subjects' self-statements were recorded during the three separate behavioural tasks using two techniques, the concurrent verbalisation (or "thinking aloud" paradigm) and a self-report questionnaire (or Thoughts Checklist) devised specifically for the study. Further information on these techniques is provided below.

3.24 Materials

Three behavioural tasks were devised to elicit subjects' thoughts about eating, weight and shape. Subjects were asked to weigh themselves, to look at themselves in a full-length mirror and to eat an "After Eight" mint.

Two methods of collecting self-statements were used. In the first subjects were asked to verbalise all the thoughts that they had before, during and after each task. These thoughts were recorded on audiotape. In the second, subjects were asked to complete the Thoughts Checklist composed of self-statements chosen to be typical of the thoughts that patients with eating disorders might be expected to have while carrying out each of the three behavioural tasks. Self-statements for the Thoughts Checklist were taken from a pool of 133 thoughts (44 for the weighing task, 48 for the mirror task, 41 for the eating task) generated by asking two clinicians (one clinical psychologist and one psychiatrist), as well as the experimenter, to make three lists, one for each task, "of the thoughts which you think might occur to someone with an eating disorder while they are doing each of the three tasks". The three list makers were provided with brief descriptions of the three tasks and details of the instructions given to subjects. The thoughts obtained were reduced to 15 negative thoughts for the eating task and 16 each for the weighing and mirror tasks. In addition, a task-specific positive thought was added to the weighing and mirror tasks. A copy of the final questionnaire can be found in Appendix 3. The Thoughts Checklist yields several scores for the negative thoughts and, where relevant, for the positive thoughts. These are an overall score (made up of absolute frequency x duration of the thoughts), absolute frequency of thoughts, mean duration of thoughts, and a score of mean degree of belief in the thoughts.

Concurrent verbalisation

Breaking transcripts into units. The "thinking aloud" task generated a considerable amount of data which had to be broken up into units for classification. As a first step all thoughts were transcribed into running prose, with no punctuation marks (see example in Appendix 4). Then this text was broken into units, using an approach similar to that employed by Henshaw

(1978) and Davison, Robins & Johnson (1983). The aim was to abstract a series of discrete idea units. The underlying principle for defining an idea unit was that "it should be as small as possible without distorting what was assumed to be the intention of the speaker" (Davison et al., 1983, p.26.). Sentence structure, naturalistic phrasing, changes in content and pauses in ideational flow were used to determine the size of each idea unit. The reliability of this method was calculated in two different ways. An independent rater broke ten randomly selected transcripts (17% of the total) into units, two transcripts taken from each group of subjects. Mean percentage agreement between the two raters of 91.7% and 93.5% was obtained. Details of the two methods used to calculate reliability can be found in Appendix 5.

Categorizing idea units. A manual was written with detailed instructions and examples of how to code the idea units. This can be found in Appendix 6. Idea units were coded using two different methods.

(1) Immediately relevant negative and positive thoughts. In this coding each task was taken individually and the number of negative and positive thoughts directly and immediately related to each task was calculated, i.e. number of negative and positive thoughts concerned with weighing in the weighing task, number of negative and positive thoughts concerned with eating in the eating task, and number of negative and positive thoughts concerned with looking in the mirror in the mirror task. Thoughts had to be immediately relevant to the task thus excluding past associations and memories. This created six substantive categories and three neutral or unclassified categories. The six substantive categories were as follows: negative thoughts directly relevant to the eating task, positive thoughts directly relevant to the eating task, negative thoughts directly relevant to the weighing task, positive thoughts directly relevant to the weighing task,

negative thoughts directly relevant to the mirror task and positive thoughts directly relevant to the mirror task. Examples of thoughts belonging in each category are listed in the manual in Appendix 6.

(2) Content, reference and valence. Using this method thoughts in each of the three tasks were coded along three dimensions, with unclassifiable thoughts being placed in a separate category. The three dimensions were as follows: (1) Content, which was divided into two categories, one consisting of thoughts related to food, eating, weight and shape (food thoughts) and the other consisting of thoughts related to other issues (non-food thoughts). Unlike the first method, which coded immediately relevant positive and negative thoughts, categories extended beyond thoughts directly and immediately relevant to the tasks being undertaken to include memories, associations and thoughts about all food, eating, weight and shape issues. (2) Reference, which was divided into two categories, thoughts related to the self (self-referent) and thoughts referring to other issues (other-referent). (3) Valence, divided into positive thoughts, negative thoughts and neutral thoughts.

Reliability of coding was calculated separately for immediately relevant negative and positive thoughts and for content, reference and valence. The method used was the same as that employed in calculating the reliability for dividing up the transcripts into idea units. Two raters categorised the idea units. For immediately relevant negative and positive thoughts this yielded reliability (mean percentage agreement) ranging from 88.7% to 98.5%. For content, reference and valence mean percentage agreement ranged from 84.4% to 98.7%. Further details can be found in Appendix 7.

3.25 Procedure

A standard procedure was used. When recruited all subjects were asked

to participate in a study investigating thoughts about eating, weight and shape. In addition the patients were told that the study may be helpful for developing new treatments for eating disorders. The experimenter explained to all subjects that they would be asked to complete three tasks during which they would be asked to speak aloud their thoughts. They were told that they would be asked detailed information about themselves and to give their comments on various aspects of themselves such as their thoughts on looking at themselves in a full-length mirror. Permission was obtained to tape record their thoughts and they were assured that the tape recordings would be confidential. They were also told that they would be asked to complete some questionnaires. Criteria for inclusion and exclusion were established first and subjects were then assessed using the EDE. After this they completed the following self-report questionnaires, the EAT, EDI, BSQ, STAI (trait version only), BDI and RSE. Then they undertook a brief Stroop colour-naming task, the results of which will be presented in Chapter 5. Instructions were given to verbalise all thoughts that came to mind during each of the three behavioural tasks. Subjects were asked to say out loud all the thoughts that occurred to them without changing them in any way. It was explained that the thoughts might range from single words to complete sentences, that they might not necessarily make sense, that they might be about anything. Subjects were asked not to describe their thoughts or to explain them (as though they were talking to someone else or to the experimenter) but simply to say them as and when they occurred. For example, if the thoughts were concerned with a walk by the river on Sunday they were told not to say "Now I'm thinking about Sunday" but to be specific and say exactly what they were thinking, e.g. "On Sunday I went for a walk by the river". They were told that there were no right or wrong thoughts and that there was nothing in particular that the experimenter was expecting them to say. If pictures or images occurred,

instead of thoughts in the form of words, then they were asked to describe these as best as they could. It was emphasised that it was important that they say all their thoughts. Reasons why this might be difficult and why thoughts might be censored were discussed, including the artificial nature of the experimental setting, the fact that some thoughts might be personal, private, embarrassing or unpleasant, and that some might be regarded as too trivial or uninteresting to report. Subjects were told not to worry if blanks occurred when there did not seem to be any thoughts in their mind but to sit and wait until something occurred that could be verbalised. After the instructions had been explained, it was emphasised that it was important to capture all thoughts, whatever they were about.

Subjects then completed a practice task to familiarise them with "thinking aloud" and with the instructions that were to be given for each of the three main tasks. For the practice task subjects were asked to sort a set of cards, each card with the picture of a face on it, into order of age, from youngest to oldest. It was explained that the experimenter was interested in thoughts that occurred before doing the task, thoughts that occurred whilst doing the task and thoughts that occurred after completing the task. Subjects were left alone to complete the task with signals being given at two points, the first to indicate that the subject could begin sorting the cards and the second to indicate that the subject should stop sorting the cards. Thoughts were recorded on audiotape and subjects were told that they should be saying their thoughts out loud all the time that they were left alone in the room. Subjects were given 2½ minutes to do the practice task, 45 seconds before sorting the cards, 1½ minutes while sorting the cards and 45 seconds after sorting the cards. After this had been completed, subjects were asked whether they had any difficulties completing the task, i.e. in knowing when to sort the cards and when to "think aloud".

They were also asked whether they had any difficulty with "thinking aloud" itself, for example, whether there had been any thoughts, particularly negative or personal thoughts, that they had not been able to say out loud. Again, it was emphasised that all thoughts were important.

The three behavioural tasks, weighing, looking in a full-length mirror and eating an "After Eight", were then carried out. There were six possible orders in which the three tasks could be presented. To control for possible order effects two subjects in each group completed the tasks in each order. The procedure was exactly as it had been for the practice task. The task was explained, the experimenter left the room, and the subject then began to "think aloud", with thoughts being recorded on audiotape. Two signals were given, the first one for subjects to start doing the task and the second for subjects to stop doing the task. At the end of the session the experimenter came back into the room. Subjects were thus asked to "think aloud" all the time they were left alone in the room so that thoughts were obtained before, during and after completing the task. The one difference from the practice task was that subjects were given twice as long to say their thoughts out loud, i.e. 1½ minutes before the task, 2 minutes during the task and 1½ minutes after the task, a total of 5 minutes instead of 2½ minutes.

The following instructions were given for each of the three tasks.

Weighing. On hearing the signal to start the task subjects were asked to stand on a pair of weighing scales, find out exactly how much they weighed, and to remain on the scales until a signal came from the experimenter to stop. They were told to try not to look at other things in the room although their thoughts could, of course, be about anything.

Mirror. For this task subjects were asked to look carefully at themselves in a full-length mirror. They were told to start with a side view, turn slowly round to look at themselves from the front, and then to look at themselves

from the other side. They were asked to try to turn round and back at least twice. The experimenter demonstrated what was to be done. They were told to focus on themselves in the mirror and not to look at other things in the room although their thoughts could, of course, be about anything.

Eating. In this task subjects were asked to eat an "After Eight" mint.

"After Eight" mints were chosen because they are packed in small, individual envelopes and because they contain chocolate, a "forbidden food" for many patients with eating disorders and many dieters. As before, subjects were given a signal to start eating but, because people take different lengths of time to eat the same amount of food, no signal was given to stop, subjects simply carried on saying their thoughts after they had finished eating until the experimenter came back into the room. Although they were told to focus on eating, they were also told that their thoughts could be about anything.

The tasks were conducted in a small, sound-proofed room. Furniture was minimal, three chairs, two cupboards and a telephone. A heavy blind was drawn across the window to prevent subjects being distracted by events taking place outside.

After the three tasks had been completed subjects were required to think back to each task, one task at a time, with tasks in the same order as they had been performed, and imagine themselves back in that situation. They were then asked to complete the appropriate section of the Thoughts Checklist for that task before moving on to imagine themselves in the second and then the third task, again completing the appropriate section of the Checklist. After this subjects were asked to rate how typical their thoughts had been of the type of thoughts that they might usually expect to have when doing each of the tasks in everyday life. A 0 to 10 scale was used with 0 being "not at all typical" and 10 being "completely typical". Finally weight and height were measured and subjects were debriefed.

3.26 Data analysis

For immediately relevant negative and positive thoughts and for each of the three dimensions of content, reference and valence separate three-way analyses of variance (group x task x type of thought) with repeated measures on the second and third factors were performed. If there was a three-way interaction ($p < .05$) these were followed by post hoc tests to identify the sources of any interactions and main effects.

For the Thoughts Checklist separate two-way analyses of variance (group x task) with repeated measures on the second factor were performed for each of the measures derived from the Checklist. These were followed by post hoc tests to identify the source of any interactions and main effects.

Specific predictions

As implied by cognitive theories (Fairburn et al., 1986a; Garner & Bemis, 1982) in the coding of immediately relevant negative and positive thoughts it was predicted that the patients with eating disorders would have more negative thoughts and fewer positive thoughts directly related to each of the three tasks being undertaken than the non-dieting female controls and that the two dieting groups would occupy an intermediate position.

In the coding using the three dimensions of content, reference and valence it was predicted that the patients with eating disorders would have more eating, weight and shape related thoughts, more self-referent thoughts, more negative thoughts and fewer positive thoughts than the non-dieting female controls and that the two dieting groups would occupy an intermediate position.

On the self-report questionnaire it was predicted that the patients with eating disorders would have a greater overall negative score and a lower overall positive score on thoughts directly related to each of the three tasks than the non-dieting female controls and that the two dieting groups

would occupy an intermediate position. Similar predictions were made for absolute number of negative self-statements, mean duration of negative and positive self-statements and mean degree of belief in the negative and positive self-statements.

Comparing overall scores on the self-report questionnaire with scores of negative and positive thoughts directly related to each of the three tasks, it was predicted that similar, but not identical, patterns of response would be observed for each of the groups of subjects in the results collected using the two different methods.

3.3 Results

3.31 Subjects

Two subjects eligible for inclusion in the normal control group and two eligible for inclusion in the bulimia nervosa group were excluded and subsequently replaced. In the normal control group one was excluded because she ate the "After Eight" mint immediately instead of waiting for the signal. The other was excluded because no thoughts were recorded on audiotape for one task. In the bulimia nervosa group one patient was excluded because she failed to record any thoughts on audiotape for any of the tasks and the other because she failed to complete the experiment. All other subjects completed the experiment successfully and were able to record thoughts on audiotape for each of the tasks.

3.32 Demographic features

Information on age, years of full-time education, Body Mass Index (BMI) and Eating Attitude Test (EAT) scores are presented in Table 3.1. (BMI = weight in kg/(height in m)²). Scores on all measures for the five groups are

similar to those of other subject and patient series, where these have been reported in the literature.

Table 3.1
Demographic features of the five groups (means and standard deviations)

		NC	ND	SD	BN	AN	F/H ratio	p
Age (years)	X	22.0	23.5	23.0	24.0	21.9	F = 0.8	NS
	SD	2.3	4.6	3.1	4.3	3.2		
Education (years)	X	16.1 ^a	15.4 ^a	15.8 ^a	13.3 ^b	14.0 ^b	F = 6.4	<.0003
	SD	1.5	1.2	2.4	1.7	1.2		
BMI	X	21.3 ^a	24.4 ^a	23.3 ^a	24.8 ^a	15.0 ^b	H = 34.1	<.0001
	SD	2.1	1.8	3.0	5.9	1.5		
EAT	X	6.8 ^a	17.6 ^{ac}	30.8 ^{bc}	42.3 ^b	53.1 ^b	H = 41.6	<.0001
	SD	4.0	9.4	12.0	11.0	20.4		

All df for F tests= 4,55. All df for H tests = 4. N = 12 for each group.

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

BMI = Body Mass Index = weight in kg/(height in m)².

EAT = Eating Attitudes Test.

Within each measure means with different superscripts are significantly different from each other.

One-way analyses of variance were conducted to detect differences between the groups on these measures. The non-parametric Kruskal-Wallis one-way analysis of variance was used where between group variances were unequal

Table 3.10

Mean raw scores and standard deviations for the self-referent vs other-referent thoughts for each of the five groups in each of the three tasks

			NC	ND	SD	BN	AN
Weighing	- self-referent	X	30.4	30.1	38.0	30.4	33.3
		SD	21.5	14.8	20.2	14.5	17.9
	- other-referent	X	19.9	13.8	21.9	6.8	15.8
		SD	13.6	10.4	19.5	6.8	15.6
Eating	- self-referent	X	22.3	22.5	37.7	30.3	33.8
		SD	14.3	19.6	17.7	12.8	14.4
	- other-referent	X	27.7	18.3	22.8	9.3	12.2
		SD	15.7	14.9	10.1	9.0	12.2
Mirror	- self-referent	X	35.6	34.4	45.6	33.5	44.9
		SD	18.2	17.7	24.4	13.9	17.0
	- other-referent	X	16.2	12.9	12.8	6.4	7.9
		SD	11.1	7.5	7.2	4.0	8.9

N = 12 for each group.

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

When the valence dimension, composed of negative thoughts, positive thoughts and neutral thoughts, was subjected to a three-way analysis of variance (group x task x negative vs positive vs neutral thoughts), there was no main effect of group ($F(4,55) = 1.33$, NS). As before, this indicated that the groups did not differ in overall number of thoughts produced in the

three tasks. There was no main effect of task ($F(2,110) < 1$) but there was a main effect of valence ($F(8,110) = 74.84, p < .0001$) and a valence $\times$ group interaction ($F(8,110) = 6.34, p < .0001$). However, these findings were modified by a group $\times$ task $\times$ type of thought interaction ($F(16,220) = 1.73, p < .05$). Mean raw scores for the valence dimension for all five groups in each of the three tasks are shown in Table 3.11.

Table 3.11

Mean raw scores and standard deviations for the valence dimension (positive vs negative vs neutral thoughts) for each of the five groups in each of the three tasks

		NC	ND	SD	BN	AN	
Weighing	- positive	X	8.4	5.2	7.7	4.1	4.8
		SD	8.0	5.7	7.0	4.2	4.0
	- negative	X	10.3	12.7	20.6	19.6	22.5
		SD	8.2	7.0	11.5	11.1	16.0
	- neutral	X	31.2	26.2	30.8	13.6	22.7
		SD	17.0	12.6	19.3	11.6	15.8
Eating	- positive	X	11.3	5.3	11.0	6.0	5.7
		SD	5.4	8.8	11.6	5.9	10.6
	- negative	X	9.0	9.4	17.3	15.3	23.7
		SD	5.4	8.8	11.6	5.9	10.6
	- neutral	X	29.7	29.3	31.8	17.9	16.2
		SD	17.0	13.1	13.0	14.4	13.3
Mirror	- positive	X	10.7	8.8	10.3	4.8	9.9
		SD	6.8	6.0	7.7	3.4	9.8
	- negative	X	11.5	15.3	22.2	23.5	21.3
		SD	4.4	11.0	14.6	8.3	9.5
	- neutral	X	29.6	24.3	24.2	12.9	22.3
		SD	14.2	10.6	14.1	10.8	10.8

N = 12 for each group.

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

To locate the source of the interaction found, two separate two way analyses of variance (group x task) with repeated measures on the second factor were carried out, one using the negative thoughts as the dependent variable and one using the positive thoughts as the dependent variable. There were no differences between groups in overall number of thoughts so, in order to assess the extent to which the groups differed in emotional content of the thoughts, the percent negative and the percent positive scores of each group were compared (i.e. percentage of total number of thoughts in each task coded as negative and percentage of total number of thoughts coded as positive). This took into account differences between groups in the number of neutral thoughts reported in each task.

With negative thoughts as the dependent variable the two way analysis of variance yielded a main effect of group ($F(4,55) = 16.84$, $p < .0001$) and of task ($F(2,110) = 3.44$, $p < .04$). However, these main effects were modified by an interaction between group and task ($F(8,110) = 3.42$, $p < .002$). Mean percentage scores for negative thoughts for the five groups in each of the three tasks are shown in Table 3.12 below.

Table 3.12

Mean percentage scores and standard deviations for negative thoughts for each of the five groups in each of the three tasks

		NC	ND	SD	BN	AN
Weighing	X	19.7 ^a	29.0 ^{ad}	37.5 ^{bd}	56.7 ^c	46.1 ^{cd}
	SD	10.3	6.1	12.7	19.8	21.1
Eating	X	19.9 ^a	18.5 ^a	27.9 ^{ac}	44.8 ^{bc}	56.3 ^b
	SD	15.3	13.1	15.4	18.9	22.4
Mirror	X	24.0 ^a	29.7 ^{ac}	38.6 ^{ac}	61.3 ^b	41.4 ^c
	SD	9.2	15.6	11.8	15.4	16.1

N = 12 for each group.

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

Within each measure means with different superscripts are significantly different from each other.

Post hoc Tukey Honestly Significant Difference tests were used to locate the source of the interaction. As predicted, between group comparisons, taking each task separately, showed that the two patient groups had more negative thoughts in each of the three tasks than the non-dieting female controls (all p values < .01). There were no significant differences between the two dieting groups and the normal controls in most tasks and several comparisons between the two dieting groups and the two patient groups were also not significant. This suggested that, as predicted, the two dieting groups occupied a position intermediate between the normal controls

and the two patient groups. When the two dieting groups were compared with the two patient groups a pattern of results similar to that for immediately relevant negative thoughts was found, i.e. patient with bulimia nervosa had more negative thoughts in the weighing and mirror task while those with anorexia nervosa had more negative thoughts in the eating task. Patients with bulimia nervosa had a greater number of negative thoughts in all three tasks than the normal dieters (all p values $< .01$). They also had a greater number of negative thoughts than the symptomatic dieters in the weighing ($p < .05$) and mirror ($p < .01$) tasks but not in the eating task. As before, patients with anorexia nervosa showed a different pattern. Compared with the two dieting groups they had a greater number of negative thoughts only in the eating task (both p values $< .01$) and not in the weighing or mirror tasks.

In the within group comparisons a similar pattern of concerns was observed. The bulimia nervosa patients had a greater percentage of negative thoughts during the weighing task ($p < .01$) and the mirror task ($p < .05$) than during the eating task. The reverse was true for the anorexia nervosa patients. They had a greater percentage of negative thoughts in the eating task than in the mirror task ($p < .01$). The other three groups, the normal controls and the two dieting groups, did not show any significant within group differences.

With positive thoughts as the dependent variable a two-way analysis of variance (group $\times$ task) with repeated measures on the second factor was carried out. This showed a main effect of group ($F(4,55) = 3.03, p < .03$) and of task ($F(2,110) = 5.20, p < .008$) but no group $\times$ task interaction ($F(8,110) < 1$). When the main effect of group was subjected to post hoc tests, contrary to predictions, no differences were found between the normal controls and the two patient groups in percentage positive thoughts reported. Thus the non-dieting controls did not have a greater percentage of positive

thoughts than the two patient groups. Mean percentage scores for positive thoughts for all five groups in the three tasks are shown in Table 3.13.

Table 3.13

Mean percentage scores and standard deviations for positive thoughts for each of the five groups in each of the three tasks

		NC	ND	SD	BN	AN
Weighing	X	17.8	10.0	13.6	10.3	9.3
	SD	13.9	7.9	9.3	7.1	7.4
Eating	X	22.2	9.9	18.2	15.0	12.7
	SD	10.0	6.9	7.9	8.0	10.8
Mirror	X	20.3	16.5	18.8	11.9	17.1
	SD	10.3	7.7	10.0	7.9	15.5

N = 12 for each group.

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

3.35 Thoughts checklist

Four measures were obtained from the negative items on the questionnaire, an overall negative score (composed of total duration of each thought x absolute frequency), a measure of absolute frequency, a measure of mean duration of thoughts and a measure of mean degree of belief in each thought. Separate two-way analyses of variance (group x task) with repeated measures on the second factor were carried out with each of these four measures as the dependent variable. Post hoc Tukey Honestly Significant

Difference tests were used to locate sources of difference in the significant interactions found.

When overall negative score was subjected to a two-way (group x task) analysis of variance there was a main effect of group ($F(4,55) = 8.57, p < .0001$) and of task ($F(2,110) = 28.37, p < .0001$). However, these main effects were modified by a significant group x task interaction ($F(8,110) = 3.53, p < .002$). Mean overall negative scores on the Thoughts Checklist for the five groups in each of the three tasks are shown in Table 3.14.

Table 3.14

Mean overall negative scores and standard deviations on the Thoughts Checklist for each of the five groups in each of the three tasks

		NC	ND	SD	BN	AN
Weighing	X	20.0 ^a	33.3 ^{ac}	40.9 ^{bc}	49.6 ^b	36.3 ^{bc}
	SD	2.8	6.4	12.6	16.9	16.8
Eating	X	16.4 ^a	20.1 ^a	28.7 ^{ab}	36.7 ^b	35.9 ^b
	SD	1.8	4.3	8.4	18.6	15.2
Mirror	X	18.9 ^a	26.7 ^a	34.5 ^b	40.9 ^b	27.8 ^{ab}
	SD	2.5	6.5	11.8	18.6	12.1

N = 12 for each group.

NC = Normal controls, ND = Normal dieters, SD = symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

Within measures means with different superscripts are significantly different from each other.

As predicted, between group comparisons, taking each task separately, showed that the two patient groups had a higher overall negative score in most of the three tasks than the non-dieting controls. The one exception was for the comparison between the normal controls and the patients with anorexia nervosa in the mirror task. All comparisons were significant at the level $p < .01$, except for that between the normal controls and the anorexia nervosa patients in the weighing task ($p < .05$). There were few significant differences between the two dieting groups and the normal controls in most tasks and several of the comparisons between the two dieting groups and the two patient

groups were also not significant. This suggested that, as predicted, the two dieting groups appeared to occupy a position between that of the normal controls and the two patient groups. However, the results were less clear than they were for the immediately relevant negative thoughts since the symptomatic dieters showed a tendency towards a greater negative score than the patients with anorexia nervosa in the weighing and mirror tasks. When the two dieting groups were compared with the two patient groups the pattern of differences between groups was also less clear than that observed for immediately relevant negative thoughts. As before, patients with bulimia nervosa had a greater frequency of negative thoughts than the normal dieters in all three tasks (all p values $< .05$) while patients with anorexia nervosa had a greater frequency of negative thoughts only in the eating task ($p < .05$). Thus, as in the analysis of immediately relevant thoughts, overall negative score successfully distinguished the normal dieters from the two patient groups. However, comparisons between the two patient groups and the symptomatic dieters showed no significant results. Thus, unlike the measure of immediately relevant negative thoughts, overall negative score on the Thoughts Questionnaire did not discriminate between the two patient groups and those who showed some symptoms, but not a diagnosis, of an eating disorder.

Comparisons within groups produced results that were similar to those observed for immediately relevant negative thoughts. Patients with bulimia nervosa had a greater score in the weighing than in the eating task ($p < .01$) and in the weighing than in the mirror task ($p < .01$). As before, this suggested greater concern with weight than with eating. In addition, it also suggested greater concern with weight than with appearance. Patients with anorexia nervosa, however, had greater scores in the eating than in the mirror task ($p < .05$) and in the weighing than in the mirror task ($p < .05$).

As before, this suggested greater concern with eating than with appearance. In addition, it also suggested greater concern with weight than with appearance. As for immediately relevant negative thoughts, the two dieting groups showed a pattern similar to that of the patients with bulimia nervosa. They had a greater score in the weighing than in the eating task (both p values $< .01$) as well as a greater score in the mirror than in the eating task (both p values $< .05$). As before, this suggested greater concern with weight and appearance than with eating. Normal controls again showed no differences in scores obtained in each task.

Absolute number of negative thoughts was also subjected to a two-way (group $\times$ task) analysis of variance. There was a main effect of group ($F(4,55) = 13.57, p < .0001$) and of task ($F(2,110) = 17.49, p < .0001$). There was no group $\times$ task interaction ($F(8,110) = 1.25, NS$). In order to test the prediction that the two patient groups would have a greater absolute number of negative thoughts than the non-dieting controls post hoc tests were carried out on the main effect of group. As predicted, the two patient groups had a greater absolute number of negative thoughts than the non-dieting controls (both p values $< .01$). The prediction that the two dieting groups would occupy a position intermediate between the normal controls and the two patient groups was partially supported. Scores of the normal dieting group were similar to those of the normal controls and the patients with anorexia nervosa but not similar to those of the patients with bulimia nervosa. This suggested that they occupied a position intermediate between the normal controls and one group of patients, those with anorexia nervosa. Scores of the symptomatic dieters were similar to those of the two patient groups and different from those of the non-dieting controls, suggesting that they were most like the two patient groups. Thus, while absolute number of negative thoughts on the Thoughts Questionnaire, like overall negative score,

discriminated between the normal controls and the two patient groups and between the normal dieters and the patients with bulimia nervosa, it did not distinguish the normal dieters from the patients with anorexia nervosa. In addition, like overall negative score, and unlike immediately relevant negative thoughts, it did not distinguish the symptomatic dieters from either of the two patient groups. Mean scores for absolute number of negative thoughts on the Thoughts Checklist for each of the five groups on the three tasks can be seen in Table 3.15.

Table 3.15
Means and standard deviations of absolute number of negative thoughts on the Thoughts Checklist for each of the five groups in each of the three tasks

		NC	ND	SD	BN	AN
Weighing	X	2.5	6.2	9.2	11.2	7.5
	SD	1.4	1.9	3.3	3.9	4.7
Eating	X	0.9	3.2	6.6	8.8	7.0
	SD	0.9	2.0	3.1	4.6	4.2
Mirror	X	2.1	4.9	8.0	9.4	6.2
	SD	1.5	3.3	3.6	3.9	3.4

N = 12 for each group.
NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

With mean duration of negative thoughts as the dependent variable in a two-way (group x task) analysis of variance there was a main effect of group

(F (4,45) = 3.11, p < .02) and of task (F (2,90) = 10.67, p < .0001). These effects were modified by a group x task interaction (F (8,90) = 3.61, p < .003). Mean scores for mean duration of negative thoughts on the Thoughts Checklist in each of the five groups on the three tasks can be seen in Table 3.16.

Table 3.16

Means and standard deviations of mean duration of negative thoughts on the Thoughts Checklist for each of the five groups in each of the three tasks

		NC	ND	SD	BN	AN
n		7	11	11	11	10
Weighing	X	2.7 ^a	3.9 ^b	3.8 ^b	4.0 ^b	3.5 ^{ab}
	SD	0.6	0.9	0.6	0.8	1.0
Eating	X	2.5 ^a	2.6 ^a	3.0 ^{ab}	3.2 ^{ab}	4.0 ^b
	SD	0.7	0.7	0.6	1.0	1.3
Mirror	X	2.4 ^a	3.4 ^{ab}	3.2 ^{ab}	3.5 ^b	3.0 ^{ab}
	SD	0.4	1.1	0.7	1.1	0.8

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

Within each measure means with different superscripts are significantly different from each other.

The prediction that negative thoughts would last longer in the two patient groups than in the non-dieting controls, i.e. that the two patient groups would spend longer thinking about the negative thoughts than the non-dieting

controls, was partially supported. Between group comparisons showed that, in the weighing and mirror tasks, negative thoughts lasted longer in the patients with bulimia nervosa than they did in the normal controls. In the eating task, negative thoughts lasted longer in the patients with anorexia nervosa than in the normal controls (all p values $< .05$). There were few differences between the two dieting groups and the normal controls and several of the comparisons between the dieting groups and the patients groups were also not significant. This suggested that, as predicted, the scores of the two dieting groups fell between those of the normal controls and the two patient groups. When the two dieting groups were compared with the patient groups only one significant finding was observed, the patients with anorexia nervosa spent longer thinking about the negative thoughts in the eating task than the normal dieters ($p < .05$). Thus, although duration of negative thoughts in the three tasks distinguished the normal controls from the patients to some extent, it did not generally distinguish the patients from the two groups of dieters.

As with previous measures, the results from the within group comparisons suggested greater concern with weight in the patients with bulimia nervosa and greater concern with eating in the patients with anorexia nervosa. The normal controls spent similar amounts of time thinking about negative thoughts in all three tasks. However, in the patients with bulimia nervosa, negative thoughts in the weighing task lasted longer than they did in the eating task ($p < .05$). The two dieting groups again showed a pattern similar to the patients with bulimia nervosa. In the normal dieters negative thoughts lasted longer in the weighing ($p < .01$) and mirror tasks ($p < .05$) than in the eating task. In the symptomatic dieters negative thoughts in the weighing task lasted longer than negative thoughts in the eating task ($p < .05$). The reverse pattern was observed in the patients with anorexia nervosa

where negative thoughts lasted longer in the eating task than in the mirror task ($p < .01$).

When mean degree of belief in the negative thoughts was subjected to a two way (group x task) analysis of variance there was a main effect of group ($F(4,45) = 3.00, p < .03$) and of task ($F(2,90) = 4.87, p < .01$). There was no group x task interaction ($F(8,90) = 1.52, p = \text{NS}$). In order to test the prediction that the patient groups would believe more strongly in the negative thoughts reported on the questionnaire than the normal controls post hoc tests were performed on the main effect of group. No evidence was found to support this prediction. This suggested that the patients did not believe the negative thoughts to a greater degree than the normal controls. Mean scores on degree of belief in the negative thoughts on the Thoughts Checklist can be seen in Table 3.17 for each of the groups in the three tasks.

Table 3.17

Means and standard deviations of mean degree of belief in negative thoughts on the Thoughts Checklist for each of the five groups in each of the three tasks

		NC	ND	SD	BN	AN
n		7	11	11	11	10
Weighing	X	78.5	69.2	58.9	69.7	71.5
	SD	15.1	15.6	14.3	19.5	23.2
Eating	X	89.3	65.4	49.0	58.9	76.7
	SD	18.4	25.8	17.9	23.5	18.0
Mirror	X	66.2	59.4	54.1	59.6	64.8
	SD	11.3	23.5	18.3	21.4	18.5

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

Two measures were obtained from the positive thoughts on the weighing and mirror tasks. These were overall positive score (which was equivalent to mean duration of each positive thought because there was only one positive thought in each of the two tasks) and mean degree of belief in each positive thought. When overall positive score was subjected to a two way (group x task) analysis of variance there was no main effect of group ($F(4,24) = 2.43, p < .08$) or of task ($F(1,24) < 1$). There was no group x task interaction ($F(4,24) = 1.10, NS$). Thus, as for immediately relevant positive thoughts, the prediction that the normal controls would have a greater overall positive score than the two patient groups was not supported.

Mean scores for each group on overall positive score on the Thoughts Checklist in each of the three tasks can be found in Table 3.18.

Table 3.18

Means and standard deviations for overall positive score on the Thoughts Checklist for each of the five groups in each of the three tasks

		NC	ND	SD	BN	AN

n		10	5	6	3	5
Weighing	X	4.2	2.6	2.3	3.7	3.8
	SD	1.0	1.3	0.5	2.1	1.6
Mirror	X	4.3	4.0	3.2	3.0	3.4
	SD	1.3	1.0	1.2	1.7	1.7

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

When mean degree of belief in positive thoughts was subjected to a two way (group x task) analysis of variance there was a main effect of group ($F(4,24) = 3.86, p < .02$) but no main effect of task ($F(1,24) = 1.29, NS$). However, the main effect of group was modified by a group x task interaction ($F(4,24) = 4.06, p < .02$). Post hoc Tukey tests were carried out to locate the source of the interaction. When between group comparisons were made, contrary to predictions, the normal controls did not believe the positive thoughts to a greater degree than the two patient groups. Only one finding was significant. This indicated that the normal controls believed the positive weighing thought more than the normal dieters ($p < .01$). Mean

scores for mean degree of belief in each positive thought on the Thoughts Checklist can be found in Table 3.19.

Table 3.19

Means and standard deviations for mean degree of belief in positive thought on the Thoughts Checklist for each of the five groups in each of the three tasks

		NC	ND	SD	BN	AN

n		10	5	6	3	5
Weighing	X	81.0 ^a	32.0 ^b	51.7 ^{ab}	63.3 ^{ab}	46.0 ^{ab}
	SD	15.2	21.7	27.9	32.1	32.9
Mirror	X	80.0 ^a	60.0 ^a	68.3 ^a	40.0 ^a	48.0 ^a
	SD	16.3	14.1	19.4	17.3	31.1

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

Within each measure means with different superscripts are significantly different from each other.

The within group comparisons showed that all groups, except the normal dieter group, believed equally in the positive thoughts in the weighing and mirror task. The one exception was that the normal dieter group believed the positive mirror thought to a greater degree than the positive weighing thought ($p < .01$).

3.4

Discussion

In this section the aims and design of the study will be briefly restated. The results will then be summarized in the order in which they are reported in the Results section. The strengths and weaknesses of the study will be considered, followed by its implications, a conclusion and suggestions for further research.

3.41 Aims and design

This study aimed to provide a detailed, empirically-based description of the content of cognitive concerns characteristic of patients with eating disorders using a method from experimental cognitive psychology, concurrent verbalisation, with additional information being provided by a self-report questionnaire. It aimed to see how the concerns of patients with anorexia nervosa and bulimia nervosa differ from each other, from those of two groups of dieters and from non-dieting female controls and to compare the performance of concurrent verbalisation and a self-report questionnaire at measuring thoughts about subjects' concerns.

Five groups of subjects took part, patients with anorexia nervosa, patients with bulimia nervosa, two groups of dieters and one group of non-dieting female controls. Subjects performed three tasks. These were weighing themselves, looking at themselves in a full-length mirror and eating an "After Eight" mint. During the tasks information was collected on thoughts using the concurrent verbalisation method. After performing the three tasks subjects completed the self-report questionnaire which was about thoughts that they may have experienced during the three tasks.

3.42 Summary of results

Immediately relevant negative and positive thoughts

Negative thoughts - between group comparisons. This method of coding the data examined negative thoughts directly related to each of the three tasks undertaken. As predicted, the between group comparisons found that patients with eating disorders had more negative thoughts in all three tasks than the non-dieting controls. Also as predicted, the two dieting groups appeared to occupy an intermediate position between the patient groups and the non-dieting controls. In addition, patients with bulimia nervosa were distinguished from dieters, including those with some symptoms of an eating disorder, by a greater number of negative thoughts about weight and appearance. Patients with anorexia nervosa, however, were distinguished from the two dieting groups by a greater number of negative thoughts about eating.

Negative thoughts - within group comparisons. When within group comparisons were made, a similar concern with weight and appearance in the bulimia nervosa patients and with eating in the anorexia nervosa patients was observed. Comparisons showed that negative thoughts about eating were more prominent in patients with anorexia nervosa than were thoughts concerned with weight and appearance and that no other group showed this pattern. Conversely, in the bulimia nervosa group, negative thoughts about weight and appearance were more prominent. The two dieting groups showed a pattern similar to that of the patients with bulimia nervosa, with negative thoughts about appearance being more prominent than negative thoughts about eating. Normal controls showed no difference in prominence of negative thoughts across the three tasks.

Immediately relevant positive thoughts

Contrary to predictions, the non-dieting controls did not have more positive thoughts than the two patient groups.

Content - food vs nonfood thoughts

No differences were found between groups in number of food thoughts, i.e. thoughts related to food, eating, weight and shape. Thus, contrary to predictions, the two patient groups did not have more food thoughts than the non-dieting controls. This result may have been due to a ceiling effect since most of the thoughts in all groups were related to these issues. A study by Hunt & Rosen (1981) in which obese subjects monitored thoughts related to food also failed to find differences between the obese subjects and the normal controls probably because most of the thoughts were concerned with food. A preliminary study conducted by the author (Cooper, 1984) using concurrent verbalisation in patients with anorexia nervosa, patients with major depression and normal controls, with a classification system rather similar to that used here for food related thoughts, also failed to find differences between groups. In this case the result seemed unlikely to be due to a ceiling effect because approximately half of all thoughts were about food and eating, less than that observed in the current study. An alternative explanation for the failure to find differences between the groups in food related thoughts, which may apply to the current study and also to the study of Cooper (1984), is that while all subjects experience such thoughts when placed in situations concerned with eating, weight and shape what distinguishes the groups is the emotional content of the thoughts experienced. This hypothesis received some support in the study by Cooper (1984) and, as we have seen, it also receives some support in the current study.

Reference - self-referent vs other referent thoughts

No differences were found between groups for the reference dimension, i.e. self-referent vs other-referent thoughts. Thus, contrary to predictions, the two patient groups did not have more self-referent thoughts

than the non-dieting controls. This may also have been due to a ceiling effect since the majority of thoughts in all groups were self-referent rather than other-referent. However, the study mentioned above (Cooper, 1984), also classified thoughts into self and other-referent using a similar coding system. This study found clear differences between the patient and normal control groups. One possible explanation for the discrepancy between the two studies is that the tasks used were different. Both studies used an eating task but only the current study also used weighing and mirror tasks. It may be that the weighing and mirror tasks, particularly the latter, are likely to encourage more self-focused attention and thus produce more self-referent thoughts in all subjects, whereas the eating task may produce greater self-focused attention and hence more self-referent thoughts only in the patient groups. Although no significant three-way interaction was found, inspection of the data provides some support for this hypothesis. However, in the current study, it seems that we must conclude that all subjects experience a greater number of self-referent thoughts than thoughts about other issues and that what distinguishes the groups is the emotional content of the thoughts.

Valence - negative vs positive thoughts

Negative thoughts - between group comparisons. Comparisons between the groups showed that, as predicted, both patient groups had a greater number of negative thoughts in the three tasks than the non-dieting group. Again, as predicted, the two dieting groups had scores that fell between those of the patients and non-dieting controls. When comparisons were made between the two dieting groups and the two patient groups results were similar to those for immediately relevant negative thoughts. Patients with bulimia nervosa had more negative thoughts in the weighing and mirror tasks than the two dieting groups while patients with anorexia nervosa had more negative thoughts in the eating task.

Negative thoughts - within group comparisons. These results were also similar to those obtained for immediately relevant negative thoughts. Within the bulimia nervosa group negative thoughts in the weighing and mirror tasks were more prominent than negative thoughts in the eating task. The reverse pattern was found in the patients with anorexia nervosa. This group had a higher percentage of negative thoughts in the eating than in the weighing and mirror tasks. The remaining three groups had equal percentages of negative thoughts in each task.

Positive thoughts. Contrary to predictions, the non-dieting normal controls did not have a greater percentage of positive thoughts than the two patient groups.

Thoughts Checklist

On the Thoughts Checklist findings on all measures, negative and positive, were generally similar to the findings for immediately relevant negative and positive thoughts. There was, however, one important exception in the between group comparisons. Unlike the measure of immediately relevant negative thoughts, none of the measures obtained from the questionnaire distinguished the symptomatic dieters from the two patient groups. The results also suggest that response dimensions other than frequency are important.

Total negative score - between group comparisons. As predicted, the two patient groups had a greater frequency of negative thoughts in the three tasks than the non-dieting controls. Again, as predicted, the two dieting groups occupied a position inbetween the normal controls and the two patient groups. The patients with bulimia nervosa differed from the normal dieters in frequency of negative thoughts on all three tasks and from the patients with anorexia nervosa on the eating task. However, unlike the analysis of immediately negative thoughts obtained from the concurrent verbalisation

data, the questionnaire did not discriminate between the two patient groups and those dieters with some symptoms, but not a diagnosis, of an eating disorder. On all three tasks patients were similar to the symptomatic dieters.

Total negative scores - within group comparisons. Within group comparisons yielded findings similar to those of the within group comparisons in the analysis of immediately negative thoughts. Like these findings they indicated a greater concern with weight than with eating in the patients with bulimia nervosa and a greater concern with eating than with appearance in the patients with anorexia nervosa. In addition they also found a greater concern with weight than with appearance in both groups of patients. Patients with bulimia nervosa had a pattern of concerns similar to those of the two dieting groups. Like the patients with bulimia nervosa both groups of dieters had a higher overall score on negative thoughts in the weighing task than in the eating task. As before, the two dieting groups also had higher scores on the mirror task than on the eating task although this pattern was not also observed in the bulimia nervosa group on this occasion. As before there were no differences between the tasks in the normal control group.

Absolute negative score. As predicted the two patient groups had a greater absolute number of negative thoughts in the three tasks than the non-dieting normal controls. The prediction that the two dieting groups would have a score between that of the normal controls and the two patient groups was partially supported with that of the normal dieters falling between that of the normal controls and the patients with anorexia nervosa. Absolute score did not, however, discriminate between the normal dieters and the patients with anorexia nervosa or between the symptomatic dieters and either patient group.

Duration of negative thoughts - between group comparisons. The prediction that negative thoughts would last longer in the two patient groups than in the non-dieting controls was partially supported. Thoughts about weight and appearance lasted longer in the patients with bulimia nervosa while thoughts about eating lasted longer in the patients with anorexia nervosa. Scores in the two dieting groups fell between those of the non-dieting controls and patients with bulimia nervosa, as predicted, but only between those of the non-dieting controls and patients with anorexia nervosa on the eating task. When the two dieting groups were compared with the two patient groups only one significant finding was observed, negative thoughts lasted longer in the patients with anorexia nervosa than they did in the normal dieters. Thus this measure did not distinguish normal dieters from patients with bulimia nervosa or symptomatic dieters from either patient group.

Duration of negative thoughts - within group comparisons. Within group comparisons showed that negative thoughts about weight lasted longer in the patients with bulimia nervosa and in the two dieting groups than negative thoughts about eating. The patients with anorexia nervosa showed a different pattern. In this group negative thoughts about eating lasted longer than negative thoughts about appearance. In the normal dieter group negative thoughts about appearance also lasted longer than negative thoughts about eating.

Belief in negative thoughts. Contrary to predictions the two patient groups did not believe in the negative thoughts to a greater extent than the normal controls. This finding is similar to that of Clark et al. (1989) where belief in negative weight related thoughts was not uniquely predictive of differences between patients with eating disorders and female controls.

Total positive score. Like the results for immediately relevant positive thoughts, and contrary to predictions, the Thoughts Checklist did not find

that the non-dieting normal controls had a greater frequency of positive thoughts than the two patient groups.

Belief in positive thoughts. Contrary to predictions the normal controls did not believe the positive thoughts to a greater extent than the normal controls.

3.43 Strengths and limitations of the study

The study has several strengths. It fulfils the three conditions outlined by Ericsson & Simon (1980) and Smith & Miller (1978) for ensuring maximum reliability and validity of the data collected in studies which use verbal reports as data. These conditions are minimum time lapse after the cognitive event has occurred; minimum probe (thus reducing the likelihood of inferential processes), and request for subjects to report cognitive experiences rather than motives. The method of concurrent verbalisation permits collection of thoughts with minimal delay in reporting thoughts after they occur. This means that they are more likely to be an accurate representation of the thoughts that actually occurred than thoughts collected, for example, by clinical interview or questionnaire where the delay between occurrence and reporting of thoughts is usually much longer. No probe questions were used, thus maximising the chances of obtaining data unbiased by the questions asked, and subjects were asked to report cognitive experiences, not motives. The concurrent verbalisation method also yields a complete record of all thoughts that occurred in a given situation whereas questionnaires, interviews and techniques such as the triple column thoughts record form only provide a partial record and one that is heavily influenced by the questions and instructions given by the clinician or experimenter.

The study was a controlled study. Anecdotal evidence and data from clinical interviews lack appropriate control groups so it is possible that

similar reports of cognitive concerns might be found in other groups of young females, particularly amongst women who are dieting. While questionnaire studies usually contain a control group of age-matched females with which to compare the patients, they have not reported data for women who are dieting to lose weight.

The data collected by interview and self-report questionnaires showed that the patient groups were similar on all measures to patient groups in other studies. This means that we can have confidence in generalising from the data obtained here to other groups of patients with eating disorders, even though one limitation of the study might be thought to be the relatively small sample size (twelve subjects in each group).

The data were collected using standardised tasks, thus reducing the likelihood of obtaining differences between the groups due to differences in procedure and not to actual group differences. In addition, data were collected in situations similar to the real life experiences of women, particularly those who are highly concerned with eating, weight and shape, thus maintaining "ecological validity" (Meichenbaum & Butler, 1980; Hollon & Kendall, 1981). This makes it more likely that relevant cognitions will be obtained than would be the case if artificial or imagined situations were used (Beck, 1976).

The reliability studies conducted in this study show that data on self-statements can be reliably broken up into units for coding, and that it can be reliably coded.

Two methods of collecting data are compared, an unstructured one (concurrent verbalisation) and a structured one (the Thoughts Checklist). The unstructured method provides empirical validation for the Thoughts Checklist, validation which is lacking for most of the questionnaires which have been developed to assess cognitive processes in patients with eating

disorders. It might be asked how readily one can generalise from the tasks performed in the course of an experiment to real life situations. To gain an idea of this subjects were asked how typical they believed their thoughts in each of the situations to be to the thoughts that they would normally expect to have when performing these tasks in real life. As reported in the Results section, ratings for all groups were reported to be highly typical.

The presence of the experimenter and the tape recording machine might be thought to have an influence on the type of thoughts reported with subjects being more reluctant to report highly embarrassing or distressing thoughts. An attempt was made to reduce the possibility of selective reporting by using a practice task before proceeding to the experimental tasks. Subjects were asked whether any thoughts had not been said and it was re-emphasised that it was important to say all their thoughts. After the experimental tasks had been completed subjects were also asked whether there had been any thoughts that they had not said out loud and, if there had been, they were asked to write them down on a sheet of paper. Very few thoughts were collected in this way and there was no suggestion that these thoughts were any more embarrassing or distressing than the thoughts recorded on audiotape.

The act of "thinking aloud" might be thought to alter the content of consciousness. This would mean that the thoughts reported in the concurrent verbalisation might not be very typical of the actual thoughts experienced. If this was the case in the present study then concurrent verbalisation would be expected to produce many thoughts about the act of "thinking aloud". Inspection of the data revealed relatively few of these thoughts. It seems likely that the practice task ensured that the process of "thinking aloud" became familiar and relatively automatic.

3.44 Implications

The self-report questionnaire, the Thoughts Checklist, appears to produce similar results to the concurrent verbalisation technique but seems to be less sensitive than concurrent verbalisation to differences between the patients and symptomatic dieters. Like the analysis of immediately relevant negative and positive thoughts based on the "thinking aloud" data, several measures of negative thoughts (overall frequency, absolute number and mean duration) differentiate the non-dieting controls from the two patient groups. These measures also generally distinguish normal dieters from patients with eating disorders. However, unlike the analysis using the unstructured data, none of these measures differentiates clearly between the symptomatic dieters and the two patient groups. Nevertheless, inspection of the data for the symptomatic dieters and patients suggests trends towards differences similar to those observed for immediately relevant negative thoughts on several of the questionnaire measures. Given the relatively small sample size it is possible that larger numbers of subjects in each group would produce statistically significant differences between these groups. Further research is obviously necessary to confirm this. Since the Thoughts Checklist is easier to administer and score than the concurrent verbalisation data it could be used to provide a measure of self-statements that characterise patients with eating disorders. Used in conjunction with the three standardised behavioural tasks it could provide a useful measure of one aspect of disturbed thinking at various stages of treatment, particularly when comparing cognitive treatments with other therapeutic interventions. However, further research is necessary to confirm that it does, as suggested, distinguish the symptomatic dieters from patients with eating disorders.

The results of this study show that patients with anorexia nervosa and patients with bulimia nervosa differ from each other, as well as from two

groups of dieters and one group of non-dieting female control subjects in the content of their self-statements and, therefore, preoccupations with eating, weight and appearance. This suggests that self-statements may be an important focus for cognitive intervention. In particular, the findings suggest that the two groups of patients studied differ from those who are dieting, including (in the analysis of the concurrent verbalisation data) those who show symptoms of an eating disorder, in rather different ways. In those with bulimia nervosa concerns with weight and appearance appear to distinguish them most from dieters while in anorexia nervosa concerns with eating distinguish them most from these two groups. Within group comparisons also support the existence of different concerns in the two groups. Patients with bulimia nervosa show greater concern with weight and appearance while patients with anorexia nervosa show greater concern with eating. These differences between the two patient groups suggest that in treatment it may be desirable to focus on different content when attempting to alter self-statements in these two groups. As discussed in Chapter 2 there has been a tendency amongst researchers and clinicians to emphasise the similarity in the cognitive concerns characteristic of bulimia nervosa and anorexia nervosa and, in particular, to stress the importance of concerns about weight and appearance. The emphasis on concerns about weight and appearance may help to explain why cognitive behaviour therapy has been an effective treatment for bulimia nervosa. However, for cognitive behavioural treatment to be equally as successful in anorexia nervosa it may be necessary to focus particularly on concerns about eating.

The finding that the two groups of dieters frequently show a pattern of concerns similar to those found in bulimia nervosa, a pattern that is very different from that found in anorexia nervosa, suggests that in bulimia nervosa there is an extension of normative concerns and preoccupations while

in anorexia nervosa concerns and preoccupations may be qualitatively different. The two groups of dieters consistently occupy a position intermediate between that of the non-dieting normal controls and the patients with bulimia nervosa but they are not always different from those with anorexia nervosa. This finding suggests that there may be a dimension of cognitive concerns which covaries with the intensity of behaviour designed to lose and control weight and which is marked at one end by non-dieting women and by those with bulimia nervosa at the other.

3.45 Conclusion

This study has provided a detailed, empirically based description of the content of the cognitive concerns characteristic of patients with eating disorders using two techniques, concurrent verbalisation and a self-report questionnaire. It has examined how the concerns of patients with anorexia nervosa and bulimia nervosa differ from each other, from two groups of dieters and from non-dieting female controls. It has compared the performance of a self-report questionnaire and concurrent verbalisation at measuring thoughts about subjects' concerns and found a high degree of similarity in the results obtained. Since self-statements are only one aspect of the cognitive disturbance in patients with eating disorders, research is needed into other features such as disturbances in information processing and the meanings attached to certain key concepts. The next chapter will, therefore, describe a study which examines information processing in patients with bulimia nervosa.

Chapter 4

Selective processing of information about eating, weight and shape in patients with bulimia nervosa and female controls¹

4.1 Introduction

4.11 Context

The study to be described here investigates a different aspect of the cognitive disturbance in patients with eating disorders. It takes up the second theme of this thesis by investigating whether there are differences between patients with bulimia nervosa and female controls at the level of information processing. Like the study presented in the preceding chapter it uses a technique from experimental cognitive psychology. In this case it is an especially adapted version of the Stroop colour-naming task.

As discussed in Chapter 2, in patients current cognitive/emotional concerns appear to act as a natural priming task and cause interference with colour-naming when the words to be colour-named are chosen to be particularly relevant to their concerns, for example to spiders in spider phobics or to threat in anxious patients. Since cognitive theories of eating disorders emphasise the importance of disturbed attitudes and processing of information related to eating, weight and shape, this suggests that using words relevant to these concerns may produce similar interference with colour-naming in patients with eating disorders. Thus this task may provide a useful measure of the extent to which these patients selectively process information related to eating, weight and shape. Also, as discussed in Chapter 2, unlike other measures that have been used, this task provides an objective measure of an

¹The data presented in this chapter have been written up as a paper (see Appendix 19) and accepted for publication in the Journal of Abnormal Psychology (Cooper, Anastasiades & Fairburn, in press).

aspect of cognitive disturbance, information processing, that may not be readily available to self-report. The study also investigates whether cognition and behaviour covary, by examining whether disturbance in eating behaviour is associated with disturbance in information processing.

4.12 Preliminary study

This study (Fairburn et al., 1991b) was conducted to see whether patients with bulimia nervosa selectively process information related to their concerns with eating, weight and shape. It found that patients were slower than female non-patient controls to colour-name words related to these concerns. It was concluded that bulimia nervosa is associated with selective processing of information related to patients' concerns with eating, weight and shape. However, the finding needs to be replicated with an improved methodology since, as in two other studies that have used the Stroop task in patients with eating disorders, cards were presented in the same fixed order to each subject, with the target card presented last. It is therefore possible that certain subjects, particularly the patients with bulimia nervosa, might have tired and been less able to concentrate by the time they reached the third card and that this, rather than selective processing, could have accounted for their relative difficulty in colour-naming the target card, i.e. the card with the words relevant to patients' concerns on it. To eliminate this possible explanation, it is necessary to counterbalance the order in which the cards are presented.

4.13 Aim

The aim of the present study was to see whether it was possible to replicate the main finding of the preliminary study that patients with bulimia nervosa selectively process information related to eating, weight and

shape but, this time, using a counterbalanced design.

4.14 Overview

Two groups of subjects were compared, patients with bulimia nervosa and female non-patient controls, on time taken to colour-name words presented on three different cards. One was the traditional conflicting colour card, one consisted of words related to eating disorder patients' concerns with eating, weight and shape and one was a control card, with words matched for word frequency and length with the words on the target card. The traditional conflicting colour card was included to determine whether the two groups of subjects differed in their ability to perform a difficult colour-naming task.

4.15 Prediction

Since cognitive theories argue that attitudes and the processing of information related to eating, weight and shape is disturbed in patients with eating disorders, it was predicted that, compared to female control subjects, patients with bulimia nervosa would selectively process information related to eating, weight and shape; i.e. that the bulimics would be slower to colour-name words on the target card than the female controls and that there would be no difference between the groups on colour-naming of the colour or control cards.

4.2 **Method**

4.21 Subjects

Two groups of subjects were investigated.

Patients with bulimia nervosa. These subjects were 36 patients who fulfilled an operational definition of bulimia nervosa based on the proposed DSM-III-R

diagnostic criteria for the disorder (American Psychiatric Association, 1985). The definition of the diagnostic items has been described in detail by Fairburn (1987). All the patients had been referred by general practitioners and psychiatrists for the treatment of bulimia nervosa. All had been selected to take part in a treatment trial comparing three different psychological treatments for bulimia nervosa. All were attending as out-patients at the time they took part in the study. Each patient was seen and tested before participating in treatment.

Female control subjects. These were 18 young women. They were recruited by placing advertisements asking for female volunteers under the age of 35 to take part in a study investigating "thoughts about eating, weight and shape". The age limit was specified in order to recruit a group of women similar in age to the bulimia nervosa patients. No reference was made to eating disorders in the advertisement. Subjects were excluded if they had ever met diagnostic criteria for either bulimia nervosa or anorexia nervosa. Bulimia nervosa was diagnosed using the operational criteria of Fairburn (1987). Subjects were also excluded if they had ever experienced behavioural symptoms characteristic of either of these two disorders, i.e. episodes of binge-eating defined as episodes of eating in which 1000 kcal or more were consumed accompanied by a definite sense of loss of control over eating, actual or attempted vomiting to lose weight or prevent weight gain, weight ever below 85% of the mean matched population weight (suggested in DSM-III-R as the cut off point for a diagnosis of anorexia nervosa).

4.22 Measures

Demographic information was obtained from each subject on age, weight and height. Each subject was assessed using the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979), a self-report measure of the symptoms of eating

disorders, and the Beck Depression Inventory (BDI; Beck et al., 1961), a self-report measure of the symptoms of depression.

4.23 Materials

The Stroop colour-naming cards. Three cards were constructed, one for each task, as described in Fairburn et al. (1991b). Each card consisted of a set of five stimulus words repeated 20 times. This yielded a total of 100 words on each card. The set of stimulus words was repeated in a new random order each time. The 100 words were arranged in ten rows of ten words each. The words were printed on a white card (53cms x 39cms) and were 0.5cm high. Each word was written in one of five colours. The colours used were orange, yellow, blue, green and black. Colours were also presented in a new random order each time. There was no immediate repetition of word or colour within a row. On the conflicting-colour card no word was printed in its own colour ink.

The following words were used:

- (i) Conflicting-colour card: orange, red, blue, green, brown.
- (ii) Target card: fat, diet, thighs, cakes, hips.
- (iii) Control card: sit, dare, filter, tower, wool.

The target and control words were matched for frequency of use (Kucera & Francis, 1976) and number of letters. Mean number of letters used in each word was exactly the same for both cards (Mean = 4.4 ± 1.14). Mean word frequency for the words used on the target card was 21.0 ± 23.5 and for the words on the control card it was 24.0 ± 24.5 . These means were not significantly different ($t(8) = 0.2$, NS).

4.24 Procedure

Subjects completed the self-report questionnaires and were then tested

individually according to a standard procedure. No detailed rationale was given and subjects were simply told that the task involved naming colours. Subjects were first shown a small card with two rows of 0s printed in the five colours to be named and asked to name each of the colours. This was done to familiarise them with the colour of the inks that were to be used. Standard instructions were then given. Subjects were asked to name as quickly as possible the colour of the ink in which each word was printed starting with the word at the top left hand corner and ending with the word at the bottom right hand corner, as though they were reading a page out of a book. They were told that they should name the colours as quickly as possible and correct any mistakes made as they went along. The time that each subject took to colour-name the 100 words was recorded using a stopwatch. Timing began at the onset of naming the first word and ended on completion of the last word. Errors were not recorded. To control for any possible order effects the cards were presented in a fully balanced order within each group. A 3 x 6 (treatments x sequences) design was used (Rosenthal & Rosnow, 1984, p.317). Each of the three stimulus cards appeared once within a single order sequence and once in each of the six unique order sequences possible for the three cards. Each of the six unique sequences was repeated six times for the 36 bulimia nervosa patients and three times for the 18 female control subjects. Thus cards were presented to each subject in one of six possible order sequences such that equal numbers of subjects within each of the two groups read the cards in each of the six possible order sequences.

4.25 Data analysis

A 2 x 3 (groups x cards) analysis of variance with repeated measures on the second factor was performed for the bulimia nervosa vs female control

group comparison. As in the preliminary study (Fairburn et al., 1991b) colour-naming times were not normally distributed and the groups had significantly different variances. All analyses were therefore performed on transformed scores. As before the appropriate transformation suggested by the data was that of the reciprocal. Multiplied by 100 this represents the rate or speed of colour-naming (i.e. number of words colour-named per second). Post-hoc Tukey Honestly Significant Difference tests were carried out to assess the differences between pairs of groups and conditions.

4.3

Results

4.37 Subject characteristics

The mean age and Body Mass Index (BMI) scores of the two groups are shown in Table 4.1 together with scores on the Eating Attitudes Test (EAT) and Beck Depression Inventory (BDI).

Table 4.1

Characteristics of the two groups of subjects

	BN		FC	
	(n = 36)		(n = 18)	
	X	SD	X	SD
Age (years)	24.3 ^a	6.2	22.1 ^a	3.5
Body mass index ¹	21.8 ^a	2.2	20.9 ^a	1.5
EAT total	49.9 ^a	14.9	7.8 ^b	3.6
BDI total	26.7 ^a	10.5	4.5 ^b	5.1

BN = Bulimia nervosa patients, FC = Female control subjects.

EAT = Eating Attitudes Test, BDI = Beck Depression Inventory.

¹Weight in kg/(height in m)².

Within each measure means with different superscripts are significantly different from each other.

Separate variance t tests were conducted to determine whether the two groups differed in age, BMI and scores on the EAT and BDI. There were no significant differences between the two groups in age or BMI but the two groups differed in scores on the EAT ($t(42.4) = 15.98, p < .0001$) and BDI ($t(52) = 10.48, p < .0001$). The scores on these measures are similar to those of other bulimia nervosa patient and female control series.

4.32 Colour-naming times

Two separate analyses of variance were carried out to test for possible order effects. Effect of ordinal position was assessed with a 2 x 3 (groups

x ordinal position) analysis of variance. Effect of order sequence was assessed with a 2 x 6 x 3 (groups x order sequence x cards) analysis of variance. Ordinal position (i.e. whether the cards were read first, second or third), order sequence (i.e. whether the cards were read in any one of the six possible sequences making up each of the blocks in the experimental design) and order sequence x card interaction did not yield a significant result. In addition there were no significant interactions between group (patients vs normals) and these factors. The F values obtained from these analyses were as follows: Ordinal position, $F < 1$; order sequence, $F(5,42) = 1.67$, NS; order sequence x card, $F(10,84) = 1.17$, NS; group x order sequence, $F = 1.08$, NS; group x order sequence x card, $F(10,84) = 1.12$, NS.

Mean speed of colour-naming each card (number of words colour-named per second) in the two groups are shown in Table 4.2. For ease of comparison with data reported in other studies using the Stroop methodology mean raw times (number of seconds taken to read the words on each card) are presented in Table 4.3.

Table 4.2

Speed of colour-naming the three cards (number of words colour-named per second

	BN		FC	
	(n = 36)		(n = 18)	
	X	SD	X	SD
Target card	1.11 ^a	0.24	1.40 ^b	0.31
Control card	1.24 ^a	0.22	1.47 ^b	0.29
Conflicting-colour card	0.94 ^a	0.21	1.12 ^b	0.24

BN = Bulimia nervosa, FC = Female controls.

Within each measure means with different superscripts are significantly different from each other.

Table 4.3

Number of seconds taken to read each of the three cards

	BN		FC	
	(n = 36)		(n = 18)	
	X	SD	X	SD
Target card	96.4	25.2	75.0	16.4
Control card	83.2	16.8	70.9	14.0
Conflicting-colour card	112.0	25.9	93.6	19.2

BN = Bulimia nervosa, FC = Female controls.

4.33 Comparison of the bulimia nervosa patients with the female control subjects

The 2 x 3 (groups x cards) analysis of variance with repeated measures on the second factor revealed a main effect of group ($F(1,52) = 12.63$, $p < .001$). This indicated that the patients were overall slower at colour-naming than the female control group. Post-hoc comparisons, using Tukey's Honestly Significant Difference Tests, showed that the colour-naming of all three cards, including the control card, took longer in the bulimia nervosa group than it did in the female control group ($p < .05$ for the colour card, $p < .01$ for the control card and the target card). The card main effect was also highly significant ($F(2,104) = 116.08$, $p < .0001$). Post-hoc tests showed that it took significantly longer to colour-name the conflicting-colour card than the target card, which in turn took significantly longer than the control card. Most important of all there was a significant group x card interaction ($F(2,104) = 4.21$, $p < .03$). This suggested that the bulimia nervosa patients were significantly slower than the female controls in colour-naming the target card than in colour-naming the control (or colour) card. Post-hoc tests confirmed this finding showing that the bulimia nervosa patients took significantly longer to colour-name the target card than the control card ($p < .01$) whereas this difference was not significant for the female controls.

Since the bulimia nervosa patients were slower than the female control subjects in the speed with which they colour-named all the cards, including the control card, this makes it difficult to compare the two groups directly on the speed with which they colour-named the target card. The overall difference between the two groups in colour-naming the control card was therefore taken into account by computing interference indices, one for the colour card and one for the target card. Two interference indices were

computed, using the transformed scores, to represent the amount of disruption caused to colour-naming times by the target and colour words when compared to the control words.

(i) A target interference index. This represents speed of colour-naming words on the target card minus speed of colour-naming the words on the control card.

(ii) A colour interference index. This represents speed of colour-naming words on the colour card minus the speed of colour-naming words on the control card.

Mean scores (speed of colour-naming) for both groups on the target interference index and on the colour interference index are shown in Table 4.4. Mean raw scores (number of seconds) are provided in Table 4.5.

Table 4.4
Mean scores on the two interference indices (number of words colour-named per second)

	BN		FC	
	(n = 36)		(n = 18)	
	X	SD	X	SD
Target interference index	-0.15 ^a	0.11	-0.07 ^b	0.09
Colour interference index	-0.30 ^a	0.14	-0.35 ^a	0.18

BN = Bulimia nervosa, FC = Female controls.

Within each measure means with different superscripts are significantly different from each other.

Table 4.5

Mean raw scores on the two interference indices (number of seconds)

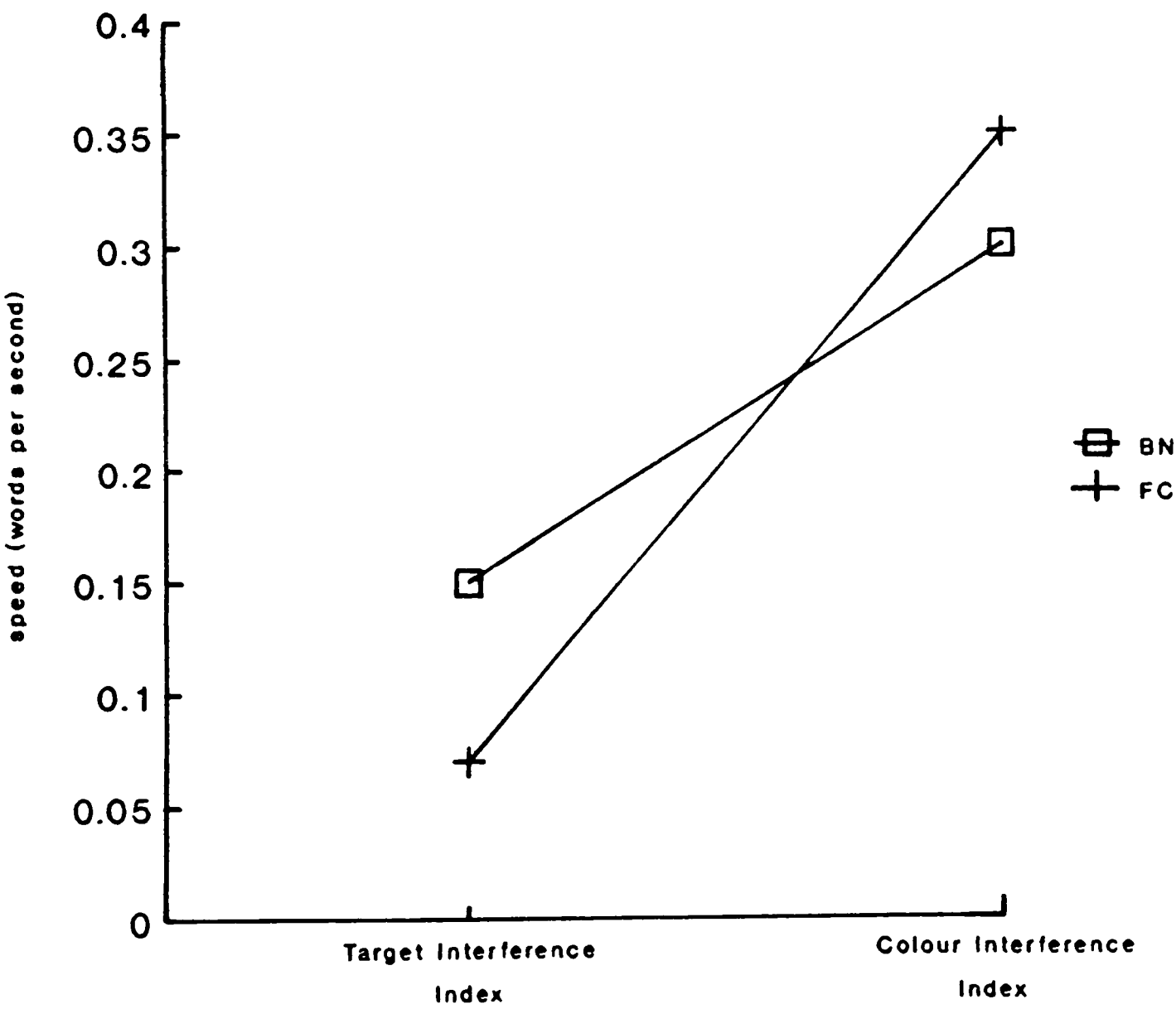
	BN		FC	
	(n = 36)		(n = 18)	
	X	SD	X	SD
Target interference index	13.2	13.6	4.1	5.8
Colour interference index	28.8	18.3	22.7	12.1

BN = Bulimia nervosa, FC = Female controls.

Analysis of variance revealed no main effect of group ($F(1,52) < 1$). This indicated that the patients were not overall more disrupted in colour-naming than the control subjects. There was a significant main effect of interference index ($F(1,52) = 69.62, p < .0001$). This indicated that the colour card caused greater disruption to colour-naming than the target card. More importantly there was a significant group x interference index interaction ($F(1,52) = 5.67, p = .02$). This clear crossover interaction is illustrated in Figure 1. Post-hoc tests between groups indicated that the colour card caused a similar amount of disruption in both the bulimia nervosa and the female control groups. Indeed, if anything, the extent of the disruption was less in the bulimia nervosa group. The target card however caused significantly greater disruption in the bulimia nervosa group than in the female control group ($p < .05$).

Figure 4.1

Disruption in colour-naming target and colour words in patients with bulimia nervosa and female controls



BN = Bulimia nervosa, FC = Female controls.

4.34 Correlations

To determine whether the amount of disruption caused by the target card was related to subject characteristics, correlations were performed within each group of the target interference index with age, weight, EAT and BDI scores. Correlations for the female control group are shown in Table 4.6 and for the bulimia nervosa group in Table 4.7.

Table 4.6

Correlations of the target interference index with age, weight, EAT and BDI scores in the female control group

	Target interference index	
	Pearson r	p
Age	-0.31	NS
Body mass index ¹	-0.04	NS
EAT total	0.20	NS
BDI total	0.22	NS

EAT = Eating Attitudes Test, BDI = Beck Depression Inventory.

¹Weight in kg/(height in m)².

Table 4.7

Correlations of the target interference index with age, weight, EAT and BDI scores in the bulimia nervosa group

	Target interference index	
	Pearson r	p
Age (years)	0.10	NS
Body mass index ¹	-0.20	NS
EAT total	-0.36	< .05
BDI total	-0.34	< .05

EAT = Eating Attitudes Test, BDI = Beck Depression Inventory.

¹Weight in kg/(height in m)².

In the bulimia nervosa group, but not in the female control group, scores on the EAT and BDI were significantly correlated with the target interference index ($r = -.36$, $p < .05$ and $r = -.34$, $p < .05$ respectively). However, EAT and BDI scores were also significantly correlated within this group ($r = .45$, $p < .01$). Partial correlations to control for the intercorrelation showed that the relationship between the target interference index and either EAT or BDI scores did not remain significant when the effect of the other measure was partialled out. There were no significant correlations between age and weight and the target interference index in either the bulimia nervosa group or the female control group. There were no significant correlations between the colour interference index and subject characteristics (i.e. age, weight, EAT and BDI scores) in either the bulimia nervosa group or the female control group. Correlations of the colour

interference index with age, weight, EAT and BDI are presented in Table 4.8 for the female control group and in Table 4.9 for the bulimia nervosa group.

Table 4.8
Correlations of the colour interference index with age, weight, EAT and BDI scores in the female control group

	Colour interference index	
	Pearson r	p
Age (years)	-0.07	NS
Body mass index ¹	0.20	NS
EAT total	-0.16	NS
BDI total	-0.38	NS

EAT = Eating Attitudes Test, BDI = Beck Depression Inventory.

¹Weight in kg/(height in m)².

Table 4.9

Correlations of the colour interference index with age, weight, EAT and BDI scores in the bulimia nervosa group

	Colour interference index	
	Pearson r	p
Age (years)	0.08	NS
Body mass index ¹	-0.01	NS
EAT total	-0.15	NS
BDI total	-0.22	NS

EAT = Eating Attitudes Test, BDI = Beck Depression Inventory.

¹Weight in kg/(height in m)².

4.4

Discussion

The most important finding was the significant group x card interaction, indicating that the bulimia nervosa patients were significantly slower than the female controls in colour-naming the target card than in colour-naming the control card. Unlike the preliminary study, patients with bulimia nervosa were slower in general at colour-naming than the female control subjects which made it difficult to compare the two groups directly on colour-naming the target card. However, when this difference was taken into account by using interference indices, words relevant to the patients' concerns with eating, weight and shape resulted in greater interference with colour-naming in the bulimia nervosa group than in the female control group. Colour words, however, resulted in a similar amount of interference in both

groups. This suggests that, compared to the female control subjects, patients with bulimia nervosa show selective processing of information related to their concerns with eating, weight and shape. The results cannot be due to an order effect since the three cards were presented in a counterbalanced design and no effect of ordinal position or order sequence was found.

Interference on the target card was not related to age or weight but it was significantly correlated with scores on the EAT. This suggests that patients with more severe symptoms, as measured by the EAT, show greater selective processing. However, controlling for the effects of depression, as measured by the BDI, reduced the effect to below significance. Thus it is not clear whether the significant relationship between the target interference index and the score on the EAT is specific to the clinical features of eating disorders or whether it is mediated by depression. Studies using versions of the Stroop task to study selective processing in depression have found greater interference with colour-naming for negative words in those who are depressed, as measured by the BDI (Gotlib & McCann, 1984), and in depressed psychiatric patients (Gotlib & Cane, 1987). One possible explanation for the results found here is that the patients with bulimia nervosa see the words on the target card as more negative than the normal controls and that this accounts for the differences found between the groups in selective processing. However, it is also possible that using a larger sample size and other measures of the symptoms associated with eating disorders might find a closer relationship between interference with colour-naming on the target card and symptoms specific to eating disorders. This question will be addressed in a later chapter.

Further research is needed to determine the value of the Stroop task in this context. It needs to be employed with other groups of subjects to

determine whether the effect is specific to patients with bulimia nervosa. One particularly important comparison group is females who are dieting. It is possible that a similar interference with colour-naming the target words might be found in dieters. It is also necessary to determine whether the effect observed here is specific to patients with bulimia nervosa as opposed to patients with anorexia nervosa. These two questions will be addressed in the next chapter.

Chapter 5

Selective processing of information about eating, weight and shape in patients with anorexia nervosa, patients with bulimia nervosa, two groups of dieters and one group of non-dieting female controls

5.1 Introduction

5.11 Context

The study reported in the preceding chapter found differences between patients with bulimia nervosa and female controls in the processing of information about eating, weight and shape. Compared with the control card the target card caused greater interference with colour-naming in the patients with bulimia nervosa than it did in the female controls. However, when the conflicting colour card was compared with the control card interference was similar in both groups. As mentioned in the discussion at the end of the chapter, further research is needed to determine whether the effect is specific to patients with bulimia nervosa. Two important comparison groups are females who are dieting and patients with anorexia nervosa.

5.12 Aim

The study to be reported here was designed to investigate whether patients with anorexia nervosa and females who are dieting, like the patients with bulimia nervosa, selectively process information related to their concerns with eating, weight and shape.

5.13 Overview

Five groups of subjects were compared, patients with anorexia nervosa,

patients with bulimia nervosa, two groups of dieters and one group of non-dieting female control subjects. As in the preceding chapter they were compared on time taken to colour-name words presented on three different cards. One was the traditional conflicting-colour card, one consisted of words relevant to patients' concerns with eating, weight and shape (the target card) and one was a control card, with words matched for length and frequency with the words on the target card.

5.14 Predictions

Because cognitive theories suggest that patients with anorexia nervosa and patients with bulimia nervosa have a similar disturbance in cognitive functioning it was predicted that, compared to the non-dieting female controls, patients with anorexia nervosa as well as those with bulimia nervosa would selectively process information related to eating, weight and shape, i.e. that both groups would be slower to colour-name words on the target card than the non-dieting female controls and that there would be no difference between the groups on colour-naming of the colour or control cards.

Because they share some, but not all, of the concerns found in patients with eating disorders it was predicted that the two groups of dieters would occupy a position in between the two patient groups and the non-dieting females with the symptomatic dieters more like the patients and the normal dieters more like the non-dieting controls. Two specific predictions were made. Firstly, it was predicted that the normal dieters, those without a history of symptoms of an eating disorder, would resemble the non-dieting female controls, i.e. that both groups would take a similar amount of time to colour-name words on the target card, colour and control cards. Secondly, it was predicted that the symptomatic dieters, those with a history of symptoms

of an eating disorder but never a diagnosis, would resemble the bulimia nervosa group, i.e. that they would be slower to colour-name words on the target card than the non-dieting female controls and that there would be no difference between groups on colour-naming of the colour or control cards.

5.2

Method

5.21 Subjects

Five groups of subjects were investigated, two groups of patients and three groups of non-patients. The subjects were the same subjects as those investigated in Chapter 3. All were female. Descriptions of each group from Chapter 3 are summarised below. Detailed information on the criteria used to select the subjects in each group can be seen in Appendix 1.

Patients with anorexia nervosa. These were 12 patients who fulfilled DSM-III-R criteria for anorexia nervosa (American Psychiatric Association, 1987). Nine had been referred for the treatment of anorexia nervosa and were recruited through their primary therapist. Three were recruited through a local self-help group for eating disorders. Seven were receiving treatment in hospital at the time they took part in the study.

Patients with bulimia nervosa. These were 12 patients who fulfilled DSM-III-R criteria for bulimia nervosa (American Psychiatric Association, 1987). In addition they also fulfilled a strict operational definition of bulimia nervosa based on these criteria (Fairburn, 1987). All had been referred for the treatment of bulimia nervosa and were recruited through their primary therapist. All were outpatients at the time they took part in the study.

Normal dieters. These subjects were 12 volunteers who fulfilled a strict operational definition of dieting. They were recruited by placing posters asking for female volunteers, under the age of 35, who had been making an

attempt to lose weight for at least four weeks. They were invited to take part in a study investigating "thoughts about eating, weight and shape". No reference was made to eating disorders. The age limit was specified in order to obtain a group similar in age to the two patient groups. To be included in this group the volunteers had to have been making a serious attempt to lose weight over the preceding four weeks. Diet followed and success were irrelevant provided a serious attempt to lose weight had been made. A serious attempt to lose weight was defined as following a standard reducing diet and/or the setting of definite and rigid rules such as a definite calorie limit, preset quantities of food or rules about what should be eaten. Subjects were excluded if they had a past psychiatric history or if they had ever met DSM-III-R criteria for anorexia nervosa or bulimia nervosa. They were also excluded if they had shown any behavioural symptoms of either eating disorder, i.e. objective episodes of binge eating, defined as episodes of eating characterised by a definite sense of loss of control and the consumption of more than 1000 kcal, actual or attempted self-induced vomiting to lose weight, weight below the 85% mean population matched weight recommended by DSM-III-R when diagnosing anorexia nervosa.

Symptomatic dieters. These were 12 volunteers who fulfilled exactly the same criteria for inclusion as the normal dieters but who, in addition, had either currently or in the past experienced behavioural symptoms of anorexia nervosa and/or bulimia nervosa as described above, i.e. objective episodes of binge eating defined as episodes of eating characterised by a definite sense of loss of control and the consumption of more than 1000 kcal, actual or attempted self-induced vomiting to lose weight, weight below the 85% mean population matched weight recommended by DSM-III-R when diagnosing anorexia nervosa. As in the normal dieter group subjects were excluded if they had ever met DSM-III-R criteria for a diagnosis of anorexia nervosa or bulimia

nervosa or if they had ever received treatment for a psychiatric disorder. Subjects were recruited exactly as they were for the normal dieter group. Subjects in the two diet groups were allocated to the appropriate group after details of their eating and dieting behaviour had been recorded. Reliability of this allocation was determined by asking an independent judge to assign the 24 subjects to two groups. Detailed criteria were provided together with brief descriptions of each subjects' eating history. Complete agreement was reached in all 24 cases. Both dieting groups had been making a serious attempt to lose weight for equivalent lengths of time. Mean number of weeks in the normal dieters was 11.6 ± 10.1 . In the symptomatic dieters it was 12.7 ± 14.5 ($t(21) = 0.64$, NS). In the symptomatic dieters seven subjects reported episodes of objective binge-eating, nine reported attempted or actual self-induced vomiting to lose weight and one had briefly reached a weight below 85% mean population matched weight by dieting.

Normal controls. These were 12 volunteers who had not been attempting to lose weight over the previous four weeks. They were recruited by placing posters asking for female volunteers under the age of 35, who had not been attempting to lose weight during the previous four weeks, to take part in a study investigating "thoughts about eating, weight and shape". No reference was made to eating disorders. Subjects were excluded if they had ever met DSM-III-R criteria for anorexia nervosa or bulimia nervosa or if they had received treatment for any other psychiatric disorder. They were also excluded if they reported any of the behavioural symptoms of an eating disorder as described above.

5.22 Measures

Information was obtained on demographic and background features, including age, weight, height and score on the Eating Attitudes Test, a self-

report measure of the symptoms of eating disorders (EAT; Garner & Garfinkel, 1979).

5.23 Materials

The Stroop colour-naming cards. Three cards were used, one for each task. They were constructed exactly as described in the preceding chapter. As before the following words were used:

- (i) Conflicting-colour card: orange, red, blue, green, brown.
- (ii) Target card: fat, diet, thighs, cakes, hips.
- (iii) Control card: sit, dare, filter, tower, wool.

5.24 Procedure

Each subject proceeded through the experiment in the same way. Demographic data and information on criteria for inclusion and exclusion were established first. Subjects were then assessed using the Eating Disorders Examination (EDE; Cooper & Fairburn, 1987), the results of which were reported in Chapter 3. They then completed some self-report measures, including the EAT. After this they performed the colour-naming tasks. Subjects were tested individually according to a standard procedure. Instructions were exactly as described in Chapter 4 and the time that each subject took to colour-name the 100 words was recorded using a stopwatch. To control for any possible order effects the cards were presented in a fully balanced order within each group. As before, a 3 x 6 (treatments x sequences) design was used (Rosenthal & Rosnow, 1984, p.317). Each of the three stimulus cards appeared once within a single order sequence and once in each of the six unique order sequences possible for the three cards. Each of the six unique sequences was repeated twice for the twelve subjects in each group. Thus cards were presented to each subject in one of six possible

order sequences such that equal numbers of subjects within each of the five groups read the cards in each of the six possible order sequences.

5.25 Data analysis

A 5 x 3 (groups x cards) analysis of variance with repeated measures on the second factor was performed for the comparison between the five groups. As in Chapter 4, raw scores were not normally distributed and the groups had significantly different variances so all analyses were performed on transformed scores. As before, the appropriate transformation suggested by the data, and the one which was most psychologically meaningful, was that of the reciprocal. Multiplied by 100 the reciprocal represents the rate or speed of colour-naming, i.e. number of words colour-named per second. Post hoc Tukey Honestly Significant Difference Tests were used to assess differences between pairs of groups and conditions.

5.3

Results

5.31 Subject characteristics

Table 5.1 is reproduced from Chapter 3 to show the scores of the five groups on age, years of full-time education, Body Mass Index (BMI) and EAT.

Table 5.1

Characteristics of the five groups of subjects (means and standard deviations)

		NC	ND	SD	BN	AN	F/H ratio	p
Age (years)	X	22.0	23.5	23.0	24.0	21.9	F = 0.8	NS
	SD	2.3	4.6	3.1	4.3	3.2		
Education (years)	X	16.1 ^a	15.4 ^a	15.8 ^a	13.3 ^b	14.0 ^b	F = 6.4	<.0003
	SD	1.5	1.2	2.4	1.7	1.2		
BMI	X	21.3 ^a	24.4 ^a	23.3 ^a	24.8 ^a	15.0 ^b	H = 34.1	<.0001
	SD	2.1	1.8	3.0	5.9	1.5		
EAT	X	6.8 ^{ac}	17.6 ^{abc}	30.8 ^{bc}	42.3 ^d	53.1 ^{bd}	H = 41.6	<.0001
	SD	4.0	9.4	12.0	11.0	20.4		

All df for F tests = 4,55. All df for H tests = 4. N = 12 for each group.

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

BMI = Body Mass Index = weight in kg/(height in m)².

EAT = Eating Attitudes Test.

Within each measure means with different superscripts are significantly different from each other.

5.32 Colour-naming times

Two separate analyses of variance were carried out to test for possible order effects. Effect of ordinal position was assessed with a 5 x 3 (groups x ordinal position) analysis of variance. Effect of order sequence was assessed with a 5 x 6 x 3 (groups x order sequence x cards) analysis of

variance. Ordinal position (i.e. whether the cards were read first, second or third) and order sequence (i.e. whether the cards were read in any one of the six possible sequences making up each of the blocks in the experimental design) did not yield a significant result although there was a significant interaction between order sequence and card. There were no significant interactions between groups and these factors. All F values obtained from these analyses were less than 1 except for ordinal position ($F(8,110) = 1.19$, NS), order sequence x card ($F(10,60) = 2.86$, $p < .006$) and group x order sequence x card ($F(40,60) = 1.15$, NS). Since the three cards were presented in balanced order this effectively controls for any order sequence x card interaction.

Mean speeds of colour-naming each card (number of words colour-named per second) in the five groups are shown in Table 5.2. For ease of comparison with data reported in other studies using the Stroop methodology mean raw times (number of seconds taken to read the words on each card) are presented in Table 5.3.

Table 5.2

Mean speed of colour-naming each card (number of words colour-named per second) in the five groups

		NC	ND	SD	BN	AN
Colour card		X 1.04	1.11	1.02	1.00	1.05
	SD	0.17	0.25	0.19	0.19	0.20
Control card		X 1.32	1.35	1.34	1.31	1.41
	SD	0.22	0.25	0.25	0.21	0.31
Target card		X 1.29	1.33	1.26	1.20	1.25
	SD	0.16	0.25	0.24	0.21	0.26

NC = Normal controls, ND = Normal dieters, SD = Symptomatic dieters, BN = Bulimia nervosa, AN = Anorexia nervosa.

Table 5.3

Mean raw times (number of seconds taken to read the words on each card) in the five groups

		NC	ND	SD	BN	AN
Colour card	X	99.1	94.8	100.8	103.1	100.8
	SD	19.9	21.8	18.9	21.4	31.4
Control card	X	77.7	77.0	76.8	78.3	75.2
	SD	13.4	16.4	13.2	13.4	21.8
Target card	X	78.5	77.8	82.6	85.8	84.9
	SD	10.5	14.7	15.7	14.8	27.7

NC = Normal controls, ND = Normal dieter, SD = Symptomatic dieter, BN = Bulimia nervosa, AN = Anorexia nervosa.

5.33 Colour-naming times in the five groups

The 5 x 3 (groups x cards) analysis of variance with repeated measures on the second factor revealed no main effect of group ($F(4,55) < 1$), indicating that the five groups were overall similar in their speed of colour-naming irrespective of the card being colour-named. The card main effect was highly significant ($F(2,110) = 149.98, p < .0001$). Most important of all there was no significant group x card interaction ($F(8,110) = 1.18, NS$), suggesting that there were no differences between the groups on colour-naming of the three cards.

However, inspection of the data shows that the standard deviations were unusually high for the colour card and that there might well be differences in some groups in colour naming of the control and target cards. The extra

variance created by including the conflicting-colour card in the analysis was therefore eliminated by removing this card from the analysis.

5.34 Colour-naming times in the five groups using the target and control cards only.

Removing the conflicting-colour card from the main analysis, a 5 x 2 (groups x cards) analysis of variance with repeated measures on the second factor was performed for the comparison between the five groups. As before all analyses were carried out using reciprocals.

As described above two separate analyses of variance were carried out to test for possible order effects. No effect of ordinal position or order sequence was found and there was no significant interaction between groups and these factors. All F values obtained from these analyses were less than 1 except for the order sequence x card interaction ($F(1,50) = 2.34$, NS).

The 5 x 2 analysis of variance revealed no main effect of group; thus the groups were not significantly different from each other in overall speed of colour-naming (as they had been in the study reported in Chapter 4). There was a significant main effect of card ($F(1,55) = 30.15$, $p < .0001$) but, most important of all, there was a significant group x card interaction ($F(4,55) = 3.06$, $p < .03$). This suggested that the symptomatic dieters, the patients with bulimia nervosa and the patients with anorexia nervosa were significantly slower to colour-name words on the target card than they were to colour-name words on the control card. Post hoc tests (Tukey Honestly Significant Difference Tests) confirmed this observation. Within groups the normal, non-dieting controls and the normal dieters showed a similar speed of colour-naming the two cards while the symptomatic dieters, bulimia nervosa patients and anorexia nervosa patients were significantly slower to colour-name words on the target card than they were to colour-name words on the

control card ($p < .05$ for the symptomatic dieters and $p < .01$ for the bulimia nervosa and anorexia nervosa patients).

5.4

Discussion

The most important finding was the significant group $\times$ card interaction, indicating that the symptomatic dieters, patients with bulimia nervosa and patients with anorexia nervosa were all significantly slower than the non-dieting female controls and the normal dieters in colour-naming the target card than in colour-naming the control card. The non-dieting female controls and the normal dieters showed no difference in speed of colour-naming the control and target cards. Unlike the study presented in the preceding chapter there were no overall differences in speed of colour-naming so groups could be compared directly on colour-naming the target card.

The findings suggest that, compared to non-dieting female controls and dieters without a history of symptoms of an eating disorder, those dieters who report a history of symptoms of an eating disorder and patients with anorexia nervosa both show selective processing of information related to their concerns with eating, weight and shape, similar to that observed in patients with bulimia nervosa. This study thus replicates the finding of the previous chapter which showed that patients with bulimia nervosa show selective processing of words related to eating, weight and shape and extends it to patients with anorexia nervosa and females who are dieting. As described in Chapter 2, since interference with colour-naming appears to occur whenever cognitive representations of the words to be colour-named are activated, the findings provide some support for cognitive theories of eating disorders which suggest that patients with anorexia nervosa and patients with bulimia nervosa share similar cognitive concerns. The findings also suggest

that a subgroup of dieters share some of these concerns.

The version of the Stroop task used here included words related to all three areas of concern to patients with eating disorders, i.e. eating, weight and shape. However, in the light of the findings in Chapter 3, that patients with bulimia nervosa are more concerned with weight and appearance and that patients with anorexia nervosa are more concerned with eating, it seems possible that this version of the Stroop may mask differences between the two patient groups in selective processing. For example, patients with bulimia nervosa might be expected to show greater selective processing of information about weight and appearance while those with anorexia nervosa might be expected to show greater selective processing of information about food and eating. There is some tentative support for this hypothesis from the results of two other studies. Since this study was completed two other groups of investigators have devised versions of the Stroop colour-naming task for use in patients with eating disorders. Both groups have devised separate tasks to investigate selective processing of food words and words related to body size (Channon et al., 1988) and shape (Ben-Tovim et al., 1989). Channon and colleagues found that patients with anorexia nervosa showed selective processing of information related to food but not of information related to body size. Ben-Tovim and colleagues found that while patients with anorexia nervosa as well as those with bulimia nervosa showed selective processing of information related to food only those with bulimia nervosa also showed selective processing of information related to shape. However, as discussed in Chapter 2, there are problems with both these studies that need to be corrected before any definite conclusions can be drawn from them.

The Stroop colour-naming task appears to be a useful measure of one aspect of the cognitive disturbance, information processing, in eating disorders. In particular, it provides an objective measure of an aspect of

cognitive functioning that may not be readily available to self-report. It thus avoids the problems of reactivity that are associated with self-report measures. However, to be most useful as an assessment measure and to increase our understanding of the precise nature of the cognitive disturbance in patients with eating disorders it is important to discover what interference with colour-naming is related to in patients with eating disorders. Since cognitive theories emphasise that the cognitive disturbance is of primary importance in eating disorders then it might be expected that the more severe the cognitive disturbance then the more severe the eating disorder. However, the study in Chapter 4 found that severity of symptoms specific to eating disorders, as measured by the EAT, was not related to interference with colour-naming on the target card when the effect of depression was partialled out. It was suggested that a larger sample size and other measures of the symptoms of eating disorders might result in a closer relationship between interference with colour-naming and symptoms specific to the disorder. This question will be addressed in the next chapter.

Chapter 6

Relationship of selective processing of eating, weight and shape related information to demographic and clinical features in patients with bulimia nervosa

6.1 Introduction

6.11 Context

The two preceding chapters, Chapters 4 and 5, found that patients with bulimia nervosa selectively process information relevant to their concerns about eating, weight and shape. In the study in Chapter 4 it was also found that score on the EAT was correlated with selective processing in these patients. However, it was not clear whether this relationship was specific to the clinical features of bulimia nervosa or whether it was mediated by depression. It was suggested that using a larger sample size and other measures of the symptoms associated with eating disorders might show a closer relationship between selective processing and symptoms specific to this disorder.

6.12 Aim

The aim of the present study was to investigate the demographic and clinical variables that are related to selective processing of information about eating, weight and shape in patients with bulimia nervosa but, this time, using a larger sample of subjects and a greater number of measures of the general and specific clinical features associated with this disorder.

6.13 Overview

Patients with bulimia nervosa were investigated. Time taken to colour-

name words related to their concerns about eating, weight and shape was compared with time taken to colour-name words matched for length and frequency of use. The difference (amount of interference) was correlated with scores on a variety of demographic and clinical variables. A regression analysis was then performed to discover which measure was the best predictor of interference with colour-naming on the target card.

6.14 Predictions

The study was primarily exploratory so no specific predictions were made. However, since cognitive theories of eating disorders assume that the cognitive disturbance is of primary importance it was hypothesised that interference with colour-naming on the target card might be more closely related to severity of symptoms specific to patients with eating disorders than to measures of general psychopathology.

6.2

Method

6.21 Subjects

One group of subjects was investigated. It consisted of 75 patients with bulimia nervosa. All 75 fulfilled the proposed DSM-III-R criteria for bulimic disorder (American Psychiatric Association, 1985). All but nine fulfilled a strict operational definition of bulimia nervosa based on these criteria and described in detail by Fairburn (1987). All had been referred by general practitioners and psychiatrists for the treatment of bulimia nervosa. They had been selected to take part in a treatment trial comparing three different psychological treatments for bulimia nervosa. They were all attending as out-patients at the time they took part in the study. Each patient was seen and tested before taking part in treatment. All were

female, aged 17 or over and had a weight greater than a Body Mass Index (BMI) score of more than 17.

6.22 Measures

Patients took part in a detailed assessment prior to starting treatment. Information was obtained on demographic variables, eating habits and attitudes to eating, shape and weight, general psychiatric symptoms and colour-naming times. Several variables were selected from this assessment because it seemed possible that they might be related to interference with colour-naming on the target card.

Demographic features. Information was obtained from subjects on height and weight.

Eating habits and attitudes to eating, weight and shape. Information collected consisted of total score on the Eating Attitudes Test, a self-report measure of the behavioural symptoms of eating disorders (EAT; Garner & Garfinkel, 1979); scores on the Body Shape Questionnaire, a self-report measure of behavioural and attitudinal dimensions of body weight and shape (BSQ; Cooper et al., 1987); and scores on the Restraint subscale and on individual items taken from the Eating Disorder Examination, a semi-structured interview measure of the specific psychopathology of eating disorders (EDE; Cooper & Fairburn, 1987, Cooper, Cooper & Fairburn, 1989). The individual items used were frequency of objective bulimic episodes and frequency of purging (i.e. vomiting and laxative misuse combined). Both scores were calculated as frequency over the 28 days immediately preceding assessment. Information was also collected on attitudes to shape and weight using the Shape Concern and Weight Concern subscales of the EDE (measured as the combined score on the two subscales divided by two).

General psychopathology. Scores were obtained for total score on the Present

State Examination, a semi-structured interview measure of general psychiatric symptoms (PSE; Wing, Cooper & Sartorius, 1974) and the Beck Depression Inventory a self-report measure of the symptoms of depression (BDI; Beck et al., 1961).

6.23 Materials

The Stroop colour-naming cards. Three cards were used. They were constructed exactly as described in Chapter 4. As before the following words were used:

- (i) Conflicting-colour card: orange, red, blue, green, brown.
- (ii) Target card: fat, diet, thighs, cakes, hips.
- (iii) Control card: sit, dare, filter, tower, wool.

6.24 Procedure

Each subject proceeded through the experiment in the same way. Diagnosis was established and the EAT completed, then came the initial pretreatment assessment. The initial assessment was conducted by one of two trained assessors. The EDE was completed first, followed by the three colour-naming tasks. The PSE and the remaining self-report questionnaires were completed a few days later.

Instructions for the colour-naming tasks were exactly as described in Chapter 4. The time that each subject took to colour-name all the words on each card was recorded using a stopwatch.

For 58 of the patients with bulimia nervosa the three cards were presented in a balanced order to control for any possible order effects. As before a 3 x 6 (treatments x sequences) design was used. Each of the three stimulus cards appeared once within a single order sequence and once in each of the six unique order sequences possible for the three cards. The 3 x 6

design was repeated in a new random order each time until all 58 patients had been allocated an individual order of presentation of the three cards. Three patients did not complete the colour-naming, thus there were 55 patients for whom the cards had been presented in balanced order. In the remaining 17 patients the cards were presented in the same fixed order to each subject, as they had been in the preliminary study described in Fairburn et al. (1991b)¹.

6.25 Order effects

To determine whether it was valid to amalgamate the two groups and perform further analyses including all 72 of the patients who completed the colour-naming tasks order effects were assessed in the 55 patients for whom cards had been presented in a balanced order. Two separate analyses of variance were carried out to test for possible order effects. Effect of ordinal position was assessed with a one way analysis of variance. Effect of order sequence was assessed with a two way 6 x 3 (order sequence x card) analysis of variance with repeated measures on the second factor. Ordinal position (i.e. whether the cards were read first, second or third), order sequence (i.e. whether the cards were read in any one of the six possible sequences making up each of the blocks in the experimental design) and order sequence x card did not yield a significant result. F values obtained from these analyses were $F < 1$ for ordinal position, $F(10,49) = 1.20$, NS for order sequence and $F(10,98) = 1.27$, NS for order sequence x card. Thus it was deemed valid to amalgamate the two groups and further analyses were

¹The Stroop studies using the patients in the treatment trial were begun shortly after this preliminary study was completed and were run in parallel with the other Stroop studies reported in this thesis. The same fixed order of presentation was used for the first few patients entering the trial (as in many other Stroop studies that have been reported in the literature) until it was decided that a balanced order was methodologically more appropriate.

therefore performed using all 72 patients.

6.26 Data analysis

Colour-naming times. Since distributions of the colour-naming times were not normal and variances were significantly different all analyses were performed on transformed scores. As before the appropriate transformation suggested by the data was that of the reciprocal which represents the speed of colour-naming (i.e. number of words colour-named per second). The transformed scores met the assumptions necessary for valid analyses of variance. Using the reciprocals two measures of interference with colour-naming on the target card were computed to represent the amount of disruption caused to colour-naming time by the target words when compared to the control words. The two values computed were target interference index a and target interference b.

(i) Target Interference Index a. This represents speed of colour-naming words on the target card minus speed of colour-naming words on the control card.

(ii) Target Interference Index b. This represents speed of colour-naming words on the target card minus speed of colour-naming words on the control card divided by speed of colour-naming words on the target card plus speed of colour-naming words on the control card. This adjustment corrects the values obtained for time taken to colour-name words on both cards.

Demographic and clinical variables. Four of the demographic and clinical measures described above, frequency of objective bulimic episodes, frequency of purging, BMI and BSQ scores, were not normally distributed. Three of these was transformed using the appropriate transformation suggested by the data and, once transformed, met the assumption of a normal distribution. The transformations made were logarithmic transformations for frequency of objective bulimic episodes, frequency of purging and that of the reciprocal

for BMI. Transformations did not normalise the distribution for BSQ scores thus raw scores and, where appropriate, nonparametric statistics were used in analyses involving this variable.

6.27 Main analyses

To determine which demographic and clinical variables were related to interference with colour-naming on the target card correlations were performed between these variables and the two target interference indices. Pearson product moment correlations were used for the data that was normally distributed while Spearman rank order correlations were used for the remaining data. To determine which of these variables was the best predictor of interference with colour-naming on the target card two stepwise multiple regression analyses were performed with the two methods of calculating the target interference index as the dependent variables.

6.3 **Results**

6.31 Subject characteristics

Scores on demographic variables, eating habits and attitudes and measures of general psychopathology are shown in Table 6.1.

Table 6.1

Subject characteristics

	X	SD
Age (years)	24.2	5.9
Body Mass Index ³	22.3	3.2
Eating Attitudes Test ¹	48.2	16.8
Body Shape Questionnaire ²	138.1	32.2
Restraint ⁴	3.5	1.2
Objective bulimic episodes ⁵	19.1	-
Purging ⁵	22.4	-
Weight and Shape Concern ⁴	4.7	1.2
PSE total symptom score	22.1	10.4
Beck Depression Inventory	24.0	11.3

N = 75. ¹N = 74. ²N = 73.

³Body Mass Index = weight in kg/(height in m)².

⁴Eating Disorder Examination subscales.

⁵Geometric means and individual items from the Eating Disorder Examination.

Both scores are frequency of episodes over the 28 days immediately prior to assessment.

PSE = Present State Examination.

Colour-naming times

Mean speeds of colour-naming words (number of words colour-named per second) on the three cards are presented in Table 6.2. Mean raw times (time taken to colour-name all the words on a card) are presented in parentheses.

Disruption in speed of colour-naming caused by the target card, calculated using the two methods, Target Interference a and Target Interference b, is also shown in this table with amount of disruption in time in parentheses.

Table 6.2

Mean speeds of colour-naming (number of words colour-named per second) on the three cards and disruption in speed of colour-naming caused by the target card with mean raw scores (number of seconds) in parentheses.

	X	SD
Colour card	0.94 (111.30)	0.20 (26.90)
Control card	1.28 (81.60)	0.24 (21.00)
Target card	1.15 (92.00)	0.25 (26.00)
Target Interference Index a	-0.13 (10.40)	0.15 (12.94)
Target Interference Index b	-0.06 (0.06)	0.06 (0.06)

N = 72.

A one way analysis of variance (using the reciprocals) with repeated measures on the second factor was conducted to assess differences in colour-naming of the three cards in the whole sample. The result was highly significant ($F(2,142) = 174.8, p < .0001$). Tukey post hoc Honestly Significant Difference Tests were carried out in order to assess differences between pairs of conditions. The colour card versus control card comparison was highly significant ($p < .01$) as was the control versus target comparison ($p < .01$) and the colour versus target comparison ($p < .01$). This indicated that the bulimia nervosa patients were slower to colour-name words on the

target card than they were to colour-name words on the control card. In addition they were slower to colour-name words on the colour card than they were to colour-name words on the target card. This pattern of results was also observed for the bulimia nervosa patients in Chapter 4.

6.33 Main Analyses

Results of the Pearson product moment correlations and Spearman rank order correlations, which investigated the relationship between the demographic and clinical variables and interference with colour-naming on the two interference indices, are presented below in Table 6.3.

Table 6.3

Correlations of demographic and clinical variables with the two target interference indices

	Target Interference Index a	Target Interference Index b
Body Mass Index ³	-0.22	-0.17
Eating Attitudes Test ¹	-0.22	-0.24*
Body Shape Questionnaire ²	-0.22	-0.21
Restraint ⁴	-0.14	-0.17
Objective bulimic episodes ⁵	-0.17	-0.20
Purging ⁵	-0.31**	-0.31**
Weight and Shape Concern ⁴	0.01	-0.02
PSE total symptom score ²	-0.29*	-0.32**
Beck Depression Inventory ¹	-0.20	-0.21

All correlations are Pearson product moment correlations except those for Body Shape Questionnaire which are Spearman rank order correlations.

N = 72. ¹N = 71. ²N = 70.

³Body Mass Index = weight in kg/(height in m)².

⁴Eating Disorder Examination subscales.

⁵Individual items from the Eating Disorder Examination. Both scores are frequency of episodes over the 28 days immediately prior to assessment.

PSE = Present State Examination.

* = p < .05; ** = p < .01.

As can be seen in Table 6.3 interference with colour-naming was related

to two measures of the symptoms of eating disorders, score on the EAT and frequency of purging. However, it was also related to a measure of general psychopathology, PSE total score. In order to determine which measure was the best predictor of interference with colour-naming on the target card two stepwise regression analyses were performed with each of the two methods of calculating the target interference index as the dependent measures. The results from these two analyses are presented in Tables 6.4 and 6.5.

Table 6.4

Amount of variance in target interference index a explained by the predictors entered into the regression equation

Variable	Multiple R	RSQ	Change in RSQ	F ratio at entry	Std reg coeff	F ratio at final	r
Purging ¹	0.33	0.11	0.11	7.97	-0.38	2.12	-0.33
PSE total	0.40	0.16	0.05	4.03	-0.23	2.87	-0.29
Body Shape Questionnaire	0.42	0.17	0.02	1.36	-0.14	4.40	-0.26
Eating Attitudes Test	0.45	0.20	0.03	2.38	0.27	2.15	-0.21
Body Mass Index	0.47	0.23	0.02	1.70	-0.16	1.57	-0.24
Objective bulimic episodes ¹	0.50	0.25	0.02	1.84	-0.16	1.86	-0.19
Weight and Shape Concern ²	0.51	0.26	0.01	1.15	-0.16	1.05	0.00
Beck Depression Inventory	0.51	0.26	0.0008	0.07	0.14	0.06	-0.23
Restraint ²	0.51	0.26	0.00	0.00	-0.001	0.00	-0.17

N = 69.

¹Eating Disorder Examination individual items. Scores are frequency of episodes over the 28 days immediately prior to assessment.

²Eating Disorder Examination subscales.

Body Mass Index = weight in kg/(height in m²).

PSE total = Present State Examination total symptom score.

SCL-90 (GSI) = Symptom Checklist - 90 global severity index.

Multiple R = multiple regression coefficient at each step.

RSQ = amount of variance accounted for by all the variables in the equation.

Change in RSQ = increase in variance due to that variable.

F ratio at entry = F ratio at point at which the variable was entered into the equation.

std reg coeff = standardised regression coefficient for that variable.

F ratio at final = F ratio at the final step, when the effects of all the variables have been taken into account.

r = correlation with the independent variable.

Table 6.5

Amount of variance in target interference index b explained by the predictors entered into the regression equation

Variable	Multiple R	RSQ	Change in RSQ	F ratio at entry	Std reg coeff	F ratio at final	r
Purging ¹	0.33	0.11	0.11	8.28	-0.33	1.88	-0.33
PSE total	0.42	0.18	0.07	5.34	-0.26	6.12	-0.32
Body Shape Questionnaire	0.46	0.21	0.03	2.55	-0.19	7.07	-0.31
Eating Attitudes Test	0.49	0.24	0.04	3.01	0.30	2.29	-0.23
Objective bulimic episodes ¹	0.52	0.27	0.03	2.67	-0.18	3.28	-0.22
Weight and Shape Concern ²	0.54	0.29	0.02	1.54	0.16	1.07	-0.03
Beck Depression Inventory	0.55	0.30	0.07	0.60	0.14	0.43	-0.21
Body Mass Index	0.55	0.30	0.004	0.35	-0.07	0.34	-0.19
Restraint ²	0.55	0.30	0.0008	0.06	-0.03	0.06	-0.21

N = 69.

¹Eating Disorder Examination individual items. Scores are frequency of episodes over the 28 days immediately prior to assessment.

²Eating Disorder Examination subscales.

Body Mass Index = weight in kg/(height in m²).

PSE total = Present State Examination total symptom score.

SCL-90 (GSI) = Symptom Checklist - 90 global severity index.

Multiple R = multiple regression coefficient at each step.

RSQ = amount of variance accounted for by all the variables in the equation.

Change in RSQ = increase in variance due to that variable.

F ratio at entry = F ratio at point at which the variable was entered into the equation.

std reg coeff = standardised regression coefficient for that variable.

F ratio at final = F ratio at the final step, when the effects of all the variables have been taken into account.

r = correlation with the independent variable.

An F to enter value greater than 4.00 indicates significant predictors. As can be seen in the two tables frequency of purging emerged as the best predictor of interference with colour-naming on the target card in both analyses. Of the other variables only PSE total symptom score also made a significant contribution to this interference. There was no significant correlation between frequency of purging and PSE total symptom score (Pearson correlation $r = .19$, NS).

6.4

Discussion

Interference with colour-naming on the target card was related to two measures of the symptoms of eating disorders, score on the EAT and frequency of purging. However, it was also related to a measure of general psychopathology, total score on the PSE. This made it difficult to determine whether or not interference with colour-naming was related uniquely to the symptoms of eating disorders or whether it was mediated by general psychopathology. When a multiple regression analysis was performed using a mixture of demographic and clinical variables to predict interference with colour-naming on the target card frequency of purging emerged as the best predictor of this interference. Thus, as would be predicted by cognitive theories of eating disorders, interference with colour-naming appears to be more closely related to the severity of symptoms specific to these disorders rather than to general psychopathology. However, it should be noted that interference with colour-naming was also significantly related to severity of general psychopathology and that the predictive value of general psychopathology was not far behind that of frequency of purging.

Two aspects of the results are of note. Firstly, interference with colour-naming on the target card was significantly predicted only by

frequency of purging and not by any other measure of the specific psychopathology of bulimia nervosa. One possible explanation for this is that, of the measures of specific psychopathology, purging is the best index of the severity of the disorder. Secondly, failure to find a significant relationship between the two measures which assess cognitive aspects of the disorder, i.e. interference with colour-naming and scores on the Weight and shape Concern subscales of the EDE, suggests that these two measures assess different aspects of the cognitive disturbance in bulimia nervosa.

The mechanism underlying interference with colour-naming on the target card is not clear. Two possibilities exist. Cognitive theories of eating disorders would predict that this interference is related to the emotional salience of the words to be colour-named. However, an alternative possibility is that it is related to patients' familiarity with the issues represented by the words used on the target card. The next chapter will investigate these two possibilities.

Chapter 7

Changes in the processing of eating, weight and shape related words with three different psychological treatments for bulimia nervosa

7.1 Introduction

7.1.1 Context

As would be predicted by cognitive theories of eating disorders previous studies conducted in this thesis have shown that patients with bulimia nervosa and patients with anorexia nervosa show selective processing of information relevant to their concerns about eating, weight and shape when compared with normal non-dieting controls and dieters without a history of symptoms of an eating disorder. This interference appears to be more closely related to the severity of symptoms specific to eating disorders rather than to symptoms of general psychopathology. However, the mechanism underlying the interference is not clear. Cognitive theories of eating disorders would predict that it is related to the emotional salience of the words to be colour-named but an alternative possibility is that it is related to patients' familiarity with the issues represented by the words. One way to test the two possibilities is by investigating colour-naming before and after treatment. If interference with colour-naming is due to the emotional salience of the words then it should improve with treatment that reduces the emotional impact of these words. If it is related to patients' familiarity with the issues represented by these words then treatment for the eating disorder which focuses on these issues and which thus increases familiarity should also increase interference. A subsidiary question is whether cognitive behavioural treatment operates through mechanisms specific to that treatment. If it does then it might be expected to result in greater

improvement in colour-naming than other treatments.

7.12 Aims

The main aim was to investigate whether the colour-naming of words related to eating, weight and shape changes with successful treatment. A subsidiary aim was to investigate whether this colour-naming changes differently according to type of treatment received.

7.13 Overview

Patients with bulimia nervosa were investigated and colour-naming times were measured before and after treatment. Time taken to colour-name words on a target card, i.e. words related to patients' concerns with eating, weight and shape was compared with time taken to colour-name words matched for length and frequency of use. A conflicting-colour word card was included to determine whether patients' ability to perform a difficult colour-naming task also changed with treatment. Patients received one of three psychological treatments. These were behaviour therapy, cognitive behaviour therapy and interpersonal psychotherapy. Behaviour therapy focussed on changing behavioural aspects of the eating disorder, cognitive behaviour therapy on changing cognitive as well as behavioural aspects while interpersonal psychotherapy focussed on altering the quality of interpersonal relationships.

7.14 Predictions

Cognitive theories of eating disorders would argue that interference with colour-naming eating, weight and shape related words is related to the emotional salience of these words. If this hypothesis is correct it predicts that scores on the target word card will improve more with treatment than

scores on the control or colour cards. However, if the familiarity hypothesis is correct and colour-naming is related to patients' familiarity with the issues represented by the words to be colour-named then scores on the target card should increase more with treatment than scores on the colour or control cards. If cognitive behavioural treatment operates through mechanisms specific to that treatment then scores should change differently according to type of treatment received. Specifically it was predicted that greater improvement would occur on the target word card than on the control or conflicting-colour word card in the group receiving cognitive behaviour therapy than in those receiving behaviour therapy or interpersonal psychotherapy.

7.2

Method

7.21 Subjects

Sixty patients with bulimia nervosa were investigated. They had all been referred by local general practitioners and psychiatrists for the treatment of bulimia nervosa. All patients were entered into a treatment trial comparing three psychological treatments for the disorder, behaviour therapy, cognitive behaviour therapy and interpersonal psychotherapy. Table 7.1 is reproduced from Fairburn et al. (1991a) to show the common and distinctive features of the three treatments.

Table 7.1
Comparison of the three forms of treatment

Features in common

Treatment structure (i.e. number and frequency of treatment sessions)
Amount of therapist-patient contact
Provision of a rational and the instillation of hope
Focus on the "here and now"

Distinctive Features

	BT	CBT	IPT
Behavioural formulation of bulimia nervosa	+	-	-
Self-monitoring	+	+	-
Education about healthy eating habits	+	+	-
Introduction of a pattern of regular eating	+	+	-
Stimulus control techniques	+	+	-
Graded introduction of avoided foods	+	+	-
Training in problem solving	+	+	-
Preparation for difficulties in future	+	+	-
Cognitive formulation of bulimia nervosa	-	+	-
Cognitive restructuring	-	+	-
Education about shape and weight	-	+	-
Focus on attitudes to shape and weight using behavioural and cognitive procedures	-	+	-
Focus on other cognitive distortions	-	+	-
"Relapse prevention" procedures	-	+	-
Interpersonal formulation of bulimia nervosa	-	-	+
Review of interpersonal context in which the eating disorder developed	-	-	+
Identification and focus on current interpersonal problems	-	-	+
Explicit emphasis on termination and its implications	-	-	+
Preparation for future difficulties and emphasis on the patients' independent competence	-	+	+

BT = Behaviour Therapy. CBT = Cognitive Behaviour Therapy. IPT =
Interpersonal Psychotherapy.

Seventy five patients initially entered treatment; those investigated here were those who completed the full course of treatment. At the beginning of treatment all met the proposed DSM-III-R criteria for a diagnosis of bulimic disorder (American Psychiatric Association, 1985). In addition, all but eight met a strict operational definition of bulimia nervosa based on these criteria (Fairburn, 1987). All the patients were female, aged 17 or over and with a weight greater than a Body Mass Index (BMI) score of 17. (BMI = weight in kg/(height in m)²). Each patient was assessed twice, once immediately before starting treatment and once after completing treatment.

7.22 Measures

Information was obtained before treatment on demographic features, eating habits and attitudes to eating, weight and shape, general psychopathology and social adjustment. The measures used are reported in Fairburn et al. (1991a). Demographic features assessed included age, height and weight. Eating habits and attitudes to eating, weight and shape were assessed using the Eating Disorder Examination (EDE; Cooper & Fairburn, 1987), an investigator based semi-structured interview measure of the characteristic psychopathology of eating disorders and the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979), a self-report questionnaire measure of the symptoms of eating disorders. The Symptom Checklist - 90 (SCL-90; Derogatis et al., 1973) and the Beck Depression Inventory (BDI; Beck et al., 1961), two self-report questionnaire measures were used to assess general psychopathology and depression in particular. Social adjustment was assessed using the self-report version of the Social Adjustment Scale (SAS; Cooper, Osborn, Gath & Feggetter, 1982) which provides a measure of functioning in a range of role areas.

7.23 Materials

The Stroop colour-naming cards. Three cards were used, constructed exactly as described in Chapter 4. As before the following words were used:

- (i) Conflicting-colour card: orange, red, blue, green, brown.
- (ii) Target card: fat, diet, thighs, cakes, hips.
- (iii) Control card: sit, dare, filter, tower, wool.

7.24 Procedure

Each patient proceeded through the experiment in the same way. Each was assessed once immediately before starting treatment and once immediately after treatment. At each assessment point the interview based measure, the EDE, was completed by one of two trained assessors. The colour-naming measures were administered after the interview data had been collected. With the exception of the EAT in the pre-treatment assessment, which was completed prior to the EDE, the self-report questionnaires were all completed a few days later.

Instructions for the colour-naming tasks were exactly as described in Chapter 4. The time that each subject took to colour-name the 100 words on each card was recorded using a stopwatch.

For 45 of the patients the three cards were presented in a balanced order to control for any possible order effects. As described in Chapter 4, a 3 x 6 (treatments x sequences) design was used. The 3 x 6 design was repeated in a new random order each time until all 45 patients had been allocated an individual order of presentation of the three cards. Two patients did not complete the colour-naming, thus there were 43 patients for whom the cards had been presented in balanced order. In the remaining 15 patients the cards were presented in the same fixed order to each subject, as they had been in the preliminary study described in Fairburn et al. (1991b).

7.25 Order effects

To determine whether it was valid to amalgamate the two groups and perform further analyses including all 58 of the patients who completed the colour-naming tasks order effects were assessed in the 43 patients for whom cards had been presented in a balanced order. Two separate analyses of variance were carried out to test for possible order effects. Effect of ordinal position was assessed with a one way analysis of variance. Effect of order sequence was assessed with a two way 6 x 3 (order sequence x card) analysis of variance with repeated measures on the second factor. Ordinal position (i.e. whether the cards were read first, second or third), order sequence (i.e. whether the cards were read in any one of the six possible sequences making up each of the blocks in the experimental design) and order sequence x card did not yield a significant result. All F values were less than 1 except that for order sequence x card ($F(10,74) = 1.85$, NS). Thus it was deemed valid to amalgamate the two groups and further analyses were therefore performed using all 58 patients.

7.26 Data analysis

Colour-naming times. Since distributions of the colour-naming times were not normal and variances were significantly different all analyses were performed on transformed scores. As before the appropriate transformation suggested by the data was that of the reciprocal, which represents the speed of colour-naming (i.e. number of words colour-named per second). The transformed scores met the assumptions necessary for valid analyses of variance.

Main analyses. Two analyses were performed. To discover whether scores on the target word card changed more with treatment than scores on the other two cards a two way 2 x 3 (time x card) within factors analysis of variance with repeated measures on both factors was performed. Post hoc tests (Tukey

Honestly Significant Difference Tests) were then carried out to assess differences between pairs of conditions. To discover whether scores changed more with treatment on the target card than on the other two cards in the group receiving cognitive-behaviour therapy than in the groups receiving behaviour therapy and interpersonal psychotherapy, a three way $3 \times 3 \times 2$ (treatment group $\times$ card $\times$ time) analysis of variance with repeated measures on the second and third factors was performed.

7.3

Results

7.3.1 Subject characteristics

The mean age of the sample at the beginning of treatment was 24.5 ± 5.7 years. Information on the main outcome variables for the three groups before and after treatment is shown in Table 7.2. Because scores for frequency of objective bulimic episodes, frequency of self-induced vomiting and laxative misuse were not normally distributed all the analyses reported here which used these variables were performed using logarithmic transformed scores. In order to determine the overall effect of treatment a 3×2 (treatment group $\times$ time) analysis of variance with repeated measures on the second factor was performed for each of the outcome variables. These analyses showed a main effect of time on each variable, thus treatment resulted in a statistically significant effect ($p < .05$) on all measures of psychopathology and social adjustment. In order to determine the differential effects of the three treatments an analysis of covariance was conducted for each outcome variable with the pretreatment level as the covariate. The results of these analyses are presented in Table 7.2.

Table 7.2

Effects of the three treatments on the main outcome variables

		BT		IPT		CT		F	p
		X	SD	X	SD	X	SD		
Objective bulimic episodes ¹	pre	14.9	-	16.4	-	18.1	-	0.71	NS
	post	1.3	-	1.8	-	0.6	-		
Dietary Restraint ²	pre	3.3	1.4	3.3	0.9	3.7	1.3	3.22	.05
	post	2.3 ^a	1.4	2.1 ^a	1.3	1.3 ^b	1.3		
Self-induced vomiting ¹	pre	18.5	-	16.4	-	28.5	-	3.96	.03
	post	0.9	-	5.5	-	1.5	-		
Laxative misuse ¹	pre	13.1	-	13.7	-	4.7	-	0.14	NS
	post	1.4	-	2.3	-	0.3	-		
Body Mass Index	pre	22.7	3.1	22.2	2.5	22.4	3.5	2.05	NS
	post	23.0	3.3	22.2	3.3	23.3	4.3		
Attitudes to shape ²	pre	4.0	1.3	3.6	1.4	4.1	1.3	4.90	.01
	post	3.3 ^a	1.5	2.6 ^{ab}	1.2	2.1 ^b	1.2		
Attitudes to weight ²	pre	3.8	1.3	3.7	1.6	4.3	1.3	5.29	.008
	post	2.9 ^a	1.4	2.4 ^a	1.2	1.7 ^b	1.2		
Eating Attitudes Test	pre	50.2	13.1	46.1	16.1	45.4	14.3	4.11	.02
	post	27.8 ^a	17.1	29.0 ^a	20.5	15.5 ^b	13.9		
SCL-90 (global severity index)	pre	1.3	0.7	1.3	0.6	1.35	0.7	0.69	NS
	post	0.7	0.7	0.7	0.5	0.6	0.6		
Beck Depression Inventory	pre	22.3	11.6	24.3	12.4	24.1	8.8	0.70	NS
	post	13.6	12.0	12.4	10.8	10.1	10.7		
Social Adjustment Scale (role area)	pre	2.5	0.7	2.5	0.4	2.5	0.5	0.46	NS
	post	2.2	0.5	2.2	0.4	2.1	0.5		

Within each measure means with different superscripts are significantly different from each other.

BT = Behaviour Therapy, IPT = Interpersonal Psychotherapy, CT = Cognitive Behaviour Therapy.

¹Geometric means and frequency per 28 days (N = 43 for vomiting; N = 19 for laxative misuse). Individual items from the Eating Disorder Examination.

²Eating Disorder Examination subscales.

SCL-90 = Symptom Checklist - 90.
Body Mass Index = weight in kg/(height in m)².

As can be seen in Table 7.2 the three treatments had different effects on some aspects of the specific psychopathology. Cognitive behaviour therapy had a greater effect than interpersonal psychotherapy on dietary restraint, self-induced vomiting, score on the EAT and attitudes to weight. Compared with behaviour therapy, cognitive behaviour therapy had a greater effect on dietary restraint, score on the EAT and attitudes to shape and weight. There were no differences between treatments on measures of overeating, general psychopathology or social adjustment. Since cognitive behaviour therapy is the only treatment which focuses on attitudes to shape and weight and these changed most in those receiving that treatment the results thus provide some support for the hypothesis (to be tested in more detail here) that cognitive behaviour therapy operates through mechanisms specific to that treatment.

7.32 Colour-naming times before and after treatment

Mean speed of colour-naming each card (number of words colour-named per second) before and after treatment are shown in Table 7.3. For ease of comparison with data reported in other studies using the Stroop methodology mean raw times (number of seconds taken to colour-name all the words on each card) are presented in Table 7.4.

Table 7.3

Mean speed of colour-naming each card (number of words colour-named per second) before and after treatment.

	Before treatment		After treatment	
	X	SD	X	SD
Colour card	0.96	0.19	1.10	0.24
Control card	1.31	0.23	1.43	0.25
Target card	1.17	0.24	1.36	0.28

N = 58.

Table 7.4

Mean raw times (number of seconds taken to colour-name the words on each card) before and after treatment

	Before treatment		After treatment	
	X	SD	X	SD
Colour card	108.1	23.6	95.5	22.9
Control card	79.7	21.4	72.3	14.4
Target card	90.4	25.6	76.9	17.5

N = 58.

The two way (time x card) analysis of variance with repeated measures on both factors revealed a main effect of time ($F(1,57) = 77.8, p < .0001$).

This indicated that there was a significant increase in speed of colour-naming with treatment. Post hoc comparisons showed that the speed of colour-naming of all three cards, including the control card, increased with treatment ($p < .01$ for all three comparisons). The card main effect was also highly significant ($F(2,114) = 220.2, p < .0001$). Post hoc tests showed that it took significantly longer to colour-name the conflicting colour card than the target card which in turn took longer than the control card ($p < .01$ for both comparisons). However, most important of all there was a significant time x card interaction ($F(2,114) = 4.9, p < .009$). This suggested that before treatment patients with bulimia nervosa were slower to colour-name words on the target (and colour) card than they were to colour-name words on the control card. However, after treatment the difference between the target card and the control card but not that between the colour and the control card, disappeared. Post hoc tests confirmed this finding showing that before treatment patients took longer to colour-name both the target and the colour card than the control card ($p < .01$ for both comparisons) whereas only the difference between the colour and control cards was significant after treatment ($p < .01$).

Since there was an overall increase in speed of colour-naming with treatment, even on the control card, this makes it difficult to make a direct comparison between the speed of colour-naming each card before treatment and the speed of colour-naming each card after treatment. The overall increase in speed with treatment was therefore taken into account by computing two interference indices, one for the colour card and one for the target card exactly as described in Chapter 4.

The two interference indices were computed using the transformed scores, to represent the amount of disruption caused to colour-naming times by the target and colour words when compared to the control words. They were

computed as follows:

- (i) A target interference index. This represents speed of colour-naming the words on the target card minus speed of colour-naming the words on the control card.
- (ii) A colour interference index. This represents speed of colour-naming the words on the colour card minus the speed of colour-naming the words on the control card.

Mean scores for the patients before and after treatment on the target interference index and the colour interference index are shown in Table 7.5. Mean raw times on both indices (disruption measured in seconds) are shown in Table 7.6.

Table 7.5

Mean scores on the colour and target interference indices (disruption measured in speed of colour-naming) before and after treatment

	Before Treatment		After Treatment	
	X	SD	X	SD
Colour Interference Index	-0.35	0.14	-0.33	0.16
Target Interference Index	-0.14	0.14	-0.07	0.15

N = 58.

Table 7.6

Mean raw scores on the colour and target interference indices (disruption measured in number of seconds) before and after treatment

	Before Treatment		After Treatment	
	X	SD	X	SD
Colour Interference Index	28.3	14.6	23.2	13.7
Target Interference Index	10.7	11.6	4.6	8.9

N = 58.

Analysis of variance revealed a main effect of time ($F(1,57) = 4.5, p < .04$). This indicated that the patients showed significantly less interference with colour-naming after treatment than before treatment. There was a significant main effect of interference index ($F(1,57) = 152.4, p < .02$), with the colour interference index causing greater interference with colour-naming than the target interference index. Most important of all there was a significant time x interference index interaction ($F(1,57) = 5.3, p < .03$). This interaction is illustrated in Figure 7.1. Post hoc tests revealed that the colour card caused a similar amount of interference with colour-naming both before and after treatment while the target card caused significantly greater interference with colour-naming before treatment than after treatment ($p < .01$).

7.33 Colour-naming times before and after each of the three treatments

Mean speeds of colour-naming each card (number of words colour-named per second) before and after each of the three treatments are shown in Table

7.7. Mean raw scores (number of seconds taken to colour-name the words on each card) are shown in Table 7.8.

Figure 7.1

Disruption in colour-naming target and control words in patients with bulimia nervosa before and after treatment

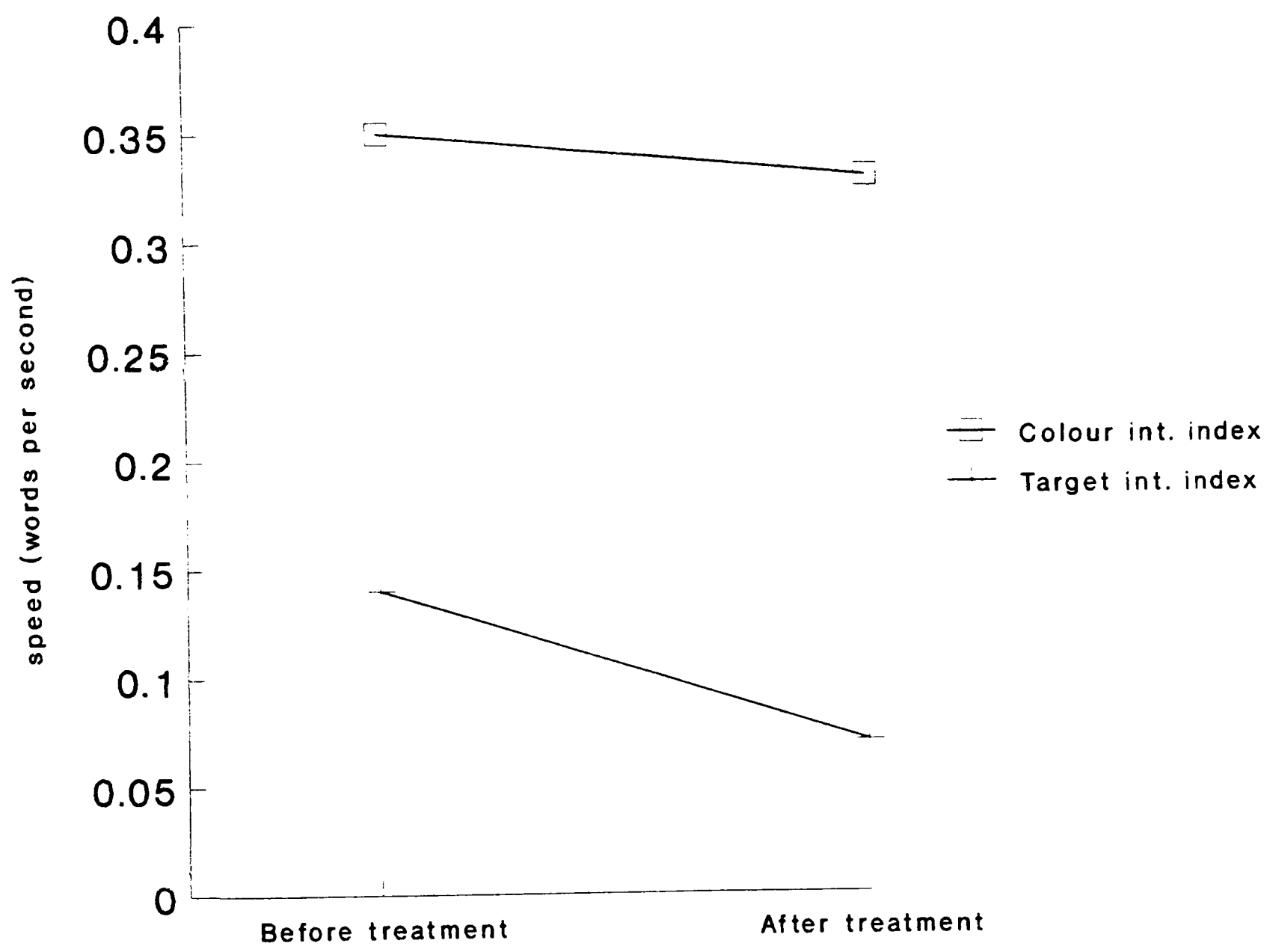


Table 7.7

Mean speeds of colour-naming (number of words colour-named per second) for each of the three cards before and after each of the three treatments

	Before Treatment		After Treatment	
	X	SD	X	SD
Behaviour Therapy				
Colour card	1.02	0.21	1.20	0.27
Control card	1.40	0.23	1.50	0.25
Target card	1.20	0.20	1.40	0.24
Cognitive Behaviour Therapy				
Colour card	1.00	0.16	1.10	0.21
Control card	1.30	0.21	1.40	0.25
Target card	1.20	0.24	1.40	0.28
Interpersonal Psychotherapy				
Colour card	0.90	0.17	1.00	0.24
Control card	1.20	0.25	1.40	0.24
Target card	1.10	0.27	1.30	0.31

N = 18 for Behaviour Therapy, N = 20 for Cognitive Behaviour Therapy and for Interpersonal Psychotherapy.

Table 7.8

Mean raw scores (number of seconds taken to colour-name all the words on a card) for each of the three cards before and after each of the three treatments

	Before Treatment		After Treatment	
	X	SD	X	SD
Behaviour Therapy				
Colour card	102.9	18.5	89.3	21.4
Control card	75.3	16.9	68.1	15.1
Target card	84.5	27.9	71.8	19.1
Cognitive Behaviour Therapy				
Colour card	103.9	23.6	95.0	20.8
Control card	78.2	13.9	72.1	12.9
Target card	88.5	13.9	76.0	11.8
Interpersonal Psychotherapy				
Colour card	116.9	26.4	101.6	25.6
Control card	85.3	29.3	76.3	14.7
Target card	97.6	30.4	82.3	19.3

N = 18 for Behaviour Therapy, N = 20 for Cognitive Behaviour Therapy and Interpersonal Psychotherapy.

The three way (treatment group x card x time) analysis of variance with repeated measures on the second and third factors revealed no significant three way interaction. ($F(4,110) < 1$). This indicated that there was no difference between the three treatments and colour-naming on each of the

three cards before and after treatment. Thus, contrary to predictions, there was no evidence that colour-naming scores improved most in those receiving cognitive-behaviour therapy and, therefore, no support for the hypothesis that cognitive behaviour therapy operates through mechanisms specific to that treatment. However, an alternative way to investigate this hypothesis is to examine the relationship between change scores on the colour-naming task and change on other symptom measures. This may be a more sensitive measure since a greater range of scores may be available than is obtained by using differences between treatments at the end of treatment. If cognitive-behaviour therapy operates through mechanisms specific to that treatment then one would predict a closer relationship between change on a measure of the cognitive disturbance, selective information processing, and change in other symptom measures in those treated with cognitive behaviour therapy than in those treated with other forms of therapy. To investigate this possibility correlations were performed separately for each treatment between change in interference with colour-naming on the target card and change on the various measures used to assess treatment outcome. Interference with colour-naming was measured using two forms of the Target Interference Index. These were calculated exactly as described in Chapter 5. One was uncorrected (Target Interference Index a) and one was corrected for time taken to colour-name the words on the target card and control card (Target Interference Index b). The results of these correlations can be seen in Tables 7.9 to 7.11.

Table 7.9

Correlations between change in the two target interference indices and change in the outcome measures with treatment in those receiving behaviour therapy

	Target Interference Index a	Target Interference Index b
Objective bulimic episodes ^{1 4}	-0.59*	-0.55*
Dietary Restraint ⁵	-0.62**	-0.61**
Self-induced vomiting ^{2 4}	-0.49*	-0.49*
Laxative misuse ^{3 4}	-0.00	-0.05
Shape Concern ⁵	-0.37	-0.34
Weight Concern ⁵	-0.53*	-0.51*
Eating Attitudes Test	-0.45	-0.46
SCL-90 (global severity index)	-0.45	-0.43
Beck Depression Inventory	-0.48*	-0.48*
Social Adjustment Scale (role area score)	0.11	0.08

N = 18. ¹N = 17. ²N = 13. ³N = 7.

⁴Eating Disorder Examination individual items.

⁵Eating Disorder Examination subscales.

SCL-90 = Symptom Checklist - 90.

* p < .05, ** p < .01.

Table 7.10

Correlations between change in the two target interference indices and change in the outcome measures with treatment in those receiving interpersonal psychotherapy

	Target Interference Index a	Target Interference Index b
Objective bulimic episodes ^{1 4}	-0.24	-0.25
Dietary Restraint ⁵	0.14	0.07
Self-induced vomiting ^{2 4}	-0.01	-0.03
Laxative misuse ^{3 4}	-0.36	-0.36
Shape Concern ⁵	-0.22	-0.24
Weight Concern ⁵	-0.17	-0.20
Eating Attitudes Test	0.16	0.07
SCL-90 (global severity index)	-0.03	-0.07
Beck Depression Inventory	-0.21	-0.21
Social Adjustment Scale (role area score)	-0.05	-0.11

N = 20. ¹N = 19. ²N = 15. ³N = 6.

⁴Eating Disorder Examination individual items.

⁵Eating Disorder Examination subscales.

SCL-90 = Symptom Checklist - 90.

Table 7.11

Correlations between change in the two target interference indices and change in the outcome measures with treatment in those receiving cognitive behaviour therapy

	Target Interference Index a	Target Interference Index b
Objective bulimic episodes ³	-0.39	-0.46*
Dietary Restraint ⁴	-0.36	-0.35
Self-induced vomiting ^{1 3}	-0.22	-0.27
Laxative misuse ^{2 3}	0.10	0.06
Shape Concern ⁴	-0.27	-0.23
Weight Concern ⁴	-0.39	-0.31
Eating Attitudes Test	-0.49*	-0.44*
SCL-90 (global severity index)	-0.52*	-0.42
Beck Depression Inventory	-0.47*	-0.41
Social Adjustment Scale (role area score)	-0.58**	-0.48*

N = 20. ¹N = 14. ²N = 5.

³Eating Disorder Examination individual items.

⁴Eating Disorder Examination subscales.

SCL-90 = Symptom Checklist - 90.

* = p < .05, ** = p < .01.

As can be seen in Tables 7.9 to 7.11 significant correlations were observed between change in the interference indices and change in measures of the symptoms of eating disorders in the groups which had received behaviour

therapy and cognitive behaviour therapy but not in the interpersonal psychotherapy group.

7.4

Discussion

7.41 Colour-naming times before and after treatment

The most important finding in this analysis was the significant time x card interaction. This suggested that the patients were faster to colour-name words on the target card after treatment than they were to colour-name words on this card before treatment. However, since they were faster in general at colour-naming after treatment this made it difficult to compare speed of colour-naming words on the target card before and after treatment directly. When the overall difference with treatment was taken into account by using the interference indices words relevant to patients' concerns with eating, weight and shape resulted in greater interference with colour-naming before than after treatment. Colour words, however, resulted in a similar amount of interference on both occasions. This suggests that patients with bulimia nervosa show selective processing of information relevant to their concerns with eating, weight and shape before but not after improvement with treatment. The amount of interference with colour-naming caused by the target card after treatment is similar to the amount of interference experienced by the normal controls tested in Chapter 4. In this chapter mean amount of interference with colour-naming words on the target card in the normal controls was 0.07 for speed and 4.1 for number of seconds. This compares with mean scores of 0.07 for speed and 4.6 for number of seconds in the patients tested here after treatment. The finding that interference with colour-naming on the target card improves with treatment is consistent with the hypothesis that this interference is related to the emotional salience of

the words rather than to patients' familiarity with the issues represented by the words. It is unlikely that the improvement in colour-naming observed on this card is simply the result of retesting or practice since there was no equivalent improvement in colour-naming the words on the colour card. The finding that interference with colour-naming on the target card changes with treatment also provides further support for the potential usefulness of this task as an objective measure of one aspect of the cognitive disturbance in patients with eating disorders.

7.42 Differences between the three treatments in effect on colour-naming times

Analysis of the outcome measures used in the treatment trial showed greater change in measures of the specific psychopathology of eating disorders, particularly in attitudes to shape and weight, in patients treated with cognitive behavioural therapy than in those treated with either behaviour therapy or interpersonal psychotherapy. These findings provide some support for the hypothesis that cognitive behaviour therapy operates through mechanisms specific to that treatment. However, when change in colour-naming times with treatment was examined there was no significant three way interaction in the three way (treatment group x card x time) analysis of variance. This indicates that there was no differential change in colour-naming times for the three cards depending on the type of treatment received and thus no evidence that cognitive behaviour therapy results in greater improvement in colour-naming the words on the target card than the other two treatments. These findings do not, therefore, support the hypothesis that cognitive behaviour therapy operates through mechanisms specific to that treatment. An alternative method was used to test this hypothesis using an analysis in which change in scores on the colour-naming

task with treatment were correlated with change scores on other symptom measures for the three treatments separately. If cognitive behaviour therapy operates through mechanisms specific to that treatment then a closer relationship between change in interference with colour-naming and change on other symptom measures should be observed in those treated with cognitive behaviour therapy than in those treated with behaviour therapy or interpersonal psychotherapy. The results of this analysis showed that change in interference with colour-naming on the target card was related to several outcome measures in the behaviour therapy group and in the cognitive behaviour therapy group but not in the interpersonal psychotherapy group. Since these relationships were found in both the behaviour therapy and cognitive behaviour therapy groups the findings do not provide conclusive evidence to support the hypothesis that cognitive behaviour therapy operates through mechanisms specific to that treatment. However, it does suggest that treatments which focus primarily on altering behavioural and attitudinal aspects of eating, weight and shape, such as behaviour therapy and cognitive behaviour therapy, operate through their focus on these issues whereas treatments that do not focus primarily on issues of eating, weight and shape, such as interpersonal psychotherapy, operate through different mechanisms. It should be noted that since this conclusion is based on comparisons of correlations that are significant in one group but not another and not on direct comparisons between the three groups the data are only consistent with this conclusion and do not provide firm evidence. The next chapter will test another prediction that follows from cognitive theories of eating disorders.

Chapter 8

The role of selective information processing in predicting outcome at 12 month follow-up in patients treated for bulimia nervosa

8.1 Introduction

8.11 Context

As would be predicted by cognitive theories of eating disorders, the previous chapter showed that interference with colour-naming words related to patients' concerns with eating, weight and shape appears to be related to the emotional salience of the words to be colour-named rather than to patients' familiarity with the issues represented by the words. In addition, the relationship between this interference and other symptoms showed that cognitive behaviour therapy and behaviour therapy, but not interpersonal psychotherapy, may operate through their focus on issues of eating, weight and shape. The present chapter tests another prediction that follows from cognitive theories of eating disorders; if the cognitive disturbance is of primary importance in the maintenance of eating disorders then it should predict relapse in symptoms after treatment for bulimia nervosa.

8.12 Aims

This study investigated whether selective processing of information related to patients' concerns with eating, weight and shape at the end of treatment predicted general outcome 12 months after treatment.

8.13 Overview

Patients with a diagnosis of bulimia nervosa were studied. Colour-naming times were measured before and after treatment. Other variables that

might be expected to predict general outcome were also measured, either at both of these points or before treatment. A global outcome score was calculated at all three assessment points, i.e. before treatment, after treatment and at 12 month follow-up. This score was based on detailed semi-structured interview data.

8.14 Predictions

Since cognitive theories argue that the cognitive disturbance is a potential determinant of the course of bulimia nervosa it was predicted that disruption in colour-naming words related to patients' concerns at the end of treatment would predict global outcome 12 months after treatment.

Because any possible relationship found between selective processing and global outcome could be explained simply as symptoms predicting symptoms, i.e. selective processing could be related to global outcome at 12 month follow-up simply through the relationship of both to global outcome at the end of treatment, it was also predicted that this relationship would still be present when the relationship between symptoms at the end of treatment and symptoms 12 months later was taken into account.

8.20

Method

8.21 Subjects

Seventy-five patients with bulimia nervosa had begun treatment. Each patient received one of three treatments, either behaviour therapy, cognitive behaviour therapy or interpersonal psychotherapy. Fifty-two completed treatment and remained to be assessed at 12 month follow up. Follow up assessments were conducted by two trained assessors who were blind to type of treatment received. Two patients had received further treatment during the

follow up period. Their scores were not included in the analyses reported here. This left a total of 50 patients who were investigated. All had met the proposed DSM-III-R criteria for a diagnosis of bulimia nervosa (American Psychiatric Association, 1987). All but seven had met a strict operational definition of bulimia nervosa based on these criteria (Fairburn, 1987). Patients were all female, aged 17 or over with a weight greater than a Body Mass Index (BMI) score of 17. ($\text{BMI} = \text{weight in kg}/(\text{height in m})^2$).

8.22 Measures

Demographic measures. Information was obtained on age, height and weight and score on the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979), a self-report measure of the symptoms of eating disorders.

Predictor variables and outcome measure. Information was obtained on colour-naming times and on three variables that have been related to outcome in patients with bulimia nervosa. These were duration of illness (Hsu & Holder, 1986), lowest body weight (Wilson et al., 1986) and self-esteem (Fairburn, Kirk, O'Connor, Anastasiades & Cooper, 1987). Treatment group, i.e. which one of three treatments patients had received was also included as a predictor variable, since it is possible that different treatments could have a differential influence on outcome. Self-esteem was measured using the Rosenberg Self-Esteem Scale, a self-report measure (RSE; Rosenberg, 1965). Duration of illness and lowest body weight (BMI) were assessed once, during the initial pretreatment interview. A global outcome score (GOS) was computed from scores on the five subscales of the Eating Disorder Examination (EDE; Cooper & Fairburn, 1987). The subscales used were Restraint, Bulimia, Eating Concern, Weight Concern and Shape Concern. Items contributing to the scores on each of these subscales are given in Appendix 9. Scores on each of the subscales were added together and divided by five to give a single

outcome score.

8.23 Materials

The Stroop colour-naming cards. Three cards were used, one for each task. They were constructed exactly as described in Chapter 4. As before the following words were used:

- (i) Conflicting-colour card: orange, red, blue, green, brown.
- (ii) Target card: fat, diet, thighs, cakes, hips.
- (iii) Control card: sit, dare, filter, tower, wool.

8.24 Procedure

Each patient proceeded through the experiment in the same way. Interview based measures, i.e. the items contributing to the subscales of the EDE, were completed at each point of assessment by one of two trained assessors. At each assessment point the colour-naming measures were administered after the interview data had been collected. The self-report questionnaires were then given to patients to be completed in their own time and were returned at a later date.

Instructions for the colour-naming tasks were exactly as described in Chapter 4. The time that each subject took to colour-name the 100 words on each card was recorded using a stopwatch.

For 37 of the patients with bulimia nervosa the three cards were presented in a balanced order to control for any possible order effects. As described in Chapter 4, a 3 x 6 (treatments x sequences) design was used. The 3 x 6 design was repeated in a new random order each time until all 37 patients had been allocated an individual order of presentation of the three cards. At the end of treatment there were two patients who did not complete the colour-naming, thus there were 35 patients at this assessment point for

whom the cards had been presented in balanced order. In the remaining 13 patients the cards were presented in the same fixed order to each subject, as they had been in the preliminary study described in Fairburn et al. (1991b).

8.25 Order effects

It was necessary to determine whether it was valid to amalgamate the two groups in which cards had been presented using the two different methods. To achieve this order effects were assessed in the 37 patients for whom cards had been presented in a balanced order. Two separate analyses of variance were carried out to test for possible order effects. Effect of ordinal position was assessed with a one way analysis of variance. Effect of order sequence was assessed with a two way 6 x 3 (order sequence x card) analysis of variance with repeated measures on the second factor. Ordinal position (i.e. whether the cards were read first, second or third), order sequence (i.e. whether the cards were read in any one of the six possible sequences making up each of the blocks in the experimental design) and order sequence x card did not yield a significant result. All F values were less than 1 except that for order sequence x card ($F(10,62) = 1.64$, NS). Thus it was deemed valid to amalgamate the two groups and further analyses were performed using all 48 patients who completed the colour-naming at the end of treatment.

8.26 Data analysis

Colour-naming times. Since distributions of the colour-naming times were not normal and variances were significantly different all analyses were performed on transformed scores. As before the data were transformed using the reciprocal which represents the speed of colour-naming (i.e. number of words colour-named per second). The transformed scores met the assumptions

necessary for valid analyses of variance. Using the reciprocals two measures of interference with colour-naming on the target card were computed to represent the amount of disruption caused to colour-naming time by the target words when compared to the control words. These were calculated exactly as described in Chapter 5. One was uncorrected (Target Interference Index a) and one was corrected for time taken to colour-name the words on the target card (Target Interference Index b).

Clinical predictors and outcome measure. Scores for duration of bulimia nervosa, Body Mass Index and global outcome score were not normally distributed. The distribution of global outcome score was normalised using logarithmic transformations and all analyses used the transformed scores. Transformations did not normalise the distributions for duration of illness or Body Mass Index thus analyses were performed using raw scores for these variables.

Main analyses. To see whether interference with colour-naming was related to global outcome at 12 month follow-up Pearson product moment correlations were performed between the two target interference indices and global outcome score 12 months after treatment. To see whether interference with colour-naming predicted global outcome score once global outcome score at the end of treatment had been taken into account two stepwise multiple regression analyses were performed forcing global outcome score at the end of treatment into the equation before interference with colour-naming. One analysis used the uncorrected version of the target interference index and the other used the corrected version.

8.30

Results

8.31 Demographic and clinical variables

Information on age, BMI and EAT at the beginning of treatment are presented in Table 8.1 below. BMI and EAT scores are also presented for the end of treatment and 12 month follow-up.

Table 8.1
Demographic variables

	Pre Treatment		Post Treatment		Twelve Month Follow-up	
	X	SD	X	SD	X	SD
Age (years)	24.2	5.1	-	--	-	--
Body Mass Index	22.4	3.1	23.0	3.7	22.6 ¹	2.8
EAT	46.6	15.2	21.0	16.6	18.2 ²	18.4

N = 50. ¹N = 47. ²N = 46.

Body Mass Index = weight in kg/(height in m²).

EAT = Eating Attitudes Test.

8.32 Predictor variables and outcome measure

Data on the two forms of the target interference index at each assessment point are given in Tables 8.2 and 8.3. Table 8.2 shows the reciprocal scores. For ease of comparison with other studies that have used the Stroop method Table 8.3 shows the raw scores.

Table 8.2

Target interference index a and b at each assessment point using reciprocals
(amount of disruption in colour-naming measured in number of words colour-
named per second)

	Pre Treatment		Post Treatment		Twelve Month Follow-up	
N	48		48		46	
	X	SD	X	SD	X	SD
Target IIa	-0.14	0.15	-0.06	0.15	-0.06	0.17
Target IIb	-0.06	0.06	-0.03	0.05	-0.02	0.06

Target IIa = Target Interference a. Target IIb = Target Interference b.

Table 8.3

Target interference index a and b at each assessment point using raw scores
(amount of disruption caused to colour-naming measured in number of seconds)

	Pre Treatment		Post Treatment		Twelve Month Follow-up	
N	48		48		46	
	X	SD	X	SD	X	SD
Target IIa	10.7	11.6	4.3	8.2	3.5	7.9
Target IIb	0.06	0.06	0.03	0.05	0.02	0.06

Target IIa = Target Interference a. Target IIb = Target Interference b.

Information on the other variables that were used to predict general

outcome at 12 month follow-up, including global outcome score (GOS), is presented in Table 8.4 for all assessment points.

Table 8.4

Predictor variables and global outcome score at each assessment point

	Pre Treatment		Post Treatment		Twelve Month Follow-up	
	X	SD	X	SD	X	SD
Rosenberg Self-Esteem	21.6	4.0	26.3	6.1	27.9 ¹	7.0
Duration of illness	6.9	5.2	-	-	-	-
Lowest Body Mass Index	18.7 ²	2.1	-	-	-	-
Global Outcome Score	3.4	1.0	1.6	1.0	2.2 ³	-

N = 50 except for ¹N = 49 and ²N = 48.

³Geometric mean.

Duration of illness = Duration of bulimia nervosa in years.

Body Mass Index = weight in kg/(height in m²).

8.33 End of treatment predictors

Both target interference indices at the end of treatment were significantly correlated with global outcome score 12 months after treatment (r = -.38, p < .01 for target interference index a and r = -.41, p < .005 for target interference index b).

Results of the two regression analyses, forcing global outcome score at the end of treatment in before score on the target interference index, can be seen in Table 8.5, with the analysis using target interference index a presented before the analysis using target interference b. An F to enter

value greater than 4.00 indicates significant predictors. Variables are listed in the order in which they entered the analyses. As can be seen in the table, in both analyses the only significant predictor of global outcome score at 12 month follow-up was global outcome score at the end of treatment. Neither of the target interference indices, nor any of the other variables that have been related to outcome in bulimia nervosa were significant predictors of outcome once the influence of global outcome score at the end of treatment had been removed.

Table 8.5

Amount of variance in global outcome score at 12 month follow-up explained by the end of treatment predictors using Target Interference Index a and b

Variable	Multiple R	RSQ	Change in RSQ	F ratio at entry	Std reg coeff	F ratio at final	r
Global outcome score	0.74	0.54	0.54	51.13	0.74	17.90	0.74
Target Int Index a	0.76	0.58	0.03	3.17	-0.18	0.23	-0.35
Lowest Body Mass Index	0.77	0.60	0.02	2.49	0.16	2.14	0.26
Duration of illness	0.78	0.61	0.008	0.85	0.10	0.95	-0.23
RSE	0.78	0.61	0.003	0.28	-0.08	3.18	-0.56
Treatment group	0.78	0.61	0.001	0.06	-0.03	0.06	-0.13
Global outcome score	0.74	0.54	0.54	51.13	0.74	17.77	0.74
Target Int Index b	0.76	0.58	0.03	3.42	-0.19	0.19	-0.38
Lowest Body Mass Index	0.77	0.60	0.02	2.35	0.15	2.01	0.26
Duration of illness	0.78	0.61	0.009	0.96	0.11	1.03	-0.23
RSE	0.78	0.61	0.002	0.24	-0.07	3.32	-0.56
Treatment group	0.78	0.61	0.001	0.04	-0.02	0.04	-0.13

N = 45.
Body Mass Index = weight in kg/(height in m²).
Duration of illness = Duration of bulimia nervosa in years.
RSE = Rosenberg Self-Esteem Scale.

Multiple R = multiple regression coefficient at each step.
RSQ = amount of variance accounted for by all the variables in the equation.
Change in RSQ = increase in variance due to that variable.
F ratio at entry = F ratio at point at which the variable was entered into the equation.
std reg coeff = standardised regression coefficient for that variable.
F ratio at final = F ratio at the final step, when the effects of all the variables have been taken into account.
r = correlation with the independent variable.

Because two of the subscales contributing to the global outcome score (weight concern and shape concern) appear to assess cognitive aspects of eating disorders it is possible that controlling for global outcome score at the end of treatment by entering it into the regression equation before the target interference index may effectively eliminate any relationship between the target interference index at the end of treatment and outcome at 12 months. To test this possibility the relationship between target interference index at the end of treatment and global outcome at 12 months, removing these two subscales (and using logarithmic transformations to normalise the distribution of the modified global outcome score), was examined using a Pearson product moment correlation. The result was highly significant ($r = -.39$, $p < .01$), using target interference index a and $r = -.40$, $p = .005$, using target interference index b).

Since this relationship could also be due simply to symptoms predicting symptoms, i.e. cognitive disturbance at the end of treatment could be related to global outcome score at 12 months through the relationship of both to global outcome score at the end of treatment, the relationship was examined taking into account the relationship between the global outcome score at the end of treatment and global outcome score 12 months later. This was achieved using two stepwise multiple regression analyses, forcing global outcome score at the end of treatment in before interference with colour-naming. One analysis used target interference index a and the other used target interference index b. Logarithmic transformed scores were used to normalise the distribution of global outcome score at the end of treatment. The results of the two analyses can be seen in Table 8.6 with the analysis using Target Interference Index a presented before that using Target Interference Index b. Variables are listed in the order in which they entered the analysis. An F to enter value greater than 4.00 indicates significant

predictors. As can be seen in the table the only significant predictor of global outcome score at 12 month follow-up was global outcome score at the end of treatment. As before, neither of the target interference indices, nor any of the other variables that have been related to outcome in bulimia nervosa were significant predictors of outcome once the influence of global outcome score at the end of treatment had been removed.

Table 8.6

Amount of variance in global outcome score at 12 month follow-up (with the cognitive subscales removed) explained by the end of treatment predictors using Target Interference Index a and b

Variable	Multiple R	RSQ	Change in RSQ	F ratio at entry	Std reg coeff	F ratio at final	r
Global outcome score	0.65	0.42	0.42	31.79	0.65	12.00	0.65
Target Int Index a	0.68	0.47	0.04	3.28	-0.21	3.00	-0.37
Lowest Body Mass Index	0.70	0.48	0.02	1.37	0.13	1.07	0.17
RSE	0.70	0.49	0.01	0.86	-0.13	1.04	-0.50
Duration of illness	0.71	0.50	0.007	0.58	0.09	0.53	-0.20
Treatment group	0.71	0.50	0.00	0.00	0.00	0.00	-0.10
Global outcome score	0.65	0.42	0.42	31.79	0.65	11.89	0.65
Target Int Index b	0.68	0.46	0.04	3.07	-0.21	2.65	-0.38
Lowest Body Mass Index	0.69	0.48	0.02	1.27	0.13	1.00	0.17
RSE	0.70	0.49	0.01	0.77	-0.13	0.95	-0.50
Duration of illness	0.71	0.50	0.01	0.61	0.10	0.55	-0.20
Treatment group	0.71	0.50	0.00	0.00	-0.005	0.00	-0.10

N = 45.

Body Mass Index = weight in kg/(height in m²).

Duration of illness = Duration of bulimia nervosa in years.

RSE = Rosenberg Self-Esteem Scale.

Multiple R = multiple regression coefficient at each step.

RSQ = amount of variance accounted for by all the variables in the equation.

Change in RSQ = increase in variance due to that variable.

F ratio at entry = F ratio at point at which the variable was entered into the equation.

std reg coeff = standardised regression coefficient for that variable.

F ratio at final = F ratio at the final step, when the effects of all the variables have been taken into account.

r = correlation with the independent variable.

An alternative explanation for the results found is that the target interference indices may not be very good measures of the cognitive disturbance in bulimia nervosa. This seems a likely explanation for the results found here, particularly in the light of the failure to find differential change with treatment in the preceding chapter. Two subscales of the EDE (weight concern and shape concern) provide an alternative way to assess this disturbance and it is possible that a measure based on these subscales might predict global outcome score (with these two subscales removed) at 12 month follow-up. To test this possibility the relationship between a composite measure of these two subscales (calculated by adding score on each subscale and dividing by two) at the end of treatment and global outcome score at 12 month follow-up was examined using a Pearson product moment correlation. The result was highly significant ($r = .55$, $p < .001$). As before, this relationship could be due simply to symptoms predicting symptoms, i.e. cognitive disturbance at the end of treatment could be related to global outcome score at 12 months through the relationship of both to global outcome score at the end of treatment. To test this possibility the relationship was examined taking into account the relationship between global outcome at the end of treatment and global outcome 12 months later. This was achieved using multiple regression analysis, including the variables chosen before as likely to be related to outcome but excluding the target interference indices. The results of this analysis, forcing global outcome score at the end of treatment in before score on the two cognitive subscales, can be seen in Table 8.7.

Table 8.7

Amount of variance in global outcome score at 12 month follow-up explained by the end of treatment predictors using the two EDE cognitive subscales

Variable	Multiple R	RSQ	Change in RSQ	F ratio at entry	Std reg coeff	F ratio at final	r
Global outcome score	0.65	0.42	0.42	33.03	0.65	11.54	0.65
EDE cognitive subscales	0.65	0.42	0.0005	0.04	0.04	0.69	0.53
Lowest Body Mass Index	0.67	0.45	0.02	1.72	0.16	2.13	0.17
RSE	0.68	0.46	0.01	1.16	-0.17	1.33	-0.48
Treatment group	0.68	0.46	0.004	0.32	-0.07	0.23	-0.10
Duration of illness	0.68	0.47	0.001	0.06	0.03	0.06	-0.19

N = 47.
EDE = Eating Disorder Examination.
Body Mass Index = weight in kg/(height in m²).
Duration of illness = Duration of bulimia nervosa in years.
RSE = Rosenberg Self-Esteem Scale.

Multiple R = multiple regression coefficient at each step.
RSQ = amount of variance accounted for by all the variables in the equation.
Change in RSQ = increase in variance due to that variable.
F ratio at entry = F ratio at point at which the variable was entered into the equation.
std reg coeff = standardised regression coefficient for that variable.
F ratio at final = F ratio at the final step, when the effects of all the variables have been taken into account.
r = correlation with the independent variable.

As before an F to enter value greater than 4.00 indicates significant predictors and variables are listed in the order in which they entered the regression equation. As can be seen in the table the only significant predictor of global outcome score at 12 month follow-up was global outcome score at the end of treatment. Neither the cognitive subscales of the EDE nor any of the other variables that might be related to outcome in bulimia

nervosa were significant predictors of outcome once the influence of global outcome score at the end of treatment had been removed.

8.4

Discussion

As predicted by cognitive theories of eating disorders, cognitive disturbance, measured here using selective processing of information related to eating, weight and shape, was significantly related to global outcome 12 months after treatment. However, since it is possible that this relationship simply reflects a significant relationship between global outcome score at the end of treatment and global outcome score at follow-up, multiple regression analysis was used to see whether the relationship remained significant once the influence of level of symptoms at the end of treatment was taken into account. The results showed that, contrary to predictions made by cognitive theories of eating disorders, selective processing of information related to eating, weight and shape was not a significant predictor of global outcome 12 months after treatment once level of symptoms at the end of treatment was taken into account.

One possible reason for the failure to find a significant relationship when global outcome score at the end of treatment was entered into the regression equation first is that the global outcome score included two subscales that appear to measure cognitive aspects of the disorder, thus it could be argued that controlling for global outcome score at the end of treatment eliminated any significant relationship between the target interference index and global outcome. However, when this possibility was tested by removing these two subscales from the global outcome score selective processing of information related to eating, weight and shape was not a significant predictor of outcome at 12 month follow-up.

Another possibility is that the target interference index may not be a very good measure of the cognitive disturbance in patients with eating disorders. To test this possibility an alternative measure, the two cognitive subscales of the EDE, was used to predict global outcome at 12 months after treatment. As would be predicted by cognitive theories of eating disorders this measure was significantly related to outcome. However, since this relationship could also simply reflect a significant relationship between global outcome at the end of treatment and global outcome at follow-up, multiple regression analysis was used to see whether the relationship remained significant when the influence of symptoms at the end of treatment was taken into account. Contrary to predictions made by cognitive theories of eating disorders, cognitive disturbance measured using the two cognitive subscales of the EDE, was not a significant predictor of global outcome 12 months after treatment once level of symptoms at the end of treatment was taken into account.

The next chapter will also examine the relationship between cognitive disturbance and the disturbed behaviour seen in patients with eating disorders. This time attitudes or the meanings attached by these patients to the key concepts of eating, weight and shape will be investigated using an experimental paradigm allowing more definite conclusions to be drawn about the hypothesis that disturbance in thinking precedes the disturbance in eating behaviour.

Chapter 9

An experimental study of the relationship between thoughts about eating, weight and shape and eating behaviour in patients with bulimia nervosa

9.1 Introduction

9.11 Context

Previous studies in this thesis have characterised the nature of the cognitive disturbance in eating disorders at the level of self-statements (Chapter 3) and information processing (Chapters 4 to 8) and correlated this disturbance with symptomatology. The results obtained have generally been consistent with cognitive theories. However, they do not provide a direct test of the hypothesis that cognitive disturbance is causally related to disturbed eating behaviour. In order to do this it is necessary to manipulate cognitions and measure the effect on eating behaviour. This is the concern of the present study.

9.12 Aims

The main aim of the study was to see whether activating the meanings that patients with bulimia nervosa attach to eating, weight and shape would affect their food consumption in a taste test.

9.13 Overview

Two groups of patients with a diagnosis of bulimia nervosa were investigated. One was an experimental group and one was a control group. The experimental group read pairs of words designed to activate the underlying meanings that patients with bulimia nervosa typically give to eating, weight and shape. The control group read pairs of words that were

not designed to activate these meanings. This experimental manipulation was based on one used by Clark and colleagues to induce panic attacks in patients with panic disorder (Clark, Salkovskis, Gelder, Koehler, Martin, Anastasiades, Hackmann, Middleton & Jeavons, 1988). Each patient then completed a task presented as a taste test in which the main interest was not the ratings given to the foods but the amount of food eaten.

9.14 Predictions

Since cognitive theories argue that attitudes to eating, weight and shape are important determinants of disturbed eating behaviour, particularly of dietary restraint which in turn precipitates binge eating (Fairburn et al., 1986a), it was predicted that patients in the experimental group would eat less than the control group in the short term, i.e. in the taste test, but that they might report more episodes of binge eating in the 24 hours following the experiment than the control group as a consequence of this increased restraint. It was also predicted that similar differences would be found between the two groups in self-report ratings of mood and eating behaviour with the experimental group rating their mood more negatively and reporting greater urges to restrict their food intake after reading the word pairs than patients in the control group. Finally, it was also predicted that self-statements and the processing of information about eating, weight and shape before and after reading the word pairs would be affected differently in the two groups.

9.2

Method

9.21 Subjects

Twenty four female subjects with a diagnosis of bulimia nervosa were

investigated. Eighteen were recruited by asking therapists to refer patients whom they were treating or were about to treat for bulimia nervosa. Six were recruited by placing posters and leaflets in libraries and University colleges asking for volunteers who experienced episodes in which they consumed large amounts of food and who compensated for these episodes by self-induced vomiting, taking laxatives or exercising. Four patients in the control group and two patients in the experimental group were recruited in this way. Three of those recruited by advertising, two in the control group and one in the experimental group, were also receiving treatment for bulimia nervosa. This meant that all but one patient in the control group and two patients in the experimental group were receiving or were about to receive treatment for bulimia nervosa. All subjects were told that the study was concerned with food preferences and taste perception and that it involved filling in some questionnaires and rating scales, a short colour-naming task, commenting on their thoughts and completing a taste test. To be included in the study subjects had to meet the DSM-III-R criteria for bulimia nervosa (American Psychiatric Association, 1987). All subjects also met Fairburn's operational definition of bulimia nervosa (Fairburn, 1987) which is based on these criteria.

9.22 Measures

Information was obtained on demographic and background features, including age, years in full-time education, weight and height. Diagnostic criteria were checked to ensure that each patient met the criteria for inclusion. Each subject completed the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979), a self-report measure of the symptoms of eating disorders, and the Beck Depression Inventory (BDI; Beck et al., 1961), a self-report measure of the symptoms of depression.

Visual analogue scales were used to collect information on mood and eating behaviour before and after reading the word pairs. Subjects also used visual analogue scales to rate the foods they tasted along four different dimensions.

Self-statements and information processing were assessed before and after reading the word pairs. Self-statements were collected using the concurrent verbalisation or "thinking aloud" procedure described in Chapter 3. Information processing was measured using the colour-naming tasks described in Chapter 4. There were three colour-naming tasks and one practice task.

(i) A standard conflicting-colour word task.

(ii) A target word task. This consisted of words relevant to the concerns of patients with eating disorders.

(iii) A control word task. This was made up of words matched as closely as possible with the target words in length and frequency of use.

Food intake and eating behaviour for the 24 hours after the experiment were recorded by each subject in a food diary.

9.23 Materials

Word pairs. Four sets of word pairs were constructed, two for the experimental condition and two for the control condition. One set of the experimental words consisted of negative aspects of the meaning of eating, weight and shape and the other consisted of positive aspects. Each word used in the experimental condition had a control word with which it was matched as closely as possible for length and frequency of use (Carroll, Davies & Richman, 1972). The word pairs used are shown in Table 9.1. Details of mean length (number of letters) and word frequency scores (standard frequency index) for the base words and paired words in each of the four sets can be

found in Appendix 9.

Table 9.1

Word pairs used in the experimental and control conditions

Experimental - negative pairs	Control pairs for negative pairs
fat - disgusting	flower - azalea
overweight - revolting	ceramics - artwork
stomach - horrible	alphabet - educational
chocolate - fattening	penny - francs
shape - ugly	soft - tones
Experimental - positive pairs	Control pairs for positive pairs
thin - confident	woods - conservation
control - successful	radio - songs
diet - good	communicate - write
weight loss - happy	examples - information
slim - attractive	bath - foam

Each set of word pairs was typed eight times in lower case letters on a sheet of A4 size paper. Pairs were presented in two columns of 20 word pairs each. Word pairs were arranged in a new random order each time with the constraint that there was no immediate repetition of word pair when reading across or down the columns. Copies of the four sets of stimuli as they were presented to subjects can be seen in Appendix 10.

Visual analogue scales for mood and eating behaviour. Seven visual analogue scales were constructed to measure mood and eating behaviour. Three measured mood. These were depression, anxiety and happiness. Four measured eating behaviour. These were urge to restrict food intake, urge to binge, hunger and satiety. Copies of the scales used can be seen in Appendix 11 .

Taste test. Subjects tasted six different foods, three sweet foods and three savoury foods. The sweet foods were three different brands of chocolate

digestive biscuit and the savoury foods were three different brands of cream cracker. Details of the brands used and their caloric values can be found in Appendix 12. Each of the three brands of chocolate biscuit contained a similar number of calories per 100g and was similar in size. Each of the three brands of cream cracker also contained a similar number of calories per 100g and was similar in size. Each item was assessed on four dimensions using four visual analogue scales. The scales were the four basic tastes. These are sweet, sour, salty and bitter (Kling & Riggs, 1972). Copies of the scales used can be found in Appendix 13. The test was designed to mask the main feature of interest which was how many crackers and biscuits each subject consumed during the tasting.

Food diary. Subjects kept a food diary for the 24 hours following the experiment. Detailed written instructions were given on how to complete the diary together with a sample diary. The recording form used and the written instructions can be seen in Appendix 14. Information was obtained on amount and type of food eaten, location of eating and the occurrence of episodes of binging and purging.

Self statements. These were recorded on audiotape.

The Stroop colour-naming cards. Four cards were used, one for each task and one practice card. The cards for each of the three tasks were constructed exactly as described in Chapter 4. The practice card was identical to the other cards but contained only 50 words (as opposed to 100 on each of the other three cards). As before the following words were used:

- (i) Conflicting-colour card: orange, red, blue, green, brown.
- (ii) Target card: fat, diet, thighs, cakes, hips.
- (iii) Control card: sit, dare, filter, tower, wool.

The practice card used the following words: nests, damp, living, fantasy, amateurs.

9.24 Procedure.

The experimental and control groups proceeded through the experiment in the same way. The only difference between the two groups was in the word pairs they were given to read.

Information was collected by interview on background and demographic features. This was followed by information to confirm diagnosis. Subjects then completed the EAT and BDI. Before completing baseline measures of information processing, self-statements and visual analogue ratings of mood and eating behaviour subjects practised using each of these measures. The practice card for the Stroop colour-naming tasks was administered first. Instructions for the colour-naming were exactly as described in Chapter 4. The time that each subject took to colour-name the words was recorded using a stopwatch. Timing began at the onset of naming the first word and ended on completion of the last word. Errors were not recorded.

After this task subjects practised saying their thoughts or "thinking aloud", the method used to obtain information on self-statements. The instructions were exactly as described in Chapter 3. Subjects were left alone to say their thoughts out loud for 2½ minutes.

Subjects also practised making ratings on the visual analogue scales used to measure mood and eating behaviour. They were asked to think of a time when they had, for example, felt somewhat depressed. They were asked to get a clear picture of that occasion, without describing it to the experimenter, and then rate how depressed they had felt by choosing a rating on the scale. Each of the three moods and four eating behaviours were practised in a similar way.

Baseline measures were then collected for each of the three measures that had been practised. Colour-naming times were measured first. The three cards used were presented in a fully balanced order within each condition

with two subjects in each of the two conditions reading the words in one of the six unique orders of presentation possible for the three cards.

Information on self statements was then collected using the "thinking aloud" method. Thoughts were collected for five minutes. Baseline visual analogue scale ratings for mood and eating behaviour were then obtained.

Subjects in the experimental condition were then presented with one of the two sets of word pairs devised for this condition, either the positive or negative pairs, and asked to read them out loud. The word pairs were written eight times each and were presented on a sheet of A4 paper as described above. Subjects were told that the experimenter would like them to read some pairs of words out loud and try to fix them in their mind. They were told to start at the top left hand corner and read across and down, as though they were reading a page out of a book. They were asked to read the words as pairs, to take their time to read them, to go slowly, dwell on them, and to think about the words and the meaning behind each pair. After reading the word pairs visual analogue scale ratings of mood and eating behaviour were obtained. Subjects then read the remaining set of word pairs, followed again by the visual analogue scale ratings. The two sets of word pairs were presented in a fully balanced order within the condition, with six subjects reading the word pairs in the order positive followed by negative and six subjects reading them in the order negative followed by positive. Subjects in the control condition were presented with one of the two sets of control word pairs and asked to read them exactly as described above for the subjects in the experimental condition. Visual analogue scale ratings were then made and subjects read the remaining set of control word pairs, followed again by the visual analogue scale ratings. As in the experimental condition the two sets of word pairs were presented in a fully balanced order. Table 9.2 shows the experimental design for order of presentation of the three Stroop colour-

naming tasks and for the positive and negative word pairs (or their matched controls).

Table 9.2

Experimental design for the Stroop colour-naming tasks and word pairs

Order for colour-naming tasks		Order for word pairs
A B C		Positive, Negative
A C B		Positive, Negative
B A C		Positive, Negative
B C A		Positive, Negative
C A B		Positive, Negative
C B A		Positive, Negative
A B C		Negative, Positive
A C B		Negative, Positive
B A C		Negative, Positive
B C A		Negative, Positive
C A B		Negative, Positive
C B A		Negative, Positive

A = Colour card, B = Control card, C = Target card.

After the word pairs came the taste test. Subjects were told that the experimenter was interested in how well people could detect differences in the taste of foods that appeared to be almost identical. Subjects first practised using each of the four visual analogue scales which were to be used for rating the different foods. They were asked to think of a food which they had eaten recently, not to tell the experimenter about it but to get a clear picture of it for themselves. They then rated the food to indicate the strength of the taste along four dimensions - sweet, salty, sour and bitter. The different types of biscuit and cracker were presented in separate bowls. There were ten biscuits in each of the biscuit bowls and 12 crackers in each of the cracker bowls. The biscuits and crackers were arranged in two rows

with the crackers at the back and the biscuits at the front. A carafe of water and a drinking glass were provided. Subjects were told to start with the savoury food, the cream crackers, and work their way from left to right along the two rows, tasting the crackers then the biscuits. They were told to taste the first food and then rate it along the four dimensions. They were then asked to take a few sips of water to clear their palate in between crackers and to do exactly the same for the subsequent foods and until all the ratings had been completed. It was emphasised that it was absolutely essential to make sure that the ratings were as accurate as possible and that they should take as many crackers or biscuits as they felt they needed in order to achieve this, going back to taste earlier samples if they were unsure of their ratings. Subjects were left alone for ten minutes to complete this task.

After the taste test information on self-statements was collected, exactly as before, for five minutes. The colour-naming tasks were then repeated with cards presented in the same order as on the first occasion of testing. The experimenter then explained how the food diary should be completed. Subjects were given a copy of the instructions, a sample sheet, blank monitoring sheets and a stamped addressed envelope in which to return their completed diary. Subjects practised ratings for the two visual analogue scales attached to the end of the diary which asked how typical their food intake had been in terms of quantity and types of food eaten. Height and weight were then measured and travel expenses paid. Before leaving subjects were reminded to complete and return the food diary.

Concurrent verbalisation.

(i) Breaking transcripts into units. The "thinking aloud" task generated a considerable amount of data which had to be broken up into units for classification to take place. This was achieved exactly as described in

Chapter 3. All thoughts were first transcribed into running prose, omitting all punctuation marks. As before, the flow of thoughts was then broken up into units using the method described by Davison et al. (1983). To determine the reliability of this method an independent rater (rater 2) not involved in the study was asked to divide up six randomly selected transcripts, three taken from the experimental condition and three taken from the control condition (25% of the total). Transcripts before and after reading the word pairs and completing the taste test were used. Inter-rater reliability, using two different methods of calculating mean percentage agreement, was 88.6% and 90.1%. Further details can be seen in Appendix 15.

(ii) Categorising idea units. The idea units obtained were categorised using the second method reported in the manual written for coding thoughts in Chapter 3. (See Appendix 6 for a copy of the manual). The idea units or thoughts were coded along three dimensions, with unclassifiable thoughts being placed in a separate category. The three dimensions were as follows: (1) Content, which was divided into two categories, one consisting of thoughts related to food, eating, weight and shape (food thoughts) and the other consisting of thoughts related to other issues (non-food thoughts). (2) Reference, which was divided into two categories, thoughts related to the self, irrespective of their content (self-referent), and thoughts referring to other issues, also irrespective of their content (other-referent). (3) Valence, divided into positive thoughts, negative thoughts and neutral thoughts, again irrespective of the content of the thoughts. In addition thoughts were also coded into positive, negative and neutral thoughts directly relevant to the task of tasting the biscuits and crackers, with unclassifiable thoughts again being placed in a separate category. The criteria used for this method of coding can be seen in Appendix 16.

An independent rater, unconnected with the project and uninformed about

its nature and purpose, coded six transcripts, three chosen at random from the experimental group and three chosen at random from the control condition (25% of the total) using the manuals in Appendices 6 and 16. After initial practice during which differences were discussed and resolved reliability was calculated using the same method as that employed for calculating the reliability for dividing up the transcripts into idea units. For the four methods of coding this ranged from 92.1% to 100%. Further details can be found in Appendix 17.

9.25 Main data analyses

Because it seemed likely that scores on the three visual analogue scale measures of mood (depression, anxiety and happiness) would be correlated and also that scores on the four visual analogue scale measures of eating behaviour (urge to binge, urge to restrict, hunger and fullness) would be correlated multivariate analyses were used to analyse these scores. Two separate two way (group x valence) multivariate analyses of covariance with repeated measures on the second factor and with baseline mood or eating behaviour ratings as the covariates were used. (Valence refers to scores after reading the negative and positive word pairs or their respective controls). These were followed by univariate analyses to locate the sources of any differences found between groups. Colour-naming times were analysed using a three way (group x card x time) analysis of variance with repeated measures on the second and third factors. To analyse the self-statements obtained from the concurrent verbalisation one way analyses of covariance were carried out with baseline scores as covariates. Differences between the groups in amount of food eaten in the taste test was assessed using non-parametric Mann-Whitney rank sum tests while measures of binge eating in the following 24 hours were also assessed using one way analyses of covariance,

with baseline measure of urge to binge as the covariate.

9.3

Results

9.31 Subject characteristics

Mean age, years of education, BMI scores and scores on the EAT and BDI for the two groups are shown in Table 9.3. As can be seen in the table there

Table 9.3

Subject characteristics

	Experimental group		Control group		t	probability
	X	SD	X	SD		
Age (years)	25.6	9.3	26.5	10.0	0.2	NS
Years of education	14.2	3.3	13.4	2.4	0.6	NS
Body Mass Index*	21.0	1.8	23.1	6.3	1.1	NS
EAT	60.4	25.4	55.6	24.5	0.5	NS
BDI	23.9	13.8	26.6	12.7	1.6	NS

N = 12 for each group. All df = 22.

*Weight in kg/(height in m)².

EAT = Eating Attitudes Test. BDI = Beck Depression Inventory.

were no significant differences between the two groups on any of these measures.

9.32 Visual analogue scale measures

The two way (group x valence) multivariate analyses of covariance found a significant main effect of group for measures of mood ($F(2,20) = 4.9$, $p < .02$) and a significant main effect of group for measures of eating behaviour ($F(2,20) = 7.3$, $p = .004$). These analyses were followed by univariate one way analyses of covariance, also using baseline scores as covariates, to locate the sources of the differences found between groups. In this analysis ratings obtained on each measure after reading the positive and negative word pairs or their respective controls were combined into a single score, calculated as the mean of the two scores. Mean scores for all visual analogue scale ratings before and after reading the positive and negative pairs of words or their respective controls can be seen in Table 9.5 together with the results of the effect of group taken from the univariate analyses of covariance. There were no significant differences between the groups in baseline scores on any mood or eating behaviour measure (all t values significant at $p > 0.1$).

Table 9.5

Mean scores on the visual analogue scales for the two groups before and after reading the positive and negative word pairs or their respective controls

		Baseline		Positive		Negative		Group effect	
		X	SD	X	SD	X	SD	F	p

Depression	Expt1	34.9	29.7	52.3	33.8	62.1	32.9		
	Control	44.5	20.8	45.3	34.6	43.3	36.5	6.1	0.02
Anxiety	Expt1	56.5	31.5	63.7	30.4	70.7	27.1		
	Control	49.2	33.4	43.5	27.1	42.2	31.5	6.6	<0.02
Happiness	Expt1	45.3	20.3	37.4	24.6	33.2	25.7		
	Control	33.8	23.4	35.0	22.4	33.3	23.1	1.5	NS
Binge	Expt1	24.7	36.7	31.0	39.5	35.3	39.5		
	Control	24.4	37.6	25.7	28.2	12.9	19.4	3.4	NS
Restraint	Expt1	80.4	24.5	70.7	76.7	62.8	34.2		
	Control	62.8	34.2	54.5	34.0	52.0	35.4	0.6	NS
Fullness	Expt1	41.7	27.3	34.9	36.0	36.8	32.7		
	Control	33.0	31.6	36.3	32.7	37.0	32.9	1.4	NS
Hunger	Expt1	29.3	28.0	29.4	31.5	34.5	26.8		
	Control	30.5	32.3	43.5	26.9	27.3	20.7	0.1	NS

Expt1 = Experimental group.

N = 12 for each group.

All df for group effects = 1,21.

As can be seen in the table significant effects of group were found for two mood ratings, depression and anxiety. These indicated that the experimental

group were significantly more depressed and anxious after reading the pairs of words concerned with attitudes to eating, weight and shape than the control group were after reading the pairs of words unconnected with these issues. No effects of group were found for any of the other visual analogue scale measures.

9.33 Colour-naming times

Two separate analyses of variance were carried out to test for possible order effects. Effect of ordinal position was assessed with a 2 x 3 (groups x ordinal position) analysis of variance. Effect of order sequence was assessed with a 2 x 6 x 3 (groups x order sequence x cards) analysis of variance. Ordinal position (i.e. whether the cards were read first, second or third), order sequence (i.e. whether the cards were read in any one of the six possible sequences making up the experimental design) and order sequence x card interaction did not yield a significant result. In addition there were no significant interactions between group and these factors. All F values obtained from these analyses were less than 1.

Mean scores for both groups on the three colour-naming tasks before and after reading the word pairs can be seen in Table 9.6.

Table 9.6

Mean time in seconds taken by both groups to colour-name words on the three cards before and after reading the word pairs

	Experimental group				Control group			
	Before		After		Before		After	
	X	SD	X	SD	X	SD	X	SD
Colour card	123.2	25.6	107.9	30.3	97.3	34.4	102.1	38.1
Control card	84.3	20.6	81.3	18.4	74.8	17.2	71.7	22.7
Target card	97.9	37.9	91.1	35.2	83.6	28.8	84.2	29.3

N = 12 for each group.

A three way analysis of variance (groups x cards x time) with repeated measures on the second and third factors revealed no significant three way interaction ($F(2,44) = 2.44, NS$). This indicated that colour naming times did not change differently in the two groups after reading the pairs of words. Since the main interest was in change on the target card compared to the control card the extra variance created by including the colour card in the analysis was removed by repeating the analysis without this card. As before there was no significant three way interaction ($F(1,22) = 1.0, NS$). As before this indicated that colour naming times on the target and control card did not change differently in the two groups after reading the word pairs.

9.34 Self-statements

Mean scores for self-statements before and after reading the pairs of

words can be seen in Table 9.7.

Table 9.7
Mean scores for self-statements in the two groups before and after reading the word pairs

		Experimental		Control		F	p
		X	SD	X	SD		
Negative - IR	Before	0.7	2.3	0.2	0.6		
	After	9.5	6.8	9.9	6.9	0.3	NS
Positive - IR	Before	0.1	0.3	0.0	0.0		
	After	0.5	1.4	0.7	1.0	0.2	NS
Food	Before	14.1	11.0	16.1	16.3		
	After	26.2	18.6	26.8	14.7	0.03	NS
Self-referent	Before	20.5	11.8	20.4	9.9		
	After	23.7	15.7	19.4	10.2	1.1	NS
Negative	Before	19.2	12.7	22.5	15.9		
	After	30.0	22.6	18.0	9.5	5.6	<.03
Positive	Before	1.6	1.7	2.9	3.4		
	After	1.7	2.0	3.9	3.7	2.0	NS

N = 12 for each group. All df = 1,21.

IR = Immediately relevant.

One way analyses of variance with scores before reading the word pairs as covariates were used to test differences between the groups in self-statements after reading the word pairs. As can be seen in the table there

were no significant differences between the groups in immediately relevant negative and positive thoughts, in food related thoughts, in self-referent or in positive thoughts. The groups did however differ in negative thoughts. Subjects in the experimental group had more negative thoughts after reading the word pairs relevant to eating, weight and shape than those in the control group had after reading the control word pairs. These negative thoughts consisted of thoughts such as "and now yeh now I could binge", "I feel a bit disgusting again", "just feel such a failure". The difference between the groups in negative thoughts acts as a check on the experimental manipulation. It shows that, as intended, the manipulation altered thoughts differently in the two groups.

9.35 Amount eaten in the taste test and in the 24 hours following the experiment

Number of crackers and biscuits eaten by the two groups in the taste test can be seen in Table 9.8.

Table 9.8

Number of crackers and biscuits eaten by the two groups in the taste test

	Experimental		Control		U	p
	X	SD	X	SD		
Crackers	0.5	0.4	1.2	1.1	33.0	< 0.03
Biscuits	0.4	0.3	1.9	2.7	38.0	< 0.05

N = 12 for each group.

Because variances of the two groups were significantly different for both crackers and biscuits non-parametric Mann-Whitney rank sum tests were used to determine whether there were differences between groups in number of crackers and biscuits eaten. As can be seen in the table, subjects in the control group ate significantly more crackers and biscuits than those in the experimental group.

To check that differences in amount of food eaten were not due to differences between the groups in the taste ratings given to the crackers and biscuits two separate two way (group x crackers and group x biscuits) multivariate analyses of variance with repeated measures on the second factor were carried out. There were no main effects of group and no group x crackers or group x biscuits interactions (all F values obtained from these analyses were less than 1 except that for group x biscuits where $F(4,17) = 1.09$, NS). Thus differences in amount of food eaten in the taste test could not be explained by differences between the groups in taste ratings.

All subjects except three returned completed food diaries for the 24 hours following the experiment so that data on episodes of binge eating was available for ten subjects in the experimental group and eleven subjects in the control group. Number of episodes of two types of binge eating was calculated for the 24 hours following the experiment using the criteria suggested by Fairburn (1989) for determining objective and subjective episodes of binge eating. Mean number of the two types of binge episodes in the two groups is shown in Table 9.9. One way analyses of covariance with baseline measures of urge to binge as covariates were carried out to assess differences between the two groups in the two types of binge eating.

Table 9.9

Mean number of episodes of binge eating in the two groups in the 24 hours following the experiment

	Experimental		Control		F	p
	(N = 10)		(N = 11)			
	X	SD	X	SD		
Objective binge episodes	0.8	1.5	0.9	1.4	0.2	NS
Subjective binge episodes	0.2	0.4	1.4	1.4	7.2	<.02

Both df = 1,21.

As can be seen in the table the two groups did not differ significantly in number of objective binge episodes. They did, however, differ in number of subjective episodes with subjects in the control group reporting significantly more of these episodes than subjects in the experimental group.

9.4

Discussion

Subjects in the experimental group reported more negative thoughts following the experimental manipulation and ate less than subjects in the control group during the taste test. Thus the experimental manipulation altered cognitions differently in the two groups and, as predicted, patients in whom the meanings attached to eating, weight and shape were activated showed greater restraint in the short term than those in whom these meanings were not activated. This finding suggests that, as predicted by cognitive theories of eating disorders, attitudes or the meanings attached to eating,

weight and shape may have a causal role in the maintenance of these disorders and that attitudes operate by increasing restraint. Cognitive theories of eating disorders also suggest that the increased dietary restraint which occurs in bulimia nervosa leads to episodes of binge eating. No support was found for this hypothesis. Contrary to predictions, greater restraint in the short term, i.e. in the taste test, in the experimental group was not followed by a greater number of episodes of binge eating in this group in the 24 hours following the experiment. Both groups reported a similar number of objective binge episodes while the difference between the two groups in number of subjective binge episodes reported was in the opposite direction to that predicted with the control group reporting a greater number of these episodes. There are several possible explanations for this finding. One possibility is that the increase in restraint was not sufficient to lead to binge-eating. Another possibility is that subjects in the experimental condition were still restricting their food intake during the 24 hours following the experimental manipulation and the time course of the experiment was not long enough to demonstrate a greater number of episodes of binge eating as a consequence of greater restraint in this group compared with the control group. A third possibility, not incompatible with this explanation, is that because subjects in the control group ate more than subjects in the experimental group during the taste test they felt a greater sense of loss of control over their eating, a feeling that persisted over the following 24 hours. Future studies could test this possibility by measuring subjects' sense of loss of control over their eating using visual analogue scales at different points.

As predicted, subjects in the experimental group rated their mood more negatively after reading the word pairs than subjects in the control group. Thus activating attitudes to eating, weight and shape held by patients with

eating disorders in patients with bulimia nervosa resulted in greater negative mood as well as greater restraint over eating compared to patients in whom these attitudes were not activated. This finding was reflected in self-statements with subjects in the experimental group reporting more negative thoughts after reading the word pairs than those in the control group. It is not clear in this study precisely how mood might be related to attitudes to eating, weight and shape and the disturbance in eating behaviour seen in eating disorders but one possible relationship will be described in the next chapter.

Contrary to predictions, and unlike measures of actual behaviour, the self-report measure of restraint, the visual analogue scale, did not distinguish the two groups. One possible explanation for this is that baseline ratings of restraint were high, particularly in the experimental group, leaving little scope for change in the predicted direction in this group after reading the word pairs.

Also contrary to predictions, there were no differences between the groups in the processing of information related to eating, weight and shape after reading the word pairs. One possible explanation is that the measure of information processing used here is not sensitive enough to detect changes in selective information processing created by temporary, short-term manipulations of attitudes. Another possibility is that selective information processing reflects cognitive structures that are relatively stable over time and thus is not affected by temporary, short-term changes in the availability or accessibility of attitudes.

It should be noted that reading generally negative pairs of words might possibly have had the same effect as reading the word pairs chosen here to be relevant to patients with eating disorders.

To summarize, the results presented here provide some support for the

prediction made by cognitive theories of eating disorders that disturbance in thinking, specifically attitudes to eating, weight and shape, may be an important causal factor in the maintenance of the disturbed behaviour seen in patients with bulimia nervosa.

Chapter 10

Discussion

This chapter will summarise the aims and main findings of the studies reported here, consider some methodological issues, possible problems with interpretation and limitations of the results, implications for cognitive theories of eating disorders, the clinical relevance of the findings and concluding remarks. Suggestions for future research will be made at appropriate points.

10.1 Aims and main findings

10.11 Background

The literature review (Chapter 2) discussed evidence for the existence and importance of a cognitive disturbance in anorexia nervosa and bulimia nervosa. This included the efficacy of cognitive behavioural treatments for eating disorders, evidence from clinical reports and anecdotal observations (which have encouraged the development of cognitive theories) and evidence from research studies which have attempted to assess the general and specific cognitive disturbance in eating disorders. It was concluded that these studies only provide limited evidence for the importance of cognitive aspects of eating disorders. For example, the success of cognitive behavioural treatments for eating disorders does not tell us whether or not the theory on which they are based is correct or precisely what levels of functioning are disturbed and which, therefore, it might be useful to address in treatment. Cognitive theories are interesting but remain untested and without an adequate empirical basis, i.e. they have not been developed on the basis of systematic observation and experiment. The small number of research studies

which have attempted to assess the cognitive disturbance in eating disorders also lack an empirical basis and do not include appropriate comparison groups, for example, dieters without eating disorders. Thus there is little empirical or experimental work on the precise nature of the cognitive disturbance implied by the theories.

10.12 Aims

The aim of this thesis was to improve our knowledge of the cognitive disturbance in eating disorders. Three main themes run throughout the studies. (1) Different aspects of the cognitive disturbance identified as important by cognitive theories were investigated including self-statements, information processing and attitudes or meanings attached to certain key concepts. (2) A set of carefully selected techniques from experimental psychology was used, chosen because they seemed to be particularly suitable for investigating the precise nature of the cognitive disturbance in a relatively new field of research and/or because they provide an objective measure of aspects not readily available to self-report. (3) The relationship between cognition and behaviour implied by cognitive theories was investigated, initially in a series of correlational studies and finally in an experimental paradigm allowing more definite conclusions to be drawn about the hypothesis that the cognitive disturbance precedes disturbance in eating behaviour.

10.13 Summary of main findings

Self-statements. Self-statements were investigated in Chapter 3 using two techniques, a self-report Thoughts Checklist and concurrent verbalisation or "thinking aloud". Data on thoughts were collected during three tasks, approximating to real life situations, in which subjects weighed themselves,

looked in a mirror and ate a chocolate covered mint (an After Eight mint). Appropriate control groups, including dieters, were used. As predicted, in the analysis of thoughts immediately relevant to the three tasks, patients with eating disorders had more negative thoughts than the non-dieting controls while the dieters occupied an intermediate position. In addition, patients with bulimia nervosa were distinguished from the dieters by a greater number of negative thoughts about weight and appearance while those with anorexia nervosa were distinguished from these two groups by a greater number of negative thoughts about eating. The two patient groups also showed a different pattern of concerns; negative thoughts about weight and appearance were more prominent in those with bulimia while negative thoughts about eating were more prominent in those with anorexia nervosa. Although the patients had more negative thoughts about eating, weight and shape than the other three groups in the analysis of thoughts immediately relevant to the three tasks, the groups did not differ in total number of food related thoughts, i.e. thoughts about food, eating, weight and shape nor did they have more self-referent thoughts than the control groups. This suggests that what is important is the emotional content of the thoughts. This hypothesis was supported by the finding that the patients also had a greater number of generally negative thoughts. Patterns were similar to those observed for immediately relevant negative thoughts with the patients with bulimia nervosa having more negative thoughts than the other groups in the weighing and mirror tasks and the patients with anorexia nervosa having more negative thoughts in the eating task. Within group concerns also differed in the same way; those with bulimia nervosa had more negative thoughts in the weighing and mirror tasks than in the eating task and those with anorexia nervosa had more negative thoughts in the eating task than in the other two tasks. Results from the Thoughts Checklist were generally similar, with one

exception, none of the measures obtained from the Checklist distinguished the symptomatic dieters from the two patient groups. The groups did not differ on any of the measures of positive thoughts.

Information processing. Information processing, using an adaptation of the Stroop colour-naming task, was investigated in Chapters 4 to 8. Chapter 4 showed that, as predicted, patients with bulimia nervosa experienced greater interference with colour-naming words relevant to their concerns with eating, weight and shape than normal controls. Chapter 5 found similar interference with colour-naming in patients with anorexia nervosa and symptomatic but not normal dieters. Because findings in Chapter 4 suggested that interference with colour-naming words on the target card might be mediated by depression, Chapter 6 investigated whether interference was more closely related to measures of general or to measures of specific psychopathology. As would be predicted by cognitive theories, it was most closely related to a measure of specific psychopathology. Chapter 7 sought to clarify the mechanism underlying interference with colour-naming in patients. Two possibilities were investigated, that it is related to the emotional salience of the words to be colour-named or that it is related to patients' familiarity with the issues represented by the words. If, as would be predicted by cognitive theories, the emotional salience hypothesis is correct then time taken to colour-name words related to eating, weight and shape should improve more with treatment, which focuses on these issues, than the colour-naming of matched control words. If the familiarity hypothesis is correct then treatment, which increases familiarity, should increase the time taken to colour-name words related to these issues when compared with the control words. Evidence was presented which suggests that, as would be predicted by cognitive theories, colour-naming of words related to eating, weight and shape is related to the emotional salience of these words. The same study

investigated whether cognitive behaviour therapy operates through mechanisms specific to that treatment by examining the relationship between change in colour-naming and change in measures of general and specific psychopathology in each of three different psychological treatments for bulimia nervosa. Findings were consistent with cognitive theories of eating disorders, suggesting that cognitive behaviour therapy operates through its focus on issues concerning eating, weight and shape, but did not provide conclusive evidence for the prediction that cognitive behaviour therapy operates through mechanisms specific to that treatment. If the cognitive disturbance precedes disturbance in behaviour then measures of the degree of cognitive disturbance at the end of treatment should predict the subsequent degree of disturbance in behaviour. However, contrary to predictions, Chapter 8 found that the cognitive disturbance in patients with bulimia nervosa, measured in two different ways, one using the Stroop colour-naming task and one using the cognitive subscales of the Eating Disorder Examination, was not related to global outcome 12 months after treatment.

Attitudes. Chapter 9 investigated attitudes or meanings attached to certain key concepts identified as important by cognitive theories also in order to determine whether a causal relationship might exist between attitudes and eating behaviour. In an experimental paradigm the meanings typically attached to eating, weight and shape by patients with eating disorders were activated in one group of patients with bulimia nervosa but not in another. Subsequent consumption of biscuits and crackers in the two groups was measured. Patients in whom the meanings attached to eating, weight and shape were activated ate less than those in whom these meanings were not activated. This finding thus supports the hypothesis that disturbance in thinking precedes the disturbance seen in eating behaviour and, in addition, suggests that attitudes may operate by increasing restraint which, in turn, may be

responsible for the episodes of binge-eating seen in patients with bulimia nervosa.

10.14 Conclusion

The studies reported here have, therefore, provided empirical evidence for the importance of three aspects of the cognitive disturbance in eating disorders, self-statements, information processing and attitudes, all of which have been identified as important by cognitive theories. Appropriate comparison groups of dieting and non-dieting young women have been used. With the exception of the study reported in Chapter 8, the evidence generally supports the existence of a close relationship between thinking and the disturbance in behaviour, and preliminary evidence was obtained which suggests that the disturbance in thinking may have a causal role.

10.2 Methodological issues

Several methodological questions are raised by the studies reported here and by other related studies, including some which have been published since the experimental work reported here was begun.

10.21 Reliability of categorising thoughts

The first question concerns the reliability with which thoughts associated with eating behaviour and eating disorders can be categorised. Many studies using unstructured methods such as concurrent verbalisation and thought listing to collect data on thoughts have shown that the thoughts obtained using these techniques can be reliably categorised. These studies range from the exploration of problem solving in children (Diener & Dweck,

1978) to thoughts obtained during in vivo exposure therapy for agoraphobia (e.g. Last et al., 1984a; 1984b). However, a recent study (Jansen et al., 1990) examining "disinhibitive thoughts" in restrained eaters, i.e. thoughts believed to be responsible for counter-regulation such as "I've blown my diet, I might as well continue to eat" reported very low interrater reliability (range 0.31 to 0.42, using Cohen's Kappa) for categorising these thoughts. This contrasts with the high levels of interrater reliability reported for categorising thoughts in the studies in Chapters 3 and 9 of this thesis (percentage agreement range 84.4 - 100%) and in two other studies which have examined thoughts in eating disorders (Hunt & Rosen, 1982; Cooper, 1984). The explanation for this discrepancy may lie in the sophistication of the categories used for coding and, possibly, in the use of detailed manuals and provision of training for raters. Disinhibitive thoughts may be complex and idiosyncratic and thus relatively difficult for raters to agree on, whereas the categories used here and in the other studies of thoughts in eating disorders may be simpler and thus easier for raters to identify and agree on. In addition, the studies reported here made use of detailed manuals and practice scripts for the raters who categorised the thoughts. This was designed to enhance reliability. In contrast the report by Jansen and colleagues does not mention the use of detailed manuals or practice for those who provided interrater reliability although one group is said to have received a "short training". It is therefore possible that the use of adequate written instructions and practice contributes to the high interrater reliability obtained here. It may also explain the high interrater reliability obtained for coding thoughts into two relatively complex categories, rational and irrational thoughts (Cooper, 1984), categories that were based on Beck's identification of distortions in information processing (Beck et al., 1979) and on Cacioppo & Petty's discussion of "reality"

(Cacioppo & Petty, 1981).

10.22 Self-statements concerned with eating, weight and shape

A different design might produce different results from those obtained here for the food thoughts examined in the five groups investigated in Chapter 3. As predicted, negative self-statements immediately relevant to the three tasks used in the study reported in Chapter 3 successfully distinguished patients with eating disorders from dieters and non-dieters. In addition generally negative thoughts also distinguished the groups. However, patients with eating disorders were not different from the other groups in the frequency of total number of thoughts concerned with issues of food, eating, weight and shape. These two findings suggest that what is important is not the total number of thoughts concerned with eating, weight and shape but rather the emotional content of the thoughts. This is perhaps not surprising given the strong and frequently noted clinical impression that patients with eating disorders are abnormally preoccupied with negative aspects of these issues. However, one possible explanation for the failure to find differences in total number of thoughts was mentioned in Chapter 3, the possibility of a ceiling effect. Since the majority of thoughts in all five groups studied were concerned with these issues, real differences between the groups may be masked.

Two other studies which have investigated thoughts about eating, weight and shape using unstructured in vivo methods (concurrent verbalisation in anorexia nervosa, Cooper, 1984, and thought sampling in obesity, Hunt & Rosen, 1982) have also failed to find differences between the eating disordered group and control groups, possibly because of a ceiling effect. In the study by Cooper (1984) all groups had equally high levels of food related thoughts while in the study by Hunt & Rosen (1982) both groups had

extremely high levels of nonfood related thoughts. It may be that differences between the groups might be found if a different design were used. For example, the findings obtained here suggest that patients with eating disorders might have more thoughts about eating, weight and shape in the absence of specific stimuli designed to trigger these thoughts or, alternatively, if presented with less salient stimuli. The study by Hunt & Rosen, in which thoughts were collected without specific stimuli designed to trigger thoughts about food (apart from naturally occurring triggers) and which found few thoughts related to food in the two groups studied, suggests that stimuli less salient than those used here or by Cooper (1984) may be needed rather than no relevant stimuli at all. Revising the design in this way might avoid ceiling effects and thus make it possible to determine whether differences do exist between patients with eating disorders and appropriate control groups in total frequency of thoughts concerned with food, eating, weight and shape under certain circumstances.

10.23 Differences between patients with anorexia nervosa and patients with bulimia nervosa in information processing

A different design in the Stroop colour-naming task might also help to identify differences in the cognitive disturbance shown by the two patient groups studied, those with anorexia nervosa and those with bulimia nervosa. The version of the Stroop task used here included words related to all three areas of concern to patients with eating disorders, i.e. eating, weight and shape. However, in the light of the findings in Chapter 3, showing that patients with bulimia nervosa are more concerned with weight and appearance and patients with anorexia nervosa are more concerned with eating, it seems possible that the version of the Stroop used here may mask differences between the two patient groups in selective processing. Patients with

bulimia nervosa might be expected to show greater selective processing of information about weight and appearance while those with anorexia nervosa might be expected to show greater selective processing of information about food and eating. As mentioned in the discussion in Chapter 5, there is some tentative support for this hypothesis from two studies which have devised separate tasks to investigate selective processing of food words and words related to body size (Channon et al., 1988) and shape (Ben-Tovim et al., 1989). Channon and colleagues found that patients with anorexia nervosa selectively processed information related to food but not information related to body size. Ben-Tovim and colleagues also found that patients with anorexia nervosa as well as patients with bulimia nervosa selectively processed information related to food but only those with bulimia nervosa also selectively processed information related to shape. Thus evidence from the concurrent verbalisation study presented in Chapter 3 and from two independent Stroop studies provides convergent validity for the importance of concerns about eating in patients with anorexia nervosa and the importance of concerns about weight and appearance in patients with bulimia nervosa. It should be noted however, as discussed in Chapters 2 and 5, that there are problems with both the independent studies which limit the conclusions that can be drawn from them. Channon and colleagues presented the colour-naming tasks in the same fixed order to each subject while Ben-Tovim and colleagues relied on separate one way analyses of variance to analyse their data. One way to test the possibilities suggested here would be to use a different method and present words from each category separately on a computer screen so that individual response latencies to each word (and to different categories of words) could be measured. This would also result in more accurate timing of response latencies than can be obtained using a stopwatch, which was the method of timing used here.

The finding that the symptomatic dieters as well as the patients with eating disorders showed interference with colour naming the words on the target card is relevant to the emotionality hypothesis (Martin, Williams & Clark, 1991). This group of investigators found that patients with generalised anxiety disorder but not equally anxious non patient controls show interference with colour naming words related to threat. They hypothesised that while there is a general effect of emotionality in anxiety, anxiety disorders are characterised by a more specific attention to stimuli that are perceived as threatening because they reflect idiosyncratic beliefs. The same is unlikely to be true of eating disorders since a group of non patients, the symptomatic dieters, also showed interference with colour naming words chosen to be relevant to the patients' concerns.

10.24 Concurrent verbalisation and the Thoughts Checklist compared

As discussed in Chapter 2 concurrent verbalisation or "thinking aloud" seems particularly appropriate for providing detailed information on the precise nature of the cognitive disturbance in a relatively new field of interest, the cognitive disturbance in patients with eating disorders. It avoids the problems of reactivity, inadequate sampling of thoughts and retrospective report associated with highly structured self-report questionnaires. While the question of whether or not verbal reports can be assessed with any reliability or validity has been debated, Ericsson & Simon (1981) outline three conditions which they argue should be fulfilled in order to ensure maximum reliability and validity when using verbal reports as data. The studies described in Chapters 3 and 9, which report on self-statements fulfil these three conditions, i.e. minimum time lapse after the cognitive event has occurred, minimum probe and request to report cognitive experiences rather than motives. However, although concurrent verbalisation has several

advantages over the highly structured techniques, such as self-report questionnaires, for collecting data on thoughts it is also extremely time-consuming when compared with these techniques. The thoughts collected need to be transcribed, broken up into units and then coded. Interrater reliability, involving the time and cooperation of one or more other raters, needs to be obtained both for breaking the thoughts up into units and for coding them. It also involves the use of an audiotape recorder and audiotapes which are more expensive than the pen and paper used for self-report questionnaires. Concurrent verbalisation makes the experiment longer for subjects than it might otherwise be since it is advisable to include a practice run. This familiarises subjects with the technique and enables the experimenter to check that subjects are indeed doing what has been asked of them. Because of the demands of the technique it is of great interest to see how the results obtained here using the concurrent verbalisation technique compare with those obtained using the self-report questionnaire, the Thoughts Checklist.

As reported in Chapter 3 similar results were obtained with the two different techniques. However, "thinking aloud" appeared to be a more sensitive measure than the self-report questionnaire since, unlike the questionnaire, it discriminated between the symptomatic dieters and the two patient groups both in immediately relevant negative thoughts and in generally negative thoughts. Thus it seems that using a highly structured retrospective measure results in some loss of discriminability, particularly between patient groups and a non-clinical group that share some behavioural features with the patients. What explains the discrepancy in the findings using the two techniques? One possibility is that it is due to differences between retrospective recall and immediate report of thoughts. The retrospective measure may be less accurate because of the delay in reporting

thoughts and thus be less sensitive to differences between the groups. Another possibility is that the patients may have more negative thoughts of a type not adequately represented on the questionnaire. This seems an unlikely explanation here since inspection of the data obtained using the concurrent verbalisation method did not suggest that there were any categories of thoughts not represented on the self-report questionnaire.

10.25 The causal relationship between cognitive disturbance and the disturbed eating behaviour

Measures of cognitive disturbance at the end of treatment for bulimia nervosa did not predict the subsequent degree of disturbance in eating behaviour at 12 month follow-up in the study reported in Chapter 8. This finding appears to suggest that, contrary to predictions that would be made by cognitive theories of eating disorders, there may not be a causal relationship between cognitive disturbance and behavioural disturbance. However, methodological issues may explain this finding. For example, the sample size may have been too small to find a significant relationship. Alternatively, life events, which were not assessed in this study, may be related to relapse and may have obscured any significant relationship between the cognitive and the behavioural disturbance. This appears to be the case in depression where it has been found that negative thinking does not predict relapse in symptoms (Lewinsohn, Steinmetz, Larson & Franklin, 1981). However, negative thinking and other symptoms are related when life events are taken into account (Metalsky, Abramson, Seligman, Semmel & Peterson, 1982). These explanations seem particularly likely to apply here since the study reported in Chapter 9, in which attitudes were manipulated experimentally in carefully controlled conditions and subsequent amount of food consumed was measured, found evidence for a causal relationship between

the cognitive disturbance and eating behaviour.

10.3 Possible problems with interpretation and limitations of the findings

10.31 The effects of hunger

One possible limitation of the studies reported here is the failure to assess the effects of hunger as has recently been suggested by Vitousek & Hollon (1990). This appears to be important in the Stroop paradigm since a recent study by Channon & Hayward (1990) found that short-term fasting in normal subjects produced selective processing of food words, but not body size words. Since the version of the Stroop paradigm used here contained food related words as well as words related to weight and shape one possible explanation for the results obtained is that the patients with eating disorders were simply hungrier than those in the control groups. This seems an unlikely explanation since a study by Channon and colleagues (Channon et al., 1988) failed to find a relationship between interference with colour-naming either food or body size related words in patients with anorexia nervosa and measures of hunger using scales developed by Grand (1968). However, this finding does not exclude such a relationship since hunger is difficult to assess in patients with eating disorders. These patients frequently report disturbed perception of hunger and satiety, an inability to determine when they are hungry and when they are full up. This difficulty was evident in the study reported in Chapter 9 in which subjects were asked to estimate current hunger and satiety using visual analogue scales. Several subjects spontaneously mentioned that they found it extremely difficult to tell how hungry and how full they were.

While subjective estimates of hunger and satiety might be difficult to

assess accurately it is, of course, possible to use indirect "objective" measures. Grand's hunger scales included two scales that might be thought to be objective measures of hunger, time since last meal and time until next meal, as well as two subjective measures. However, as mentioned above none of these scales, including the objective measures of hunger, were related to interference with colour-naming in patients with anorexia nervosa. It is possible that objective measures might also be relatively inaccurate reflections of actual hunger since subjects will vary considerably in amount eaten and amount that they plan to eat irrespective of frequency of eating. In particular, those subjects with an eating disorder might be expected to eat less at each meal than those without an eating disorder even though the time between meals might be similar.

Differences in hunger might also be thought to explain differences between the groups in self-statements, particularly the greater preoccupation with eating in patients with anorexia nervosa. Studies with volunteers, for example those by Keys, Brozek, Henschel, Mickelson & Taylor, 1950 and Schiele & Brozek, 1948, indicate that extremely low calorie diets, such as those frequently adopted by patients with anorexia nervosa, increase preoccupation with food and eating. While future studies should in theory control for possible differences in hunger (although it is not clear how this might be achieved most accurately) it seems unlikely that hunger could explain why the groups studied here differed only in negative thoughts related to eating and why only these thoughts and not positive thoughts were more prominent in patients with anorexia nervosa.

An alternative way to test the hypothesis that hunger contributes to differences in information processing and self-statements would be to examine the effects of a weight restoration programme on these measures in patients with anorexia nervosa. If hunger explains the results found here then the

effect of weight restoration and the resumption of normal eating behaviour should be to reduce the cognitive disturbance as measured in these two different ways. However, clinical experience suggests that patients with anorexia nervosa become more distressed and experience more negative thoughts about eating, weight and shape as eating behaviour and weight approaches normal levels.

10.32 Depressive type thoughts

A second limitation is that the studies reported only on thoughts related to eating, weight and shape. Clinical observation and the results of the research studies discussed in Chapter 2, however, suggest that patients with eating disorders also have other types of thoughts, particularly depressive type thoughts and thoughts about low self worth that are not related specifically to issues of eating, weight and shape. These thoughts, particularly those concerning self worth, might plausibly be argued to underlie the eating disorder (Garner & Bemis, 1982; Vitousek & Hollon, 1990). Although these thoughts have not been examined on this occasion, they could be investigated using techniques similar to those employed here. For example, "thinking aloud" and/or a self-statement questionnaire could be used to investigate the presence of negative self-statements independent of concerns about eating, weight and shape using tasks similar to that employed by Fremouw & Heyneman (1983) who measured self-evaluation following failure on a performance task (solving anagrams). Similarly, versions of the Stroop colour-naming task used by investigators interested in the processing of negatively toned information in depression (e.g. Gotlib & McCann, 1984; Gotlib & Cane, 1987) could be used to investigate this aspect of selective information processing in patients with eating disorders.

The presence of these thoughts may be related to the methodology used.

Inspection of the data obtained using "thinking aloud" in Chapters 3 and 9 suggested that the patients had relatively few depressive type thoughts and thoughts about low self worth when asked to carry out the three tasks related to eating, weight and shape but that they had rather more of these thoughts when asked to report their thoughts without simultaneously carrying out a specific task. This observation is consistent with the finding that depressed patients had fewer negative thoughts when asked to carry out a specific task (concentrating on a series of picture slides), than when they sat quietly looking at a rectangle of white light (Fennell, Teasdale, Jones & Damlé, 1987).

10.33 Schemata

The studies reported here have not included assessment of self-schemata. Clinical observations suggest that patients with eating disorders view themselves in terms of weight and shape and use these to determine their personal worth and value (Garner & Bemis, 1982; Fairburn et al., 1986a). These self-schemata organised around weight and shape could be investigated in more detail using self-report questionnaires or techniques adapted from experimental cognitive psychology. For example, a questionnaire similar to that developed to measure the interpretation of ambiguous events in a negative fashion (Butler & Mathews, 1983) could be used to investigate the extent to which patients in the two eating disorders interpret different types of ambiguous events in terms of weight and shape. As in this study questions could be of the following form. Subjects would be presented with a brief ambiguous scenario, for example, "two friends are giggling and whispering when you walk into the room". Subjects would then be asked to respond to an open ended question, e.g. "what do you think they were talking about?". They would then be asked to arrange possible explanations in order

in which they would be most likely to come to mind. Only one of these would be judged to be related to weight and shape, e.g. "they're probably saying how fat and unattractive I am". Techniques adapted from experimental psychology such as those used by Markus for investigating the independence-dependence dimension (Markus, 1977), gender (Markus, Crane, Bernstein & Siladi, 1982) and weight related self-schema in non-clinical populations (Markus, Hamill & Sentis, 1987) could also be used. In the study of weight related self-schema these include response latency to judging whether or not adjectives and body silhouettes are self-descriptive.

10.4 Implications for cognitive theories of eating disorders

Cognitive theories of eating disorders are still at a very early stage of development. The studies reported here have provided some initial preliminary support for some of the cognitive abnormalities identified as important by these theories. These include negative self-statements related to eating, weight and shape, information processing influenced by these concerns and attitudes or the meanings attached to eating, weight and shape. In addition they have shown that, as would be predicted by cognitive theories, aspects of the cognitive disturbance are closely related to measures of specific behavioural symptoms (Chapters 4 and 6). Some evidence suggests that this relationship may be causal (Chapter 9) since, in a carefully controlled experimental paradigm in which attitudes to eating, weight and shape were manipulated patients in whom these attitudes were activated experienced more negative thoughts (thus confirming the success of the manipulation in activating thoughts) and subsequently ate less than those in whom these attitudes were not activated. However, contrary to predictions (but necessarily using less carefully controlled methodology), the cognitive

disturbance as measured by interference with colour-naming and also by the cognitive subscales of the EDE did not predict disturbance in behaviour at 12 month follow-up after treatment for bulimia nervosa (Chapter 8). As would be required by an adequate theory, some degree of specificity was also observed; self-statements (as assessed using concurrent verbalisation) distinguish patients with eating disorders from normal as well as symptomatic dieters and non-dieting controls while selective processing is characteristic of patients and symptomatic dieters but not of normal dieters and those who are not dieting.

10.41 The relative importance of positive and negative thoughts

Since none of the measures of positive thoughts distinguished the patients from the other groups it seems that any theory of the cognitive disturbance in eating disorders must focus primarily on the negative or maladaptive thoughts that patients have about their eating, weight and shape rather than on any presumed absence of positive thoughts. Other studies in which positive as well as negative thoughts have been examined also generally support what Kendall (Kendall & Korgeski, 1979; Kendall & Hollon, 1981) has called the power of "non-negative thinking" and find that an absence of negative thoughts rather than the presence of positive thoughts is related to positive adjustment. These studies have mainly been conducted with non-clinical populations and include investigations of subjects high and low in assertiveness (Schwartz & Gottman, 1976; Safran, 1982), positive adjustment during invasive medical procedures (Kendall, Williams, Pechacek, Graham, Shisslak & Herzof, 1979), self-evaluation (Cacioppo, Glass & Merluzzi, 1979), the importance of social approval (Craighead, Kimball & Rehak, 1979), social anxiety (Glass, Merluzzi, Biever & Larson, 1982; Merluzzi, Burgio & Glass, 1984), test anxiety (Galassi, Frierson & Sharer, 1981) clinical anxiety and

depression (Butler & Mathews, 1983) anxiety in students approaching important examinations (Butler & Mathews, 1987) and depression (Ingram & Wisnicki, 1988). The similarity of the findings cannot be explained by similarity in the methods used since these studies used a variety of methods including questionnaires, thinking aloud and thought listing. There are a few contradictory findings. For example, a study of test anxiety (Hollandsworth, Glazeski, Kirkland, Jones & Van Norman, 1979) and one of depression (Missel & Sommer, 1983) suggest that positive and negative thoughts may be equally important while a study of snake phobia (Eifert & Lauterbach, 1984) and one of heterosocial anxiety (Heimberg, Acerra & Holstein, 1985) suggest that positive thoughts are more important than negative thoughts. The finding here that in eating disorders the presence of negative thoughts is more characteristic of psychopathology than the absence of positive thoughts also has implications for therapeutic intervention. These implications will be discussed in the following section.

10.42 Qualitative vs quantitative differences in concerns

Some evidence from Chapter 3 suggests the possibility that the concerns of patients with bulimia nervosa may be an extension of normal preoccupations and concerns while those of patients with anorexia nervosa may be distinct from these. This suggestion is based on the apparent difference between the groups in the pattern of their concerns. Patients with bulimia nervosa show a pattern similar to that of the two dieting groups, the normal dieters and the symptomatic dieters, with all three groups showing greater concern with weight and appearance than with eating. Patients with anorexia nervosa, however, show greater concern with eating than with weight and appearance. Cognitive theories must eventually be able to explain this difference between the groups. One possible explanation is that the differences found simply

reflect differences in diagnostic criteria and thus are not of great interest. However, this seems an unlikely explanation since extreme concerns with shape and weight are required for both diagnoses to be made using the DSM-III-R criteria employed here whereas no attention is paid to concerns with food or eating.

Another possibility is that the differences found reflect differences in the stage of illness. Approximately 30% of patients with bulimia nervosa have previously suffered from anorexia nervosa (Fairburn et al., 1991b) so it is possible that as the illness develops, perhaps as patients begin to lose control over their eating and start to gain weight, concern with eating and food is replaced by increased concern with weight and appearance. This possibility could be examined by investigating the relationship between concerns and a history of anorexia nervosa. However, this explanation seems unlikely to explain the results obtained here since only two of the 12 patients with bulimia nervosa studied in Chapter 3 (16.7%) had previously met diagnostic criteria for anorexia nervosa. A further possible explanation for the difference observed in self-statements is that the two groups of patients differ in their attitudes and beliefs. This possibility requires further investigation. For example, patients with anorexia nervosa may place greater value on extreme thinness and on control of eating than patients with bulimia nervosa for whom control of weight and an attractive appearance may be more important. In particular, for patients with anorexia nervosa, extreme thinness and control of eating may be valued simply as a means of obtaining control, irrespective of whether or not the low weight achieved makes them look attractive to other people whereas for patients with bulimia nervosa control of weight and an attractive appearance may be valued as a means of becoming acceptable to others. Thus while those with anorexia nervosa generate internal standards that do not appear to be greatly influenced by

external values and achieve extreme thinness in their pursuit of control, patients with bulimia nervosa strive to achieve a weight and appearance that is strongly influenced by external values and which they believe will make them more acceptable to others. Differences in attitudes and beliefs could be investigated using self-report questionnaire measures or techniques adapted from experimental cognitive psychology. For example, a version of the contextual priming task (Fischler & Bloom, 1979) such as that used by Clark et al. (1988) to investigate catastrophic interpretations of bodily symptoms in patients with panic disorder, could be used to determine the relative importance of these different concerns in the two groups of patients. In this task subjects are presented (on a VDU) with a sentence which is complete apart from the last word. Having read the sentence subjects are then presented with one of two possible last words and asked to read the word out aloud as quickly as possible. Subjects typically respond faster if the word is one which they would expect from the sentence frame. Two possible sentence frames with their alternative last words which could be used with patients with eating disorders are presented below:

If I don't eat when I'm hungry I feel successful/weak.

If I lose a pound others will find me more attractive/reliable.

It might be predicted that patients with anorexia nervosa would be faster to respond to the word successful than to the word weak in the first example than patients with bulimia nervosa. In the second example it might be predicted that patients with bulimia nervosa would be faster to respond to the word attractive than to the word reliable than those with anorexia nervosa.

A further, speculative, possibility is that differences in attitudes or the meanings attached to eating, weight and shape could in turn be due to differences in cultural and familial values absorbed and/or to the usefulness

for the individual in achieving avoidance from feared consequences of adult maturity and sexuality. The latter may be less of an issue for patients with bulimia nervosa who are more likely than patients with anorexia nervosa to be similar to their peers in most aspects of sexual attitudes and behaviour (Abraham, Bendit, Mason, Mitchell, O'Connor, Ward, Young & Llewellyn-Jones, 1985; Johnson & Connors, 1987).

10.43 The importance of depressive type thinking

As mentioned in the previous section an adequate analysis of thinking in patients with eating disorders needs to include reference to depressive thoughts, particularly thoughts about self worth. How might these two observations, the presence of certain attitudes to eating, weight and shape and thoughts about low self worth be integrated? One possibility is that low self worth may provide the setting conditions which make individuals vulnerable to an eating disorder (and possibly to other disorders, particularly depression). When cultural and familial influences place great value and emphasis on eating, weight and shape the individual with low self-esteem is particularly likely to attempt to diet and subsequently develop an eating disorder, possibly because these influences have encouraged the belief that losing weight is an appropriate solution to problems of dysphoria and general feelings of inadequacy. The combination of low self worth and value placed on eating, weight and shape ultimately leads to a situation described by several clinicians in which the individual evaluates herself solely in terms of shape and weight. This formulation is similar to that suggested by Slade (1982).

10.44 Schema theory in eating disorders

Vitousek & Hollon (1990) have recently described these three aspects of

the cognitive disturbance in eating disorders, i.e. low self worth, attitudes to eating, weight and shape and evaluation of the self in terms of weight and shape, within the framework of schema theory. Specifically these three aspects map onto disturbances at the level of self schemata, weight related schemata and weight related self-schemata. Vitousek & Hollon propose that patients with eating disorders develop organised cognitive structures around issues of weight and its implications for the self that influence perception, thought, affect and behaviour. These schemata account for the persistence of eating disorders, e.g. by determining selective attention and memory. In addition they function to simplify, organise and stabilise the individual's experience of herself and the environment. This may be particularly important in patients with eating disorders whose experience of themselves and their environment may seem formless and chaotic.

Vitousek & Hollon confine themselves to providing a framework to guide research into cognitive models of eating disorders and do not elaborate on the nature of the schemata, on how they might be constructed or on how they might operate. However, semantic network theory (e.g. Collins & Loftus, 1975; Anderson, 1983) and network theory of affect (e.g. Gilligan & Bower, 1984) provide possible clues as to the construction and operation of these schemata. As Vitousek & Hollon suggest weight related schemata, i.e. what it means to be thin and what it means to be fat, are likely to exist in a similar form in many people including those without eating disorders. In other words many people without eating disorders are also likely to endorse such beliefs as "to be fat is to be a failure" or "to be thin is to be successful". However, in terms of semantic network theory the relationship between these concepts, for example, fat and failure, thin and successful, may differ in patients with eating disorders when they are compared with normal controls. In particular, the relationship between the concept fat and

the concept failure or between the concept thin and the concept successful is likely to be stronger. Concepts of fat and thin, as well as other relevant concepts, may also be relatively well elaborated in patients with eating disorders. As well as stronger links there may be a greater number of links to other concepts. For example, fat may also be strongly associated with the concepts inadequate, disgusting, friendless and so on. One way to measure the strength of the relationship between different concepts would be to use an adaptation of the contextual priming task mentioned above. Number and type of links to other concepts could be measured using attribute listing such as that described by Landau (1980) for investigating the concept of dog in dog phobics.

Thus patients with eating disorders may differ from normal controls in their concepts of fat and thin along several dimensions, including precisely which concepts are associated with fat and thin, and in the strength and diversity of the associations. In addition, the degree of emotion associated with each concept may differ in the two groups. As will be discussed below this may be related to the accessibility of schemata. Weight related self-schemata may also be found in those without eating disorders and may differ from the weight related self-schemata found in patients in similar ways, including the precise nature of the concepts associated with the self, the strength and diversity of the associations and in the degree of emotion attached to each concept. Such schemata could be investigated in similar ways to weight related schemata. Of particular interest would be differences between ratings and response latencies to judgements related to the self as opposed to judgements referring to other people.

10.45 Schema theory and mood in eating disorders

While individuals may differ in the existence of schemata along the

dimensions suggested above they might also differ in the activity or availability of these schemata; thus in people sharing the same schema the threshold for activation of the schema may differ. How might this occur? One possibility is through the association between the schema and mood. Clinically, issues of eating, weight and shape are observed to be associated with strong emotions, both anxiety and depression, in patients with eating disorders and it has been suggested that these emotions may precipitate episodes of binge-eating. In a similar way it has been suggested that decisions to diet and restrict food intake may be a way of coping with dysphoria. Thus disturbed eating behaviour may follow emotional disturbance. Conversely, reading the word pairs in Chapter 9 which were designed to activate the meanings attached to eating, weight and shape by patients with eating disorders led to significant increases in anxiety and depression. This suggests that there may be a reciprocal relationship between cognition and emotion similar to that outlined by Teasdale (1983) for depression and by Clark (1986) for panic disorder. In these analyses negative or dysfunctional thoughts produce a disturbance in emotion which in turn produces more negative or dysfunctional thoughts and so on in a vicious circle. Since thoughts and attitudes concerned with eating, weight and shape appear to be strongly tied to depression and anxiety, an increase in these emotions may make the problematic thoughts and attitudes more available and this in turn may increase anxiety and depression thus making yet more problematic thoughts available and so on. This mechanism may help to explain why antidepressant drugs sometimes provide relief from symptoms of bulimia nervosa (Fairburn et al., in press; Wilson, in press). The improvement in mood which occurs with antidepressant drugs may make problematic thoughts about eating, weight and shape less available which in turn reduces the disordered behaviour. Some preliminary evidence suggests that antidepressant drugs may reduce the

frequency of binge-eating and purging but not the level of dietary restraint in patients with bulimia nervosa (Rossiter et al., 1988; Mitchell, Fletcher, Pyle, Eckert, Hatsukami & Pomeroy, 1989). This suggests that, at least in bulimia nervosa, mood may be particularly implicated in triggering the problematic thoughts associated with episodes of binge-eating but that it is not necessarily involved in decisions to restrict food intake. The same may not be true in anorexia nervosa where clinicians have noted that dysphoria often precedes the decision to diet (Garner & Bemis, 1982) and where it may, therefore, also be involved in the repeated dieting that maintains the disorder.

Existing research suggests that depression and anxiety may interact with thoughts about the self and about eating, weight and shape in rather different ways. Depression is characterised by themes of loss and with a bias in recall as well as attention to mood congruent information while anxiety is characterised by themes of threat and by a bias in attention to, but not recall of, mood congruent information. It may be that depressed mood makes available themes of eating, weight and shape associated with loss, e.g. "I'm a failure, I can't control my eating", while anxiety makes available themes of eating, weight and shape associated with threat, e.g. "I'm going to get fat, nobody will want to know me". In eating disorders, in addition to the relationship between negative thoughts and emotions, clinical observation suggests there also seems to be a relationship between positive or happy mood and thoughts emphasising the value of controlling eating, weight and shape particularly in anorexia nervosa (e.g. Bemis, 1983). In a similar way to negative mood, positive or happy mood may make available problematic thoughts concerned with these issues which in turn increases mood and makes these thoughts more available. This interaction or reciprocal relationship between cognition and emotion may be one way in which eating disorders are

maintained. One possible way to investigate the types of thought made available by different moods would be to use mood induction. Thoughts made available in different moods could be assessed using structured or unstructured techniques. This strategy might provide one way to investigate the possibility mentioned above that mood, particularly depression, interacts differently with thoughts related to restraint and thoughts related to episodes of binge-eating.

10.5 Implications for cognitive therapy for eating disorders

Clinically, since aspects of the cognitive disturbance appear to be specific to patients with eating disorders and are closely related to the behavioural disturbance, the studies reported here suggest that self-statements and attitudes about eating, weight and shape may be an important focus for cognitive intervention. Since there are differences between patients with bulimia nervosa and patients with anorexia nervosa in the content of their self-statements, with patients with anorexia nervosa being more concerned with eating and patients with bulimia nervosa being more concerned with weight and appearance, it may be necessary to focus on different content when attempting to alter self-statements and (possibly) attitudes. As suggested above, patients with anorexia nervosa may place greater value on extreme thinness and control of eating while patients with bulimia nervosa place greater value on control of weight and on the importance of having an attractive appearance. For those with anorexia nervosa absolute internal standards and control as an end in itself, independent of external criteria may be important whereas those with bulimia nervosa may be more concerned with what other people think of them and pay more attention to standards set by other people. Thus a patient with

anorexia nervosa may be more likely to express the belief "I'm only successful if I can keep my weight below 7 stone" while a patient with bulimia nervosa may be more likely to express the belief "other people will only like me if I lose weight". The first belief may be tackled by asking the patient to consider the meaning of success and whether keeping her weight low will really achieve what she wants and by asking her whether she would apply her own absolute rules equally to others or whether she has a special set for herself. In particular she may be asked to consider "would you think your friend X any more successful if she weighed less than 7 stone?". In the case of the second belief it may be helpful to ask the patient what her own rules are by asking, for example, "would you like your friend Y any more if she lost weight?" and then to ask whether other people are likely to have different rules. With the patient with anorexia nervosa the aim may therefore be to challenge her absolute beliefs about herself whereas the aim with the patient with bulimia nervosa may be to challenge her view of other people's opinions. Ultimately the aim may be to break the link between self worth, weight and appearance in bulimia nervosa and, in anorexia nervosa, to break the link between control, both of oneself and the external environment, and eating behaviour.

The finding that the presence of negative thoughts but not the absence of positive thoughts was characteristic of those with eating disorders when compared with several control groups suggests that the encouragement of positive thinking may be inappropriate or at least relatively less important than the removal of negative thoughts. Some evidence from other studies supports the general suggestion that interventions should focus primarily on negative thoughts. For example, subjects who had a high number of positive self-statements in a study of assertiveness (Safran, 1982) were perceived as brusque and irritable by raters in role plays while a recent study (Oettingen

& Wadden, 1991) found that positive fantasies about the possibility of achieving success in a weight loss programme were strongly predictive of failure. The findings obtained here also suggest that therapeutic interventions which focus primarily on negative and dysfunctional thinking (e.g. those developed by Ellis and Beck) may be more successful in treating eating disorders than interventions which focus on encouraging positive coping responses (e.g. that developed by Meichenbaum).

Although a less sensitive measure than the concurrent verbalisation technique, the self-report Thoughts Checklist, used in conjunction with the three behavioural tasks, may be a useful clinical measure of self-statements. Further research is, however, needed to determine whether scores change with successful treatment. Evidence presented in Chapter 7 shows that scores on the Stroop colour-naming task do change with treatment, thus this measure may be a useful, objective measure of one aspect of the cognitive disturbance over treatment in patients with eating disorders. It may be particularly useful in the assessment of concerns about eating, weight and shape in patients with anorexia nervosa where illness may be "denied" (Vandereycken & Vanderlinden, 1983; Wilson, 1989b)

10.6

Concluding remarks

Several specific suggestions have already been made for directions for further research, including assessing the effect of hunger and splitting the colour-naming tasks into separate areas of concern to patients with eating disorders. Further research is also needed into possible differences between patients with anorexia nervosa and patients with bulimia nervosa (including comparisons between those with a history of anorexia nervosa and those without such a history) in self-statements and attitudes to eating, weight

and shape and into other patterns of thinking, such as those also found in depression and in those with low self-esteem and low self worth, which may characterise these disorders as well as into the relationship between mood and thinking. In general, the methods used here from experimental cognitive psychology have provided a useful means to test some of the basic assumptions made by cognitive theories concerning the importance of self-statements, selective information processing and attitudes to eating, weight and shape and the nature of the relationship between aspects of the cognitive disturbance and eating behaviour. Further research along these lines may, as suggested by Vitousek & Hollon (1990) in their recent review, provide more information that will help to develop and refine treatment interventions in both anorexia nervosa and bulimia nervosa.

References

- Abraham, S.F., Bendit, N., Mason, C., Mitchell, H., O'Connor, N., Ward, J., Young, S. & Llewellyn-Jones, D. (1985). The psychosexual histories of young women with bulimia. Australian and New Zealand Journal of Psychiatry, 19, 72-76.
- Agras, W.S., Rossiter, E.M., Arnow, B., Schneider, J.A., Telch, C.F., Raeburn, S.D., Bruce, B., Perl, M. & Koran, L.M. (in press). Pharmacologic and cognitive-behavioural treatment for bulimia nervosa: a controlled comparison. American Journal of Psychiatry.
- Agras, W.S. Schneider, J.A., Arnow, B., Raeburn, S.D. & Telch, C.F. (1989). Cognitive-behavioural and response prevention treatments for bulimia nervosa. Journal of Consulting and Clinical Psychology, 57, 215-221.
- American Psychiatric Association. (1985). DSM-III-R in Development (10-5-85). Washington, D.C.: American Psychiatric Association.
- American Psychiatric Association. (1987). DSM-III-R. Washington, D.C.: American Psychiatric Association.
- Anderson, J.R. (1983). The Architecture of Cognition. Harvard: Harvard University Press.
- Beck, A.T. (1976). Cognitive Therapy and the Emotional Disorders. New York: International Universities Press.
- Beck, A.T., Rush, A.J., Shaw, B.F. & Emery, G. (1979). Cognitive Therapy of Depression: A Treatment Manual. New York: Guilford Press.
- Beck, A.T., Ward, C.H., Mendelson, M., Mock, J. & Erbaugh, J. (1961). An inventory for measuring depression. Archives of General Psychiatry, 4, 53-63.
- Bemis, K.M. (1983) A comparison of functional relationships in anorexia nervosa and phobia. In P.L. Darby, P.E. Garfinkel, D.M. Garner & D.V.

- Coscina (Eds.), Anorexia Nervosa: Recent Developments in Research. (pp 403-415). New York: Alan R. Liss.
- Ben-Tovim, D.I., Hunter, M. & Crisp, A.H. (1977). Discrimination and evaluation of shape and size in anorexia nervosa: An exploratory study. Research Communications in Psychology, Psychiatry & Behaviour, 2, 241-257.
- Ben-Tovim, D.I., Walker, M.K., Fok, D. & Yap, E. (1989) An adaptation of the Stroop test for measuring shape and food concerns in eating disorders: A quantitative measure of psychopathology? International Journal of Eating Disorders, 8, 681-687.
- Bessai, J.L. (1977). The common beliefs survey: A factor measure of irrational beliefs. Paper presented at the Second National Conference on Rational Psychotherapy, Chicago.
- Blackwell, R.T., Galassi, J.P., Galassi, M.D. & Watson, T.E. (1985). Are cognitive assessment methods equal? A comparison of think aloud and thought listing. Cognitive Therapy and Research, 9, 399-414.
- Blankstein, K.R., Toner, B.B. & Flett, G.L. (1989). Test anxiety and the contents of consciousness: Thought listing and endorsement measures. Journal of Research in Personality, 23, 269-286.
- Bliss, E.L. & Branch, C.H. (1960). Anorexia Nervosa: Its History, Psychology & Biology. New York: Hoeber.
- Brock, T.C. (1967). Communication discrepancy and intent to persuade as determinants of counterargument production. Journal of Experimental Social Psychology, 3, 269-309.
- Bruch, H. (1973). Eating Disorders: Obesity, Anorexia Nervosa and the person within. New York: Basic Books.
- Bruch, H. (1979). Anorexia nervosa. In R.J. Wurtman & J.J. Wurtman. (Eds.), Nutrition and the Brain, vol 3. (pp 101-115). New York: Raven Press.

- Buhrich, N. (1981). Frequency of presentation of anorexia in Malaysia. Australian and New Zealand Journal of Psychiatry, 15, 153-155.
- Butler, G. & Mathews, A. (1983). Cognitive processes in anxiety. Advances in Behaviour Research and Therapy, 5, 51-62.
- Butler, G. & Mathews, A. (1987). Anticipatory anxiety and risk perception. Cognitive Therapy and Research, 11, 551-566.
- Butterfield, P.S. & Leclair, S. (1988). Cognitive characteristics of bulimic and drug-abusing women. Addictive Behaviours, 13, 131-138.
- Cacioppo, J.T., Glass, C.R. & Merluzzi, T.V. (1979). Self-statements and self evaluations: A cognitive response analysis of heterosocial anxiety. Cognitive Therapy and Research, 3, 249-262.
- Cacioppo, J.T. & Petty, R.E. (1981). Social psychological procedures for cognitive response assessment: The thought listing technique. In T.V.Merluzzi, C.R.Glass, & M.Genest. (Eds.), Cognitive Assessment. (pp 309-342). New York: Guilford Press.
- Carroll, J.B., Davies, P. & Richman, B. (1971). Word Frequency Book. New York: American Heritage Publishing Company.
- Channon, S., De Silva, P., Hemsley, D. & Perkins, R. (1989). A controlled trial of cognitive-behavioural and behavioural treatment of anorexia nervosa. Behaviour Research & Therapy, 27, 529-535.
- Channon, S. & Hayward, A. (1990). The effect of short term fasting on processing of food cues in normal subjects. International Journal of Eating Disorders, 9, 447-452.
- Channon, S., Hemsley, D. & De Silva, P. (1988). Selective processing of food words in anorexia nervosa. British Journal of Clinical Psychology, 27, 259-260.
- Clark, D.A., Feldman, J. & Channon, S. (1989). Dysfunctional thinking in anorexia and bulimia nervosa. Cognitive Therapy and Research, 13, 377-

387.

- Clark, D.M. (1986). A cognitive approach to panic. Behaviour Research and Therapy, 24, 461-470.
- Clark, D.M., Salkovskis, P.M., Gelder, M., Koehler, C., Martin, M., Anastasiades, P., Hackmann, A., Middleton, H. & Jeavons, A. (1988). Tests of a cognitive theory of panic. In I. Hand & H.U. Wittchen. (Eds). Panic and Phobias 2. (pp 151-157). Berlin: Springer-Verlag.
- Collins, A.M. & Loftus, E.F. (1975). A spreading activation theory of semantic processing. Psychological Review, 82, 407-428.
- Connors, H.E., Johnson, C.L. & Stuckey, M.K. (1984). Treatment of bulimia nervosa with brief, psychoeducational group therapy. American Journal of Psychiatry, 141, 1512-1516.
- Cooper, M.J. (1984). Assessing cognitions: An in vivo study of self-statements in anorexia nervosa. Master's dissertation, University of Edinburgh.
- Cooper, M.J., Anastasiades, P. & Fairburn, C.G. (in press). Selective processing of eating, weight and shape related words in bulimia nervosa. Journal of Abnormal Psychology.
- Cooper, P.J. & Fairburn, C.G. (1984). Cognitive-behaviour therapy for anorexia nervosa: Some preliminary findings. Journal of Psychosomatic Research, 28, 493-500.
- Cooper, P.J., Osborn, M., Gath, D. & Feggetter, G. (1982). Evaluation of a modified self-report measure of social adjustment. British Journal of Psychiatry, 141, 68-75.
- Cooper, P.J., Taylor, M.J., Cooper, Z. & Fairburn, C.G. (1987). The development and validation of the Body Shape Questionnaire. International Journal of Eating Disorders, 6, 485-494.
- Cooper, Z., Cooper, P.J. & Fairburn, C.G. (1989). The validity of the Eating

- Disorder Examination and its subscales. British Journal of Psychiatry, 154, 807-812.
- Cooper, Z. & Fairburn, C.G.F. (1987). The Eating Disorder Examination: A semi-structured interview for the assessment of the specific psychopathology of eating disorders. International Journal of Eating Disorders, 6, 1-8.
- Craighead, W.E., Kimball, W.H. & Rehak, P.J. (1979). Mood changes, physiological responses and self-statements during social rejection imagery. Journal of Consulting and Clinical Psychology, 47, 385-396.
- Crisp, A.H. (1967). Primary anorexia nervosa or adolescent weight phobia. The Practitioner, 213, 525-535.
- Crisp, A.H. & Fransella, F. (1972). Conceptual changes during recovery from anorexia nervosa. British Journal of Medical Psychology, 45, 395-405.
- Csikszentmihalyi, M., Larson, R. & Prescott, S. (1977). The ecology of adolescent activity and experiences. Journal of Youth and Adolescence, 6, 281-294.
- Dansereau, P. & Gregg, L.W. (1966). An information processing analysis of mental multiplication. Psychonomic Science, 6, 71-72.
- Davison, G.C., Robins, C. & Johnson, M.K. (1983). Articulated thoughts during simulated situations: A paradigm for studying cognition in emotion and behaviour. Cognitive Therapy and Research, 7, 17-40.
- Dedman, P.A., Numa, S.F. & Wakeling, A. (1988). A cognitive-behavioural group approach for the treatment of bulimia nervosa - a preliminary study. Journal of Psychosomatic Research, 32, 285-290.
- Derogatis, L.R., Lipman, R.S. & Covi, L. (1973). SCL-90: An outpatient psychiatric rating scale - preliminary report. Psychopharmacology Bulletin, 9, 13-28.
- Diener, C.I. & Dweck, C.S. (1980). An analysis of learned helplessness: II.

- The processing of success. Journal of Personality and Social Psychology, 39, 940-952.
- Dixon, K.N. & Kiecolt-Glaser, J. (1984). Group therapy for bulimia. Hillside Journal of Clinical Psychiatry, 6, 156-170.
- Eifert, G.H. & Lauterbach, W. (1987). Relationships between overt behaviour to a fear stimulus and self-verbalisations measured by different research strategies. Cognitive Therapy and Research, 11, 169-184.
- Ellis, H.C., Siebert, P.S. & Herbert, B.J. (1990). Mood state effects on thought listing. Bulletin of the Psychonomic Society, 28, 147-150.
- Ericsson, K.A. & Simon, H.A. (1980). Verbal reports as data. Psychological Review, 87, 215-251.
- Fairburn, C.G. (1981). A cognitive-behavioural approach to the treatment of bulimia nervosa. Psychological Medicine, 11, 707-711.
- Fairburn, C.G. (1987). The definition of bulimia nervosa. Annals of Behavioural Medicine, 9, 3-7.
- Fairburn, C.G. (1988). The current status of the psychological treatments for bulimia nervosa. Journal of Psychosomatic Research, 32, 635-645.
- Fairburn, C.G. (1989). Eating Disorder Examination (11.3 D). Unpublished manuscript, University of Oxford.
- Fairburn, C.G., Agras, W.S. & Wilson, G.T. (in press). The research on the treatment of bulimia nervosa: Practical and theoretical implications. In G.H. Anderson & S.H. Kennedy (Eds.). The Biology of Feast and Famine: Relevance to Eating Disorders. New York: Academic Press.
- Fairburn, C.G. & Beglin, S.J. (1990). Studies of the epidemiology of bulimia nervosa. American Journal of Psychiatry, 147, 401-408.
- Fairburn, C.G., Cooper, P.J., Cooper, M.J., Anastasiades, P. & McKenna, F.P. (1991b). Selective information processing in bulimia nervosa. International Journal of Eating Disorders, 10, 415-422.

- Fairburn, C.G., Cooper, Z. & Cooper, P.J. (1986a). The clinical features and maintenance of bulimia nervosa. In K.D. Brownell & J.P. Foreyt (Eds.), Physiology, Psychology and Treatment of the Eating Disorders. New York: Basic Books.
- Fairburn, C.G., Jones, R., Peveler, R.C., Carr, S.J., Solomon, R.A., O'Connor, M.E., Burton, J. & Hope, R.A. (1991a). Three psychological treatments for bulimia nervosa: A comparative trial. Archives of General Psychiatry, 48, 463-469.
- Fairburn, C.G., Kirk, J., O'Connor, M., Anastasiades, P. & Cooper, P.J. Prognostic factors in bulimia nervosa. (1987). British Journal of Clinical Psychology, 26, 223-224.
- Fairburn, C.G., Kirk, J., O'Connor, M. & Cooper, P.J. (1986b). A comparison of two psychological treatments for bulimia nervosa. Behaviour Research and Therapy, 24, 629-643.
- Fennell, M.J.V., Teasdale, J.D., Jones, S. & Damlé, A. (1987). Distraction in neurotic and endogenous depression: An investigation of negative thinking in major depressive disorder. Psychological Medicine, 17, 441-452.
- Fischler, I. & Bloom, P.A. (1979). Automatic and attentional processes in the effects of sentence contents on word recognition. Journal of Verbal Learning and Verbal Behaviour, 18, 1-20.
- Franko, D.L., Zuroff, D.C. & Rosenthal, F. (1986). Construct validation of the Bulimic Thoughts Questionnaire. Paper presented at the annual meeting of the Society of Behavioural Medicine, March 1986, San Francisco.
- Freeman, C.P.L., Barry, F., Dunkeld-Turnbull, J. & Henderson, A. (1988). Controlled trial of psychotherapy for bulimia nervosa. British Medical Journal, 296, 521-525.

- Freeman, R.J., Beach, B., Davis, R. & Solyom, L. (1985). The prediction of relapse in bulimia nervosa. Journal of Psychiatric Research, 19, 349-353.
- Fremouw, W.J. & Heyneman, N.E. (1983). Cognitive styles and bulimia. The Behaviour Therapist, 6, 143-144.
- Gagné, R.M. & Smith, E.C. (1962). A study of the effects of verbalization on problem solving. Journal of Experimental Psychology, 63, 12-18.
- Galassi, J.P., Frierson, H.T. & Sharer, R. (1981). Concurrent versus retrospective assessment in test anxiety research. Journal of Consulting and Clinical Psychology, 49, 614-615.
- Galassi, J.P., Frierson, H.T. & Siegel, R.G. (1984). Cognitions, test anxiety, and test performance: a closer look. Journal of Consulting and Clinical Psychology, 52, 319-320.
- Galdston, R. (1974). Mind over matter: observations on 50 patients hospitalized with anorexia nervosa. American Academy of Child Psychiatry, 13, 246-263.
- Garner, D.M. & Bemis, K.M. (1982). A cognitive-behavioural approach to anorexia nervosa. Cognitive Therapy and Research, 6, 123-150.
- Garner, D.M., Fairburn, C.G. & Davis, R. (1987). Cognitive-behavioural treatment of bulimia nervosa: A critical appraisal. Behaviour Modification, 11, 398-431.
- Garner, D.M. & Garfinkel, P.E. (1979). The Eating Attitudes Test: An index of the symptoms of anorexia nervosa. Psychological Medicine, 9, 273-279.
- Garner, D.M., Olmsted, M.P. & Polivy, J. (1983). Development and validation of a multidimensional Eating Disorder Inventory for anorexia nervosa and bulimia. International Journal of Eating Disorders, 2, 15-34.
- Genest, M. & Turk, D.C. (1981). Think-aloud approaches to cognitive assessment. In T.V. Merluzzi, C.R. Glass & M. Genest. (Eds.), Cognitive

- Assessment. (pp 233-269). New York: Guilford Press.
- Giles, T.R., Young, R.R. & Young, D.E. (1985). Behavioural treatment of severe bulimia. Behaviour Therapy, 16, 393-405.
- Gilhooly, K.J. & Gregory, D.J. (1989). Thinking aloud performance; individual consistencies over tasks. Current Psychology: Research and Reviews, 8, 179-187.
- Gilligan, S.G. & Bower, G.H. (1984). Cognitive consequences of emotional arousal. In C. Izard, J. Kagan & R. Zajonc (Eds.), Emotions, Cognition and Behaviour. New York: Cambridge University Press.
- Glass, C.R., Merluzzi, T.V., Biever, J.L. & Larsen, K.H. (1982). Cognitive assessment of social anxiety: development and validation of a self-statement questionnaire. Cognitive Therapy and Research, 6, 37-55.
- Goebel, M., Spalthoff, G., Schulze, C. & Florin, I. (1989). Dysfunctional cognitions, attributional style and depression in bulimia. Journal of Psychosomatic Research, 33, 747-752.
- Goldfried, M.R. & Davison, G.C. (1976). Clinical Behaviour Therapy. New York: Holt, Reinhart & Winston.
- Goor, A. & Sommerfield, R.E. (1975). A comparison of problem-solving processes of creative students and noncreative students. Journal of Educational Psychology, 67, 495-505.
- Gotlib, I.H. & Cane, D.B. (1987). Construct accessibility and clinical depression: A longitudinal investigation. Journal of Abnormal Psychology, 96, 199-204.
- Gotlib, I.H. & McCann, C.D. (1984). Construct accessibility and depression: an examination of cognitive and affective factors. Journal of Personality and Social Psychology, 47, 427-439.
- Grand, S. (1968). Colour word interference. II An investigation of the role of vocal conflict and hunger in associative priming. Journal of

Experimental Psychology, 77, 31-40.

- Gray, J.J., Ford, K. & Kelly, L.M. (1987). The presence of bulimia in a black college population. International Journal of Eating Disorders, 6, 733-740.
- Greenwald, A.G. (1968). Cognitive learning, cognitive response to persuasion, and attitude change. In A.G. Greenwald, T.C. Brock & T.M. Östrom. (Eds.), Psychological Foundations of Attitudes. (pp 147-170). New York: Academic Press.
- Grinc, G.A. (1982). A cognitive-behavioural model for the treatment of chronic vomiting. Journal of Behavioural Medicine, 5, 135-141.
- Gross, J., Rosen, J.C., Leitenberg, H. & Willmuth, M.E. (1986). Validity of the Eating Attitudes Test and the Eating Disorder Inventory in bulimia nervosa. Journal of Consulting and Clinical Psychology, 54, 875-876.
- Guidano, V.F. & Liotti, G. (1983). Cognitive Processes and Emotional Disorders: A Structural Approach to Psychotherapy. New York: Guilford Press.
- Hauserman, N. & Lavin, P. (1977). Post hospitalization continuation treatment of anorexia nervosa. Journal of Behaviour Therapy and Experimental Psychiatry, 8, 309-313.
- Hautzinger, M. (1980). Anorexia nervosa: A behaviour-analytic model. Behaviour Analysis and Modification, 4, 210-223.
- Heimberg, R.G., Acerra, M.C. & Holstein, A. (1985). Partner similarity mediates interpersonal anxiety. Cognitive Therapy and Research, 9, 443-453.
- Henshaw, D. (1978). A cognitive analysis of creative problem-solving. Doctoral dissertation, University of Waterloo, Ontario, Canada. Dissertation Abstracts International, 39, 4580B.
- Herzog, D.B., Keller, M.B. & Lavori, P.W. (1988). Outcome in anorexia

- nervosa and bulimia nervosa: a review of the literature. Journal of Nervous and Mental Disease, 176, 131-143.
- Hollandsworth, J.G., Glazeski, R.C., Kirkland, K., Jones, G.E. & VanNorman, L.R. (1979). An analysis of the nature and effects of test anxiety: cognitive, behavioural and physiological components. Cognitive Therapy and Research, 3, 165-180.
- Hollon, S.D. & Kendall, P.C. (1980). Cognitive self-statements in depression: Development of an Automatic Thoughts Questionnaire. Cognitive Therapy and Research, 4, 109-143.
- Hollon, S.D. & Kendall, P.C. (1981). In vivo assessment techniques for cognitive-behavioural processes. In P.C. Kendall & S.D.Hollon. (Eds.), Assessment Strategies for Cognitive-Behavioural Interventions. (pp 319-362). London: Academic Press.
- Hsu, L.K.G. (1990). Eating Disorders. New York: Guilford Press.
- Hsu, L.K.G. & Holder, D. (1986). Bulimia nervosa: Treatment and short-term outcome. Psychological Medicine, 16, 65-70.
- Hunt, D.A. & Rosen, J.C. (1981). Thoughts about food by obese and nonobese individuals. Cognitive Therapy and Research, 5, 317-322.
- Huon, G.F. & Brown, L.B. (1985). Evaluating a group treatment for bulimia. Journal of Psychiatric Research, 19, 479-483.
- Hurlburt, R.T. & Sipprelle, C.N. (1978). Random sampling of cognitions in alleviating anxiety attacks. Cognitive Therapy and Research, 2, 165-169.
- Ingram, R.E. & Wisnicki, K.S. (1988). Assessment of positive automatic cognition. Journal of Consulting and Clinical Psychology, 56, 898-902.
- Inhelder, B. & Piaget, J. (1955). The Growth of Logical Thinking from Childhood to Adolescence: An Essay on the Construction of Formal Operational Structures. New York: Basic Books.
- Jansen, A., Merckelbach. H., Oosterlaan, J., Tuiten., & Van Den Hout, M.

- (1988). Cognitions and self talk during food intake of restrained and unrestrained eaters. Behaviour Research and Therapy, 26, 393-398.
- Johnson, C. & Connors, M.E. (1987). Demographic and clinical characteristics. In C. Johnson & M.E. Connors. The aetiology and treatment of bulimia nervosa. A biopsychosocial perspective. (pp 31-60). New York: Basic Books.
- Johnson, W.G., Schlundt, D.G. & Jarrell, M.P. (1986). Exposure with response prevention, training in energy balance and problem solving therapy for bulimia nervosa. International Journal of Eating Disorders, 5, 35-45.
- Jones, R.G. (1968). A Factored Measure of Ellis' Irrational Belief Systems. Wichita, Kansas: Test Systems Inc.
- Katzman, M. & Wolchik, S.A. (1984). Bulimia and binge-eating in college women: A comparison of personality and behavioural characteristics. Journal of Consulting and Clinical Psychology, 52, 423-428.
- Kendall, P.C. & Hollon, S.D. (1981). Assessing self-referent speech: Methods in the measurement of self-statements. In P.C. Kendall & S.D. Hollon. (Eds.), Assessment strategies for Cognitive-Behavioural Interventions. (pp 85-117). London: Academic Press.
- Kendall, P.C. & Korgeski, G.P. (1979). Assessment and cognitive-behavioural interventions. Cognitive Therapy and Research, 3, 1-21.
- Kendall, P.C., Williams, L., Pechacek, T.F., Graham, L.E., Shisslak, C. & Herzof, N. (1979). Cognitive-behavioural and patient education interventions in cardiac catheterization procedures: The Palo Alto Medical Psychology Project. Journal of Consulting and Clinical Psychology, 47, 48-59.
- Keys, S.A., Brozek, J., Henschel, A., Mickelsen, O. & Taylor, H.L. (1950). The Biology of Human Starvation, vol 1. Minneapolis: University of Minnesota Press.

- King, M.B. (1986). Eating disorders in general practice. British Medical Journal, 293, 1412-1414.
- King, M.B. (1989). Eating disorders in a general practice population: Prevalence, characteristics and follow up at 12 to 18 months. Psychological Medicine Monograph Supplements, 14, 1-34.
- Kirkley, B.G., Schneider, J.A., Agras, W.S. & Bachman, J.A. (1985). A comparison of two group treatments for bulimia nervosa. Journal of Consulting and Clinical Psychology, 53, 43-48.
- Klein, G.S. (1964). Semantic power measured through the interference of words with colour-naming. American Journal of Psychology, 73, 576-588.
- Klerman, G.C., Weissman, M.M., Rounsaville, B.J. & Chevron, E.S. (1984). Interpersonal Psychotherapy of Depression. New York: Basic Books.
- Kling, J.W. & Riggs, L.A. (1972). Woodworth & Schlosberg's Experimental Psychology. (3rd ed.). London: Methuen.
- Klinger, E. (1974). Utterances to evaluate steps and control attention distinguish operant from respondent thought while thinking out loud. Bulletin of the Psychonomic Society, 4, 44-45.
- Krantz, S. & Hammen, C. (1979). Assessment of cognitive bias in depression. Journal of Abnormal Psychology, 88, 611-619.
- Kucera, H. & Francis, W.N. (1967). Computational Analysis of Present Day American English. Providence, Rhode Island: Brown University Press.
- Lacey, J.H. (1983). Bulimia nervosa, binge eating, and psychogenic vomiting: a controlled treatment study and long term outcome. British Medical Journal, 286, 1609-1613.
- Landau, R.J. (1980). The role of semantic schemata in phobic word recognition. Cognitive Therapy and Research, 4, 427-434.
- Larson, R. & Johnson, C. (1981). Anorexia nervosa in the context of daily experience. Journal of Youth and Adolescence, 10, 455-471.

- Last, C.G., Barlow, D.H. & O'Brien, G.T. (1984a). Cognitive change during treatment of agoraphobia. Behaviour Modification, 8, 181-210.
- Last, C.G., Barlow, D.H. & O'Brien, G.T. (1984b). Cognitive changes during in vivo exposure in an agoraphobic. Behaviour Modification, 8, 93-113.
- Last, C.G., Barlow, D.H. & O'Brien, G.T. (1985). Assessing cognitive aspects of anxiety: stability over time and agreement between several methods. Behaviour Modification, 9, 72-93.
- Last, C.G., O'Brien, G.T. & Barlow, D.H. (1985). The relationship between cognitions and anxiety. Behaviour Modification, 9, 235-241.
- Lee, N.F. & Rush, A.J. (1986). Cognitive-behavioural group therapy for bulimia. International Journal of Eating Disorders, 5, 599-615.
- Leitenberg, H., Gross, J., Peterson, J. & Rosen, J.C. (1984) Analysis of an anxiety model and the process of change during exposure plus response prevention treatment of bulimia nervosa. Behaviour Therapy, 15, 3-20.
- Leitenberg, H., Rosen, J.C., Gross, J., Nudelman, S. & Vara, L.S. (1988). Exposure plus response prevention treatment of bulimia nervosa: a controlled evaluation. Journal of Consulting and Clinical Psychology, 56, 535-541.
- Lewinsohn, P.M., Steinmetz, J.L., Larson, D.W. & Franklin, J. (1981). Depression related cognitions: Antecedent or consequence? Journal of Abnormal Psychology, 90, 213-219.
- Long, C.G. & Cordle, C.J. (1982). Psychological treatment of binge-eating and self-induced vomiting. British Journal of Medical Psychology, 55, 139-145.
- Lucas, A.R., Beard, C.M., O'Fallon, W.M. & Kurland, L.T. (1988). Anorexia nervosa in Rochester, Minnesota: A 45 year study. Mayo Clinic Proceedings, 63, 433-442.
- Lucas, A.R., Beard, C.M., O'Fallon, W.M. & Kurland, L.T. (1991). 50-year

- trends in the incidence of anorexia nervosa in Rochester, Minn.: A population-based study. American Journal of Psychiatry, 148, 917-922.
- McKenna, P.J. (1984). Disorders with overvalued ideas. British Journal of Psychiatry, 145, 579-585.
- McNally, R.J., Kaspi, S.P., Riemann, B.C. & Zeitlin, S.B. (1990). Selective processing of threat cues in post traumatic stress disorder. Journal of Abnormal Psychology, 99, 398-402.
- McNally, R.J., Riemann, B.C. & Kim, E. (1990). Selective processing of threat cues in panic disorder. Behaviour Research and Therapy, 28, 407-412.
- Mahoney, M.J. & Mahoney, K. (1976). Permanent Weight Control. New York: W.W. Norton.
- Markus, H. (1977). Self-schemata and processing information about the self. Journal of Personality and Social Psychology, 35, 63-78.
- Markus, H., Crane, M., Bernstein, S. & Siladi, M. (1982). Self-schemas and gender. Journal of Personality and Social Psychology, 42, 38-50.
- Markus, H., Hamill, R. & Sentis, K.P. (1987). Thinking fat: Self schemata for body weight and the processing of weight relevant information. Journal of Applied Social Psychology, 17, 50-72.
- Martin, M., Williams, R.M. & Clark, D.M. (1991). Does anxiety lead to selective processing of threat-related information? Behaviour Research and Therapy, 29, 147-160.
- Mathews, A. & MacLeod, C. (1985). Selective processing of threat cues in anxiety states. Behaviour Research and Therapy, 23, 563-569.
- Mathews, A. & MacLeod, C. (1986). Discrimination of threat cues without awareness in anxiety states. Journal of Abnormal Psychology, 95, 131-138.
- Mathews, A., Mogg, K., May, J. & Eysenck, M. (1989). Implicit and explicit

- memory bias in anxiety. Journal of Abnormal Psychology, 98, 236-240.
- Meichenbaum, D. (1977). Cognitive Behaviour Modification. New York: Plenum.
- Merluzzi, T.V., Burgio, K.L. & Glass, C.R. (1984). Cognition and psychopathology: An analysis of social introversion and self-statements. Journal of Consulting and Clinical Psychology, 52, 1102-1103.
- Metalsky, G.I., Abramson, L.Y., Seligman, M.E.P., Semmel, A. & Peterson, C. (1982). Attributional styles and life events in the classroom: Vulnerability and invulnerability to depressive reactions. Journal of Personality and Social Psychology, 43, 612-617.
- Missel, P. & Sommer, G. (1983). Depression and self-verbalisation. Cognitive Therapy and Research, 7, 141-148.
- Mitchell, J.E., Fletcher, L., Pyle, R.L., Eckert, E.D., Hatsukami, D.K. & Pomeroy, C. (1989). The impact of treatment on meal patterns in patients with bulimia nervosa. International Journal of Eating Disorders, 8, 167-172.
- Mitchell, J.E. & Pyle, R.L. (1982). The bulimic syndrome in normal weight individuals: A review. International Journal of Eating Disorders, 1, 61-73.
- Mitchell, J.E., Pyle, R.L., Eckert, E.D., Hatsukami, D., Pomeroy, C. & Zimmerman, R. (1990). A comparison study of antidepressants and structured intensive group psychotherapy in the treatment of bulimia nervosa. Archives of General Psychiatry, 47, 149-157.
- Mizes, J.S. (1988). Personality characteristics of bulimic and noneating disordered female controls: A cognitive-behavioural perspective. International Journal of Eating Disorders, 7, 541-550.
- Nasser, M. (1986). Comparative study of the presence of abnormal eating attitudes among Arab female students of both London and Cairo

- universities. Psychological Medicine, 16, 621-625.
- Nelson, R.O. (1977). Methodological issues in assessment via self-monitoring. In J.D. Cone & R.P. Hawkins. (Eds.) Behavioural Assessment: New Directions in Clinical Psychology. New York: Brunner/Mazel.
- Nevo, S. (1985). Bulimic symptoms: Prevalence and ethnic differences among college women. International Journal of Eating Disorders, 4, 151-168.
- Nisbett, R.E. & Bellows, N. (1977). Verbal reports about causal inferences on social judgments: private access versus public theories. Journal of Personality and Social Psychology, 35, 613-624.
- Nisbett, R.E. & Wilson, T.D. (1977). Telling more than we can know: verbal reports on mental processes. Psychological Review, 84, 231-259.
- Oettingen, G. & Wadden, T.A. (1991). Expectation, fantasy and weight loss: Is the impact of positive thinking always positive? Cognitive Therapy and Research, 15, 167-175.
- Ordman, A.M. & Kirschenbaum, D.S. (1985). Cognitive-behavioural therapy for bulimia: an initial outcome study. Journal of Consulting and Clinical Psychology, 53, 305-313.
- Paine, P.M. (1982). Investigation of the abstinence violation effect in an obese population. Doctoral dissertation, University of Georgia. Dissertation Abstracts International, 42, 3434B-3435B.
- Peterson, C., Semmel, A., von Baeyer, C., Abramson, L.Y., Metalsky, G.I. & Seligman, M.E.P. (1982). The Attributional Style Questionnaire. Cognitive Therapy and Research, 6, 287-300.
- Phelan, P.W. (1987). Cognitive correlates of bulimia: the Bulimic Thoughts Questionnaire. International Journal of Eating Disorders, 6, 593-607.
- Pope, K.S. (1987). How gender, solitude and posture influence the stream of consciousness. In K.S. Pope & J.L. Singer. (Eds.), The Stream of

Consciousness: Scientific Investigations into the Flow of Human Experience. New York: Plenum.

- Pyle, R.L., Mitchell, J.E., Eckert, E.D., Hatsukami, D.K. & Goff, G. The interruption of bulimic behaviours: a review of three treatment programmes. Psychiatric Clinics of North America, 7, 275-286.
- ReynaMcGlone, C.L., Ollendick, T.H. & Hart, K.J. (1986). Self-efficacy and bulimia: Development and validation of the self assessment scale. Poster presented at the meeting of the association for the Advancement of Behaviour Therapy, Chicago, Illinois.
- Rosen, B. (1979). A method of structured brief psychotherapy. British Medical Journal, 52, 157-162.
- Rosen, J.C., Leitenberg, H., Fondacaro, K.M., Gross, J. & Willmuth, M. (1985). Standardized test meals in assessment of eating behaviour in bulimia nervosa: consumption of feared foods when vomiting is prevented. International Journal of Eating Disorders, 4, 59-70.
- Rosen, J.C., Leitenberg, H., Gross, J. & Willmuth, M. (1985). Standardized tests in the assessment of bulimia nervosa. Advances in Behaviour Research and Therapy, 7, 181-197.
- Rosenberg, M. (1965). Society and the Adolescent Self Image. Princeton: Princeton University Press.
- Rosenthal, R. & Rosnow, R.L. (1984). Essentials of Behavioural Research: Methods and Data Analysis. New York: McGraw-Hill.
- Rossiter, E.M., & Wilson, G.T. (1985). Cognitive restructuring and response prevention in the treatment of bulimia nervosa. Behaviour Research and Therapy, 23, 349-360.
- Roy-Byrne, P., Lee-Benner, K & Yager, J. (1984). Group therapy for bulimia: A year's experience. International Journal of Eating Disorders, 3, 97-116.

- Ruderman, A.J. (1986). Bulimia and irrational beliefs. Behaviour Research and Therapy, 24, 193-194.
- Russell, G.F.M. (1970). Anorexia nervosa: its identity as an illness and its treatment. In J.H. Price. (Ed.), Modern Trends in Psychological Medicine, II. New York: Appleton-Century-Crofts.
- Russell, G.F.M. (1979). Bulimia nervosa: An ominous variant of anorexia nervosa. Psychological Medicine, 9, 429-448.
- Safran, J.D. (1982). The functional asymmetry of negative and positive self statements. British Journal of Clinical Psychology, 21, 223-224.
- Scanlon, E., Ollendick, T.H. & Bayer, K. (1986). The role of cognitions in bulimia: an empirical test of basic assumptions. Paper presented at the Association for the Advancement of Behaviour Therapy, Chicago, Illinois.
- Scheibe, K.E., Shaver, P.R. & Carrier, S.C. (1967). Colour association values and response interference on variants of the Stroop test. Acta Psychologica, 26, 286-295.
- Schiele, B.C. & Brozek, J. (1948). "Experimental neurosis" resulting from semi starvation in man. Psychosomatic Medicine, 10, 31-50.
- Schlesier-Carter, B., Hamilton, S.A., O'Neil, P.M., Lydiard, R.B. & Malcolm, R. (1989). Depression and bulimia: The link between depression and bulimic cognitions. Journal of Abnormal Psychology, 98, 322-325.
- Schneider, J.A. & Agras, S. (1985). A cognitive-behavioural group treatment of bulimia. British Journal of Psychiatry, 146, 66-69.
- Schulman, R.G., Kinder, B.N., Powers, P.S., Prange, M. & Gleghorn, A. (1986). The development of a scale to measure cognitive distortions in bulimia. Journal of Personality Assessment, 50, 630-639.
- Schwartz, R.M. & Gottman, J.M. (1976). Towards a task analysis of assertive behaviour. Journal of Consulting and Clinical Psychology, 44, 910-920.
- Selvini-Palazzoli, M.P. (1974). Self-Starvation. London: Chaucer.

- Shorkey, C.T. & Whiteman, V.L. (1977). Development of the Rational Behaviour Inventory: Initial validation and reliability. Educational and Psychological Measurement, 37, 527-534.
- Slade, P. (1982). Towards a functional analysis of anorexia nervosa and bulimia nervosa. British Journal of Clinical Psychology, 21, 167-179.
- Spielberger, C., Gorsuch, R. & Lushene R. (1970). State-Trait Anxiety Inventory Manual. Consulting Psychologist Press, Palo Alto, CA, USA.
- Steiger, H., Goldstein, C., Mongrain, M. & Van Der Feen, J. (1990). Description of eating disordered, psychiatric and normal women along cognitive and psychodynamic dimensions. International Journal of Eating Disorders, 9, 129-140.
- Stevens, E.V. & Salisbury, J.D. (1984). Group therapy for bulimic adults. American Journal of Orthopsychiatry, 54, 156-161.
- Stroop, P.J. (1935). Studies of interference in serial verbal reactions. Journal of Experimental Psychology, 18, 643-661.
- Teasdale, J.D. (1983). Negative thinking in depression: Cause, effect or reciprocal relationship? Advances in Behaviour Research and Therapy, 5, 3-25.
- Teasdale, J.D. (1985). Psychological treatments for depression: How do they work? Behaviour Research and Therapy, 23, 157-165.
- Vandereycken, W. & Vanderlinden, J. (1988). Denial of illness and the use of self-reporting measures in anorexia nervosa patients. International Journal of Eating Disorders, 2, 101-107.
- Vitousek, K.B. & Hollon, S.D. (1990). The investigation of schematic content and processing in the eating disorders. Cognitive Therapy and Research, 14, 191-214.
- Warren, R.E. (1972). Stimulus control and memory. Journal of Experimental Psychology, 94, 90-100.

- Warren, R.E. (1974). Association, directionality and stimulus encoding. Journal of Experimental Psychology, 102, 151-158.
- Watts, F.N., McKenna, F.P., Sharrock, R. & Trezise, L. (1986). Colour-naming of phobia-related words. British Journal of Psychology, 77, 97-108.
- Weissman, A.N. (1979). The Dysfunctional Attitude Scale. Doctoral dissertation, University of Pennsylvania, Dissertation Abstracts International, 40, 1389-1390B
- Welch, G.J. (1979). The treatment of compulsive vomiting and obsessive thoughts through graduated response delay, response prevention and cognitive correction. Journal of Behaviour Therapy and Experimental Psychiatry, 10, 72-82.
- Williams, J.M.G. & Broadbent, K. (1986). Distraction by emotional stimuli: Use of a Stroop task with suicide attempters. British Journal of Clinical Psychology, 25, 101-110.
- Williamson, D.A., Prather, R.C., Bennett, S.M., Davis, C.J., Watkins, P.C. & Grenier, C.E. (1989). An uncontrolled evaluation of inpatient and outpatient cognitive-behaviour therapy for bulimia nervosa. Behaviour Modification, 13, 340-360.
- Wilson, G.T. (1985). The treatment of bulimia nervosa: A cognitive-social learning analysis. Paper delivered as Presidential address of Section III, Division 12 of the American Psychological Association, 93rd Annual Convention, Los Angeles, California.
- Wilson, G.T. (1989a). Bulimia nervosa: models, assessment and treatment. Current Opinion in Psychiatry, 2, 790-794.
- Wilson, G.T. (1989b). The treatment of bulimia nervosa: A cognitive-social learning analysis. In A.J. Stunkard & V. Baum. (Eds.). Perspectives in Behavioural Medicine: Eating, Sleeping and Sex. (pp 73-98). Hillsdale: Erlbaum.

- Wilson, G.T. (in press). Cognitive-behavioural versus pharmacological treatment of bulimia nervosa. Verhaltenstherapie.
- Wilson, G.T., Rossiter, E., Kleifield, E.I. & Lindholm, L. (1986). Cognitive-behavioural treatment of bulimia nervosa: a controlled evaluation. Behaviour Research and Therapy, 24, 277-288.
- Wilson, G.T. & Smith, D. (1989). Assessment of bulimia nervosa: An evaluation of the Eating Disorder Examination. International Journal of Eating Disorders, 8, 173-179.
- Wilson, T.D. & Nisbett, R.E. (1978). The accuracy of verbal reports about the effects of stimuli on evaluations and behaviour. Social Psychology, 41, 118-131.
- Wing, J.K., Cooper, J.E. & Sartorius, N. (1974). The Measurement and Classification of Psychiatric Symptoms. Cambridge: Cambridge University Press.
- Wolchik, S.A., Weiss, L. & Katzman, M. (1986). An empirically validated, short-term psychoeducational group treatment programme for bulimia. International Journal of Eating Disorders, 5, 21-34.
- Yates, A.J. & Sambrailo, F. (1984). Bulimia nervosa: A descriptive and therapeutic study. Behaviour Research and Therapy, 22, 503-517.

Appendices

Appendix 1	Selection criteria for the five groups of subjects assessed in Chapter 3 and Chapter 5	288
Appendix 2	Reliability of coding the Eating Disorder Examination in the five groups studied in Chapter 3	292
Appendix 3	The Thoughts Checklist used in Chapter 3	293
Appendix 4	Example of transcribed thoughts prior to coding and breaking up into idea units	298
Appendix 5	Reliability of breaking the transcripts into units in Chapter 3	299
Appendix 6	The manual used for classifying thoughts in Chapters 3 and 9	300
Appendix 7	Reliability of coding the transcripts in Chapter 3 into immediately relevant positive and negative thoughts, content, reference and valence	334
Appendix 8	Items contributing to the five subscales of the Eating Disorder Examination	336
Appendix 9	Mean length and word frequency scores for the stimuli used in Chapter 9	337
Appendix 10	The four sets of stimuli as they were presented to subjects in Chapter 9	338
Appendix 11	Visual analogue scales used to measure mood and eating behaviour in Chapter 9	343
Appendix 12	Brands and caloric values of the stimuli used in the taste test in Chapter 9	345
Appendix 13	Visual analogue scales used to assess the four basic tastes in Chapter 9	346

	287
Appendix 14 Food diary and instructions used in Chapter 9	347
Appendix 15 Reliability of breaking the transcripts into units in Chapter 9	350
Appendix 16 Criteria for classifying thoughts relevant to the taste test in Chapter 9	351
Appendix 17 Reliability of coding the transcripts in Chapter 9 into immediately relevant positive and negative thoughts, content, reference and valence	353
Appendix 18 Results from the analyses of variance of the questionnaire and semi-structured interview measures used in Chapter 3	355
Appendix 19 Paper accepted for publication in the Journal of Abnormal Psychology	356

Appendix 1

Selection criteria for the five groups of subjects assessed in Chapter 3 and

Chapter 5

Anorexia nervosa

A. Refusal to maintain body weight over a minimum normal weight for age and height, e.g. weight loss leading to a maintenance of body weight 15% below that expected; or failure to make expected weight gain during period of growth, leading to body weight 15% below that expected.

B. Intense fear of gaining weight or becoming fat, even though underweight.

C. Disturbance of the way in which one's body weight, size or shape is experienced, e.g. the person claims to "feel fat" even when emaciated, believes that one area of the body is "too fat" even when obviously underweight.

D. In females, absence of at least three consecutive menstrual cycles when otherwise expected to occur (primary or secondary amenorrhoea). (A woman is considered to have amenorrhoea if her periods occur only following hormone, e.g. oestrogen, administration).

Bulimia nervosa

A. Recurrent episodes of binge eating (rapid consumption of a large amount of food in a discrete period of time).

B. A feeling of lack of control over eating behaviour during the eating binges.

C. The person regularly engages in either self-induced vomiting, use of laxatives or diuretics, strict dieting or fasting, or vigorous exercise in order to prevent weight gain.

D. A minimum average of two binge eating episodes a week for at least three months, with no more than two weeks free from such episodes (unless the subject has been in an environment where external factors prevented overeating).

E. Persistent overconcern with body shape and weight.

Normal dieters

A. A serious attempt to lose weight over the preceding four weeks, i.e. following a standard reducing diet and/or the setting of definite and rigid rules such as a definite calorie limit, preset quantities of food or rules about what should be eaten. These self imposed limits must be clearly articulated rules and not just general principles. (This is equivalent to item "dietary rules" on the Eating Disorders Examination or EDE, Cooper & Fairburn, 1987). To define the length of the current dieting episode, these rules must have been followed for a consecutive period with no more than 14 days free from following them. (Similar criteria apply to the symptoms of bulimia nervosa when determining length of current episode in Fairburn's operational definition of the disorder, Fairburn, 1987).

B. No current or previous psychiatric history, including anorexia nervosa and bulimia nervosa.

C. None of the following behavioural symptoms of anorexia nervosa or bulimia nervosa, either currently or in the past: objective episodes of binge eating, defined exactly as described in Fairburn's operational definition of bulimia nervosa, i.e. episodes of eating characterised by a definite sense of loss of control and the consumption of more than 1000 kcal; actual or attempted self-induce vomiting to prevent weight gain; weight below 85% of that expected for age and height.

Symptomatic dieters

A. A serious attempt to lose weight over the preceding four weeks, i.e. following a standard reducing diet and/or the setting of definite and rigid rules such as a definite calorie limit, preset quantities of food or rules about what should be eaten. These self imposed limits must be clearly articulated rules and not just general principles. (This is equivalent to item "dietary rules" on the Eating Disorders Examination or EDE, Cooper & Fairburn, 1987). To define the length of the current dieting episode, these rules must have been followed for a consecutive period with no more than 14 days free from following them. (Similar criteria apply to the symptoms of bulimia nervosa when determining length of current episode in Fairburn's operational definition of the disorder, Fairburn, 1987).

B. No current or previous psychiatric history, including anorexia nervosa and bulimia nervosa.

C. One or more of the following behavioural symptoms of anorexia nervosa or bulimia nervosa, either currently or in the past: objective episodes of binge eating, defined exactly as described in Fairburn's operational definition of bulimia nervosa, i.e. episodes of eating characterised by a definite sense of loss of control and the consumption of more than 1000 kcal; actual or attempted self-induce vomiting to prevent weight gain; weight below 85% of that expected for age and height.

Normal controls

A. No attempt to lose weight over the preceding four weeks, i.e. not following a standard reducing diet or setting definite and rigid rules such as a definite calorie limit, preset quantities of food or rules about what should be eaten. This is equivalent to item "dietary rules" on the Eating Disorder Examination or EDE, Cooper & Fairburn, 1987.

B. No current or previous psychiatric history, including anorexia nervosa and bulimia nervosa.

C. None of the following behavioural symptoms of anorexia nervosa or bulimia nervosa, either currently or in the past: objective episodes of binge eating, defined exactly as described in Fairburn's operational definition of bulimia nervosa, i.e. episodes of eating characterised by a definite sense of loss of control and the consumption of more than 1000 kcal; actual or attempted self-induced vomiting to prevent weight gain; weight below 85% of that expected for age and height.

Appendix 2

Reliability of coding the Eating Disorder Examination (EDE) in the five groups studied in Chapter 3

Each assessment using the EDE was audiotaped and all the interviews were rated by the investigator using the EDE manual. Ten tapes, two from each of the five groups of subjects (17% of the total), were selected at random and rated by an independent rater. Reliability of coding was calculated in two ways. In the first percentage of ratings on which the two raters agreed completely was calculated. In the second percentage of ratings on which the two raters agreed by at least one point was calculated. Overall agreement for the first method was $89.8 \pm 5.7\%$ (range 80.6 - 98.4%) and for the second it was $97.5 \pm 2.2\%$ (range 93.3 - 100%).

Appendix 3

The Thoughts Checklist used in Chapter 3

THOUGHTS CHECKLIST: WEIGHING TASK

Please think back to the weighing task and then rate the extent to which each of the thoughts listed below occurred during the task. Use the 1-6 rating scale below. Put your ratings on the LEFT HAND SIDE of the page.

- 1 Thought did not occur
- 2 Thought briefly occurred
- 3 Thought was there for some of the time
- 4 Thought was there for much of the time
- 5 Thought was there for most of the time
- 6 Thought was there all of the time

_____I can't look at my weight	.....	X
_____I'll go away and eat	.....	X
_____I won't be able to do anything else for the rest of the day	.....	X
_____I'm getting fatter and fatter	.....	X
_____As long as I'm not heavier, that's all that matters	.....	X
_____I'm so fat	.....	X
_____I am gross	.....	X
_____I'm just going to go on getting heavier and heavier	.....	X
_____I've no self control	.....	X
_____I'm disgusting	.....	X
_____I hate myself	.....	X
_____I'm a complete failure	.....	X
_____I must lose weight	.....	X
_____I must keep my weight under control	.....	X
_____I mustn't let myself gain weight	.....	X
_____I mustn't eat anything else today	.....	X
_____My weight's OK	.....	x

Other thoughts not listed (Please describe and rate)

_____.....	
_____.....	
_____.....	

THOUGHTS CHECKLIST: MIRROR TASK

Please think back to the mirror task and then rate the extent to which each of the thoughts listed below occurred during the task. Use the 1-6 rating scale below. Put your ratings on the LEFT HAND SIDE of the page.

- 1 Thought did not occur
- 2 Thought briefly occurred
- 3 Thought was there for some of the time
- 4 Thought was there for much of the time
- 5 Thought was there for most of the time
- 6 Thought was there all of the time

_____I can't look at myself in this mirror	.....	X
_____I'll go away and eat	.....	X
_____As long as I don't look fat, nothing else matters	.....	X
_____I won't be able to do anything else for the rest of the day	.....	X
_____I'm so fat	.....	X
_____I'm so ugly	.....	X
_____I am gross	.....	X
_____I look OK	.....	X
_____My shape's completely out of proportion	.....	X
_____I loathe my (part of body, eg, hips, stomach)	.....	X
_____It shows, I have no self control	.....	X
_____I'm not that thin - it must be a distorting mirror	.....	X
_____I'm a complete failure	.....	X
_____I'm disgusting	.....	X
_____I hate myself	.....	X
_____I must lose weight	.....	X
_____I mustn't eat anything else today	.....	X

Other thoughts not listed (Please describe and rate)

_____.....	
_____.....	
_____.....	

THOUGHTS CHECKLIST: EATING TASK

Please think back to the eating task and then rate the extent to which each of the thoughts listed below occurred during the task. Use the 1-6 rating scale given below. Put your ratings on the LEFT HAND SIDE of the page.

- 1 Thought did not occur
- 2 Thought briefly occurred
- 3 Thought was there for some of the time
- 4 Thought was there for much of the time
- 5 Thought was there for most of the time
- 6 Thought was there all of the time

_____I can't possibly eat this	.....	X
_____Chocolate's fattening	.....	X
_____I shouldn't be eating today	.....	X
_____I'll get fat	.....	X
_____I just can't eat like other people	.....	X
_____I'll have to make sure I get rid of it or compensate for it somehow	.....	X
_____I mustn't eat anything else today	.....	X
_____I won't be able to stop eating	.....	X
_____I can't control my eating	.....	X
_____I won't be able to do anything else for the rest of the day	.....	X
_____I'm disgusting	.....	X
_____I've no self control	.....	X
_____I'm a complete failure	.....	X
_____I hate myself	.....	X
_____I may as well carry on eating	.....	X

Other thoughts not listed (Please describe and rate)

_____.....		
_____.....		
_____.....		

THOUGHTS CHECKLIST

1 Please go back and rate how much you believed each of the thoughts which went through your mind. Rate how much you believed each thought at the time it occurred by choosing a number from the scale below. If the thought did not occur at all, do not rate it. Put your ratings in the column on the RIGHT HAND SIDE of the page.

0	10	20	30	40	50	60	70	80	90	100
I did					I was					
not believe this					completely convinced					
thought at all					this thought was true					

2 Please go back to each of the thoughts you didn't rate. For each one indicate whether it was present during either of the other tasks you did by circling the X on the RIGHT HAND SIDE of the page.

Appendix 4Example of transcribed thoughts prior to coding and breaking up into idea units**EATING**

Before: oh no going to be difficult and I bet if I eat this now that when I leave here I'll want to eat something else I'm not going to eat it yes I'll eat it glad she doesn't have the whole box out oh dear me huh psyching myself up to eat it now hopefully I'll forget about it when I've gone pretend I haven't eaten it

During and After: right here goes I shouldn't be doing this really I just hope I don't eat anything afterwards oh dear oh it's like a nice taste in my mouth probably go and eat lots of chocolates on the way home now a few bars oh well oh well maybe when I get rid of the taste then I won't need feel anything more it's stupid really it's only a little bit of chocolate that's enough I've been here ages now K'll be panicking what am I going to tell her hm this taste is still there oh I wish I hadn't eaten that oh well can always try again tomorrow

Appendix 5

Reliability of breaking the transcripts into units in Chapter 3

To determine the reliability of the method used to break the transcripts into units for categorisation an independent rater (rater 2) not involved in the study was asked to divide up ten randomly selected transcripts, two taken from each group of subjects (17% of the total), using the same criteria as the investigator (rater 1). After an initial practice during which discrepancies were discussed and resolved a high degree of inter-rater reliability was achieved. Mean percentage agreement was calculated in two ways. First, a measure of overall agreement on position of end boundaries was calculated by noting the number of end boundaries on which both raters agreed and dividing this by the larger number of boundaries used by either rater. For the ten transcripts rater 1 employed a total of 1848 end boundaries. Rater 2 used 1840 end boundaries and they agreed on 1718. Overall mean percentage agreement for the 30 sections, each transcript being divided up into three parts, corresponding to thoughts collected before, during and after each task, was $91.7 \pm 3.7\%$ (range 82.5 - 100%). Secondly, since rater 1 divided the rest of the data into units, the independent raters' (rater 2) agreement with rater 1's judgments was determined by dividing the number of units agreed on by the total number of units used by rater 2, instead of the larger number of units used by either rater. Using this method overall mean percentage agreement was $93.5 \pm 4.3\%$ (range 80.2 - 100%).

Appendix 6

The manual used for classifying thoughts in Chapters 3 and 9

Classifying thoughts from transcripts

A manual for classifying thoughts obtained in three situations,
eating, weighing and looking in a mirror

Myra Cooper

Department of Psychiatry

University of Oxford

February, 1990

CONTENTS

Chapter 1	Background
	Methods of coding
Chapter 2	Immediately relevant positive and negative thoughts: Validation of thoughts collected using the thinking aloud method with thoughts endorsed on the self-report thoughts questionnaire
	(a) EATING
	(i) Negative thoughts
	(ii) Positive thoughts
	(b) WEIGHING
	(i) Negative thoughts
	(ii) Positive thoughts
	(c) MIRROR
	(i) Negative thoughts
	(ii) Positive thoughts
Chapter 3	Classification of thoughts collected using the thinking aloud method along three dimensions, content, reference and valence
	(a) CONTENT
	(i) Food, eating, weight and shape related thoughts
	(ii) Thoughts related to other issues
	(iii) Unclassifiable statements
	(b) REFERENCE
	(i) Self referent thoughts
	(ii) Other referent thoughts
	(iii) Unclassifiable statements

(c) VALENCE

- (i) Positive thoughts
- (ii) Negative thoughts
- (iii) Neutral thoughts
- (iv) Unclassifiable statements

Appendix 1 Examples of thoughts falling into each of the categories used
in the immediately relevant positive and negative coding

Appendix 2 Examples of thoughts falling into each of the categories used
in the content, reference and valence coding

Appendix 3 Abbreviations used in coding

Chapter 1

Background

Each subject completed three tasks, eating, weighing and looking in a mirror. Data was collected using a concurrent verbalisation or thinking aloud procedure in which subjects verbalised all the thoughts which they had before, during and after each of the three tasks. Each subject also completed a self report thoughts questionnaire containing lists of thoughts that may have been present while undertaking each of the three tasks.

Methods of coding

Two separate methods will be described for coding the data obtained during each of the three tasks.

1. Immediately relevant positive and negative thoughts: Validation of thoughts collected using the thinking aloud method with thoughts endorsed on the self report thoughts questionnaire.
2. Classification of thoughts collected using the think aloud method along three dimensions, Content, Reference and Valence.

Chapter 2

Validation of thoughts collected using the think aloud method with thoughts endorsed on the self report questionnaire

See Appendix 1 for examples of thoughts falling into each category.

The first method of coding uses the thoughts collected during the thinking aloud task to validate the three categories of thoughts used on the self-report thoughts questionnaire. Transcripts for each task (eating an "After Eight", weighing and looking in a mirror) are scored separately for the presence of thoughts similar to those listed for the relevant task on the self-report thoughts questionnaire. Two dimensions are involved in judging whether or not a thought is similar to those listed under the relevant task on the self-report questionnaire - content and valence.

The following criteria are used for determining similarity of thoughts collected using the two measures.

(a) EATING

(i) Negative, maladaptive thoughts directly concerned with the task of eating, or of attempting to eat, the "After Eight" similar to those listed on the thoughts checklist under EATING. See Appendix 1 for a list of these thoughts. It includes initial reaction to being asked to eat it, anticipation of eating it and the consequences and implications of having eaten it. It includes thoughts that refer to the self as well as thoughts that refer to the task of eating the "After Eight" and that don't necessarily involve any direct reference to the self. It includes thoughts that hinder the self in coping with the task, thoughts that indicate a desire for avoidance or escape from the task, unfavourable comments about eating and

about the "After Eight", anticipated negative consequences of eating including catastrophic interpretations and predictions, desire to escape or avoid the consequences of eating, maladaptive and dysfunctional strategies for coping with the consequences of eating (including those that are likely to increase the chances of binge eating such as reducing food intake), examples of all or nothing thinking and absolute statements related to eating, statements indicating the importance of controlling eating, unfavourable comments about the self in the context of having eaten or attempted to eat during the task, negative affect related to the task of eating or to the self in the context of having eaten or attempted to eat during the task, unfavourable comparisons with other people in similar situations.

Must refer to eating and not simply to the experimental task of thinking aloud itself.

See Appendix 1 for examples.

(ii) Positive thoughts about eating the "After Eight", e.g. "I'm enjoying this". Must be purely positive statements with no reference to any negative aspect. For example, "that wasn't too bad" would not be rated as a positive thought.

See Appendix 1 for examples.

(b) WEIGHING

(i) Negative, maladaptive thoughts similar to those listed on the thoughts checklist under WEIGHING. See Appendix 1 for a list of these thoughts. Includes initial reaction to being asked to weigh oneself, thoughts about weighing oneself and about the consequences and implications of having weighed oneself. Includes thoughts that refer to the self as well

as thoughts that don't necessarily involve any reference to the self.

Includes thoughts that hinder the self in coping with the task, that indicate a desire for avoidance or escape from the task, anticipated negative consequences of weighing, including catastrophic interpretations and predictions, maladaptive and dysfunctional strategies for coping with the consequences of having weighed oneself, thoughts that are examples of all or nothing thinking and absolute statements related to weight and weighing, statements indicating the importance of controlling weight, unfavourable comments about the self in the context of weighing oneself, negative affect about the self that is related to the task of weighing.

Must refer to weighing and not simply to the experimental task of thinking aloud itself.

See Appendix 1 for examples.

(ii) Positive thoughts about the weight that one is, similar to that listed on the thoughts questionnaire under WEIGHING, i.e. "My weight's OK". Must be purely positive statements with no reference to any negative aspect. For example, "it's not that bad" would not be rated as a positive thought. See Appendix 1 for examples.

(c) MIRROR

(i) Negative, maladaptive thoughts about looking in the mirror similar to those listed on the thoughts checklist under MIRROR. See Appendix 1 for a list of these thoughts. Includes initial reaction to being asked to look in the mirror, thoughts experienced while looking in the mirror and thoughts about the consequences and implications of having looked at oneself in the mirror. Includes thoughts that refer to the self as well as thoughts that refer to the task of looking in the mirror and not to the self. Includes

thoughts that hinder the self in coping with the task, thoughts indicating a desire for avoidance or escape, anticipated negative consequences of doing the task, including catastrophic interpretations and predictions, negative affect related to the self in the context of having looked in the mirror, thoughts indicating all or nothing thinking and absolute statements related to looking in the mirror, statements indicating the importance of controlling shape (and weight as a means to that end), unfavourable comments about the self in the context of the task, inability to accept or acknowledge the reality of oneself in the mirror (accept that one is as thin as one appears). Must refer to looking in the mirror and not simply to the experimental task of thinking aloud itself.

See Appendix 1 for examples.

(ii) Positive thoughts about looking at oneself in the mirror, similar to that listed on the thoughts questionnaire under MIRROR, i.e. "I look OK". Must be purely positive statements with no reference to any negative aspect. For example, "I don't think I look too fat" would not be rated as a positive thought.

See Appendix 1 for examples.

Chapter 3

Classification of thoughts collected using the think aloud method along three dimensions, Content, Reference and Valence

See Appendix 2 for examples of thoughts falling into each category.

Dimensions:

(a) CONTENT

(i) Statements referring to food, eating, weight, body shape, body image, exercise, clothes, physical features, i.e. specific body parts, e.g. face, legs (but not age or height), mirrors, dieting, either explicitly or clearly implied by the context.

(ii) Statements referring to other issues, including, for example, the experimental situation per se, events or situations other than those noted in (i), again either explicitly mentioned or implied by the context.

(iii) Unclassifiable statements, those with no obvious referent explicitly mentioned or implied by the context, including isolated exclamations, unfinished thoughts that cannot be related to any immediate referent.

(b) SELF-REFERENT v OTHER REFERENT

(i) Statements with the self as the main target of the statement, self as the main referent, either explicitly mentioned or implied by the context, attention focussed on the self, on personal attributes, abilities, internal attributions, may begin with or include me, my, I.

(ii) Statements that refer to the task, descriptions of the task and of the situation that S is in, statements that refer to other objects, to other situations, statements with other people as the main referent, statements

describing any action that the subject has taken, is taking or may take.

(iii) Unclassifiable, as above.

(c) VALENCE

(i) Positive - thoughts that facilitate coping, adaptive thoughts, realistic appraisal of situations and of oneself or other people, complimentary, praising, positive evaluation of the referent, involving favourable consequences, expressions of positive affect, favourable associations, approach behaviour. Again, either explicitly mentioned or implied by the context.

(ii) Negative - dysfunctional, maladaptive thoughts, involving unfavourable consequences, catastrophic interpretations or predictions, all or nothing thinking - absolute statements (e.g. use of shoulds, ought, must), avoidance, escape, negative affect, negative evaluation of referent, unfavourable associations, statements hindering the self in coping with the task or with other situations, expressions of confusion, uncertainty, unfavourable comparisons, rejection of, unfavourable comments about the referent. Again, either explicitly mentioned or implied by the context.

(iii) Neutral - all other statements, e.g. simple descriptions without any affective or evaluative component.

(iv) Unclassifiable, as above.

APPENDIX 1

**Examples of thoughts falling into each of the categories mentioned
in the description of the first analysis**

(a) EATING

(i) Negative thoughts

(ii) Positive thoughts

(b) WEIGHING

(i) Negative thoughts

(ii) Positive thoughts

(c) MIRROR

(i) Negative thoughts

(ii) Positive thoughts

(a) EATING

(i) Negative thoughts

These are thoughts similar to the negative, maladaptive thoughts listed under EATING on the thoughts questionnaire. The thoughts listed under EATING on the questionnaire are reproduced below.

I can't possibly eat this
 Chocolate's fattening
 I shouldn't be eating today
 I'll get fat
 I just can't eat like other people
 I'll have to make sure I get rid of it or compensate for it somehow
 I mustn't eat anything else today
 I won't be able to stop eating
 I can't control my eating
 I won't be able to do anything else for the rest of the day
 I'm disgusting
 I've no self control
 I'm a complete failure
 I hate myself
 I may as well carry on eating

These thoughts would all be rated as negative thoughts related to eating. Further examples of thoughts that would fall into this category are given below.

what a pig
 shouldn't be having this in the light of the last little episode with the
 scales
 I'll have something very low calorie for lunch
 I don't feel like eating this now
 I'm not hungry really
 I don't like after eights very much
 I keep thinking that it's sort of going to be really difficult to eat

I can imagine myself being too embarrassed
 it's awful
 I feel really fat
 it's really disgusting (ref to being fat)
 I wish I didn't have to eat anything on this
 but fattening
 I don't really want to eat it
 and it's unnecessary
 it'll make me even more hungry
 to me could just as well be a bit of black paper sitting on the table
 it's all going to stick to my teeth and be horrible afterwards
 I won't eat it now
 and they know that I tend to binge
 I want something else to eat now
 oh I didn't realise this would be so difficult
 probably go and eat lots of chocolates on the way home now
 I wish I hadn't eaten that
 I'll have to count it in my calories
 but a trillion calories for one
 how many calories is it
 I wonder if they'd notice if I removed half of them
 maybe I won't need any lunch
 well there is in the cupboard (whole box of mints)
 I'm wondering if I can eat properly today
 glad she didn't leave the whole box out
 I don't know

(ii) Positive thoughts

I'm looking forward to eating it
 I like chocolate
 I enjoyed the after eight
 this is really nice come on
 yum
 wonderful
 that's cheered me up
 I like tasting sweetness
 they're OK

I can see all the creamy niceness in the middle of it
 maybe because I've accepted that just eating a mint that's fine
 I'm sure that I can feel it in my tummy already that its getting something
 nice
 quite nice
 I sort of like all chocolates to a certain extent

(b) WEIGHING

(i) Negative thoughts

These are thoughts similar to the negative, maladaptive thoughts listed under WEIGHING on the thoughts questionnaire. The thoughts listed under WEIGHING on the questionnaire are reproduced below.

I can't look at my weight
 I'll go away and eat
 I won't be able to do anything else for the rest of the day
 I'm getting fatter and fatter
 As long as I'm not heavier, that's all that matters
 I'm so fat
 I am gross
 I'm just going to go on getting heavier and heavier
 I've no self control
 I'm disgusting
 I hate myself
 I'm a complete failure
 I must lose weight
 I must keep my weight under control
 I mustn't let myself gain weight
 I mustn't eat anything else today

These thoughts would all be rated as negative thoughts related to weight and weighing. Further examples of thoughts that would fall into this category are given below.

and I'm hoping I don't weigh more than nine and a half stone
 if I'm more than that (eleven and a half) that's hell
 this is going to either make or break me
 I'm worried about going over ten stone
 I feel so embarrassed
 god I'll die
 makes me feel fat now
 I'm going to get off these
 I hope I've lost some weight
 just want to be down every day
 I wish I could lose it more quickly
 just begrudge being more than ten stone
 don't be stupid
 I really want to get off now
 I'm a loop
 gosh it's really uncomfortable
 I don't like this bit
 I daren't (get on scales)
 tomorrow I'm not going to eat
 if this shows that I'm heavier that will really make me want to eat going
 away from here
 I don't know

(ii) Positive thoughts

oh that's pleasing
 basically now I've weighed myself I'm feeling a lot smug
 fine
 this should be some good news
 that makes me feel a lot better actually
 thank god for that
 that's reasonable
 I'm really quite happy about that
 it doesn't bother me
 I mean I'm sort of alright

(c) MIRROR

(i) Negative thoughts

These are thoughts similar to the negative, maladaptive thoughts listed under MIRROR on the thoughts questionnaire. The thoughts listed under MIRROR on the questionnaire are reproduced below.

I can't look at myself in this mirror
 I'll go away and eat
 As long as I don't look fat, nothing else matters
 I won't be able to do anything else for the rest of the day
 I'm so fat
 I'm so ugly
 I am gross
 I look OK
 My shape's completely out of proportion
 I loathe my (part of body, e.g. hips, stomach)
 It shows, I have no self control
 I'm not that thin - it must be a distorting mirror
 I'm a complete failure
 I'm disgusting
 I hate myself
 I must lose weight
 I mustn't eat anything else today

These thoughts would all be rated as negative thoughts related to looking in the mirror. Further examples of thoughts that would fall into this category are given below.

my hips are a bit out of proportion
 big bottom
 and my face feels fat
 and my chin is all sort of horrible
 I really hate the sort of the way my face is sort of so podgy
 I feel I've sort of let him down by being so fat

he doesn't mind how fat I am
 it really is revolting (when I am fat)
 and your hair's a mess too
 I've got big bags under my eyes
 completely flat chested as well
 it's really depressing (ref to how S looks)
 oh dear when I laugh I've got sort of an extra chin
 and I haven't got a waist
 I do want to be skinny
 but I'm so huge
 from the back looks even worse
 I do actually (ref to looking bad)
 all disgusting on the inside (ref to legs)
 I look stupid
 it looks like a thin mirror though
 it would help if I had some self control
 which I haven't (ref to self control)
 I don't know

(ii) Positive thoughts

well I'm looking alright
 I quite like mirrors
 I'm usually quite happy with what I see in them
 they're not as tight as they were when I first bought them which is a nice
 feeling (ref to trousers)
 aren't you well-dressed
 I quite like my legs
 I'm really into these trousers
 a good ego boost (ref to looking at self in the mirror)
 I really like this jumper
 this skirt is a good move
 seems I'm a bit thinner than I was
 your head looks the right size for your body now
 I look fine

APPENDIX 2

Examples of thoughts falling into each of the categories mentioned in the description of the coding into content, reference and valence

(a) CONTENT

- (i) Food, eating, weight and shape related thoughts
- (ii) Thoughts related to other issues
- (iii) Unclassifiable statements

(b) REFERENCE

- (i) Self referent thoughts
- (ii) Other referent thoughts
- (iii) Unclassifiable statements

(c) VALENCE

- (i) Positive thoughts
- (ii) Negative thoughts
- (iii) Neutral thoughts
- (iv) Unclassifiable statements

(a) CONTENT

(i) Food, eating, weight etc. abbreviated to F.

better not sort of be in period costumes (ref to clothes)
 this one with a beard (ref to physical features)
 I've spilt it all (tea) on my trousers (ref to clothes)
 perhaps I ought to sit back so that I can't (see myself) until the proper
 moment (ref to seeing self in the mirror)
 got a huge hole in my jumper (ref to clothes)
 feel quite rumpled (ref to clothes)
 side view (implied ref to view in the mirror)
 my legs (ref to body part)
 that was usual (implied ref to seeing self in the mirror, follow on from
 previous statement)
 I don't know why (ref back to having cigarette on the way to being weighed)
 but it's later in the day I suppose (implied ref back to weight)
 well it's you know what I thought (implied ref to weight)
 might as well not bother putting it there (implied ref to After 8)
 I'm looking at these faces (ref to body part)
 oh there's one good looking one (ref to face, physical features)
 he's got very nice eyes (ref to physical features)
 it's quite heavy and thick (implied ref to jumper)
 moment of truth (implied ref to weighing)
 but that's with being carried around (implied ref to mirror)
 now I've got to see myself (implied ref to looking in the mirror)
 oh I could do with a hair brush (ref to physical features)
 well I'm looking alright (ref to looking in mirror)
 and usually I'm quite happy (ref to looking in the mirror)
 they're very thin (implied ref to After 8s)
 wafer thin mint (ref to food)
 not really (ref to being chocaholic)
 you're living with people who get the urge (to eat chocolate implied)
 but then it depends I suppose on what happens for the rest of the day (it =
 implied ref to whether or not will want chocolate)
 I don't know how I'll feel about it later (it = implied ref to wanting
 chocolate)

I don't need to go and buy anything (implied ref to for lunch)
 I can imagine myself being too embarrassed (implied ref to eating)
 I feel really embarrassed (implied ref to eating)
 and I feel that this is in public (implied ref to eating)
 I feel really fat (ref to body shape)
 it's so disgusting (implied ref to chin, body part)
 it's really difficult to swallow (ref to eating)
 oh god I wonder if I have to say what it is (implied ref to weight)
 god I'll die (implied ref to having to say weight)
 oh god it could be worse (implied ref to weight)
 eleven point two (ref to weight)
 thank god for that (implied ref to weight)
 I'm sure they're leaner ones (implied ref to scales)
 so I'm worried about it (it = weight, weighing self)
 it's a bit like food scales (ref to food)
 I mean it's depressing (implied ref to scales)
 how embarrassing (implied ref back to weighing)
 I'd stomp about (ref back to feet)
 I sort of wish he did mind (ref back to how fat S is)
 he's really nice about it (it = ref back to how fat S is)
 have it pulled all (ref back to jumper)
 I wish I could stop biting my nails as well (ref to body part)
 my feet are really cold
 and I want to brush my teeth now (after having eaten, part of body)
 the first face is from some sort of magazine
 mirror could do with a polish
 full length mirror
 should be funny (ref to looking in the mirror)
 and a cup of coffee
 gosh it's really uncomfortable (ref to how S feels after weighing self)
 I'm worried like hell about my teeth (after having eaten, part of body)
 well I'll have to see (ref to what S weighs)
 this should be some good news (ref to what S will weigh)

(ii) Statements referring to other issues. Abbreviated to NF.

turning round (ref to action S is taking)
 so that's why maybe I look sad (description, no obvious ref to F issues)

yawn tired

if I'm feeling so tired I might as well not do the next one (ref to self not included in F and to experimental task in non-specific way)

I might as well sit down

they're all men

I'm waiting for the tap on the door

and trying to decide how old they are (age not included under F)

there's a rather distinguished looking gentleman with a pipe (no clear ref to physical features)

probably back home

oh I look stupid

I look a bit like a tramp

I bet I look tired and haggard

must be getting cold out there

J is shorter than me (height not included under F)

I'm thinking more about things in the room at the moment

I'm covered in cat hair

it's a nice packet (ref to "After 8" packet per se)

it's very unpredictable (ref to the rest of the day)

it's sad to be sitting here with an empty wrapper

they're all from magazines (ref to the practice task pictures)

they all look terribly intelligent (not a ref to physical features)

skipping around

because it's peppermint flavoured toothpaste (no ref to food)

I really like these earrings

I don't know (no clear ref to F items)

I just want to die of embarrassment (no clear ref to F items, appears to be experimental situation per se)

I'm so embarrassed (no clear ref to F items, again appears to refer to experimental situation per se)

I always have to ask for ten p from the shop girl

oh dear at least I'm alright (no clear ref to F items implied)

it's something to do with pressure (no clear ref to F items implied)

he's really lovely (ref to boyfriend, no clear ref to physical features)

could breathe in

it depends how you feel inside doesn't it (no ref to physical features)

and I felt terrible all day (no ref to physical features)

that's your arrogance coming out again
 this chair it's not wide enough
 this is strange (ref to tearing "After Eight" wrapper apart)
 they all look old (ref to age, no direct ref to physical features)
 and I'm whispering
 oh I didn't realise this would be so difficult (ref to thinking aloud)
 problem is I'm aware of so many things about this whole problem that I've got
 and things (again no clear reference to what the problem is)

(iii) Unclassifiable. Abbreviated to U.

hm well
 right
 and now what
 I think
 (?)
 well
 something (?)
 not really
 but it's not that (?)
 oh good
 oh dear
 um gosh
 sort of
 too much
 oh god
 oh dear I've got

(b) SELF-REFERENT v OTHER REFERENT

(i) Self-Referent. Abbreviated to SR.

of course I heard the tap (ref to aspect of self, hearing)
 I'm not used to that to stand up (attention focussed on self)
 hm my legs (attention focussed on self)
 we've put on so much weight (ref to self included in we)
 I wonder what these ones are going to say about me
 I can't see myself at all in the mirror
 face (attention focussed on self)

hm I weigh more on these ones
 and it's gone all er wavy (ref to hair, attention focussed on self)
 'cos it's sort of big and baggy (ref to appearance of self)
 front view (of self implied)
 seems much the same as I did this morning when I had a bath (ref to self)
 that was usual (implied ref to view of self)
 I'm having a fag because it reminds me of morning (focus on self, reminds me)
 I don't know why (referent is self)
 because I'm not standing here like a blooming lemon (focus on self, attributes)
 if I'm feeling so tired I might as well not do the next one (ref to self, feeling tired, attribute of self)
 so that's why maybe I look sad
 hm my weight's up a lot (self attribute)
 I'm thinking maybe he's somebody famous I ought to recognise
 I haven't finished
 can't really think of anything else to say
 apart from that I've fairly lightweight clothing
 I haven't eaten that much
 oh that's pleasing (to me implied)
 it would be nice if it was nine but it's not important (ref to S' weight)
 J is shorter than me
 when we were discussing it
 but I tend to like baggy jumpers
 as I was saying earlier shape's more important (implied ref to me)
 they're not as tight as they were when I bought them which is a nice feeling
 than shape (implied ref to my shape)
 hadn't thought about that before (ref back to shape)
 I'm covered in cat hair
 it's er hard to think of anything
 and I'm looking forward to eating it
 it's sad to be sitting here with an empty wrapper
 I think I'll mess up these
 my feet are really cold
 I don't have a clue
 I don't like after 8s very much

I feel really embarrassed
 I feel really fat
 um it sort of goes from ear to ear (ref to chin)
 but people always think I'm not
 I don't know quite how you read these things
 I really like hill walking
 a complete murder getting up there and down again (implied ref to self)
 I'm glad I'm wearing this jumper
 he doesn't mind my being fat
 I'm so glad I've got him
 he didn't realise how fat I'd get
 I keep kidding myself in those (trousers)
 used to be really shiny hair
 it's really depressing (implied ref to self)
 I wish I looked like PO
 and she said I looked really good
 not enough room for both my legs in this chair
 I was given it by A
 this blouse is quite loose so I can't make out much else
 bit too much saliva (ref to self)
 it's so disgusting (ref back to my chin)
 but it actually makes me feel really powerful when I wear them (them =
 earrings)
 hm looks like my ring to me

(ii) Other Referent. Abbreviated to OR.

me slippers (ref to other object)
 turning round (describes action S is taking)
 hm I might as well sit down (describes action S is going to take)
 hm I always have a fag on me way to be weighed anyway (describes action S
 usually takes)
 if that's of any interest to you (focus on outside person)
 might as well not bother putting it ("After Eight") there (describes action
 taken by E)
 just sitting here wasting time at this minute (describes situation S is in)
 I'm looking at these faces (describes action being taken, other people as
 main referent)

I'm wondering how old it is (ref to photograph, other object)
 I put a bit of make-up on this morning (action taken)
 I wonder if my jumper weighs a lot (ref to other object)
 had a sunday roast with friends (ref to other object and other people,
 describes action taken by S)
 so staring down at this now (action S is taking)
 because I haven't been particularly eating and thinking about weight recently
 (describes action taken by S)
 even so I wonder if they're weighted scales (ref to other object)
 'cos last time I looked in a mirror (action taken by S)
 I wonder if I should take my jumper off (action S may take, ref to other
 object)
 but that's not why I'm wearing it (ref to jumper, describing situation)
 see what it's like when I stand up and look in the mirror (ref to jumper,
 describing action S will be taking)
 from the side (action S is taking, describing situation)
 I'm wearing my my jeans which are quite loose (description of situation)
 put jumper back on (action S is taking)
 and I'm imagining how it's going to be nice and chocolately and minty (main
 ref to "After Eight", other object)
 but it feels odd to be about to eat without anything to drink (describing
 situation, action S will be taking)
 I'm breaking it into pieces and eating it (describes action S is taking)
 my mind starts wondering to other things
 I keep thinking it's sort of going to be really difficult to eat (ref to
 "After Eight" being difficult to eat)
 and I feel that this is in public (ref to doing task per se, description of
 situation)
 a very nice taste (ref to other object, "After Eight")
 I want to hide the wrapper (description of action wants to take)
 I've never wanted to wear a kaftan ever since (description of action S might
 have taken)
 oh god I wonder if I have to say what it is (describing action S might have
 to take)
 I know it's going to be eleven (describing amount that will register on
 scales)
 I always keep all my clothes on (describing situation)

I have to take my shoes off (describing action to be taken)
 oh god it could be worse (describing situation of weighing oneself)
 I've got some trousers (simple description)
 but then it depends I suppose on what happens for the rest of the day now
 (ref to other situation)
 they're all very well and that but you just eat them and then they're gone
 (ref to "After Eights", other object)
 not too difficult (describing task)
 my god they're over nine stone (describing amount registered by scales)
 but they're probably wrong anyway (ref to other object, scales)
 it won't hurt (ref to chocolate)
 that wasn't too bad (ref to task)
 oh it's a funny mirror
 unwrap it (ref to "After Eight")
 but it looks odd from the front (ref to blouse)
 I'm going to sit down (action about to be taken by S)
 I'm just about to get on the scales (describes action about to be taken by
 S)
 I can see the plug (describes situation, other object)
 I don't think it matters (ref to practice task)
 I feel that this is in public (describes situation)
 this is horrible (no clear self-reference)
 actually all her examples were cream cakes (ref to other person, other
 objects)
 eleven point two (description of weight)
 oh my god it's gone up eleven one two three (description of weight)
 god it could be so much worse (ref to weight, no clear ref to self)
 he's never said anything horrible (ref to other person)
 so staring down at this now (describes action S is taking)
 that's something about winter you wear thick clothes so that it doesn't show
 (no clear ref to self)
 I wear it 'cos it's warm (description of situation, action taking)
 see what it's like when I stand up and look in the mirror (ref to clothes
 and to action S will be taking)

(iii) Unclassifiable, as above.

(c) VALENCE

(i) Positive. Abbreviated to +.

but it's later in the day I suppose (adaptive thought after finding weighed more than expected, facilitates coping)

I want to get back on the scales now (approach behaviour)

I don't feel particularly heavy this weekend (positive evaluation of self)

it would be nice if it were x but it's not that important (realistic appraisal of the situation)

I feel thin

I haven't been particularly thinking about weight recently (facilitates coping)

it would be nice to be nine stone for the summer (positive affect)

I'm looking forward to eating it (approach behaviour)

after eights are they're very elegant

I'll never refuse chocolate if I'm offered it (approach behaviour)

I hope I can eat this after eight soon (approach behaviour)

now thinking that I might as well go down and have a nice bath (positive evaluation of referent bath)

he's got very nice eyes

although it doesn't usually bother me (ref to weighing more than S would expect, favourable association that facilitates coping)

I don't feel particularly heavy this weekend (positive evaluation of referent)

oh that's pleasing (positive affect)

I wonder if I should take my jumper off (approach behaviour when looking in the mirror)

it'd look better belted (facilitates coping, follows negative thought)

less spots seem to be coming out in acne at the moment (positive evaluation of self)

yes but basically I'm quite slim

thinking about wearing some of the more figure revealing things or nothing (approach behaviour to looking in the mirror)

I don't think I bulge out too much

but I'll never refuse chocolate if I'm offered it (approach behaviour)

it makes a good crackly noise

it doesn't inspire me to rush off and buy a whole box though (adaptive thought, facilitates coping with the task of eating one "After Eight")

sort of plan (facilitates coping)
 I'll be eating later anyway (facilitates coping with task of eating one
 "After Eight")
 you just eat them and they're gone (realistic appraisal of the situation)
 it's lovely/I can sit right at the back (positive affect/favourable
 associations implied by the context)
 I'm quite slim (positive evaluation of referent)
 I like mirrors (positive affect/evaluation of referent)
 I don't think it matters (facilitates coping, implied by the context)
 because Myra said it didn't matter (facilitates coping)
 she really loves mint (positive affect)
 but I suppose everyone knows I've got it so there's not much point in trying
 to hide it (adaptive thought, realistic appraisal of the situation)
 thank god I wasn't wearing holey tights (complimentary, praising referent)
 oh god it could be worse (adaptive, realistic appraisal of the situation)
 and then I'd only be half a stone overweight (positive, adaptive, implied by
 context)
 they sort of weigh really accurately (positive evaluation of referent,
 scales)
 I really like hill walking (positive affect)
 but again I sort of think I will (ref to getting to Australia, approach
 behaviour, involving favourable consequences)
 I was much thinner (favourable association)
 but he never minded (ref to boyfriend not minding S being heavier, positive
 evaluation of referent boyfriend)
 he's never said anything horrible (positive evaluation of referent,
 boyfriend)
 from the front it's not so bad (complimentary)
 and she said I looked really good (complimentary, praising)
 but sometimes you tell yourself you (that you look good implied, adaptive
 thought)
 I've been feeling thinner because I've put on a dress I hadn't worn since I
 lost half a stone in the summer (positive evaluation of referent, self)
 I wonder what I'm going to weigh (implies approach behaviour)

(ii) Negative. Abbreviated to -.

I wonder how much what I've eaten today weighs (avoidance of reality,
hindering self in coping with the task)
I wonder how heavy my clothes are (avoidance of reality)
maybe it's a good thing I went to the loo (avoidance of weight)
I'm shuffling now to see whether it moves (avoidance of weight)
that could just be slightly underweighing (avoidance of reality, scales are
wrong it's not my true weight)
so that's why maybe I look sad (negative affect)
it's hard to tell what I'm like really (avoidance, uncertainty)
and everything's covered up anyway (avoidance)
I don't know why (uncertainty)
better go to the toilet first (avoidance of true weight)
it's not normal anyway is it (negative evaluation of action)
yawn tired
might as well not bother putting it there (ref to "After 8", rejection of
"After 8", hindering self in coping with the task)
now if that were a nice gravy and black pudding I would be tempted
(hindering self in coping with task of eating "After 8")
I'm thinking maybe he's somebody famous I ought to recognise (absolute
statement)
they're sort of coffin shaped (ref to scales, unfavourable association)
I might take it off if I seem to weigh too much (avoidance of weight)
must be getting cold out there
even so I wonder if they're weighted scales (rejection of true weight)
I don't suppose I'd have taken any action if I'd been feeling odd anyway
(negative evaluation of main referent)
I don't know (confusion, uncertainty)
or is it the jeans (implied ref to being out of proportion)
oh I could do with a hair brush (implied negative evaluation of hair)
because it does look strange (negative evaluation)
it's very sweet though (implied negative evaluation of "After 8", doesn't
facilitate coping with task)
I wonder if they'd notice if I removed half of them (ref to "After 8"s,
doesn't facilitate coping with task of eating one "After 8")
I wonder if I'll be able to do it (unfavourable consequences predicted)
wish she'd come back in (escape from task)

it's one of those days (negative associations implied)
 I feel really fat
 I feel really embarrassed
 ouch my tooth's hurting (unfavourable association)
 it's really difficult to swallow (hindering self in coping with the task)
 but I can feel them again now because they're really big (ref to legs,
 negative evaluation)
 I want to hide the wrapper (escape, avoidance of having eaten "After Eight")
 when I woke up I looked in the mirror and my chin was just huge (negative
 evaluation)
 and the really fat French teacher was talking about kaftans and how wonderful
 they were because they hid everything (negative evaluation of main
 referent)
 my tights are holey apart from these
 and they always get really irritated (negative affect)
 I think I apologise too much (unfavourable comment about referent, self)
 maybe if I took off all my clothes and things I'd be eleven (avoidance of
 actual weight)
 completely inaccurate (negative evaluation of referent, scales)
 and very weird (unfavourable comment)
 but it's just such hard work (negative associations)
 I feel I've sort of let him down by being so fat (negative evaluation of
 main referent, self)
 he doesn't mind my being fat (negative evaluation of main referent, self)
 oh dear when I laugh I've got sort of an extra chin (unfavourable comment
 about referent, self)
 and I haven't got a waist (unfavourable comment about referent, self)
 and I felt terrible all day (negative affect)
 but sometimes you just can't even though you want to (absolute statement)
 I do actually (look bad) (negative evaluation of referent, self)
 this chair it's not wide enough (unfavourable comment about referent, chair)
 I wish I could take all my clothes off (avoidance)
 you wear thick clothes so that it doesn't show (avoidance)
 how many calories is it (hindering self in coping with the task of eating
 the "After Eight")
 I have to break the corner off and eat it slowly (absolute statement, have
 to)

anticipation's the best part of eating (hindering self in coping with the
 actual task of eating the "After Eight")
 you have to get your calories worth out of every bite (absolute statement)
 it's nicer to eat by yourself (avoidance)
 I'm ashamed of being seen to enjoy food (negative affect)
 I mustn't lose it (ref to a crumb, absolute statement)
 they're not like pigging out on a mars bar or something (negative
 associations)
 you do wear big jumpers so that people can't see how skinny you are
 (avoidance)
 you couldn't have worn these jeans not the way you used to be (unfavourable
 comparison, ref to unfavourable view of referent)
 is it dangerous (negative, unfavourable consequences)
 will I ever look nice again (unfavourable comments about referent implied)
 it used to be horrible (unfavourable associations implied by the context)
 it's sort of big and baggy (avoidance of self)
 I do want to be skinny (avoidance of normal weight)
 he's really skinny (unfavourable comment, rejection of normal weight, more
 extreme than thin)
 this blouse is quite loose so I can't make out much else (avoidance)

(iii) Neutral. Abbreviated to o.

turning round (simple description of action taking)
 I'm just about to get on the scales now (simple description of action being
 taken)
 hm I weigh more on these ones (description)
 hm my weight's up a lot (description)
 I wonder if my jumper weighs a lot
 I'm actually slightly under nine and a half in fact
 so I've definitely lost weight since since the last time I seriously weighed
 myself
 I'm covered in cat hair (description)
 it's er hard to think of anything
 probably having had chocolate in the morning I won't want anymore chocolate
 today
 I haven't finished

it's just like I imagined it would be
I can feel my chin
I'd forgotten about my legs
um it sort of goes from ear to ear (ref to chin)
now I can feel my tummy now as well
eleven point two
I'm sure they're leaner ones (scales)
get off the scales thank god
I sort of wish he did mind (ref to S being fat)

(iv) Unclassifiable, as above.

Appendix 3

Abbreviations used in coding

Immediately relevant positive and negative thoughts:

- (a) EATING
 - + positive
 - negative
- (b) WEIGHING
 - + positive
 - negative
- (c) MIRROR
 - + positive
 - negative

Content, reference and valence:

- (a) CONTENT
 - F food
 - NF non-food
 - U unclassifiable
- (b) REFERENCE
 - SR self-referent
 - OR other-referent
 - U unclassifiable
- (c) VALENCE
 - + positive
 - negative
 - o neutral
 - U unclassifiable

Appendix 7

Reliability of coding the transcripts in Chapter 3 into immediately relevant positive and negative thoughts, content, reference and valence

An independent rater, unconnected with the project and uninformed about its nature and purpose, coded ten transcripts, two chosen at random from each group of subjects (17% of the total) using the manual in Appendix 6. After initial practice during which differences were discussed and resolved reliability of coding was calculated separately for immediately relevant positive and negative thoughts and for content, reference and valence using the same method as that employed in calculating the reliability for dividing up the transcripts into idea units. For immediately relevant positive and negative thoughts, noting the number of thoughts on which both raters agreed on the classification used and dividing this by the larger number of thoughts used by either rater for this category, this yielded reliability (in percentages) across the three tasks, each task being divided into three sections, of $88.7 \pm 15\%$ (range 83.6 - 93.7%) for the negative items, $90.4 \pm 22\%$ (range 87 - 93.7%) for the positive items and $95.9 \pm 4.2\%$ (range 95.2 - 97%) for the neutral items. Since the experimenter (rater 1) rated the rest of the transcripts agreement with the independent rater (rater 2) was determined by using rater 1 as the standard and dividing the number of thoughts on which both raters agreed by the total number of thoughts used by rater 1. This yielded reliability of $92.71 \pm 13.4\%$ (range 84.9 - 97.5%) for negative thoughts, $98.5 \pm 6.4\%$ (range 96.7 - 100%) for positive thoughts and $97.5 \pm 4\%$ (range 96.7 - 98%) for neutral items.

For content, reference and valence a similar reliability check on the coding was carried out. For the food vs non-food dimension dividing number of thoughts agreed on by the larger number of thoughts employed by either

rater for each category yielded reliability ratings of $98 \pm 2.2\%$ (range 93.4 - 100%) for thoughts related to eating, weight and shape, $84.4 \pm 16\%$ (range 50 - 100%) for thoughts related to other issues, and $98.7 \pm 3.2\%$ (range 90 - 100%) for unclassifiable thoughts. Using rater 1 as the standard yielded reliability of $98.4 \pm 2.1\%$ (range 93.9 - 100%) for thoughts related to eating, weight and shape, reliability of $97.7 \pm 3.6\%$ (range 83.3 - 100%) for thoughts not related to these issues, and reliability of $98.7 \pm 3.2\%$ (range 90 - 100%) for unclassifiable thoughts. For the self-reference dimension reliability using the larger number of thoughts as the denominator was $94.6 \pm 3.6\%$ (range 87.1 - 98.4%) for self-referent thoughts and $90.6 \pm 8.8\%$ (range 75 - 98.6%) for other referent thoughts. Using rater 1 as the standard reliability for self-reference was $95.4 \pm 3.83\%$ (range 87.1 - 100%) and for other-referent it was $96.4 \pm 3.9\%$ (range 86.4 - 100%). For the valence dimension, using the larger number of units as the denominator, reliability for negative thoughts was $92.7 \pm 5.5\%$ (range 84.2 - 97.8%), for positive thoughts it was $94.7 \pm 5.8\%$ (range 81.3 - 100%) and for neutral thoughts $94.6 \pm 2.9\%$ (range 89.3 - 97.9%). Using rater 1 as the standard, reliability for negative thoughts was $96.0 \pm 4.9\%$ (range 85.4 - 100%), for positive thoughts it was $97.3 \pm 4.2\%$ (range 89.7 - 100%) and for neutral thoughts it was $95.5 \pm 1.9\%$ (range 92.6 - 100%).

Appendix 8Items contributing to the five subscales of the Eating Disorder Examination(EDE)Restraint

Restraint over eating
Avoidance of eating
Food avoidance
Dietary rules
Desire for an empty stomach

Bulimia

Subjective loss of control over eating
Objective bulimic episodes - number of days
Objective bulimic episodes - frequency
Subjective bulimic episodes - number of days
Subjective bulimic episodes - frequency
Duration of bulimic episodes
Fullness after bulimic episodes

Eating concern

Preoccupation with food or calories
Fear of losing control over eating
Avoidance of eating with other people
Eating in secret
Guilt after eating

Shape concern

Desire for a flat stomach
Preoccupation with shape and weight
Importance of shape
Fear of fatness
Dissatisfaction with shape
Discomfort seeing body
Avoidance of body exposure
Feelings of fatness

Weight concern

Importance of weight
Reaction to prescribed weighing
Preoccupation with shape and weight
Dissatisfaction with weight
Pursuit of weight loss

Appendix 9

Mean length and word frequency scores for the stimuli used in Chapter 9

Mean number of letters and standard frequency index

	Number of letters				Standard Frequency Index			
	Base word		Paired word		Base word		Paired word	
	X	SD	X	SD	X	SD	X	SD
Negative								
experimental words	6.8	2.9	8.0	2.3	52.8	8.6	40.8	10.0
Control words	6.2	1.8	7.0	2.3	52.8	8.6	40.8	10.0
Positive								
experimental words	5.8	2.7	7.6	2.9	55.8	6.0	57.5	8.6
Control words	6.6	2.9	7.4	3.8	55.8	6.0	57.5	8.6
Total sample								
Experimental words	6.3	2.7	7.8	2.5	54.3	7.1	49.3	12.5
Control words	6.4	2.3	7.4	3.0	54.3	7.1	49.3	12.5

Results of t tests for comparisons between experimental and control words

	Base words		Paired words	
	t value	probability	t value	probability
Negative v control pairs				
Number of letters	0.56	NS	0.23	NS
Standard frequency index	0.00	NS	0.00	NS
Positive v control pairs				
Number of letters	0.64	NS	0.26	NS
Standard frequency index	0.00	NS	0.00	NS
Total sample - experimental v control pairs				
Number of letters	0.09	NS	0.32	NS
Standard frequency index	0.00	NS	0.00	NS

Appendix 10

The four sets of stimuli as they were presented to subjects in Chapter 9

fat - disgusting
stomach - horrible
shape - ugly
overweight - revolting
chocolate - fattening
fat - disgusting
shape - ugly
chocolate - fattening
stomach - horrible
overweight - revolting
stomach - horrible
shape - ugly
overweight - revolting
fat - disgusting
chocolate - fattening
shape - ugly
overweight - revolting
fat - disgusting
stomach - horrible
chocolate - fattening

overweight - revolting
chocolate - fattening
stomach - horrible
fat - disgusting
shape - ugly
stomach - horrible
overweight - revolting
fat - disgusting
chocolate - fattening
shape - ugly
fat - disgusting
chocolate - fattening
shape - ugly
stomach - horrible
overweight - revolting
stomach - horrible
chocolate - fattening
overweight - revolting
fat - disgusting
shape - ugly

thin - confident	weight loss - happy
diet - good	control - successful
slim - attractive	diet - good
control - successful	slim - attractive
weight loss - happy	thin - confident
diet - good	control - successful
thin - confident	weight loss - happy
slim - attractive	diet - good
control - successful	slim - attractive
weight loss - happy	thin - confident
control - successful	weight loss - happy
diet - good	slim - attractive
thin - confident	control - successful
weight loss - happy	thin - confident
slim - attractive	diet - good
control - successful	weight loss - happy
slim - attractive	thin - confident
diet - good	control - successful
weight loss - happy	slim - attractive
thin - confident	diet - good

woods - conservation	radio - songs
communicate - write	examples - information
bath - foam	communicate - write
radio - songs	bath - foam
examples - information	woods - conservation
radio - songs	communicate - write
bath - foam	woods - conservation
examples - information	radio - songs
communicate - write	bath - foam
woods - conservation	examples - information
bath - foam	radio - songs
communicate - write	examples - information
woods - conservation	communicate - write
examples - information	bath - foam
radio - songs	woods - conservation
communicate - write	bath - foam
examples - information	woods - conservation
radio - songs	communicate - write
bath - foam	radio - songs
woods - conservation	examples - information

flower - azalea

alphabet - educational

soft - tones

penny - francs

ceramics - artwork

alphabet - educational

penny - francs

soft - tones

flower - azalea

ceramics - artwork

soft - tones

alphabet - educational

penny - francs

flower - azalea

ceramics - artwork

flower - azalea

soft - tones

ceramics - artwork

penny - francs

alphabet - educational

ceramics - artwork

penny - francs

flower - azalea

alphabet - educational

soft - tones

flower - azalea

ceramics - artwork

alphabet - educational

soft - tones

penny - francs

ceramics - artwork

flower - azalea

soft - tones

alphabet - educational

penny - francs

alphabet - educational

penny - francs

soft - tones

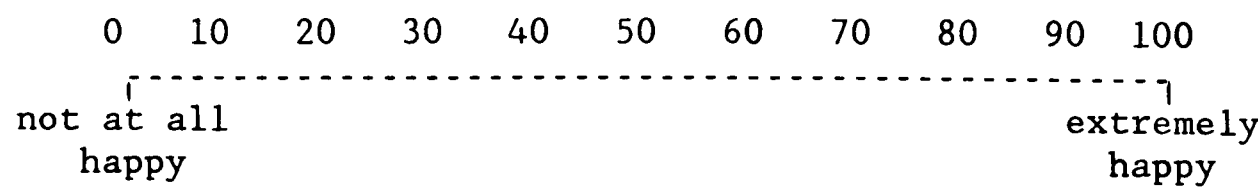
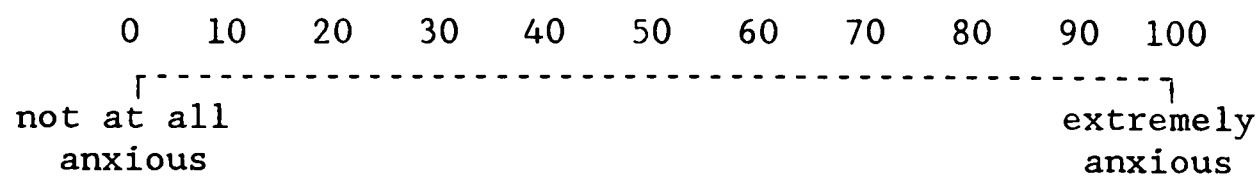
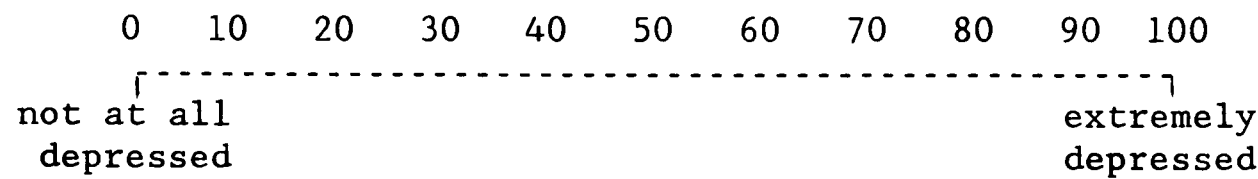
ceramics - artwork

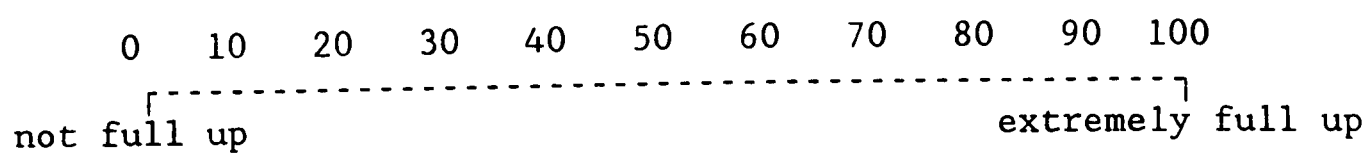
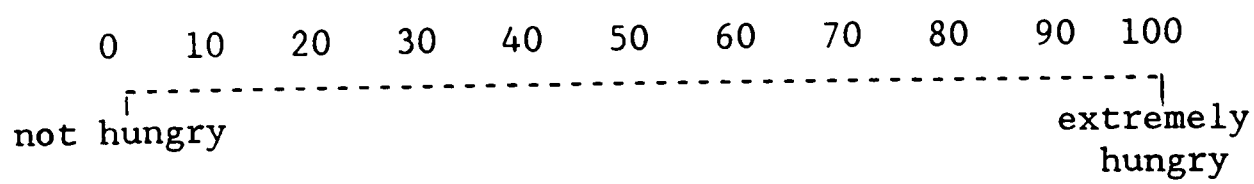
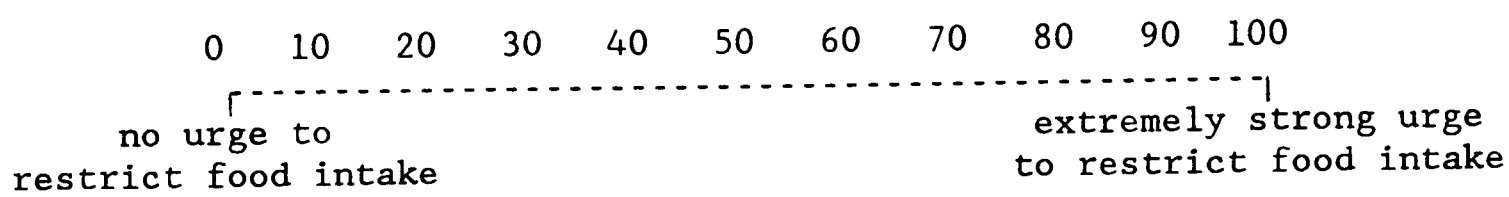
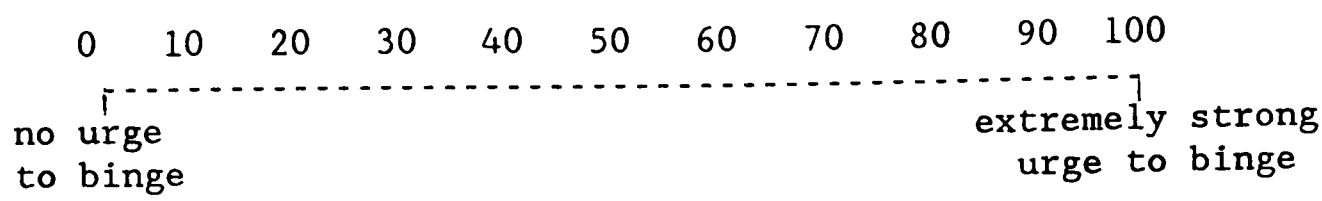
flower - azalea

Appendix 11

Visual analogue scales used to measure mood and eating behaviour in Chapter 9

Here is a set of scales for rating how you feel right now. Please circle the number on each scale which best describes how you are feeling right at this moment. You can put your rating between two numbers if you think that is the best description of how you feel right now.





Appendix 12

Brands and caloric values of the stimuli used in the taste test in

Chapter 9

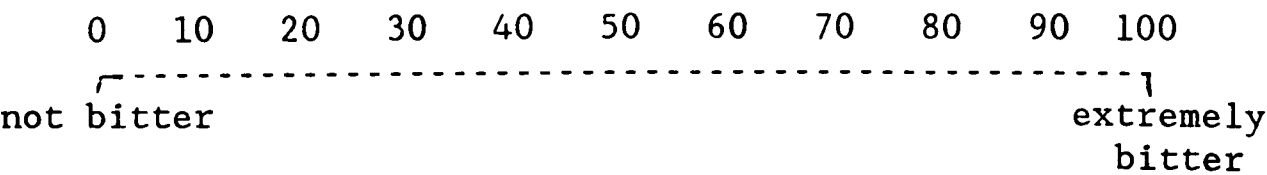
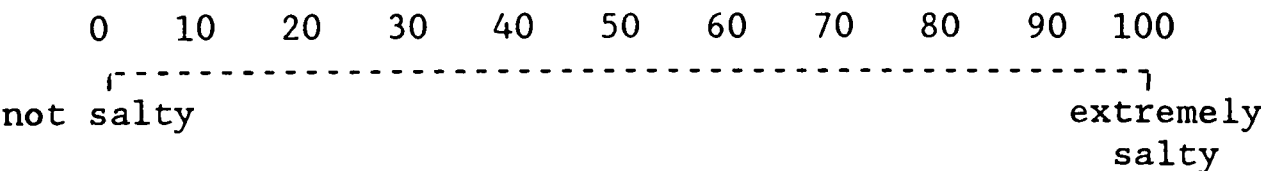
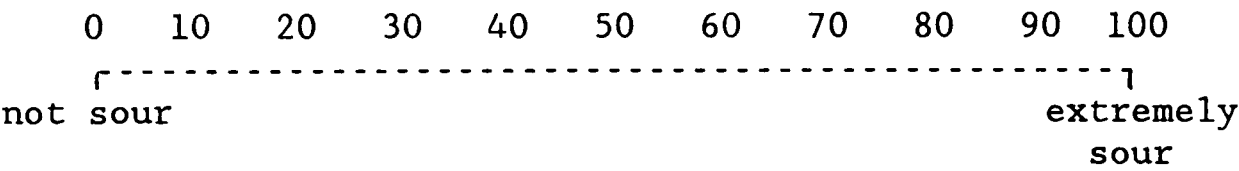
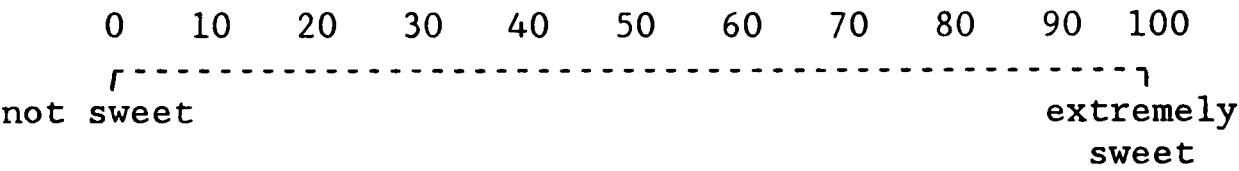
Brand name	kcal per 100g	kcal per item
Cream crackers		
Jacob's	418	32
Sainsbury's	-	35
Tesco's	429	34
Chocolate digestive biscuits		
Hobnobs plain chocolate	496	77
McVitie's plain chocolate	506	84
Tesco's plain chocolate	496	84

Appendix 13

Visual analogue scales used to assess the four basic tastes in Chapter 9

Cracker/Biscuit number

Here is a set of scales for rating the taste of each type of cracker and biscuit. Please circle the number on each scale which best describes the taste of the type of cracker or biscuit you are tasting. You can put your rating between two numbers if that seems most accurate. Please remember that it is essential that your ratings are as accurate as you can possibly get them so take as many crackers or biscuits as you need to achieve this.



Appendix 14Food diary and instructions used in Chapter 9

INSTRUCTIONS FOR FOOD DIARY

There are two pages for the 24 hours. There is a third page to be completed at the end of the 24 hours. Fill in the date first. Then record absolutely everything that you eat and drink, no matter how small or large. In the first column fill in the time of day. In the second column fill in exactly what you've eaten or drunk. For example don't write large helping of spaghetti but try and write down the type of spaghetti and the exact amount you've eaten in terms of ounces or grams. So, instead of large helping of spaghetti, put, for example, 8 oz of spaghetti hoops in tomato sauce. Don't miss anything out. If you put butter on your food include that, if you put sugar in your tea or drink your coffee with milk remember to include these items. If you're not sure of the exact amount then give your best estimate. In the third column write down where you were at the time you were eating/drinking. In the fourth column put a star * to mark episodes of eating that you would call a binge. These should be occasions when you felt that your eating was out of control and that you couldn't stop eating. Put a star in the column besides the foods that you feel were eaten as part of a binge. In column five write down whether you vomited or used laxatives. Use V to indicate vomiting and L to indicate laxatives. On the third sheet are two questions which ask you to rate how typical the 24 hours has been. Circle the number which answers each question best. Remember that you can put your rating in between the numbers on the scale if you feel that this is the best answer. Remember to answer all the parts of the questions. Answer these two questions only at the end of the 24 hours.

FOOD DIARY

Name

Date

Time	Food or liquid consumed	Place	*	V/L

* = foods eaten as part of a binge
V = vomiting L = laxatives

Name: Date

1. How typical were the types of food you've eaten today compared with the types of food you've been eating over the past three months?

0 10 20 30 40 50 60 70 80 90 100

not typical

extremely typical

Have you eaten different types of food today than usual?

.....

What foods have you eaten that you wouldn't usually eat?

.....

2. How typical was the overall amount of food you've eaten today of the amount that you've been eating each day over the past three months?

0 10 20 30 40 50 60 70 80 90 100

not typical

extremely typical

Did you eat the same amount as you've usually been eating each day over the past three months or was it more or less than usual?

Appendix 15

Reliability of breaking the transcripts into units in Chapter 9

To determine the reliability of the method used to break the transcripts into units for categorisation an independent rater (rater 2) not involved in the study was asked to divide up six randomly selected transcripts, three taken from each group of subjects (25% of the total), using the same criteria as the investigator (rater 1). After an initial practice during which discrepancies were discussed and resolved a high degree of inter-rater reliability was achieved. Mean percentage agreement was calculated in two ways. First, a measure of overall agreement on position of end boundaries was calculated by noting the number of end boundaries on which both raters agreed and dividing this by the larger number of boundaries used by either rater. For the six transcripts rater 1 employed a total of 511 end boundaries. Rater 2 used 482 end boundaries and they agreed on 456. Overall mean percentage agreement for the 12 sections, each transcript being divided up into two parts, corresponding to thoughts collected before, and thoughts collected after each task, was $88.7 \pm 6.0\%$ (range 78.9 - 100%). Secondly, since rater 1 divided the rest of the data into units, the independent raters' (rater 2) agreement with rater 1's judgments was determined by dividing the number of units agreed on by the total number of units used by rater 1, instead of the larger number of units used by either rater. Using this method overall mean percentage agreement was $90.1 \pm 6.9\%$ (range 78.9 - 100%).

Appendix 16

Criteria for classifying thoughts relevant to the taste test in Chapter 9

Thoughts obtained using the "thinking aloud" method were categorised into negative and positive thoughts immediately relevant to the task of tasting the crackers and biscuits. The following criteria were used:

Negative thoughts

These are negative, maladaptive thoughts directly concerned with the task of tasting, or attempting to taste the crackers and biscuits. See below for list of examples. It includes initial reaction to being asked to do the task, anticipation of tasting the crackers and biscuits, consequences and implications of having tasted them. It includes thoughts that refer to the self as well as thoughts that refer to the task. It includes thoughts that hinder the self in coping with the task, thoughts that indicate a desire for avoidance or escape from the task, unfavourable comments about tasting and about the crackers and biscuits, anticipated negative consequences of tasting and eating including catastrophic interpretations and predictions, desire to escape from the consequences of tasting and eating including balancing the amount of food eaten against existing periods of fasting or exercise, maladaptive and dysfunctional strategies for coping with the consequences of eating including all or nothing thinking.

Examples:

I love these chocolates but cannot eat them
 one or the other (biscuits or crackers) is all I want
 don't want to eat anything
 I'm angry (ref to how feels about being asked to eat something)
 glad that's over (ref to taste test)
 I am just wondering about how many calories
 got to have lunch with L and G so got to keep my lunch in my bag until

then

I'm very aware of the biscuits and crackers but I don't have any strong desire to eat them

I don't like days when I just have a little nibble of something

I wanted to destroy them (ref to crackers and biscuits)

Positive thoughts

Positive thoughts about tasting the crackers and biscuits, e.g. "I'm enjoying this". Must be purely positive statements with no reference to any negative aspect. For example, "that wasn't too bad" would not be rated as a positive thought. See below for examples.

Examples:

I enjoyed doing that (ref to taste test)

I like chocolate biscuits

Appendix 17

Reliability of coding the transcripts in Chapter 9 into immediately relevant positive and negative thoughts, content, reference and valence

An independent rater, unconnected with the project and uninformed about its nature and purpose, coded six transcripts, three chosen at random from each group of subjects (25% of the total) using the manuals in Appendix 6 and Appendix 16. After initial practice during which differences were discussed and resolved reliability of coding was calculated separately for positive and negative thoughts immediately relevant to the taste test and for content, reference and valence using the same method as that employed in calculating the reliability for dividing up the transcripts into idea units. For positive and negative thoughts immediately relevant to the taste test, noting the number of thoughts on which both raters agreed on the classification used and dividing this by the larger number of thoughts used by either rater for this category, yielded reliability (in percentages) of $96 \pm 8.5\%$ (range 75 - 100%) for the negative items, 100% for the positive items and $96.4 \pm 7.3\%$ (range 77.8 - 100%) for the neutral items. Since the experimenter (rater 1) rated the rest of the transcripts agreement with the independent rater (rater 2) was determined by using rater 1 as the standard and dividing the number of thoughts on which both raters agreed by the total number of thoughts used by rater 1. This yielded reliability of $96.4 \pm 8.5\%$ (range 75 - 100%) for negative thoughts, 100% for positive thoughts and $97 \pm 7.3\%$ (range 77.8 - 100%) for neutral items.

For content, reference and valence a similar reliability check on the coding was carried out. For the food vs non-food dimension dividing number of thoughts agreed on by the larger number of thoughts employed by either rater for each category yielded reliability ratings of $92.1 \pm 12.9\%$ (range

66.7 - 100%) for thoughts related to eating, weight and shape, $97.2 \pm 4.1\%$ (range 87.5 - 100%) for thoughts related to other issues, and 100% for unclassifiable thoughts. Using rater 1 as the standard yielded reliability of $93.5 \pm 12.7\%$ (range 66.7 - 100%) for thoughts related to eating, weight and shape, reliability of $98.4 \pm 3.9\%$ (range 87.5 - 100%) for thoughts not related to these issues, and reliability of 100% for unclassifiable thoughts. For the self-reference dimension reliability using the larger number of thoughts as the denominator was $92.3 \pm 11.4\%$ (range 60 - 100%) for self-referent thoughts and $94.6 \pm 4.7\%$ (range 85.7 - 100%) for other referent thoughts. Using rater 1 as the standard reliability for self-reference was $92.3 \pm 11.3\%$ (range 60 - 100%) and for other-referent it was $97.4 \pm 4.9\%$ (range 85.7 - 100%). For the valence dimension, using the larger number of units as the denominator, reliability for negative thoughts was $96.6 \pm 4\%$ (range 88.9 - 100%), for positive thoughts it was 100% and for neutral thoughts $95.2 \pm 6.7\%$ (range 85.7 - 100%). Using rater 1 as the standard, reliability for negative thoughts was $99.7 \pm 1.2\%$ (range 95.8 - 100%), for positive thoughts it was 100% and for neutral thoughts it was $96.9 \pm 4.7\%$ (range 85.7 - 100%).

Appendix 18

Results from the analyses of variance of the questionnaire and semi-structured interview measures used in Chapter 3

Measure	F/H value	p
Eating Disorder Inventory subscales:		
Drive for thinness	H = 34.61	< .0001
Bulimia	H = 27.16	< .0001
Body Dissatisfaction	F = 6.61	< .0002
Ineffectiveness	H = 28.48	< .0001
Perfectionism	F = 1.28	NS
Interpersonal Distrust	F = 9.57	< .0001
Interpersonal Awareness	H = 28.71	< .0001
Maturity Fears	H = 26.44	< .0001
Body Shape Questionnaire		
	F = 11.62	< .0001
Beck Depression Inventory		
	F = 12.81	< .0001
State Trait Anxiety Inventory - Trait		
	H = 27.63	< .0001
Rosenberg Self Esteem Scale		
	H = 31.19	< .0001
Eating Disorder Examination Subscales:		
Restraint	H = 27.21	< .0001
Bulimia	H = 34.51	< .0001
Eating Concern	H = 30.55	< .0001
Shape Concern	F = 12.20	< .0001
Weight Concern	H = 31.59	< .0001
All df for F values = 4,55. All df for H values = 4.		

Appendix 19

Paper accepted for publication by the Journal of Abnormal Psychology

Journal of Abnormal Psychology (in press)

**SELECTIVE PROCESSING OF EATING, SHAPE AND WEIGHT RELATED
WORDS IN BULIMIA NERVOSA**

Myra J. Cooper

Pavlos Anastasiades

Christopher G. Fairburn

Oxford University Department of Psychiatry

Warneford Hospital

Oxford

Running head: SELECTIVE PROCESSING IN BULIMIA NERVOSA

ABSTRACT

The Stroop colour-naming task was used to investigate selective information processing in bulimia nervosa. Three cards were used; a target card consisting of words related to eating, weight and shape, a control word card, and the standard conflicting-colour card. Thirty six patients with bulimia nervosa were compared with a group of age-matched female controls. It was found that the amount of disruption caused to colour-naming by the target card was significantly greater in the bulimia nervosa group than in the female control group, whereas that caused by the colour card was similar in the two groups. The Stroop colour-naming task may be a useful objective measure of one aspect of the cognitive disturbance of patients with bulimia nervosa.

**Selective Processing of Eating, Weight and Shape Related Words
in Bulimia Nervosa**

Clinical observations suggest that patients with eating disorders are unusually preoccupied with thoughts about eating, weight and shape, and it has been suggested that distorted attitudes to eating, weight and shape play an important role in maintaining these disorders (Fairburn, Cooper & Cooper, 1986). However, despite these observations, and the recent interest in cognitive-behavioural treatments for eating disorders (Fairburn, 1985; Garner & Bemis, 1985), there have been surprisingly few studies of the cognitive disturbance of these patients.

Brief objective measures, developed by experimental psychologists, have been used to provide valuable information about the cognitive disturbance present in certain clinical populations. One example is the Stroop colour-naming task (Stroop, 1935) in which interference with colour-naming appears to occur whenever cognitive representations of the words to be colour-named are activated (Mathews & MacLeod, 1985). Since thoughts and distorted attitudes to eating, weight and shape appear to be important in eating disorders, it might be expected that these patients would show interference in colour-naming when asked to colour-name words related to these topics.

Three studies have used this paradigm to study patients with eating disorders (Ben-Tovim, Walker, Fok & Yap, 1989; Channon, Helmsley & de Silva,

Selective Processing of Eating

4

1988; Fairburn, Cooper, Cooper, Anastasiades & McKenna, 1991). The first two studies failed to address all three key areas of eating, weight and shape, looking only at food and body size in the Channon et al (1988) study and food and body shape in the Ben-Tovim et al (1989) study. Moreover, the latter study is difficult to interpret because of the method used to analyse the data. We found that patients with bulimia nervosa were slower than female control subjects to colour-name words related to eating, weight and shape (Fairburn et al., 1991). This suggests that selective processing of eating, weight and shape related words may be restricted to those with an eating disorder of clinical severity. However, this finding needs to be replicated with improved methodology since, as in the study by Channon and colleagues, the cards used for the colour-naming tasks were presented in the same fixed order with the target card being colour-named last. This design was chosen so that any practice effect ran counter to the hypothesised interference effect. However, it is also possible that a fatigue effect operated and that this, rather than selective processing, accounted for the patients' relative difficulty colour-naming the target card. To eliminate this explanation, it is necessary to counterbalance the order in which the cards are presented.

The aim of the present study, therefore, was to see if we could replicate the main finding of our preliminary report, that patients selectively process information related to eating, weight and shape, but this time using a counterbalanced design. To achieve this aim, patients with bulimia nervosa were

compared with a group of age-matched female control subjects.

METHOD

Subjects

Patients with bulimia nervosa. These subjects were 36 female patients who fulfilled the proposed DSM-III-R diagnostic criteria for bulimia nervosa (American Psychiatric Association, 1985). The operational definition used has been described in full elsewhere (Fairburn, 1987). All had been referred by local general practitioners and psychiatrists for the treatment of bulimia nervosa.

Female control subjects. These were 18 young women recruited by placing advertisements asking for female volunteers to take part in a study investigating "thoughts about eating, weight and shape". No reference was made to eating disorders. Those with the features of bulimia nervosa or anorexia nervosa were excluded by interview as were those with a history of these disorders.

Information was collected on age, weight and height. Each subject completed the Eating Attitudes Test or EAT (Garner & Garfinkel, 1979) and the Beck Depression Inventory or BDI (Beck, Ward, Mendelson, Mock & Erbaugh, 1961).

Materials

The Stroop colour-naming cards. Three cards were constructed, as described in our previous paper (Fairburn et al., 1991). Each card consisted of a set of five stimulus words repeated 20 times. The ink colours were orange, yellow, blue,

Selective Processing of Eating

6

green and black. The words were printed in block capitals 0.5 cm high in one of five different colours. They were presented in random order on a white card (53 cms x 39cms) in ten rows of ten. For the conflicting-colour card the words orange, red, blue, green, brown were used. On the target card the words were fat, diet, thighs, cakes, hips. On the control card they were sit, dare, filter, tower, wool. Words on the target and control cards were matched for number of letters and frequency of use (Kucera & Francis, 1967). The conflicting colour card was included to determine whether the two groups differed in their ability to perform a task in which colour-naming is reliably impaired. On the target and control cards the complete set of stimulus words was repeated, in a new random order, twice in each row. There was no immediate repetition of word or colour within a row. On the conflicting-colour card no word appeared in its own colour ink.

Procedure

Subjects completed the EAT and BDI before performing the colour-naming tasks. They were not provided with a detailed rationale but simply told that the tasks involved naming colours. They were first shown a small card with two rows of the letter O printed in the five colours to familiarize them with the colours to be named. Standard instructions were then given, including the request to name as quickly as possible the colour of the ink in which each word was printed and to correct any mistakes immediately they occurred. The time taken to colour-name all the words on each card was recorded using a stopwatch. Error rates

were not recorded. There were six orders in which the three cards could be presented. To control for possible order effects six patients in the bulimia nervosa group and three subjects in the female control group read the cards in each order.

Table 1 here

RESULTS

Subject characteristics

The mean age and body mass index ($BMI = \text{weight in kg}/(\text{height in m})^2$) of the two groups are shown in Table 1, together with scores on the EAT and BDI. There were no significant differences between the groups in age or BMI, but they differed in their scores on the EAT ($t(42) = 15.98, p = < .0001$) and BDI ($t(52) = 10.48, p = < .0001$).

Colour-naming times

Since the colour-naming times were not normally distributed and the groups had significantly different variances, all analyses were performed on transformed scores. The appropriate transformation was that of the reciprocal. Multiplied by 100 this represents the rate or speed of colour-naming, (i.e. the number of words colour-named per second). The colour-naming speeds for each card (number of words colour-named per second) are shown in Table 2. For comparison with previously reported data, mean raw times (number of seconds taken to read the words on each card) are presented in parentheses.

Table 2 here

To control for differences in general colour-naming speed two interference indices were computed, using the transformed scores, to represent the amount of disruption caused to colour-naming times by the target and colour words when compared to the control words. These were a target interference index, which represents the difference in speed of colour-naming the words on the target card and the words on the control card, and a colour interference index, which represents the difference in speed of colour-naming the words on the colour card and the words on the control card. Mean scores for both groups on the two interference indices are also shown in Table 2. As before, mean raw scores (number of seconds) are provided in parentheses.

Comparison of the bulimia nervosa patients with the female control subjects

A 2 x 2 (group x interference index) analysis of variance with repeated measures on the second factor revealed no main effect of group ($F(1,52) = 0.36$, NS). This indicates that the patients did not show greater interference with colour-naming than the control subjects. There was a significant main effect of interference index ($F(1,52) = 69.62$, $p < .0001$). This indicates that the colour card caused greater disruption to colour-naming than the target card. More importantly there was a significant group x interference index interaction ($F(1,52)$

= 5.67, $p = .02$). Post-hoc Tukey tests between groups indicated that the colour card caused a similar amount of disruption in both the bulimia nervosa and the female control groups. Indeed, if anything, the extent of the disruption was less in the bulimia nervosa group. The target card however caused significantly greater disruption in the bulimia nervosa group than in the female control group ($p < .05$).

Correlations

To determine whether the amount of disruption caused by the target card was related to subject characteristics, correlations were performed within each group of the target interference index with age, weight, EAT and BDI scores. In the bulimia nervosa group, but not in the female control group, scores on the EAT and BDI were significantly correlated with the target interference index ($r = -0.36$, $p < 0.05$ and $r = -0.34$, $p < 0.05$ respectively). However, EAT and BDI scores were also significantly correlated within this group ($r = .45$, $p < .01$). Partial correlations to control for the intercorrelation showed that the relationship between the target interference index and either EAT or BDI scores did not remain significant when the effect of the other measure was partialled out. There were no significant correlations between age and weight and the target interference index in either the bulimia nervosa group or the female control group. There were no significant correlations between the colour interference index and subject characteristics (i.e. age, weight, EAT and BDI scores) in either

group.

DISCUSSION

The most important finding is that words related to concerns about eating, weight and shape resulted in greater interference with colour-naming in the bulimia nervosa group than in the female control group. Colour words, however, resulted in a similar amount of interference in both groups. This indicates that, compared with the female control subjects, the patients with bulimia nervosa showed selective processing of information related to eating, weight and shape. The results cannot be due to an order effect since the three cards were presented in a counterbalanced design.

Interference on the target card was significantly correlated with scores on the EAT. This suggests that patients with more severe symptoms, as measured by the EAT, show greater selective processing. However, controlling for the effects of depression, as measured by the BDI, reduced this effect to below significance. Thus it is not clear whether the significant relationship between the target interference index and the score on the EAT is specific to the clinical features of eating disorders or whether it is mediated by depression. Further research is needed into the clinical correlates of the interference.

Two limitations of the study should be noted. First, subjects completed the EAT before completing the colour-naming task. This may have primed concerns about eating, weight and shape. It is not clear whether the same is true of the

study by Channon and colleagues (1988) since it is not specified whether the EAT was completed before or after the colour-naming. In future studies such measures should be completed after the colour-naming. Second, the study did not separate food words from those relating to shape and weight, nor did it assess the effects of hunger as suggested by Vitousek & Hollon (1990). This is important since a recent study by Channon & Hayward (1990) found that short-term fasting in normal subjects produced selective processing of food words, although not body size words. One possible explanation for our results is that the patients with eating disorders were simply hungrier than the female controls. Future studies should control for possible differences between groups in hunger, and separate food, shape and weight words.

The paradigm described here needs to be employed with other groups of subjects to determine whether the effect is specific to patients with bulimia nervosa. One particularly important comparison group is females who are dieting (Wilson, 1989). Since dieters are often highly concerned about eating, weight and shape, and may also be hungry as a result of food deprivation, it is possible that they too might show interference with colour-naming. It is also necessary to determine whether the effect occurs in patients with anorexia nervosa. Since by definition patients with anorexia nervosa have concerns about weight and shape similar to those found in bulimia nervosa, it should be expected that they too would exhibit interference with colour-naming. The findings of two of the

previous studies suggest that patients with anorexia nervosa are slowed by food-related words but not by body size or shape-related words (Channon et al., 1988; Ben-Tovim et al., 1989). Differences in the relative importance attached to these three areas of concern could be further investigated using separate versions of the Stroop task, as in the present study, or by presenting the different categories of words on a computer screen so that individual response latencies for each word may be calculated.

Finally, it is important to consider the potential value of the Stroop task in assessing patients with eating disorders. Unlike the other measures designed to assess the cognitive disturbance found in eating disorders, it does not rely on self-report. It is not therefore subject to demand effects. Thus it may be of value both in detailed psychopathological studies and in assessing the effects of different forms of treatment.

REFERENCES

- American Psychiatric Association. (1985). DSM-III-R in Development (10-5-85). Washington D.C.: American Psychiatric Association.
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J. E. & Erbaugh, J. K. (1961). An inventory for measuring depression. Archives of General Psychiatry, 4, 561-571.
- Ben-Tovim, D. I., Walker, M. K., Fok, D. & Yap, E. (1989). An adaptation of the Stroop test for measuring shape and food concerns in eating disorders: a quantitative measure of psychopathology? International Journal of Eating Disorders, 8, 681-687.
- Channon, S. & Hayward, A. (1990). The effects of short-term fasting on processing of food cues in normal subjects. International Journal of Eating Disorders, 9, 447-452.
- Channon, S., Hemsley, D. & de Silva, P. (1988). Selective processing of food words in anorexia nervosa. British Journal of Clinical Psychology, 27, 259-260.
- Fairburn, C. G. (1985). Cognitive-behavioral treatment for bulimia. In: D. M. Garner & P. E. Garfinkel (Eds.), Handbook of Psychotherapy for Anorexia Nervosa and Bulimia, (pp. 160-192). New York: Guilford Press.
- Fairburn, C. G., Cooper, Z. & Cooper, P. J. (1986). The clinical features and maintenance of bulimia nervosa. In: K. D. Brownell & J. P. Foreyt (Eds.),

Handbook of Eating Disorders: Physiology, Psychology and Treatment of Obesity, Anorexia and Bulimia, (pp. 389-404). New York: Basic Books.

Fairburn, C. G. (1987). The definition of bulimia nervosa: guidelines for clinicians and research workers. Annals of Behavioral Medicine, 9, 3-7.

Fairburn, C. G., Cooper, P. J., Cooper, M. J., Anastasiades, P. & McKenna, F. P. (1991). Selective information processing in bulimia nervosa. International Journal of Eating Disorders, (in press).

Garner, D. M. & Garfinkel, P. E. (1979). The Eating Attitudes Test: an index of the symptoms of anorexia nervosa. Psychological Medicine, 9, 273-279.

Garner, D. M. & Bemis, K. M. (1985). A cognitive-behavioral approach to anorexia nervosa. In: D. M. Garner & P. E. Garfinkel (Eds.), Handbook of Psychotherapy for Anorexia Nervosa and Bulimia, (pp. 107-146). New York: Guilford Press.

Kucera, H. & Francis, W. N. (1967). Computational Analysis of Present-day American English. Providence, RI: Brown University Press.

Mathews, A. & MacLeod, C. (1985). Selective processing of threat cues in anxiety states. Behaviour Research and Therapy, 23, 563-569.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. Journal of Experimental Psychology, 18, 643-661.

Vitousek, K. B. & Hollon, S.D. (1990). The investigation of schematic content and processing in eating disorders. Cognitive Therapy and Research, 14, 191-214.

Selective Processing of Eating

15

Wilson, G. T. (1989). Bulimia nervosa: a cognitive-social learning analysis. In: A. J. Stunkard & A. Baum (Eds.), Recent Advances in Behavioral Medicine, (pp. 73-98). New York: Erlbaum.

Table 1. Characteristics of the two groups of subjects.

	Bulimia nervosa		Female control	
	patients		subjects	
	(N = 36)		(N = 18)	
	X	SD	X	SD
Age (years)	24.3	6.2	22.1	3.5
Body mass index*	21.8	2.2	20.9	1.5
EAT total	49.9	14.9	7.8	3.6
BDI total	26.7	10.5	4.5	5.1

*Weight in kg/(height in m)²

Table 2. Speed of colour-naming the three cards (number of words per second) and interference indices, with raw scores (number of seconds taken to read each card) in parentheses.

	Bulimia nervosa patients		Female control subjects	
	(N = 36)		(N = 18)	
	X	SD	X	SD
Control card speed	1.24 (83.2)	0.22 (16.8)	1.46 (70.9)	0.29 (14.0)
Target card speed	1.10 (96.4)	0.24 (25.9)	1.40 (75.0)	0.31 (16.4)
Target interference index	-0.15 (13.2)	0.11 (13.6)	-0.07 (4.1)	0.09 (5.8)
Conflicting colour card speed	0.94 (112.0)	0.21 (25.9)	1.11 (93.6)	0.24 (19.2)
Colour interference index	-0.30 (28.8)	0.14 (18.3)	-0.35 (22.7)	0.18 (12.1)