

Type A Behaviour, Uncontrollability, and the Activation of
Hostile Self-schema Responding

by

© Cathy G. Moser

A dissertation submitted in partial fulfillment
of the requirements for the degree of Doctor of Philosophy
in the Department of Psychology
in the Faculty of Graduate Studies
of the University of Manitoba

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OF HOSTILE SELF-SCHEMA RESPONDING

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CATHY G. MOSER

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Abstract

The Type A behaviour pattern has been identified as a risk factor for coronary heart disease, and includes extremes of competitive achievement striving, time urgency, and easily evoked hostility. According to Glass (1977), Type A behaviour represents a coping response to perceived threats of loss of control. The function relating Type As' perceptions of loss of control to consequent affect and behaviour was postulated to follow a biphasic hyper-hyporesponsiveness curve. Following exposure to brief uncontrollability, Type As are hypothesized to react with hyperresponsiveness, which expresses itself as exaggerated achievement striving, time urgency, and hostility. In contrast, following extended exposure to uncontrollability, Type As give up their efforts to control, and become helpless and depressed.

The present research served as a test of Glass' (1977) theory. University students were defined as Type As and Bs according to both the Jenkins Activity Survey and the Structured Interview. They then received either nofeedback or bogus noncontingent failure feedback on either a short or long aptitude test. Upon completion of the aptitude test mood states were assessed, both through self-report and through the self-schema processing index of incidental recall for positive, depressed, and hostile content adjectives.

Both JAS- and SI-defined Type As who were exposed to noncontingent failure feedback showed enhanced recall for hostile content adjectives. Both Type As and Type Bs had similar recall for depressed content adjectives, and the length of exposure did not affect recall. Thus Type As but not Bs were found to retain hostile self-schemata which were activated by threats to their sense of control. On the other hand, there was no evidence of A/B differences in depressive information processing following extended exposure to the noncontingent feedback.

The results were discussed in terms of their relevance to both self-schematic processing and Type A theories. The observation of hostile self-schemata in Type As extends the schematic processing research from the current focus on depressive self-schemata to another affective state (i.e., hostility). With respect to Type A theory, the emergence of hostile self-schemata in Type As supports the hyperresponsiveness portion of Glass' (1977) biphasic response function. However, the failure to document depressive self-schemata in Type As exposed to lengthy noncontingent feedback is inconsistent with the hypothesized hyporesponsiveness portion of the response function.

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Overview of Experiment

The Type A behaviour pattern has been identified as a risk factor for coronary heart disease (CHD), and includes extremes of competitive achievement striving, time urgency, and easily evoked hostility (Rosenman, Brand, Sholtz, & Friedman, 1978). Current conceptualizations of the psychological mechanisms underlying Type A behaviour focus on the dimension of uncontrollability. According to Glass (1977), Type As are particularly sensitive to threats of loss of control. The function relating Type As' perceptions of loss of control to consequent affect and behaviour was postulated to follow the biphasic hyper-hyporesponsiveness curve described by Wortman and Brehm's (1975) integration of reactance and learned helplessness theories. Following exposure to brief uncontrollability, Type As are hypothesized to react with hyperresponsiveness, which expresses itself as exaggerated achievement striving, time urgency, and hostility. In contrast, following extended exposure to uncontrollability, Type As give up their efforts to control, and become helpless and depressed.

Generally, researchers have focussed on the effects of uncontrollability on perceptual motor performance (cf. Glass, 1977). And, while it has been shown that exposure to an unsolvable task results in heightened interpersonal aggression for Type As as compared to Bs (Carver & Glass,

1978), hostility or depression have not been directly assessed. In part, the failure of researchers to directly assess the impact of uncontrollability on hostility and depression may be due to an awareness that Type As tend to deny subjective feelings of distress (Carver, Coleman, & Glass, 1976; Rosenman, 1978). The purpose of this research project was to test Glass' theory using an index of hostility and depression that is less sensitive to self-report biases than typical paper and pencil measures. The index referred to is the self-schematic processing measure of recall for self-referent trait adjectives (cf. Kuiper, MacDonald, & Derry, 1983).

Self-schemata are cognitive structures that organize and store information pertaining to the self, and influence the type of information that is attended to and recalled (cf. Taylor & Crocker, 1981). In recent applications of self-schema theory and methodology recall for self-referent depressed content adjectives was found to be sensitive to depressed affective states (cf. Kuiper, MacDonald, & Derry, 1983). And, while hostile self-schemata have not yet been documented, it has been shown that recall for negatively valenced materials is facilitated by angry mood induction (Nasby & Yando, 1982). Accordingly, recall for hostile content adjectives could serve as an index of hostile content self-schemata.

In the following experiment, recall for depressed and hostile content adjectives was used as an index of depressed and hostile self-schemata in Type As and Bs who were exposed to either brief or extended durations of noncontingent failure. Based on Glass' theory, it was expected that hostile content self-schemata would emerge in Type As who were exposed to brief noncontingent failure, while depressed content self-schemata would be activated in Type As who were exposed to extended durations of noncontingency. The following sections detail the premises upon which the above predictions were based. First, a brief description of Type A assessment techniques will be presented, followed by sections describing the literature on Type A behaviour and hostility and uncontrollability. Finally, a rationale and description of the self-schematic processing dependent variable is provided.

Type A Assessment

The assessment of Type A behaviour has been based on a variety of instruments, four of which were found to be related to CHD: The Structured Interview (SI; Rosenman, 1978); the Jenkins Activity Survey (JAS; Jenkins, Rosenman, & Zyzanski, 1974); the Framingham Type A Scale (FAS; Haynes, Feinleib, & Kannel, 1980a, 1980b); and, the Bortner Rating Scale (Bortner, 1969).

The SI was the assessment instrument used in the original prospective study demonstrating a relationship between the TABP and CHD (the Western Collaborative Group Study; Rosenman et al., 1978; Rosenman, Brand, Sholtz, & Friedman, 1976). It is a provocative interview designed to elicit Type A behaviour in susceptible individuals. Interviewees are probed for responses to items developed to cover three topic areas: achievement striving, hostility, and time urgency. Both the content of answers and style of responding form the basis upon which Type A assessment is made. Based on the interview, subjects are designated as one of the following: A1 (extreme Type A); A2 (moderate Type A); X (equal proportions of Type A and B behaviour); B3 (moderate Type B); or, B4 (extreme Type B). While subjects are categorized as one of the above types, often research groups are based on either a dichotomous A/B dimension, or a trichotomous rating system including Type Xs.

In contrast to the SI, the JAS, FAS, and Bortner Rating Scale are administered in questionnaire form. The 54-item JAS was designed to mirror the SI, with items selected and weighted based on their ability to discriminate between SI-defined Type As and Type Bs (Jenkins, Rosenman, & Friedman, 1967; Jenkins, Zyzanski, & Rosenman, 1971). In addition to the AB scale, the JAS yields scores on three scales, which were factor analytically derived: Speed and Impatience (S); Hard-Driving (H); and, the Job Involvement (J) scale. Only

the AB and H scales have been shown to be related to coronary heart disease (Jenkins, Zyzanski, & Rosenman, 1971).

The FAS was developed to assess Type A behaviour in 1600 men and women participating in the prospective study of CHD in the town of Framingham, Massachusetts (the Framingham Study; Dawber, 1980; Haynes, Levine, Scotch, Feinleib, & Kannel, 1978). It is a 10-item scale with questions focussing on themes of job pressure, competitive drive, and time urgency.

In contrast to the JAS and FAS, the Bortner Rating scale was developed independent of the epidemiological study of CHD. However, the Bortner Rating Scale has been shown to predict CHD among European population samples. The 14-item scale is used less frequently in North America than either the JAS or FAS. (see Matthews, 1982; Manuck, Kaplan, & Matthews, 1986; Matthews & Haynes, 1986 for reviews of the various assessment techniques).

Although the development of the JAS was based on the SI, there appears to be little overlap between classifications based on the two measures (cf. MacDougall, Dembroski, & Musante, 1979; Matthews, 1982; Matthews, Krantz, Dembroski, & MacDougall, 1982). The agreement of SI ratings with JAS classification is approximately 60 to 70% (Matthews et al., 1982), which is little above the 50%

chance level. According to Matthews et al. (1982), the JAS and SI share content areas related to self-reported drive, competitiveness, energy, and hostility. The SI differs from the JAS in terms of its focus on nonverbal aspects of the TABP, while the JAS is unique in the area of self-reported time urgency. It has been suggested that SI-defined Type A behaviour is more closely related to A/B differences in physiological responding (Dembroski, MacDougall, Herd, & Shields, 1979; MacDougall, Demboski, & Krantz, 1981), and that the JAS is more closely linked to psychological differences (Musante, MacDougall, & Demboski, 1984).

The more consistent relationship between SI-defined Type A behaviour and physiological responsivity may help to explain recent reports of a lack of association between Type A behaviour and CHD (cf. Manuck et al., 1986; Matthews & Haynes, 1986). The majority of reports claiming a lack of association between the TABP and CHD were based on JAS-defined groups (cf. Matthews & Haynes, 1986), and thus it is possible that differences would have been observed with SI-defined groups. It has also been suggested that the critical variable relating Type A behaviour to CHD may be associated with hostility and anger expression (cf. Matthews & Haynes, 1986). This literature will be reviewed in the following section. However, with respect to Type A assessment measures, it is possible that the greater strength of association of CHD with SI-defined as compared

to JAS-defined Type A behaviour may be due to the stronger focus of the SI on hostility related themes. Thus the SI would tend more to identify hostile individuals as Type As; and, if hostility is indeed the toxic element of Type A related CHD, then SI-defined Type As would be more likely than JAS-defined As to develop CHD.

Coronary-Prone Behaviour, Anger, Hostility, And Aggression

Buss (1961) has operationally defined the similarities and differences between anger, hostility, and aggression. Aggression is an instrumental response in which a noxious stimulus is delivered to another organism. Anger is a drive state which can energize aggression. Operationally, anger is defined as an emotional reaction accompanied by facial-skeletal and autonomic components. In contrast to the reactive and transitory nature of anger and aggression, hostility is an enduring attitudinal response. Buss (1961) defined hostility as an implicit verbal response which involves negative feelings and evaluations of other people and events. While anger, hostility, and aggression differ definitionally, it is clear that anger and hostility can precede, follow, or concur with aggression.

In comparison to research on the time urgent and achievement oriented components of Type A behaviour, there are relatively few studies directed at explicating the anger, hostile or aggressive components of the TABP (cf.

Matthews, 1982). Of the few existing studies, the focus of research exploring hostility, anger, and aggression of Type As and Bs differs across studies. Typically, hostility has been epidemiologically related to the TABP and CHD (cf. Barefoot, Dahlstrom, & Williams, 1983; Dembroski, MacDougall, Williams, Haney, & Blumenthal, 1985; Haynes et al., 1980a, 1980b; Shekelle, Gale, Ostfeld, & Oglesby, 1983; Matthews, Glass, Rosenman, & Bortner, 1977; Williams, Haney, Lee, Kong, Blumenthal, & Whalen, 1980); anger has been experimentally manipulated through frustration or harassment, and indexed by physiological measures of arousal (cf. Dembroski, MacDougall, Herd, & Shields, 1979; Diamond et al., 1984; Glass et al., 1980; Holmes & Will, 1985; Zurawski & Houston, 1983); and aggression has been indexed behaviourally, in situations wherein individuals are frustrated and harassed, and provided with the opportunity to take retaliatory action (Carver & Glass, 1978; Check & Dyck, in press; Holmes & Will, 1985; Strube, Turner, Cerro, Stevens, & Hinchey, 1984).

Epidemiological Studies. The observation of a relationship between hostility, aggressiveness, and CHD predates the formulation of the TABP. Based on Rorschach profiles (Kempe, 1945), psychoanalytic case studies (Meninger & Meninger, 1936), and clinical interview (Miller, 1965), it was observed that patients with coronary disease tended to exhibit a pattern of aggressiveness and hostility.

However, because the patients were interviewed following the development of cardiovascular disorder, it is not known whether hostility and aggression preceded the development of CHD, or occurred as a result of psychological or physiological factors associated with CHD.

In a more recent study, Williams et al. (1980) measured hostility and Type A behaviour in 424 male and female patients who were referred for coronary arteriography. Patients were classified as either Type A or non-Type A based on the Structured Interview. Hostility was indexed by responses to a 50 item hostility scale (Cook & Medley, 1954) derived from Minnesota Multiphasic Personality Inventory (MMPI) items which differentiated teachers with good student-teacher rapport from teachers with poor rapport. The dependent variable measured was the percent of patients with at least one coronary occlusion. Williams et al. found that sex, hostility, and the TABP were independently related to CHD. Additionally, there was an increasing gradient of risk for CHD, going from non-Type A females with low hostility scores (12.5%) to male Type As with high hostility scores (82%). One interpretational difficulty with the Williams et al. study was that it was retrospective, in the sense that patients were exposed to the SI and the hostility scale after being referred to the hospital for diagnostic coronary arteriography. While Williams et al. argued that both As and Bs would be

similarly affected by the threat of diagnostic procedures and possible CHD, existing evidence suggests that the hostility levels of Type As and Bs are differentially affected by perceived threats (Carver & Glass, 1978; Strube et al., 1984). Thus differences in state, but not trait hostility may have been reflected on hostility scale scores. If this were the case, then Williams et al.'s (1980) data could not be presented as support for the hypothesized association between the TABP, hostility, and the development of CHD.

There are several prospective studies which document the relationship between hostility and CHD. In two separate studies, Barefoot, Dahlstrom, and Williams (1983) and Shekelle et al. (1983) documented the relationship between responses to the Cook and Medley (1954) hostility scale, and subsequent development of CHD. Barefoot et al. found that individuals with high hostility scores evidenced a five-fold higher incidence of CHD in the 25 years following administration of the hostility scale. Shekelle et al. (1983) also found that men with high hostility scores had a higher 10 year incidence of CHD. Both Barefoot and Shekelle noted that hostility scores also predicted mortality from all causes. Unfortunately, Type A behaviour was not assessed in either study.

Two studies which prospectively documented the relationship between the TABP, hostility, and the development of CHD are derived from the Western Collaborative Group and Framingham studies. Matthews et al. (1977) selected a subsample of 62 CHD cases and 124 matched non-CHD control cases from the Western Collaborative Group Study. Among the 62 CHD cases, 73% were Type As and 27% were Type Bs. Based on the sample of 62 coronary cases and 124 controls, Matthews, Glass, Rosenman, and Bortner (1977) applied factor analytic procedures to the individual SI items for each subject, and the relationship of each factor score with the development of CHD was determined. The results indicated a grouping of five factors for the SI items. The factors were labelled competitive drive, past achievements, impatience, non-job achievement, and speed. Of the five factors, only the competitive drive and impatience factors were found to relate to CHD. Within the two factors, the means of four of the eight individual items were significantly higher for CHD cases than for non cases. The items were: explosive voice modulation; potential for hostility; subject's answers are vigorous; and, irritation at waiting in lines. Based on these results, it was suggested that vigour, drive, and hostility are importantly related to both the TABP and CHD development.

Haynes et al. (1978) also reported a relationship between the TABP, CHD, and hostility in both men and women

who participated in the Framingham study. A 300-item questionnaire was administered to 1674 coronary free individuals. Ten of the items on the questionnaire measured self-reported Type A behaviour. An additional 12 items formed the basis of four anger scales: anger symptoms (e.g., when angry, do you feel tense, weak, etc.); anger-in (e.g., when angry, do you try to act as though nothing much happened); anger-out (e.g., when angry, do you take it out on others); and, anger-discuss (e.g., when angry, do you get it off your chest). Anger symptoms correlated with both the TABP and CHD (Haynes et al., 1978). In terms of anger expression, however, not showing or discussing anger predicted development of CHD, while overt anger expression (i.e., anger-out) did not. The relationship between suppressed anger and CHD occurred independently of the relationship between the TABP and CHD (Haynes et al., 1980a, 1980b).

The Framingham findings that suppression of anger was related to CHD seems to be inconsistent with Matthews et al.'s (1977) report that explosive voice modulation and the potential for hostility (i.e., the outward expression of anger) were related to the development of CHD. A recent investigation by Dembroski and associates moves toward clarifying the relationship between the potential for hostility, anger expression, Type A behaviour, and CHD.

Dembroski, MacDougall, Williams, Haney, and Blumenthal (1985) rated the Structured Interviews of patients who underwent diagnostic coronary angiography on a number of content and stylistic dimensions, including potential for hostility and the tendency to suppress anger (anger-in). The anger-in dimension was based purely on self-report, while the potential for hostility was assessed based on content of SI answers and observations of rudeness, argumentative condescension, and surliness. It was found that the interaction between the potential for hostility and the suppression of anger were better predictors of CHD than any of the other components, including overall Type A ratings. Thus heightened potential for hostility was associated with increased pathology only for patients who suppressed anger. Unlike Matthews et al. (1977), Dembroski et al. (1985) found that there was no relationship between CHD and explosive voice modulation. Thus unexpressed anger which was evocable under a variety of conditions was the best predictor of CHD.

Physiological Studies. While the exact sequence of events leading to CHD is as yet unknown, several physiological processes have been hypothesized to occur (cf. Krantz & Manuck, 1984 for a review). It has been suggested that serum cholesterol contributes to the fibrous plaques which are characteristic of atherosclerosis, and that hemodynamic stress (e.g., high blood pressure) and

circulating catecholamines contribute to lesions in the atherosclerotic arteries (Ross & Glomset, 1976a; 1976b). Consequently, the focus of measurement for the physiological concomitants of the TABP has typically been levels of serum cholesterol, catecholamines (e.g., epinephrine and norepinephrine), heart rate, and systolic and diastolic blood pressure (cf. Weiss, Cooper, & Detre, 1981).

Dembroski, MacDougall, Herd, and Shields (1979) used the SI to categorize male university students on both A/B and hostility/competitiveness dimensions. Subjects were exposed to a cold pressor and reaction time task under instructions of either high or low challenge, and concomitant measures of cardiovascular arousal (heart rate, systolic and diastolic blood pressure) were taken. The results revealed that Type As under high challenge responded with greatest cardiovascular arousal. When As were subdivided into high and low hostility/competitiveness, it was found that highly hostile/competitive Type As responded with the same level of cardiovascular arousal under both high and low challenge conditions. In contrast, the low hostile/competitive As responded with marked arousal under high but not low challenge instructions. Dembroski et al. interpreted these results as suggesting that highly hostile and competitive As perceive mildly challenging circumstances as more challenging than low hostile As, and therefore, respond more frequently with cardiovascular arousal.

Rather than basing hostility ratings on the SI, Glass et al. (1980) directly manipulated anger and competition by subjecting Type As and Bs to a competitor who challenged them in a hostile fashion. The subjects in the Glass et al. (1980) study were SI-defined Type As and Bs who were asked to compete on a computer game of Pong for a \$25.00 gift certificate. While the competitor was a confederate who was actually unbeatable at Pong, he allowed the subject to win three of the nine games played. Under the Harass Condition, the confederate made a series of derogatory remarks to the subject. In the No Harass Condition, the confederate was quiet throughout the competition. Heart rate, systolic and diastolic blood pressure, and circulating levels of epinephrine and norepinephrine were monitored before, during, and after the competition. The results revealed that harassed Type As responded with the largest systolic blood pressure, heart rate, and plasma epinephrine elevations, compared to nonharassed As and Bs, and to harassed Bs. In contrast, there were no significant differences in the elevations of diastolic blood pressure or plasma norepinephrine for either As or Bs. Based on these results, Glass et al. argued that Type As were more physiologically aroused by competition with a hostile opponent than Type Bs. Unfortunately, Glass et al. did not assess the impact of harassment on changes in self-reported anger. Thus it is not known whether the documented physiological changes reflect what is commonly called anger.

Similar effects were reported by Diamond et al. (1984), who exposed Type As and Bs to harassment by a hostile competitor during a computer game of Pong. Heart rate, systolic and diastolic blood pressure were measured before, during, and after the competition. Consistent with the Glass et al. (1980) findings, it was found that the systolic blood pressure of Type As showed greater elevations than Type Bs during initial exposure to the harassment and competition. In contrast to Glass et al.'s (1980) findings, however, the heart rate of Type Bs increased during the experimental manipulation, while the heart rate of Type As showed little change over time. These observations are consistent with Contrada, Wright, and Glass' (1985) review which suggested that systolic blood pressure is sensitive to differences among SI-defined Type As and Bs, while diastolic blood pressure and heart rate bear a weak association with individual differences in physiological reactivity among Type As and Bs.

While the Glass et al. (1980) and Diamond et al. (1984) studies suggest that Type As are more physiologically responsive than Bs when confronted with a hostile challenging opponent, Holmes and Will (1985) found Type Bs to be more physiologically aroused by harassment and competition. In the Holmes and Will (1985) study, JAS-defined Type A and B university students were harassed by a confederate who was ostensibly working together with the

subject on an Etch-A-Sketch game. Both physiological measures (heart rate, systolic and diastolic blood pressure) and behavioural indices of aggression were assessed. In contrast to Glass et al.'s (1980) and Diamond et al.'s (1984) observations, there were no A/B differences in systolic blood pressure or heart rate. And, contrary to theoretical expectations, Type Bs who were harassed tended to have higher diastolic blood pressure than Type As. Behavioural indices of aggression did not mirror physiological measures, however. Harassed Type As and Bs displayed comparable levels of aggression toward the confederate, while nonharassed As were more aggressive than Type Bs. The inconsistency between the physiological responding observed by Holmes and Will (1985) and Glass et al. (1980) and Diamond et al. (1984) may have been due to the different classification methods employed. Holmes and Will (1985) categorized subjects based on the JAS, while the SI was utilized in both the Glass et al. and Diamond et al. studies. Evidence from several laboratories suggests that the JAS may be less sensitive than the SI to A/B differences in physiological reactivity (cf. Contrada, Wright, & Glass, 1983; Dembroski et al., 1979; MacDougall et al., 1981; Mayes, Sime, & Ganster, 1984).

Self-reported Anger and Behavioural Studies. There are few studies measuring self-reported anger and hostility, or behavioural indices of aggression. In one study, changes in

the affect of Type As and Bs in a class of physiotherapy students was assessed throughout a university term. On the first day of classes, Francis (1981) administered the JAS, the Multiple Affect Adjective Check List (MAACL) trait scale (Zuckerman & Lubin, 1965), and the trait scale of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970). On 11 consecutive weeks of the term, subjects completed the state scales of the MAACL and STAI. Generally, there were no differences in responding of Type As and Bs to the initial administration of the MAACL and STAI trait scales on the first day of classes. However, on the three MAACL subscales, the state scale scores for As were elevated for depression, anxiety, and hostility on 5, 3, and 2 (respectively) testing sessions. Scores on the STAI did not differ across groups. Francis noted that in general, differences between As and Bs emerged at the beginning of classes, midterm, and at final exams. Because the trait scores did not differ across groups, Francis concluded that Type As and Bs did not differ affectively under normal conditions. However, Type As were more likely to become distressed in response to academic pressures than Type Bs. Unfortunately, the precise relationship between MAACL scores and academic pressures (i.e., tests, assignments, etc.) was not documented.

While Francis (1981) failed to find A/B differences in self-reported ratings of trait adjectives, Chesney, Black,

Chadwick, and Rosenman (1981) documented differences in ratings on the Adjective Check list (ACL: Gough & Heilbrun, 1975) across behaviour types. Specifically, Type As described themselves as being more aggressive, autonomous, self-confident, and dominant than Bs. The differences between the Francis (1981) and Chesney et al. (1981) results may be due to the differences in adjectives describing aggressiveness (on the ACL) and hostility (on the MAACL). In the former case, the aggressive adjectives seem to be descriptive of an achievement oriented individual, while in the latter case, the adjectives tend more to describe hostile attitudes. In a subsequent analysis of the Chesney et al. (1981) data, Herman et al. (1981) noted that Type As tended to endorse as self-descriptive socially acceptable descriptions of aggressiveness (e.g., aggressive, dominant), and not endorse descriptions with negative connotations (e.g., hostile, irritable). Many of the MAACL adjectives could be viewed as having negative connotations (e.g., irritated, mean, cruel). Thus, it is possible that Type As in the Francis (1981) study failed to endorse the hostile trait adjectives as self-descriptive because of the negative connotations associated with the adjectives. However, under special circumstances [e.g., the academic pressure described by Francis (1981)], Type As were more willing to describe themselves in hostile terms.

In contrast to Francis' (1981) observation of differential levels of self-reported anger for Type As and Bs, Zurawski and Houston (1983) provided evidence that Type As and Bs responded similarly on the hostility scale of the MAACL following a frustration manipulation. JAS-defined Type A and B university students competed with a confederate for a \$2.00 prize on a team effort at tracing a design on an Etch-A-Sketch. To induce frustration, the confederate made obvious attempts to sabotage the subject's chances of winning a prize. Following the frustration manipulation, subjects were asked to complete MAACL items, and physiological measures of blood pressure, heart rate, finger pulse volume, and skin resistance were recorded. Following the frustration manipulation, Type As and Bs had similar levels of self-reported hostility. Of the physiological indices, the only significant A/B differences observed occurred for the skin resistance measure, with Type As evidencing more arousal than Type Bs. However, because physiological measures were taken while subjects were completing the MAACL, and not during the competition itself, it is not known whether the results reflected the effects of frustration, or were confounded by: (1) the physiological concomitants of activity necessary to respond to the MAACL; or (2) recovery from arousal, during the time period between the frustration manipulation, and filling out the MAACL. Zurawski and Houston (1983) attributed the failure to

observe A/B differences in hostility to the weakness of the JAS in measuring the hostility component of the TABP (Matthews, Krantz, Dembroski, & MacDougall, 1982).

Rather than rely on self-report measures of anger and hostility, Carver and Glass (1978), Strube et al. (1984), and Check and Dyck (in press), employed a measure of interpersonal aggression to assess the hostility component of the TABP. Carver and Glass (1978) selected Type A and B university students based on their responses to the JAS. For half of the subjects, an instigation procedure was implemented by having subjects perform a difficult (and unsolvable in the time period allotted) perceptual-motor task in the presence of a confederate who made derogatory remarks about their performance. In the No Instigation Condition, subjects were not exposed to the perceptual-motor task or the confederate's derogatory remarks. Subsequently, both groups were asked to teach the confederate a concept formation task by flashing a 'correct' light for each correct response by the learner, and administering one of ten increasingly painful shock intensities for incorrect responses. The level of shock intensity used by the subject to punish incorrect responding was assumed to index aggression. It was found that the shock intensity delivered by subjects who were exposed to the instigation procedure was higher than for subjects in the No Instigation Condition. However, the Instigation - No Instigation

differences occurred only for Type As, and not for Type Bs. As well, Type As administered marginally higher shock intensities than Type Bs under conditions of instigation, but no differences existed in the No Instigation Condition.

One problem with the Carver and Glass experiment was that the independent variable of harassment may have been confounded with frustration induced by exposure to a difficult perceptual-motor task. Subjects in the No Instigation Condition were not exposed to the task, and thus it is possible that the effects observed in the Instigation Condition were the result of frustration rather than harassment. Therefore, in a second experiment, Carver and Glass (1978) exposed subjects to one of three pretreatments: the instigation procedure described above; a frustration manipulation in which subjects were exposed to the task in the absence of derogatory commentary; or, notreatment. In the pursuant teaching task, Type As administered higher levels of shock in both the Frustration and Instigation Conditions, as compared to the Notreatment Group. In contrast, there were no significant differences for Type Bs exposed to instigation or frustration, as compared to the Notreatment Group. A/B differences emerged only in the Frustration Condition, thus suggesting that frustration itself led to the higher levels of shock intensities administered by Type As.

On the basis of the results from Carver and Glass' (1978) experiments, Strube et al. (1984) and Carver and Glass (1978) suggested that Type As may feel threatened by frustrating and potentially uncontrollable situations. Consequently, on subsequent tasks (e.g., the teaching procedure utilized by Carver & Glass), Type As may have attempted to reassert control over the situation. If Type As believed that higher levels of shock produced faster learning, it is possible that the higher shock intensities administered by Type As represented an instrumentally aggressive response designed to regain mastery over the experimental task. To separate instrumental from hostile aggression, Strube et al. (1984) replicated Carver and Glass' (1978) Frustration and Notreatment Conditions with two modifications. First, instead of shock, Strube et al. used rewards and fines of points which were later redeemable for gifts. And second, for one group, the learner was given only partial feedback in that s/he was told about the magnitude of rewards delivered, but not the magnitude of fines. Since any fine above the lowest level could not affect learning (because the learner was unaware of fine magnitudes), Strube et al. considered the level of fines employed by the teacher to be an index of hostile rather than instrumental aggression. For the other group of subjects, the learner was given feedback about the levels of both rewards and fines received. Therefore, levels of fines

administered by the teacher could have had an instrumental value in promoting learning. In the Full Feedback Condition, no significant A/B differences emerged, although Type As in the Frustration Condition tended to employ marginally lower fines than nonfrustrated Type As. In contrast, in the Partial Feedback Condition, frustrated As fined the learner more severely than both nonfrustrated As and nonfrustrated and frustrated Bs. The results thus indicated that frustrated Type As responded with hostile but not instrumental aggression, while Type Bs did not respond with hostile or instrumental aggression following the frustration manipulation. Strube et al. proposed that the hostility component to the TABP represented an emotional response to the perceived loss of control resulting from task frustration. However, it is not clear from Strube et al.'s methodology, that the frustration manipulation employed was effective in producing perceptions of uncontrollability, rather than simple frustration or perceptions of failure. Moreover, as noted by Check and Dyck (in press), while Strube et al. (1984) assessed aggression, they did not provide a direct measure of hostility. The absence of self-reported hostility measures is particularly detrimental to the interpretation of their results because of the frustration/anger manipulation employed. In the Strube et al. study, the frustrating agent (i.e., the experimenter) was not the recipient of the

subject's aggressive actions. Instead, the recipient of the fines was a confederate who was not responsible for the frustration experienced by the subject. Thus, as Check and Dyck (in press) point out, the motivation for aggression directed toward the confederate was unclear.

In a refinement of the Strube et al. (1984) design, Check and Dyck (in press) exposed Type A and B students to an aggression paradigm which was conceptually similar to that employed by Strube et al. (1984). However, rather than utilizing a frustration manipulation, subjects in the Check and Dyck (in press) study were interpersonally provoked by a confederate. Subsequently, subjects were provided with the opportunity to retaliate against the confederate by administering either aversive noise or monetary fines. Additionally, self-reported hostility and subjects' desire to hurt the confederate were assessed. It was observed that the provocation resulted in elevated hostility levels, and, Type As evidenced both higher levels of aggressive behaviour and desire to hurt, as compared to Type Bs. Check and Dyck's (in press) results thus suggested that under conditions of interpersonal provocation, Type As aggress, and that such aggression reflects anger and hostility.

In a second experiment, Strube et al. (1984) assessed the interpersonal aggression of Type As and Type Bs in a naturalistic setting by documenting the representation of

Type As and Bs in violent and nonviolent domestic settings. It was hypothesized that wife and child abuse represents a reaction to perceived loss of control, and a consequent attempt to regain control of the family environment. Conversely, it was proposed that victims of physical abuse were passive individuals who failed to assert control over their environment. Thus it was expected that Type As would be overrepresented in the population of victimizers, and underrepresented in the population of victims, as compared to Type Bs. Samples of women who were under treatment as victims of wife abuse or as perpetrators of child abuse were assessed for the TABP using the JAS. Consistent with the Strube et al. hypothesis, it was found that child abusing women were more likely to be Type As, while victims of wife abuse were more likely to be Type Bs. As Strube et al. suggest, because of the correlational nature of the experimental design, it is uncertain as to whether Type A behaviour preceded or followed abuse or victimization. Moreover, because perceived loss of control was not assessed, it is difficult to determine whether or not the domestic violence of Type As occurred in response to perceived loss of control.

In summary, there is preliminary evidence that suggests a relationship between hostility, aggression, and the TABP, and that hostility may be related to CHD. While it has been hypothesized that the hostility component of the TABP

reflects a response to perceived loss of control, there are relatively few direct tests of this hypothesis. However, there is a growing body of literature documenting the relationship between uncontrollability and other facets of the TABP. This literature is described in the following section.

The TABP and Uncontrollability

The most comprehensive theoretical account that has been developed to explain the psychological mechanisms underlying the TABP is Glass' (1977) application of learned helplessness theory to Type A behaviour (Matthews, 1982). According to Glass (1977), the TABP represents a style of responding which is evoked by perceptions of loss of control. It is postulated that Type As are characterized by heightened sensitivity to perceived threats to control. Glass described the reactions of Type As to loss of control in the framework of a biphasic hyper-hyporesponsiveness function. Specifically, it was argued that upon initial exposure to perceived uncontrollability, Type As attempt to reassert control over the threatening situation through hyperresponsiveness. These attempts are accomplished through the achievement striving, time urgent, and hostile behaviours which characterize the TABP. However, after prolonged experience with uncontrollable failure, As become hyporesponsive. That is, they begin to give up their

efforts to control, and are characterized by learned helplessness.

Learned helplessness theory is based on an animal learning model. The initial research employed a triadic group design with dogs (Seligman & Maier, 1967). In a pretreatment phase, an Escapable Group was trained to escape shock by pressing a lever. The number of shocks received by subjects in the Escapable Group determined the number of shocks administered to a yoked Inescapable Group. However, for the Inescapable Group, presentation of shock was not contingent on responding; subjects could not escape shock presentations by pressing the lever. The third group in the triadic design received no stimulus presentations during pretreatment. Following pretreatment, subjects were exposed to a test phase of escape/avoidance training in a shuttlebox. It was found that while subjects in the Escapable and Notreatment Conditions acquired the necessary escape/avoidance responses, subjects that were previously exposed to inescapable shock failed to acquire the escape/avoidance response in the test phase. The decrements in learning of the escape/avoidance responses after exposure to uncontrollable aversive events have since been demonstrated in a variety of infrahuman and human subjects (cf. Maier & Seligman, 1976). It has been proposed that exposure to uncontrollable aversive events results in three primary effects, termed learned helplessness: a decrease in

motivation to continue responses which may control future events; a cognitive deficit which expresses itself as interference in subsequent learning of responses which can control outcomes; and emotional disturbance (e.g., in humans, depression).

The paradigm used for the induction of learned helplessness in humans typically parallels the triadic design described above. Hiroto (1974) exposed university students to loud bursts of noise. Two groups of subjects were led to believe that they could control the noise by responding on a manipulandum. For one group, escape was possible by responding on the manipulandum, while for the second group, the noise was not contingent on the responses emitted. A third group received no noise at all. Subjects were then exposed to an escapable shuttlebox task, in which noise could be escaped by moving a lever from one side of the box to the other. Consistent with observations of learned helplessness in infrahumans (Seligman & Maier, 1967), it was found that the students who were exposed to inescapable noise in pretreatment evidenced slower acquisition of the hand shuttlebox response, as compared to subjects who received either escapable noise or no noise in pretreatment.

Initially, learned helplessness theory was directly applied from the infrahuman to the human population.

However, the limited generalizability of learned helplessness effects across situations led theorists to formulate a modified model of learned helplessness for human populations. In the reformulated model attributional processes have been identified as a parameter of the learned helplessness effect. Briefly, it has been proposed that the types of attributions made about the causes of outcomes determine the generalizability of learned helplessness effects across situations and time (cf. Abramson, Seligman, & Teasdale, 1978; Alloy, Peterson, Abramson, & Seligman, 1984; Miller & Norman, 1979). Attributions to global rather than specific causes are presumed to lead to learned helplessness effects which generalize across situations, while attributions to stable rather than unstable causes lead to learned helplessness effects which generalize across time. Finally, attributions of failure to internal sources (i.e., some aspect of the self) result in self-esteem deficits, while attributions of failure to external causes have little impact on self-esteem.

Based on the conceptualization of the TABP as a response to perceived loss of control, Glass and associates (cf. Glass, 1977) have applied a modified version of learned helplessness theory to the study of Type A behaviour. Essentially, the modified version of learned helplessness theory described by Glass (1977) parallels Wortman and Brehm's (1975) integration of learned helplessness and

reactance theories. According to reactance theory (Brehm, 1966), the perceived loss of control results in motivational arousal, termed reactance. Behaviourally, reactance expresses itself in enhanced efforts to regain control. Additionally, Wortman and Brehm (1975) suggested that initial attempts to regain control may be accompanied by hostility and aggressive behaviour directed at the threatening agent. The extent of observed reactance was hypothesized to vary directly with several parameters, including: expectations of control; the strength of the threat to control; the importance of the outcome; and, the implications for control in other situations.

While reactance and learned helplessness theories describe the effects of uncontrollability on motivation differently, Wortman and Brehm's (1975) model integrates the two theories in the following manner. Initially, when subjects are exposed to the unsolvable tasks used in the learned helplessness paradigm, reactance results. The subjects expect to be able to control the problem that they are presented with, and therefore, when threats to the controllability of the task are perceived, there is an enhanced effort and motivation to control the experimental situation. However, after prolonged exposure to an unsolvable task, subjects give up their expectation to control. Consequently, reactance diminishes, and learned helplessness results.

In applying reactance and learned helplessness theories to the TABP, Glass proposed that Type As had a heightened sensitivity to threats of loss of control. It was thus hypothesized that following brief exposure to uncontrollable outcomes, susceptible individuals (i.e., Type As) would react with hyperresponsivity, in an effort to regain mastery or control over the threatening situation. In contrast, it was hypothesized that with prolonged exposure to uncontrollability, the hyperresponsivity of As would diminish, and the hyporesponsivity characteristic of helpless individuals would result.

There are three lines of research which test the hypothesized biphasic response function for Type As. First, a series of reactance studies (e.g., Carver, 1980; Rhodewalt & Davison, 1983) has provided evidence suggesting that Type As, relative to Type Bs, have a heightened sensitivity to perceived loss of control. Second, recent investigations have directly assessed the perceived control of Type As and Bs (e.g., Dresel, 1984; Dyck, Moser, & Janisse, 1986; Strube & Lott, 1985). And third, a number of experiments have tested the reactions of Type As and Bs to brief and extended exposure to uncontrollability (e.g., Glass, 1977). For the most part, these experiments have utilized a university student population that was assessed for Type A behaviour based on a version of the JAS which was modified for a student population. The following experiments were based on JAS-defined Type A students, unless otherwise reported.

In their initial experiment, Krantz and Glass (cf. Glass, 1977) exposed Type A and B university students to 12 trials of either escapable or inescapable noise. The impact of uncontrollable noise on performance was subsequently measured on a choice reaction test. Consistent with Glass' hypothesis, Type As who had been exposed to inescapable noise were faster in responding to the reaction test than Type Bs in the Inescapable Group. In contrast, when escape was possible and perceptions of control were not threatened, Type Bs were marginally faster than As.

Krantz and Glass' observations of enhanced responding of Type As following brief exposure to uncontrollability was replicated using solvable and unsolvable concept formation problems as pretreatment and a differential reinforcement of low rates (DRL) of responding as the transfer task. Similarly, Glass observed differential performance of As and Bs working on a variable ratio (VR) but not a fixed ratio (FR) schedule. It was reasoned that because VR schedules lack a discernible relationship between responding and outcome, the task should be perceived as uncontrollable, particularly by Type As. Consistent with the hyperresponsiveness hypothesis, Glass observed that Type As required fewer trials to criterion than Type Bs while working on a VR schedule. However, no differences emerged for an FR schedule, in which outcome is directly contingent on responding (i.e., completely controllable).

In subsequent replications of the partial reinforcement schedule experiment mentioned above, it was observed that As do not outperform Bs on all types of VR schedules. In the initial experiment, the VR and FR apparatus were brightly illuminated, so that the relationship between responding and outcome was salient. In a subsequent experiment, Glass varied the salience of reinforcement by using either a brightly or dimly lit apparatus. Under conditions of high salience, the results of the first study were replicated; that is, Type As had a higher response rate than Bs on the VR, but not FR schedule. In contrast, under conditions of low salience, Type Bs responded more frequently on the VR schedule than Type As. In a separate study, Matthews (1979) confirmed these results in a group of university students and found that the results were generalizable to a group of elementary school children. Thus initial support for the hyperresponsiveness of As to brief uncontrollable outcomes was provided. However, it appears as though these effects occur only under conditions in which the uncontrollability of the situation is highlighted by salient cues.

To test the postulated hyporesponsiveness phase of responding to uncontrollable situations, Krantz, Glass, and Snyder (1974) extended the number of uncontrollable noise bursts used in pretreatment from 18 (Glass, 1977) to 35 trials. In addition, the intensity of the noise was varied to include a high stress (107 dB) and a low stress (78 dB)

condition. During the test phase, noise could be escaped and/or avoided by responding on a manipulandum. It was observed that under moderate stress levels, As exposed to uncontrollable noise had shorter latencies to respond, more escape responses, and required fewer trials to learn the escape response than Bs. In contrast, under high stress levels, As performed more poorly than Bs. Conceptually similar results were derived using prolonged exposure to solvable and unsolvable concept formation problems where success and failure were either highlighted or minimized (Glass, 1977). Thus while the learned helplessness effect was demonstrated to occur in Type As following uncontrollable aversive events, the effect seemed to be moderated by cue salience. Glass (1977) explained the development of learned helplessness for As in the high but not moderate salience conditions in terms of a denial process. Specifically, it was argued that when the cues accompanying uncontrollability were not salient, Type As ignored or denied lack of control. In contrast, when the cues accompanying uncontrollability were highly salient, it was more difficult to ignore uncontrollability, and, in response, Type As either exerted enhanced effort (following brief exposure) or gave up responding (after prolonged exposure).

While evidence from Glass' laboratory provided support for the induction of learned helplessness in Type As

following prolonged salient uncontrollability, Frankel and Snyder (1978) have argued that performance deficits observed on the transfer task of the learned helplessness paradigm may not reflect the consequences of perceived loss of control. As an alternative account of learned helplessness effects, Frankel and Snyder proposed the egotism hypothesis. Specifically, it was suggested that subjects who have been exposed to uncontrollable failure on one task subsequently avoid trying on another task, in order that they may attribute failure to poor effort, and thereby maintain self-esteem. In testing the egotism hypothesis with Type As and Bs, Weidner (1980) hypothesized that if Type As feel more threatened by task failure than Type Bs, then they would be more prone to attribute the cause of failure to external as opposed to internal causes. To test this hypothesis, Weidner used a self-handicapping paradigm (Berglas & Jones, 1978). Type As and Bs were exposed to either success or failure on four concept formation problems and were then asked to choose to consume various doses of either a performance enhancing or inhibiting drug prior to working on a subsequent task. The choice of a performance inhibiting drug was assumed to reflect a preference for attributing probable failure to external causes (i.e., the drug). It was found that Type As who were exposed to failure chose higher doses of the performance inhibiting drug than As exposed to success or Bs in either condition. Additionally,

on a post-experimental questionnaire, As in the failure condition tended to attribute their performance to reduced effort, as compared to As in the success condition. In short, it appeared that Type As exposed to failure accepted the opportunity to externalize the cause of subsequent performance, possibly in an effort to maintain self-esteem.

Conceptually similar results were derived from Janisse, Yerama, Yeh, Moser, and Dyck (1986). The first of three experiments focussed on the attributions of Type As and Bs following success or failure on a midterm university exam. Type A males who had succeeded on their exam tended to attribute their performance to internal and stable causes, rather than external and unstable causes. Conversely, under conditions of failure, Type As tended to attribute their performance more to unstable than to stable causes. In contrast, Type B males were more evenhanded in their attributions. Type As were also found to be more self-serving in their attributions for success and failure on a laboratory task in which bogus success and failure feedback was given. Finally, in a third experiment, Type As and Bs completed the Attributional Style Questionnaire (Seligman, Abramson, Semmel, & von Beyer, 1979), a scale which probes internal, external, unstable, stable, global, and specific attributions for positive and negative events. Janisse et al. found that Type As made less internal attributions and more unstable attributions for negative events than did Type

Bs. It was suggested that the observed attributional biases of Type As reflected the motivation to maintain and enhance self-esteem. In contrast, Rhodewalt (1984) found that Type As made more internal attributions for negative events on the Attributional Style Questionnaire than did Type Bs. The main difference in the methodologies of Janisse and Rhodewalt was the use of a student population in the Janisse study, versus a group of health care professionals in the Rhodewalt study. However, it is not clear why the difference in sample populations would result in opposite effects.

In a paradigm which more directly assessed attributions for success and failure, Brunson and Matthews (1981) asked Type As and Bs to continuously verbalize their cognitions during exposure to four solvable and four unsolvable discrimination learning problems. Similar to the Glass (1977) studies, the salience of feedback was varied by having subjects either record (high salience) or not record (low salience) the number of correct and incorrect responses they made. The dependent variables included the frequencies of: effectual and ineffectual strategies utilized (as determined by the experimenter); verbalizations of attributions to either task difficulty or ability; statements of either effective or ineffective task strategies; and, statements of negative or positive affect. Consistent with Glass' (1977) results, it was observed that

over the success-failure trials, there was a deterioration in performance for As in the High Salience Group, and Bs in the Moderate Salience Group. However, the deterioration in performance was more pronounced for As than for Bs. An analysis of the efficacy of strategies utilized by As and Bs revealed that by the end of the fourth unsolvable problem, 60% of Type As, but only 10% of Type Bs had abandoned useful strategies. In contrast, on the third and fourth unsolvable problems, high salience Bs and moderate salience As continued to employ effective task strategies. The shift to ineffectual strategies for As in the High Salience Group was accompanied by statements of ineffective strategies, negative affect, and attributions of lack of ability. A different pattern of cognitive concomitants was found for Bs, who tended not to make statements of ineffective strategies and attributed their performance to task difficulty, rather than lack of ability. In summary, the Brunson and Matthews' finding replicated Glass' (1977) observations of poorer performance by Type As exposed to prolonged salient failure and Type Bs exposed to prolonged moderately salient failure. In addition, Brunson and Matthews' (1981) results suggested that the deterioration of performance observed in As and Bs are accompanied by different cognitive processes. In contrast to hypotheses and data derived from tests of the egotism hypothesis (Janisse et al., 1986; Weidner, 1980), Type Bs appeared to

have demonstrated a cognitive coping style which would maintain self-esteem, while Type As did not.

Although it appears as though the performance deficit observed in Type As exposed to prolonged uncontrollability is replicable across situations, there are two exceptions to these findings. In a transfer task paradigm, Lovallo and Pishkin (1980) exposed SI-defined Type As and Bs to success or failure on two pretreatment tasks. The ostensible controllability dimension was manipulated through random presentations of noise throughout the pretreatment tasks. The effects of extended exposure to uncontrollable noise were later indexed by performance on a concept identification problem. Under conditions of success, A/B differences did not occur. In contrast to predictions based on Glass' (1977) work, it was observed that Type Bs exposed to uncontrollable noise and failure tended to perform more poorly than their Type A counterparts. While Type As performed better than Bs when no noise was presented during failure, the differences were slight and nonsignificant. Based on these results, Lovallo and Pishkin (1980) argued that the acceptance of Glass' biphasic performance function was premature. However, it should be noted that Lovallo and Pishkin's procedures differed from Glass' (1977) and Matthews' (1979; Brunson & Matthews, 1981) on two counts. First, Lovallo and Pishkin (1980) categorized Type As and Bs based on the SI, while Glass (1977) and Matthews (1979;

Brunson and Matthews, 1981) categorized students based on the JAS. It is thus possible that the JAS taps a controllability dimension to the TABP while the SI does not. Second, subjects in the Lovallo and Pishkin study were not led to believe that they could control noise presentations, and thus the lack of control over the noise was not indicative of a 'loss of control'. Indeed, as suggested by learned helplessness (Abramson et al., 1978) and reactance (Wortman & Brehm, 1975) theories, the absence of control in the context of expectations for control impacts on behaviour quite differently than the absence of control in situations where control is not expected.

One interesting finding reported by Lovallo and Pishkin (1980) was that on a self-report measure of noise annoyance, Type As reported that the noise was more annoying and interfered more with their performance than did Type Bs, but only under conditions of failure. The converse was true under conditions of success; that is, Type Bs reported more noise annoyance than Type As. It thus appeared that Type As tended to externalize their performance under conditions of failure, by implying that the noise interfered with their performance. These results are consistent with the egotism hypothesis (Frankel & Snyder, 1978).

In a more direct assessment of the effects of uncontrollability on performance, Nielson and Neufeld (1986)

exposed JAS-defined subjects to 48 trials of a reaction time task in which the latency to release a button either controlled or had no effect on noise occurrence. On each trial, subjects were asked to press a button in response to the instruction to start the trial, and to then release the button when so instructed. Both behavioural (button press and release latencies) and physiological indices (pulse transit time; systolic and diastolic blood pressure; interbeat interval) were assessed. While A/B differences on button releasing latencies failed to support Glass' theory, the button pressing latencies of Type As did follow the hypothesized biphasic response function; however, this pattern occurred regardless of whether or not the noise was controllable. Of the physiological measures, the only variable which differentiated Type As from Bs was pulse transit time. It was observed that Type As who were exposed to uncontrollable noise were more reactive than Bs in the same condition; however, these differences did not vary as a function of the number of trials. The results did not, therefore, provide support for Glass' hypothesized biphasic response function.

Another paradigm that has been recently utilized to investigate perceptions of control among Type As and Bs is the judgement of control task developed by Alloy and Abramson (1979). Dresel (1984) exposed Type As and Bs to 16, 32, or 48 trials of a button pressing task in which

subjects tried to produce the onset of a light which was associated with reward. While the onset of the light bore no relationship to pressing the button, subjects were asked to judge the amount of control they had over the onset of the light. It was found that both Type As and Type Bs overestimated the amount of control that they actually had. In contrast to predictions based on Glass' (1977) biphasic response function, the trials variable did not affect judgements of control. Similar observations were made by Strube and Lott (1985), who also utilized the judgement of control task (Alloy & Abramson, 1979). However, in the Strube and Lott study, As and Bs were both participants in the button pressing task (actors) and observers of others engaging in the button pressing task (observers). Consistent with Dresel's (1984) results, it was found that both Type A and B actors overestimated their judgements of control. However, while Type B observers overestimated the amount of control that the actors exerted, Type As made accurate estimates of the degree of control that the actors had. Strube and Lott (1985) argued that Type A observers judged the actors to have less control because As were less likely to believe that others were as competent as they themselves.

The suggestion that Type As overestimate the control they have in order to enhance perceptions of self-competence and self-esteem was also derived from studies investigating

the relinquishment of control. In several studies, As and Bs were asked to work as a team to acquire as many points as possible on perceptual motor tasks (Strube & Werner, 1985; Strube, Berry, & Moergen, 1985; Miller, Lack, & Asroff, 1985). Subjects were led to believe that their partners were more successful at the task than they were, and were then asked to decide whether they or their partner would continue to work at the task. Generally, it was found that Type As tended to retain control over performance of the task, while Bs preferred to relinquish control to their more successful partners. Strube and Werner (1985) also probed the attributions of Type As and Bs in their relinquishment of control study, and found that As were less likely than Bs to attribute the performance of their partners to internal causes. Thus Type As tended not to acknowledge the competence of their partners, even when the information provided suggested that their partners were more competent than themselves.

Finally, the relationship between Type A behaviour and judgements of control was also investigated by Dyck et al., (1986). Type As and Bs were asked to recall an experience from their past in which they felt time pressure and one in which they were involved in an intense competition. They were then asked to rate the degree of control they felt in the situation, the amount of control that another person would have had, and, how pleasant the experience was. It

was found that Type As, relative to Bs, rated themselves as having more control in the competitive situation, but not in the time urgent situation. In contrast, the ratings of Type As for control of others did not differ from the ratings of Type Bs. It was also found that the pleasantness of the experience was related to the degree of control felt. Dyck et al. suggested that Type As perceived more control than Bs in competitive but not time urgent situations because competitive situations lend themselves more readily to social comparisons. Social comparison processes were presumed to provide Type As with more clearly defined standards and better opportunity to recognize their successes. This interpretation would be consistent with an egotism point of view.

Dyck et al.'s observations that Type As judged themselves to have more control than Bs and others to have similar degrees of control are conceptually similar to Strube and Lott's (1985) report that Type A actors succumbed to the illusion of control while observers did not. Thus Type As in the Dyck et al. (1986) study may have perceived themselves as having more control than others because they believed themselves to be more competent than others.

In summary, with few exceptions, results from a variety of experiments have supported the biphasic response function for Type As exposed to uncontrollability. For the most

part, however, evidence confirming the hyporesponsiveness phase has been based upon transfer task performance. As Frankel and Snyder (1978) have noted, results derived from transfer task performance are vulnerable to interpretations other than the motivational and cognitive deficits implied by learned helplessness theory. Specifically, there is evidence to suggest that the control judgements and behaviour of Type As reflects an effort to maintain self-esteem (Strube & Lott, 1985; Strube & Werner, 1985), rather than the depressed affect and disrupted cognition and motivation postulated by learned helplessness theory. Moreover, the affective consequences of extended exposure to uncontrollable outcomes have not typically been measured in Type A and B populations (Glass, 1983). Thus, while there is evidence for a performance deficit for Type As exposed to extended uncontrollability, it is not known whether the performance measures mirror the depressed affect postulated by learned helplessness theory. The purpose of the following experiment was to provide a more direct test of Glass' application of the integrated reactance-learned helplessness model (Wortman & Brehm, 1975) to Type A behaviour.

Purpose of Proposed Experiment

According to Wortman and Brehm (1975), brief exposure to uncontrollable outcomes leads to feelings of hostility

and enhanced efforts to reassert control. In contrast, extended exposure to uncontrollability results in interference in subsequent learning, lack of motivation to control future controllable outcomes, and, depression. For the most part, the application of the integrated model to Type A behaviour has focussed on the effects of uncontrollability on performance measures. As yet, the emotional consequences of brief and prolonged uncontrollability remain relatively unexplored. In the only study to date, Dresel (1984) asked subjects to complete the MAACL following a judgement of control task (Alloy & Abramson, 1979). Type As and Bs reported similar levels of hostility, depression, and anxiety following both brief and extended exposure durations. In part, the absence of A/B differences in the Dresel study, and the failure of researchers to directly measure affect may be due to the tendency of Type As to deny or distort self-reports of feeling states (Carver, Coleman, & Glass, 1976; Glass, 1977; Rosenman, 1978). The purpose of the following experiment, therefore, was to index the affective consequences of brief and extended uncontrollability in Type As and Bs, using an index of affect that is less sensitive to self-report biases than typical paper and pencil measures. The index referred to is the recall of self-referenced hostile and depressed content adjectives. The following sections describe research on the relation of mood to memory, and the role of self-referencing in this relation.

Mood, Memory, and Self-referenced Recall

Mood and Memory. Research examining the influence of mood on memory has shown that biases in memorial functions may serve as a sensitive index of affective states (cf. Bower, 1981; Teasdale, 1983). Generally, two approaches to the study of mood influences on memory appear in the literature: the assessment of memorial processes on populations of clinical depressives; and, analogue studies in which happy, sad, and angry mood are induced, and recall for positively and negatively valenced material is measured.

Lloyd and Lishman (1975) asked depressed inpatients to recall personal experiences which they associated to a list of neutral cue words. Severity of depression was found to be related to the latency of recall for pleasant and unpleasant memories. With increasing severity of depression there was a tendency to recall unpleasant memories more rapidly than pleasant memories. More recently, Clark and Teasdale (1982) asked depressives with diurnal mood variations to retrieve personal memories associated with cue words during each phase of their diurnal cycle. During the more depressed phase of the cycle, memories of unhappy experiences were more likely to be retrieved, while during the less depressed phase, memories of happy experiences were more likely to be recalled. Clark and Teasdale (1982) argued that the effect of depressed mood is to increase the

accessibility of negative cognitions and decrease the accessibility of positive cognitions.

Analogue studies with nondepressed populations have typically utilized two paradigms. Subjects are either asked to recall happy, sad, or angry personal memories under induced depression, anger, or elation; or, subjects are exposed to lists of positively and negatively valenced words, and are then asked to recall the words under happy, sad, or angry mood. Mood is manipulated through a variety of procedures, including: hypnosis (Bower, 1981); recall of personal experiences which have affective consequences (Nasby & Yando, 1982); reading Velten's (1968) depressed and elated self-statements (Natale & Hantas, 1982; Snyder & White, 1982; Teasdale & Russell, 1983; Teasdale & Taylor, 1981; Teasdale, Taylor, & Fogarty, 1980); exposure to success or failure experiences (Isen, Shalker, Clark, & Karp, 1978; Mischel, Ebbesen, & Zeiss, 1976); or, the manipulation of facial expressions into smile or frown postures (Laird, Wagener, Halal, & Szegda, 1982).

Results from the analogue studies have consistently shown a facilitatory effect of happy mood on memory for positively valenced material. Similarly, in the few studies which manipulated angry mood, there was a facilitatory effect of anger on memory for negatively valenced material (Bower, 1981; Laird et al., 1982; Nasby & Yando, 1982). In

contrast, the effects of sad mood on recall have been mixed. Results have shown: a facilitatory effect of sad mood on recall for negatively valenced material (Bower, 1981; Snyder & White, 1982; Teasdale & Russell, 1983; Teasdale & Taylor, 1981); the attenuation of recall for positively valenced material (Nasby & Yando, 1982; Natale & Hantas, 1982); or, no effects of sad mood manipulations on memory (Isen et al., 1978; Mischel et al., 1976). It has been suggested that differences in reported effects for depressed mood may have occurred as a function of the differential efficacy of mood induction procedures utilized across studies (Nasby & Yando, 1982; Teasdale & Russell, 1983).

To account for the effects of mood on memory, Bower (1981) has proposed a semantic network theory of memory and emotion. Within the model of the semantic network, memories of events are represented by clusters of descriptive propositions (event nodes). Conscious thought processes reflect the suprathreshold activation of propositions and related concepts. Activation flows from one node to another through associative linkages. Emotions are also represented in the network (emotion nodes); hence one type of linkage could occur between an event node, and the emotion that was aroused during the event. A second proposition of the theory is that if there are strong associative linkages between an event and emotion node (through prior contiguous activation), activation of the event node alone will likely

activate the emotion node beyond the threshold for consciousness, and vice versa. In addition, since activation is presumed to irradiate, a very intense emotional experience could activate tangentially connected event nodes, even if they had not been strongly associated with the activated emotion in the past.

In applying Bower's (1981) semantic network theory to explain observations of enhanced recall when mood states and word valence are congruent, Teasdale (1983) argued that typically, the experience of happy mood is temporally contiguous with positive thoughts and verbalizations, while sad mood is contiguous with negative thoughts and verbalizations. Thus for example, the associative linkages between happy affect and positively valenced words are stronger than for happy affect and negatively valenced words. According to semantic network theory, if there are strong linkages between happy affect and representations of positive words, then it is possible that the arousal of happy affect will activate associatively linked positive words beyond the threshold for consciousness. Accordingly, positive words would be more accessible during happy than during sad affect, and vice versa.

While there is initial support for mood effects on memory, the components of Bower's and Teasdale's (1983) semantic network theory remain relatively untested.

Moreover, there is accumulating evidence from self-schema research in depression showing that depressed affect does not uniformly enhance recall for negatively valenced material. Rather, the effects of mood on memory seem to be specific to information that is relevant to the self. In order to effectively employ measures of recall biases as an index of mood, the parameter of self-referencing needs be considered. The relevant theoretical positions and empirical findings in self-schema research are presented in the following section.

Self-schemata and Memory. Craik and associates have shown that the context within which words are encoded determines subsequent recall (Craik & Lockhart, 1972; Craik & Tulving, 1975). It has been suggested that the strength of a memory trace is related to both the extent to which a given word fits in with the context in which it is presented, and, the elaborateness of linguistic analysis required for encoding. Evidence in support of the importance of encoding contexts was derived from the depth-of-processing paradigm. Briefly, the task involved presenting subjects with a set of stimulus words which were preceded by orienting tasks of increasing complexity. The more complex task involved a semantic judgement (e.g., does the word mean the same as _____?), while less complex tasks required subjects to make judgements regarding phonemic and structural aspects of the stimulus words (e.g.

does the word sound like _____? and, is the word in uppercase letters?). Craik and Tulving (1975) argued that words rated on the semantic dimension were processed more deeply, and hence, better recalled, because a) more linguistic analysis was required for semantic decisions; and b) words presented in the context of the semantic task were more consistent with the context in which they were presented (because they were synonyms), as compared to words rated on phonemic and structural levels.

In an extension of the depth-of-processing paradigm, Rogers, Kuiper, & Kirker (1977) included a self-referent orienting task (e.g., does the word describe you?) and found that words rated on a self-referent level were more deeply processed than words rated on semantic, phonemic, or structural levels. It was argued that the cognitive representation of the self is a complex structure, consisting of traits and self-descriptions. This structure, labelled the self-schema (Markus, 1977), promotes the processing of incoming information by acting as a background against which information is compared, interpreted, and encoded (Rogers et al., 1977). Thus, when subjects rate the stimulus words used in the depth-of-processing paradigm as self-descriptive, the words are evaluated with reference to a complex contextual network (i.e., the self-schema), and recall is facilitated.

In recent applications of the depth-of-processing paradigm, Davis (1979) and Kuiper and associates (cf. Kuiper, MacDonald & Derry, 1983) have examined the influence of depressed affective states on self-referenced recall. Based on Beck's (1967) assertion that depressives retain negative self-schemata, Derry and Kuiper (1981) hypothesized that depressives would show enhanced recall for negative self-descriptive personality adjectives, as compared to nondepressives. Accordingly, Derry and Kuiper (1981) presented a clinically depressed group and nondepressed psychiatric and normal control groups with the depth-of-processing task utilized by Rogers et al. (1977), but varied the content of adjectives by including a group of adjectives with depressed content. In contrast to predictions based on Bower (1981) and Teasdale's (1983) semantic network theory, depressives did not show enhanced recall for depressed content adjectives in general. However, as per Derry and Kuiper's (1981) predictions, depressives did evidence enhanced recall for depressed content adjectives which were rated on a self-referent level and endorsed as self-descriptive. Conceptually similar results have been demonstrated in a variety of studies utilizing clinically depressed inpatient and moderately depressed university student populations (Bradley & Mathews, 1983; Dyck, Erdile, Herbert & Hewitt, 1983; Hammen, Miklowitz, & Dyck, 1986; Kuiper & Derry, 1982; Kuiper, MacDonald, & Derry, 1983).

While Derry and Kuiper (1981) argued that the observation of enhanced recall for depressed content self-referent adjectives supports the view that depressives retain negative self-schemata, more recent research has shown that the facilitatory recall effects are moderated by mood states at the time of information processing. Specifically, it has been observed that recall biases in the depth-of-processing task vary according to changes in depressed affect (Dyck et al., 1983; Hammen et al., 1986). These results suggest that both mood (Bower, 1981; Teasdale, 1983) and self-referent contexts (Kuiper, MacDonald, & Derry, 1983) interact to produce affective state memorial biases (Dyck et al., 1983; Teasdale & Russell, 1983).

To summarize, evidence for the utility of employing measures of recall biases as an index of affective states has been presented. It was suggested that the type of information to be remembered is an important parameter determining the extent of recall bias, as is the level at which the information is processed. Specifically, the use of content relevant self-referent information seems to be a critical factor in producing mood state dependent memory effects. At an empirical level, then, it would appear that a reliable memory index of mood states need incorporate material with self-referential content. And thus, the model upon which the current research is based integrates both associative network and self-schema theories.

The use of self-referential material in measures of mood states of Type As may also be indicated at a theoretical level. Recent research has shown that the frequency of self-references (e.g., the use of personal pronouns) made by Type As during the SI was positively related to emotional intensity and systolic and diastolic blood pressure in response to a stressor, and, to the extent of coronary artery disease in a group of CHD patients (Scherwitz, Berton, & Leventhal, 1977, 1978; Scherwitz et al., 1983). In interpreting the relationship between the TABP, self-referencing, and indices of CHD, Scherwitz et al. (1983) cited evidence suggesting that the focus on the self heightens emotional arousal (Scheier & Carver, 1977), and argued that the heightened arousal which is particularly pronounced in high self-referencing Type As may contribute to pathogenic cardiovascular reactivity. While the measure of self-referencing utilized by Scherwitz et al. (1983) differs from the measure of self-referenced recall in the depth-of-processing paradigm, it is possible that prompting Type As to make self-referential decisions may effectively elicit the emotional component of the TABP.

Finally, a recent research project exploring cognitive features of Type As and Bs has utilized self-schematic processing indices (Strube et al., 1986). Strube et al. (1986) hypothesized that Type As would retain well developed cognitive self structures with content that is relevant to

what has observationally been identified as Type A behaviour. Similarly, it was hypothesized that Type Bs would retain self-schemata with themes relevant to Type B behaviour. To test this notion, JAS-defined Type A and B students were presented with trait adjectives of either Type A, B, or neutral content, and were asked to rate the adjectives as self-descriptive or non self-descriptive. Subsequently, subjects were asked to memorize half of the words from the list and to then identify memorized adjectives on a recognition task. The dependent variables utilized were the endorsement latencies on the self-referent endorsement task, and false positive and negative errors on the recognition task. Based on the assumption that schema compatible decisions are made more rapidly than schema incompatible decisions, it was expected that Type As would respond affirmatively to Type A words and negatively to Type B words more rapidly than discounting Type A words and endorsing Type B words. Comparable schema compatible decision latencies were expected for Type Bs. On the recognition task, it was anticipated that Type A content adjectives would be more available and hence more intrusive on the recognition decisions of Type As as compared to Bs (i.e., more false positives) and Type B relevant material would be more intrusive on the recognition of Type Bs. Consistent with predictions, the reaction times for schema compatible decisions of Type As and Bs were faster than for

schema incompatible decisions. Although decision latency has not been consistently related to other self-schema measures at either theoretical or empirical levels (cf. Taylor & Crocker, 1981), the decision latencies reported by Strube et al. were consistent with endorsement frequencies and false positive errors. Type As tended to endorse as self-descriptive more Type A than B content adjectives and Bs endorsed more Type B than A content adjectives. As well, there were more schema congruent than schema incongruent false positive errors on the recognition task. Thus Strube et al.'s data provided support for the utility of applying self-schematic processing methods and theory to the understanding of Type A and B behaviour.

In the following experiment, self-schema theory and methodology were applied to the assessment of hostility and depression in Type As and Bs who were exposed to uncontrollable outcomes. Type As and Bs were asked to complete an aptitude test similar to the Graduate Record Exam. Behaviour type was assessed through both self-report (JAS) and interview (SI) methods. Half of the subjects were given noncontingent feedback with a 75% failure rate on answers to test questions, while the remaining subjects received no feedback at all. There were two lengths of the test, with half of the subjects receiving 20 questions (Brief Exposure) and the other half receiving 70 questions (Extended Exposure). Upon completion of the aptitude test,

mood states were assessed, both through self-report and through the self-referenced recall of positive, depressed, and hostile content adjectives. Following the experimental manipulation, subjects' attributions for their performance were probed.

In addition to the affective and attributional measures, two attitudinal scales were completed. First, in order to assess pre-experimental differences in motivation to control environmental events, the Desirability of Control Scale (Burger & Cooper, 1979) was administered. Second, several researchers have suggested that the attributional style of Type As resembles that of depressives (Brunson & Matthews, 1981; Rhodewalt, 1984). In order to explore the cognitive similarities between Type As and depressives, the Dysfunctional Attitude Scale (Weissman, 1980; Weissman & Beck, 1978) was administered. The Dysfunctional Attitude Scale assesses attitudes which are thought to constitute a vulnerability to depression factor. Thus, if the cognitive style of Type As resembles that of depressives, it would be expected that As would endorse attitudinal statements which have been associated with vulnerability to depression.

Based on recent reports demonstrating a relationship between Type A behaviour and desirability for control (Dembroski, MacDougall, & Musante, 1984), it was predicted that Type As would show a greater need to control than Type

Bs on the Desirability of Control Scale. From Glass' (1977) theory, it would be expected that Type As and Bs exposed to noncontingent failure feedback would react differently. Predictions based on Glass' theory were that Type As experiencing short durations of uncontrollability would be more hostile than Type Bs. However, under extended exposure durations, Type As would become more depressed than Bs. Because of the tendency for Type As to deny their feelings (cf. Rosenman, 1978), it was expected that differences in affective states would be more pronounced on the more unobtrusive incidental recall measure than on self-report indices. On the basis of suggestions that the JAS is more consistently related to A/B differences on psychological dimensions than the SI (Musante, MacDougall, & Dembroski, 1984; also see Matthews, 1982), it was expected that A/B differences on self-report indices would be more pronounced among JAS- as compared to SI-defined subjects. Finally, the attributions of Type As for failure have been found to be both more external and unstable than Bs (Janisse et al., 1986; Strube, 1985) and more internal and stable (Brunson & Matthews, 1981; Musante et al., 1984; Rhodewalt, 1984). While Glass' theory does not specifically address attributions, intuitively, the attributions associated with hostility are external attributions of blame, while internal, stable, global attributions are associated with depression and helplessness (cf. Abramson, Seligman, &

Teasdale, 1976). Following exposure to brief uncontrollability, it was expected that Type As would attribute their poor performance to unstable (e.g., poor effort) and external (e.g., bad luck) causes. Conversely, following extended exposure to noncontingency, it was expected that Type As would make more stable (e.g., task difficulty) and internal (e.g., lack of skill) attributions, as compared to Type Bs.

Method

The experimental design was a 2 x 2 x 2 factorial. The three factors were: Behaviour Type (Type A; Type B); Treatment (Feedback; Nofeedback); and, Length of Treatment (Brief Exposure; Extended Exposure).

Subjects

The final subject sample consisted of 129 University of Manitoba students whose first language was English. There were 56 males and 73 females. All subjects received partial course credit for their participation in each of the three phases of the experiment.

Apparatus

Type classification. At the beginning of the semester students were asked to fill out the Jenkins Activity Survey (JAS) - Form T in the context of a number of questionnaires. The JAS - Form T is a 44 item questionnaire that was adapted for use with university student populations (Glass, 1977; Krantz, Glass, & Snyder, 1974) from the Jenkins Activity Survey (Jenkins, Rosenman, & Zyzanski, 1974).

The JAS - Form T is similar to the JAS, but excludes items related to the J scale. Thus the JAS - Form T yields an overall AB score, as well as scores on the S and H scales. There is little research investigating the reliability or validity of the JAS - Form T. However, Glass (1977) reported that only 9 of 83 cases switched classification categories over a 2 to 16 week duration. And, like the JAS, the JAS - Form T demonstrates an agreement rate of approximately 60% to 75% with the SI (Diamond et al., 1984; MacDougall, Dembroski, & Musante, 1979; Matthews, Krantz, Dembroski, & MacDougall, 1982). Subjects who scored 8 or above (Type A) or 5 and below (Type B) on the AB scale were selected for further behaviour type assessment.

The SI for university students (cf. Dembroski, 1978; Rosenman, 1978) was also used to assess behaviour type. There were three interviewers who conducted the interviews.

All were trained at SI administration by Dr. Dyck, who was, in turn, trained by Rosenman and associates at SRI International. Previous research has shown that interviewer's speech characteristics have little impact on the type of responding elicited in the interview (Scherwitz, Berton, & Leventhal, 1977), and that interviewers trained in this manner are capable of successfully executing the SI (Dembroski et al., 1979).

The student form of the SI consists of 22 questions with competitive, hostile, and time urgent themes. Both the content of answers, and the form of responding (e.g., vocal intonation, response latency) formed the basis upon which behavioural categorization was made. The interviews were tape recorded and subsequently rated by the investigator, who was trained to rate interviews by Dr. Dyck. Behavioural categorization was made according to the scoring system developed by Rosenman and associates (cf. Rosenman, 1978). Raters were unaware of the subjects' JAS scores.

Based on the SI, subjects were rated as either Type A or Type B. There was a subset of 34 subjects about whose classification the author was not certain. Each of those subjects were subsequently rated by Dr. Dyck, and, if agreement between the two raters could not be reached, the subject was rated as Type X. There were six subjects who were rated as Type X, and were thus deleted from data

analysis. Interrater reliability was computed based on a randomly selected sample of subjects which excluded the 34 subjects mentioned above. The sample ($n = 16$) included interviews from each of the three interviewers, and was independently rated by both Dr. Dyck and the investigator. Interrater agreement was 94%.

Baseline Measures. Three affective self-report scales were included along with the JAS administration: The Beck Depression Inventory (BDI: Beck, Ward, Mendelson, Mock, & Erbaugh, 1981); the trait scale (General Form) of the MAACL (Zuckerman & Lubin, 1965); and, the trait scale of the State-Trait Personality Inventory (STPI; Spielberger, Jacobs, Russell, & Crane, 1982). In addition, the Desirability of Control Scale (Burger & Cooper, 1979) was included in the pre-experimental questionnaire package. Copies of the questionnaires are provided in Appendix I.

The Beck Depression Inventory is a 21-item scale which has been validated as an index of severity of depression in university student populations (Bumberry, Oliver, & McClure, 1978). While it has been suggested that the BDI demonstrates high test-retest reliability over periods of weeks, (Miller & Seligman, 1973; Oliver & Burkham, 1979), others have shown low consistency of depression classifications across intervals as short as hours (Hatzenbuehler, Parpal, & Matthews, 1983; Sacco, 1981; Sacco

& Hokanson, 1978). However, Hatzenbuehler et al. (1983) demonstrated that high classification consistency could be obtained if the BDI was used on one session, and an alternate depression inventory on the other. Their findings suggested that the initial demonstrations of inconsistency were more likely due to the general effects of retesting with the same instrument than to the transience of depressive symptomatology in university students.

The MAACL is an inventory of 132 adjectives which subjects rate as descriptive of current (state scale) or general (trait scale) feelings. The MAACL yields scores on three subscales: hostility, anxiety, and depression. The internal reliability of the scale ranges between .7 and .9 for university students (Zuckerman & Lubin, 1965). The three subscales are highly intercorrelated (cf. Pankratz, Glaudin, & Goodmonson, 1972). However, differential changes on the subscales have been shown to occur in response to anxiety provoking stimuli (Zuckerman & Lubin, 1965).

The STPI consists of 3 scales with 10 items each; the curiosity, anxiety, and anger scales. The scale of interest for current purposes was the anger scale, which also serves as the 10 item State-Trait Anger Scale (Spielberger, Jacobs, Russell, Crane, 1982). Only the trait scale of the STPI was utilized. Spielberger reported high levels of internal validity for the Trait Anger Scale (alphas of .91 and .89

for female and male university students, respectively), and found that it strongly correlated with other measures of hostility, most notably the Buss Durkee Hostility Inventory and the Cook and Medley Hostility Scale (Spielberger et al., 1982).

The Desirability of Control Scale (Burger & Cooper, 1979) is purported to measure individual differences in the desire for control over environmental events. The scale consists of 20 items which describe how one might feel about maintaining control, either generally, (e.g., 'I enjoy making my own decisions') or in specific situations (e.g., 'I enjoy political participation because I want to have as much say in running government as possible'). Each item is rated on a seven point scale, with anchor points of 'This statement doesn't apply to me at all', and 'This statement always applies to me'.

While the Desirability of Control Scale is relatively new, Burger and associates (Burger & Cooper, 1979; Burger & Arkin, 1980) have provided information about reliability and validity. In their initial study, Burger and Cooper (1979) reported a six week test-retest reliability of .75, and a Kuder-Richardson 20 reliability of .80. Construct validity was suggested by their demonstration of behavioural differences among high and low desire for control subjects in experiments probing the illusion of control and learned

helplessness phenomena. Burger and Cooper (1979) also offered some evidence for discriminant validity by demonstrating a low negative correlation between the Desirability of Control Scale and the Rotter Internal-External Locus of Control Scale (Rotter, 1966). Thus it appeared that the Desirability of Control Scale tapped the motivation for control rather than perceptions of control. Finally, Dembroski, MacDougall and Musante (1984) have provided correlational evidence relating measures of Type A behaviour to scores on the Desirability of Control Scale.

Aptitude Test. The aptitude test for which noncontingent feedback was given was developed by Dickens (1981; Perry & Dickens, 1984) for investigation of perceived control and learned helplessness phenomenon. The instructional set suggested that the aptitude test was developed as a measure of ability and as a predictor of future success in university. The test consisted of either 20 (Brief Exposure) or 70 (Extended Exposure) items. The questions were verbal analogies, sentence completions, and, quantitative questions similar to those found on the Miller's Analogies Test and the Graduate Record Exam. The test format was multiple choice with four alternative answers provided for each question. Copies of the aptitude tests are provided in Appendix I.

Subjects in the Nofeedback Condition answered the questions on standard IBM forms, and did not receive feedback regarding the accuracy of their answers. Subjects in the Feedback Condition were provided with specially designed multiple choice answer sheets which allowed for provision of immediate feedback as to the accuracy of the answer selected. Each answer was pre-assigned a correct (C) or incorrect (X) mark which was initially invisible. When subjects darkened their selected alternative with a special marker, either a C or an X was revealed. Bogus feedback was provided such that for 75% of the questions each alternative was marked with an X, and a C was placed under the remaining 25% of answers. To increase the salience of the feedback, subjects were asked to sum up the number of correct responses at the end of the test.

Self-Referent Recall Task. Subjects were presented with 20 positive, 20 hostile, and 20 depressed content adjectives, and were asked to rate each as self-descriptive or non self-descriptive. The list of adjectives is presented in Table 1. The positive and depressed content adjectives were used in previous research investigating the effect of induced mood states among nondepressed and depressed university students on self-referenced recall (cf. Dyck, Erdile, Herbert, & Hewitt, 1983). The hostile content adjectives were selected from several sources, including: the hostility scale of the MAACL; Buss' (1961) list of

Table 1
Positive, depressed, and hostile content adjectives

POSITIVE CONTENT	DEPRESSED CONTENT	HOSTILE CONTENT
INFLUENTIAL	DRAINED	STORMY
SKILLFUL	WEARY	FURIOUS
SPONTANEOUS	INFERIOR	PROVOKED
CAPABLE	UNLOVED	AGGRESSIVE
PERSERVERING	BLEAK	ARGUMENTATIVE
DECISIVE	DESPERATE	ANGRY
CONSTRUCTIVE	OVERWHELMED	ANNOYED
IMAGINATIVE	DULL	DISAGREEABLE
POLITE	WORTHLESS	RESENTFUL
GENUINE	HELPLESS	BITTER
WITTY	AFFLICTED	EXPLOSIVE
AMIALE	AWKWARD	DISCONTENTED
PROMPT	UNSUCCESSFUL	ENRAGED
EXUBERANT	POWERLESS	BOTHERED
EAGER	INSECURE	DISGUSTED
ENTERPRISING	HESITANT	LOUD
LIVELY	PASSIVE	IRRITATED
INTELLIGENT	WEAK	CRUEL
AMBITIOUS	SICK	MAD
UNSELFISH	UNAPPEALING	AGGRAVATED

hostile content adjectives; and, the STPI (Spielberger et al., 1982). The positive, depressed, and hostile content adjectives were matched for word frequencies (Kucera & Francis, 1967). Four additional buffer items were presented, with two at the beginning and two at the end of the word list. All of the adjectives were typed in upper-case letters and photographed with slide film. A Kodak Ektagraphic 35 mm slide projector (Model AF-2), equipped with a built-in timer was used to project the slides onto a wall-sized screen in a small lecture room. The timer was set for 8 seconds, so that each of the adjectives was presented for a total of 8 seconds. Subjects were provided with a form which included 64 questions ('Describes you?') with two alternatives ('yes__; no__'), and were asked to place a check beside their chosen alternative. After completing the 64 items, subjects were unexpectedly asked to recall the adjectives that they had just rated and to write the recalled adjectives on the back of the above mentioned response sheet.

Post-Experimental Questionnaires. Three questionnaires were administered following the incidental recall task: the MAACL Today Form (i.e., state scale); the Dysfunctional Attitude Scale (DAS); and, a post-experimental questionnaire probing attributions and suspiciousness about the experimental manipulation. Copies of the post-experimental questionnaires are provided in Appendix I.

The MAACL Today Form is similar to the MAACL General Form, with the exception of the instructional set. The instructions on the Today Form request that subjects place a check beside the adjectives that best describes the way they 'feel now, today'.

The Dysfunctional Attitude Scale is a questionnaire designed to assess the extent to which individuals retain beliefs which, according to Beck (1967), predispose them to depression. The questionnaire consists of 40 statements of beliefs or attitudes (e.g., If I fail at my work, then I am a failure as a person; I am nothing if a person I love doesn't love me). For each item, seven response alternatives are presented in a Likert-type scale, with anchor points of 'Totally Agree' and 'Totally Disagree'. Higher scores are assigned to dysfunctional attitudes. There are two forms of the questionnaire; Form A was used in the present investigation. While the Dysfunctional Attitude Scale is a relatively new instrument, there has been some research exploring its reliability and validity. Weissman (1980) reported that the correlation between the two forms was .79, and that the internal validity (alpha correlation) of Form A was between .86 and .92 on several testing occasions. Weissman also provided some information on the validity of the scale, showing that it correlated with measures of depressed affect and an independent measure of cognitive distortion.

Finally, the post-experimental questionnaire (see Appendix I) consisted of five questions. Four questions probed the extent to which subjects attributed their performance to lack of skill, poor effort, lack of ability, or bad luck. Subjects were asked to rate, on seven point scales, the extent to which each of these factors accounted for their performance. Only subjects in the Feedback Condition were presented with these questions. All subjects were asked whether or not they were suspicious about any aspect of the experiment. They were also asked to elaborate on their suspicions if they had stated that they were suspicious. As a manipulation check, all subjects were verbally asked to write down on their questionnaire forms a value between 0 and 100% which represented the extent to which they felt control over the test outcome.

Procedure

Introductory Psychology students were asked to participate in an experiment assessing student habits and traits. They were tested in groups of 30 to 40, and asked to complete the JAS, MAACL General Form, STPI Trait Scale, Desirability of Control Scale, and, the Beck Depression Inventory. Approximately two weeks later subjects who scored either 8 and above or 5 and below were contacted and asked if they would like to participate in two separate experiments. It was explained to them that a number of

researchers were conducting different research projects, but were utilizing the same student population so that they would have a consistent population. Individual appointments were made for subjects who agreed to participate.

The first experiment was the Structured Interview for Type assessment. The interviews took approximately 15 minutes, and, at the end of the interview, subjects were asked to sign up for a time to participate in the second experiment.

The second experiment was conducted in groups of 10 to 25 subjects. Subjects were told that the objective of the first part of the experiment was to aid in the development of an aptitude test, while the second half was involved in perceptual processing. The experimenter then read the instructions on the cover of the aptitude test presented in Appendix I, and, explained the use of the markers to subjects receiving noncontingent feedback. Subjects were told that most university students achieved approximately 75% on the test.

After completion of the aptitude test, subjects were told that they would be working on a perceptual task in which they were to rate 64 adjectives as self-descriptive or non self-descriptive. They were given a form on which to record their responses. The adjectives were projected on a screen at the front of the room at a rate of one every 8

seconds. After presentation of the last adjective, subjects were unexpectedly asked to turn over their response forms and write down all the adjectives that they could recall having rated. Five minutes were allotted for the recall of adjectives, after which subjects were asked to complete the MAACL, DAS, and the post-experimental questionnaire probing attributions and suspiciousness. Finally, subjects were thoroughly debriefed. The nature and purpose of all phases of the experiment was explained to them. As well, subjects who received bogus feedback were fully debriefed as to the false nature of the feedback. Subjects were then thanked and asked not to divulge the nature of the experiment to their peers.

Results

Two sets of results will be presented, one utilizing the JAS, and the other using the SI to define Type As and Type Bs. Preliminary analyses suggested an absence of sex differences on the main dependent variable, incidental recall. Therefore, to enhance the power of the analyses, the independent variable of sex was not pursued.

JAS-defined Type As and Type Bs

There were 66 Type As and 63 Type Bs that completed all phases of the experiment. Table 2 presents the mean scores for Type As and Bs on the three JAS subscales. As can be

Table 2
Mean scores for JAS-defined Type As and Bs on the JAS subscales

Subscale	Type A	Type B
AB	10.00 (1.92)	3.98 (1.50) ****
S	21.33 (5.00)	12.68 (4.14) ****
H	15.58 (3.67)	7.82 (3.83) ****

Note. Numbers in parentheses are standard deviations.

**** $p < .0001$

seen from the table, Type As had significantly higher scores than Type Bs on the AB [$F(1,127) = 390.91, p < .0001$], Speed and Impatience (S) [$F(1,127) = 113.95, p < .0001$], and Hard Driving (H) [$F(1,127) = 137.89, p < .0001$] scales of the JAS.

Baseline Measures. One way Analyses of Variance (ANOVA's) comparing Type As and Type Bs were applied to all baseline measures. Table 3 presents the mean scores for Type As and Bs on each of the baseline measures, including the subscales of the Multiple Affect Adjective Check List (MAACL) and the State-Trait Personality Inventory (STPI), the Beck Depression Inventory, and the Desirability of Control Scale.

As can be seen from Table 3, on the MAACL, Type As evidenced higher anxiety scores than Type Bs, [$F(1,127) = 6.17, p < .025$], while differences on the depression and hostility scales were not evident. In contrast, on the STPI, Type As and Bs had similar scores on the trait anxiety scale. However, Type As had higher curiosity scores as compared to Type Bs, [$F(1,127) = 10.54, p < .01$]. From Table 3 it appears that Type As had higher scores than Bs on the trait anger scale. However, these differences did not reach acceptable levels of significance, [$F(1,127) = 3.15, p = .08$].

Table 3
Mean scores for JAS-defined Type As and Type Bs on the MAACL, STPI, Beck Depression Inventory and Desirability of Control Scale

Scale	Type A	Type B
<u>MAACL:</u>		
Anxiety	7.18 (.47)	5.60 (.43) *
Depression	11.18 (.67)	10.97 (.63)
Hostility	7.71 (.47)	6.62 (.46)
<u>STPI:</u>		
Anxiety	20.10 (5.89)	19.52 (4.74)
Curiosity	30.50 (4.27)	20.02 (4.42) **
Anger	23.54 (5.71)	21.84 (5.16)
<u>Beck Depression Inventory:</u>		
	8.77 (5.75)	6.59 (5.28) *
<u>Desirability of Control Scale:</u>		
	102.14 (10.85)	98.52 (12.36)

Note. Numbers in parentheses are standard deviations.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Finally, Type As evidenced more severe depression on the Beck Depression Inventory, as compared to Type Bs, [$F(1,127) = 5.04, p < .05$]. As may be seen from Table 3, Type As had higher scores on the Desirability of Control Scale than Type Bs. Higher scores on the Desirability of Control Scale reflect a higher need to control environmental events. While these differences were in the predicted direction, they did not reach acceptable levels of significance, [$F(1,127) = 3.12, p = .08$].

Experimental Measures

The results for experimental measures were divided into two sections: one focussing on measures related to the self-referent processing paradigm; and the other on the post-experimental questionnaires - the MAACL, Dysfunctional Attitude Scale, and, suspiciousness and attribution ratings. ANOVAs were applied to each of the measures, with significant results ($\alpha = .05$) followed by Dunn's comparisons ($\alpha = .05$; cf. Kirk, 1968).

Self-Referent Processing

Self-Referent Ratings. The dependent variable used for the analysis of self-descriptiveness ratings was the frequency of yes-ratings for the three levels of Word Content (positive, hostile, and depressed content adjectives). A repeated measures ANOVA was applied to the

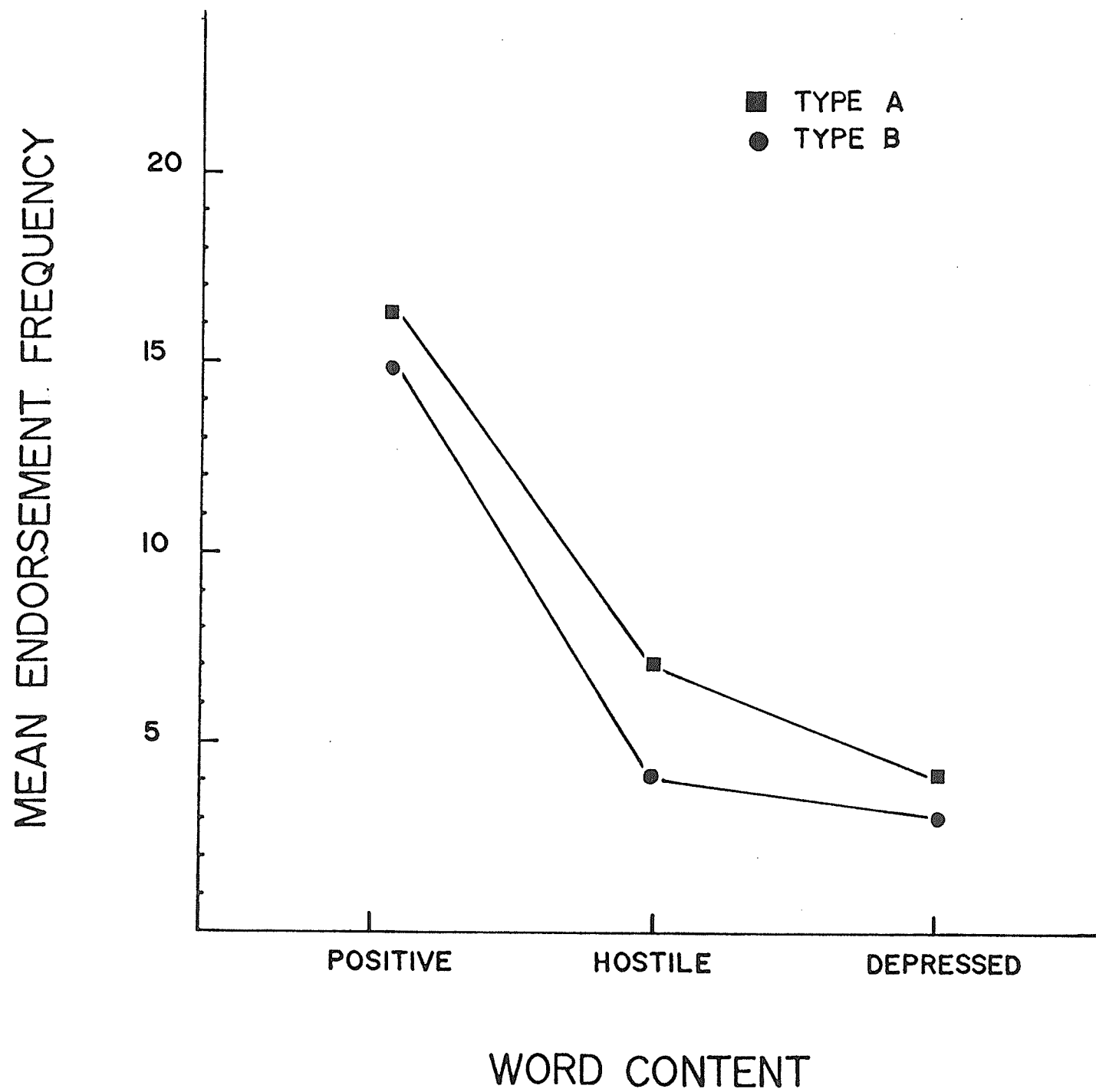
frequency of self-referent endorsements utilizing a 2 (Length: short, long) x 2 (Feedback: feedback, nofeedback) x 2 (Behaviour Type: Type A, Type B) x 3 (Repeated measure - Word Content: positive, hostile, depressed) design.

There was a significant main effect of Behaviour Type [$F(1,121) = 22.36, p < .0001$], suggesting that Type As endorsed more adjectives as self descriptive (Mean = 9.13) than did Type Bs (Mean = 7.42). As well, there was a significant main effect of Word Content, [$F(2,242) = 387.15, p < .0001$], with post hoc comparisons showing that the subjects endorsed positive adjectives (Mean = 15.81) to a greater extent than they did either hostile (Mean = 5.61) or depressed (Mean = 3.46) content adjectives.

The main effects for Behaviour Type and Word Content were qualified by a significant interaction involving these variables, [$F(2,242) = 3.34, p < .05$], which is graphically depicted in Figure 1. As can be seen from Figure 1, Type As rated significantly more hostile adjectives as self-descriptive than did Type Bs, but had similar frequencies of endorsements for positive and depressed content adjectives.

Incidental Recall. The dependent variable used was an adjusted proportion score which was calculated by dividing the number of recalled yes- and no-rated positive, hostile, and depressed content adjectives over the frequency of yes- and no-ratings for positive, hostile, and depressed content

Figure 1. Mean frequency of endorsements for positive, hostile, and depressed content adjectives for JAS-defined Type As and Bs.



adjectives, respectively. Using this system, recall can range from 0.0 to 1.0. The adjusted score has been used previously by various investigators employing the depth-of-processing paradigm (e.g., Derry & Kuiper, 1981; Dyck et al., 1983; Hammen et al., 1986; Rogers et al., 1977) to adjust for the general finding that yes-rated words are better recalled than no-rated words (cf. Craik & Tulving, 1975).

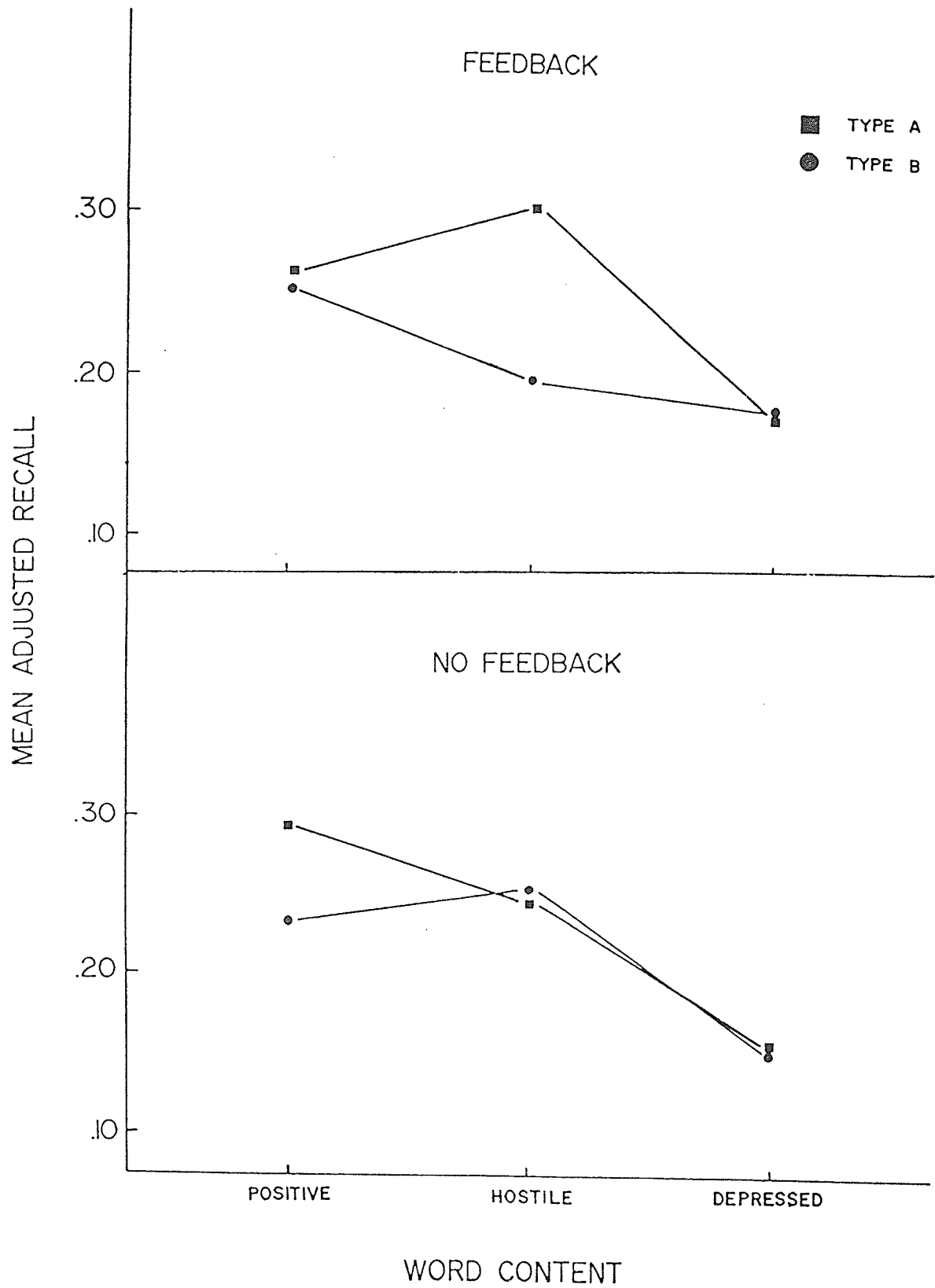
A 2 (Length) x 2 (Feedback) x 2 (Behaviour Type) x 3 (Repeated measure - Word Content) x 2 (Repeated measure - Rating Category: yes, no) ANOVA was applied to the adjusted scores. There was a significant Word Content main effect, [$F(2,242) = 14.73, p < .0001$], with post hoc comparisons showing that subjects recalled a higher proportion of positive (Mean = .26) and hostile (Mean = .25) as compared to depressed content (Mean = .17) adjectives, but equal proportions of positive and hostile content adjectives. As predicted, the Word Content main effect was qualified by the interaction of Word Content, Feedback, and Behaviour Type, [$F(2,242) = 2.98, p = .05$]. Post hoc tests compared Type As and Type Bs in the Feedback and Nofeedback Conditions for recall of positive, hostile, and depressed content adjectives. Additionally, the differences between recall for positive and depressed content adjectives as well as positive and hostile content adjectives were explored for Type As and Type Bs.

Figure 2 depicts the mean adjusted recall of positive, hostile, and depressed content adjectives for Type As and Bs in the Feedback and Nofeedback Conditions. As can be seen from the figure, in the Feedback Condition, Type As recalled a significantly higher proportion of hostile adjectives as compared to Type Bs. In contrast, Type As and Bs in the Nofeedback Condition did not differ in the recall of hostile adjectives. Similarly, Type As and Bs in both conditions did not differ in the recall of positive and depressed content adjectives.

Also visible in Figure 2 is the higher proportion of recall for positive as compared to depressed content adjectives by Type As in the Nofeedback Condition. In contrast, under conditions of feedback, recall for positive adjectives was not different from the recall of depressed content adjectives. The recall of Type Bs for positive and depressed content adjectives did not differ; nor did the recall for positive and hostile content adjectives by both Type As and Bs.

Finally, while not predicted from theoretical considerations, there was a significant Word Content x Rating Category interaction, [$F(2,242) = 4.78, p < .01$], which in turn was qualified by the interaction of Word Content, Rating Category, and Length, [$F(2,242) = 5.55, p < .01$]. This interaction was broken down by comparing the

Figure 2. Mean adjusted recall of positive, hostile, and depressed content adjectives for JAS-defined Type As and Bs in the Feedback and Nofeedback Conditions.



recall of positive adjectives with hostile and depressed content adjectives at each level of the Length factor, for both yes- and no-rated words. In the Brief Exposure Condition, no-rated positive adjectives were more frequently recalled than either no-rated hostile or depressed content adjectives. In contrast, under Extended Exposure, the content of the no-rated adjectives did not differentially affect recall. Conversely, in the Brief Exposure Condition, the content of yes-rated adjectives did not differentially affect recall. However, under Extended Exposure, yes-rated positive adjectives were better recalled than yes-rated depressed adjectives.

In summary, as predicted, Type As who received noncontingent feedback recalled more hostile content adjectives as compared to Type Bs. More specifically, it was predicted that with brief exposure to noncontingent feedback, Type As, relative to Bs, would recall more hostile content adjectives; and under extended exposure to noncontingent feedback, they would recall more depressed content adjectives. Contrary to predictions, however, increasing the length of noncontingent feedback did not seem to have an impact on recall.

Post-experimental Questionnaires. The questionnaires that followed the experimental manipulation and self-referent processing task included the MAACL, Dysfunctional

Attitude Scale, and a questionnaire probing judgements of control, attributions for subjects' performance, and suspiciousness about the experimental manipulation. While only subjects who received noncontingent feedback were queried about attributions for their performance, all subjects completed the judgement of control and suspiciousness questions.

The three scales of the MAACL were subjected to separate repeated measures ANOVAs comparing baseline responding with post-experimental scores. Thus 2 (Length) x 2 (Feedback) x 2 (Behaviour Type) x 2 (Repeated Measure - Time: baseline, post-experimental) ANOVAs were applied to the anxiety, depression, and hostility scales of the MAACL. On the anxiety scale, there was a marginally significant effect of Behaviour Type, [$F(1,121) = 3.60$, $p = .06$], with Type As reporting more anxiety (Mean = 7.01) than Type Bs (Mean = 5.85). As well, there was a significant interaction of the Time variable with Length and Feedback, [$F(1,121) = 3.96$], $p < .05$]. However, post hoc comparisons of theoretical interest were not significant. While there were no significant differences in levels of reported depression, there were differences in the levels of reported hostility. Consistent with the incidental recall results, Type As reported more hostility on the MAACL (Mean = 8.48) than did Type Bs (Mean = 7.06), [$F(1,121) = 4.35$, $p < .05$]. The Behaviour Type main effect was qualified by a marginally

significant interaction between Feedback and Behaviour Type factors, [$F(1,121) = 3.48, p = .06$], with post hoc comparisons showing greater hostility levels for Type As (Mean = 9.56) as compared to Bs (Mean = 7.02) in the Feedback Condition, but similar levels for Type As (Mean = 7.26) and Bs (Mean = 7.12) in the Nofeedback Condition. Finally, there was a significant change from baseline to post-experimental levels of hostility, [$F(1,121) = 4.50, p < .05$], with greater hostility evident following the experimental manipulations (Mean = 8.40) as compared to baseline levels (Mean = 7.18). In summary, on the MAACL, Type As evidenced marginally higher levels of anxiety and higher levels of hostility as compared to Type Bs. Consistent with the observation of enhanced recall for hostile content adjectives by Type As in the Feedback Condition, Type As, but not Type Bs, reported more hostility on the MAACL following the experience of noncontingent feedback.

Responses on the Dysfunctional Attitude Scale were subjected to a 2 (Length) x 2 (Feedback) x 2 (Behaviour Type) ANOVA, and it was found that Type As endorsed more dysfunctional attitudes (Mean = 127.39) than did Type Bs (Mean = 112.66), [$F(1,121) = 10.87, p < .01$]. The mean for Type Bs was consistent with the mean score of 113 for university students reported by Weissman (1980) and medians in the range of 110 to 125 reported by Kuiper, Olinger, and

McDonald (in press). The mean for the Type As fell in the vulnerability to depression range as defined by Kuiper et al. (in press).

The suspiciousness probe consisted of a question asking subjects if they were suspicious about any aspect of the experiment, and, if so, why. Answers to the two questions were classified into one of four categories, with the following frequencies: 58 subjects were not suspicious; 39 subjects were suspicious about some aspect of the experiment other than the experimental manipulation (e.g., 'I didn't really know what the experiment was about or what direction it was taking'); 24 subjects stated that they were suspicious about some aspect of the experimental manipulation (e.g., 'answers that I knew were right showed up wrong'); and, 8 subjects uncovered the experimental manipulation by using their markers to expose the feedback on all four of the answers to a single question.

For purposes of analyses, subjects were divided into two groups: those that were suspicious of the experimental manipulation (i.e., the latter two groups described above, $n=32$) and those that were not (i.e., the former two groups, $n=97$). Two sets of questions were addressed by the analyses. First, the question of whether suspiciousness was affected by either the length of the experimental manipulation or by the behaviour type of the subject was

explored. For example, it might be predicted that since researchers have reported that Type As externalize failure (Janisse et al., 1986; Strube, 1985), they would be more suspicious than Type Bs. And, it could be hypothesized that increasing the length of treatment would increase suspiciousness, simply because of the greater probability that subjects would come across questionable feedback on an item. Chi square analyses were performed and it was found that suspiciousness was independent of both the length of treatment and behaviour type.

The second issue addressed was whether suspiciousness had any effect on the major dependent variable, incidental recall. To explore the effects of suspiciousness on recall, a 2 (Length) x 2 (Behaviour Type) x 2 (Suspiciousness) x 3 (Word Content) x 2 (Rating Category) ANOVA was performed. There was a main effect of Suspiciousness, [$F(1,121) = 4.37$, $p < .05$], with suspicious subjects recalling more adjectives (Mean = .25) than nonsuspicious subjects (Mean = .22). Additionally, there was an interaction between Rating Category, Behaviour Type, and Suspiciousness, [$F(1,121) = 5.38$, $p < .025$]. The interaction was broken down by comparing the recall of yes- and no-rated adjectives for suspicious Type As and Bs vis-a-vis their nonsuspicious counterparts. For yes-rated words only, suspicious Type Bs recalled more adjectives than nonsuspicious Type Bs. However, differences in the recall of Type Bs were

consistent across positive, hostile, and depressed content adjectives. Thus suspiciousness did not significantly contribute to the effects of interest (i.e., content specific recall of Type As and Bs).

Subjects' attributions for their performance to difficult task, poor effort, bad luck, or lack of skill were analyzed with 2 (Length) x 2 (Behaviour Type) ANOVAs. The mean attributions for Type As and Bs in the Brief and Extended Exposure Conditions are presented in Table 4. Although it was expected that Type As in the Brief Exposure Condition would tend more to attribute their performance to the external factors of difficult task and bad luck (cf. Janisse et al., 1986; Strube, 1985), while Type As in the Extended Exposure Condition would attribute their performance to internal factors (cf. Abramson, Seligman, & Teasdale, 1978; Brunson & Matthews, 1981), differences in attributions were not found.

Finally, the control judgements of subjects were subject to 2 (Length) x 2 (Feedback) x 2 (Behaviour Type) ANOVAs. Nineteen subjects did not respond to the question asking them to rate the extent to which they had control over the outcome. Approximately half of these subjects did not respond because the experimenter neglected to ask the question in one session; the reasons why the other subjects did not respond are not known. As expected, there was a

Table 4
Mean attributional ratings of JAS-defined Type As and Bs in the Brief and Extended Exposure Conditions

	Brief Exposure		Extended Exposure	
	Type A	Type B	Type A	Type B
Difficult Task	4.13 (1.25)	3.88 (1.41)	4.40 (1.60)	4.24 (1.44)
Poor Effort	3.07 (1.71)	3.29 (1.65)	3.40 (1.64)	3.00 (1.46)
Bad Luck	2.60 (2.03)	2.82 (1.59)	2.90 (1.45)	2.41 (1.91)
Lack of Skill and Ability	3.67 (1.54)	3.59 (1.97)	3.25 (1.80)	3.88 (1.54)

Note. Numbers in parentheses are standard deviations.

significant effect of Feedback [$F(1,102) = 12.11, p < .001$], with subjects who received feedback estimating less control over the test outcome (Mean = 37.53) than subjects who were not given the feedback (Mean = 53.75). No other effects were significant.

SI-Defined Type As and Type Bs

There were 66 Type As and 57 Type Bs as assessed by ratings of the Structured Interviews. Eighteen JAS-defined Type As were rated as Type Bs on the Structured Interview, while 20 JAS-defined Type Bs were categorized as Type As according to the Structured Interview. Consistent with past research (Musante, MacDougall, & Dembroski, 1984; Matthews et al., 1982), there was approximately 70% agreement between the JAS and SI methods of Type classification. Six subjects who were designated as Type Xs according to SI classifications were deleted from all analyses. Table 5 depicts the mean scores for SI-rated Type As and Bs on each of the three JAS subscales. As can be seen from the table, Type As had significantly higher scores than Type Bs on the AB, [$F(1,121) = 21.29, p < .0001$], S, [$F(1,121) = 12.13, p < .001$], and H, [$F(1,121) = 21.31, p < .0001$], scales of the JAS.

While the SI-defined As and Bs differed on the JAS subscales in an expected manner, self-report indices of affect and attitudes for SI-defined As and Bs did not match

Table 5
Mean scores for SI-defined Type As and Type Bs on the JAS subscales

Subscale	Type A	Type B
AB	8.41 (3.32)	5.72 (3.10) ****
S	19.14 (5.79)	15.35 (6.25) ***
H	13.83 (5.01)	9.65 (5.02) ****

Note. Numbers in parentheses are standard deviations.

* $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$.

the differences observed in JAS-defined subjects. SI-defined Type As did not differ from Bs on levels of depression, anxiety, and hostility, both pre- and post-experimentally. Moreover, while JAS-defined Type As endorsed more hostile content adjectives than did Bs on the self-referent task, the endorsement frequencies of SI-defined As and Bs did not differ. As can be seen from a comparison of Tables 3 and 6, which depict mean scores on pre-experimental measures, the SI- and JAS-defined Type As had comparable levels of self-reported affect and attitudes. However, SI-defined Type Bs tended to have higher scores than their JAS-defined counterparts. Thus differences between SI-defined As and Bs were minimal, while the affect and attitudes of JAS-defined subjects differed significantly.

Although differences between As and Bs on self-report indices were more pronounced among JAS-defined subjects, the main dependent variable, content specific recall, was unaffected by classification mode. Both JAS- and SI-defined Type As that received noncontingent failure feedback recalled more hostile content adjectives than Type Bs. Thus recall seemed to have been a more sensitive index, and was consistent across self-report and interview classification methods.

Baseline Measures. Table 6 presents the mean scores for Type As and Type Bs on each of the baseline measures, including the subscales of the MAACL and STPI, the Beck Depression Inventory, and the Desirability of Control Scale. As can be seen from Table 6, Type As and Bs did not differ on any of the baseline measures. These findings are in contrast with the observation of greater anxiety (on the MAACL), curiosity (on the STPI), and depression (on the Beck Depression Inventory) for JAS-defined Type As as compared to Type Bs.

Self-Referent Processing

Self-Referent Ratings. A 2 (Length) x 2 (Feedback) x 2 (Behaviour Type) x 3 (Repeated measure - Word Content) ANOVA was applied to the frequency of yes-rated positive, hostile, and depressed content adjectives. Consistent with results from JAS-rated Type As and Bs, there was a significant Behaviour Type main effect, [$F(1,115) = 4.79, p < .05$], with Type As endorsing more adjectives as self-descriptive (Mean = 8.75) as compared to Type Bs (Mean = 7.86). As well, there was a significant effect of Word Content, [$F(2,230) = 346.34, p < .0001$], with post hoc comparisons showing greater frequency of endorsements for positive adjectives (Mean = 15.72) as compared to either hostile (Mean = 5.76) or depressed (Mean = 3.54) content adjectives. The interaction of Behaviour Type and Word Content that was

Table 6

Mean scores for SI-defined Type As and Type Bs on the MAACL, STPI, Beck Depression Inventory, and Desirability of Control Scale

Scale	Type A	Type B
<u>MAACL:</u>		
Anxiety	6.54 (3.65)	6.35 (3.47)
Depression	11.11 (5.38)	11.26 (4.97)
Hostility	7.26 (3.85)	7.23 (3.60)
<u>STPI:</u>		
Anxiety	20.09 (5.52)	19.70 (5.20)
Curiosity	29.92 (4.38)	28.79 (4.53)
Anger	23.36 (5.56)	22.10 (5.44)
<u>Beck Depression Inventory:</u>		
	8.42 (5.64)	7.10 (5.49)
<u>Desirability of Control Scale:</u>		
	101.35 (11.19)	99.32 (12.57)

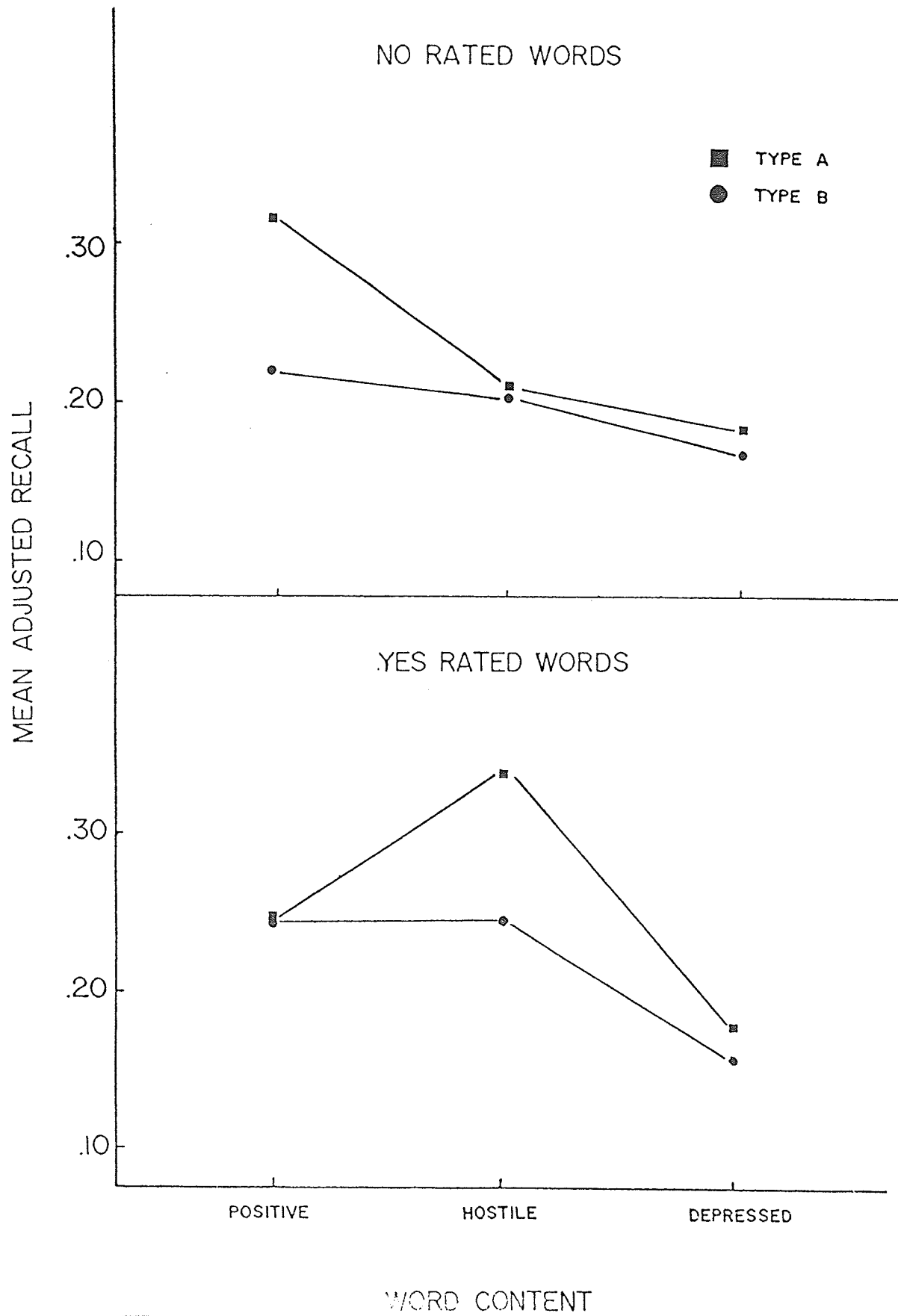
Note. Numbers in parentheses are standard deviations.

observed with JAS-defined Type As and Bs was not found with SI-defined subjects. Thus, unlike JAS-defined As, SI-defined Type As did not provide more self-descriptive ratings for hostile content adjectives.

Incidental Recall. The dependent variable used was an adjusted proportion score that was described in a preceding section. These scores were subjected to a 2 (Length) x 2 (Feedback) x 2 (Behaviour Type) x 3 (Repeated measure - Word Content) x 2 (Repeated Measure - Rating Category) ANOVA. A significant main effect of Behaviour Type was found, [$F(1,115) = 4.04, p < .05$], suggesting that Type As recalled more adjectives (Mean = .24) than Type Bs (Mean = .20). As well, there was a significant effect of Word Content, [$F(2,230) = 13.19, p < .0001$], showing that positive content adjectives (Mean = .26) were better recalled than depressed (Mean = .17) but not hostile (Mean = .25) content adjectives.

As predicted, the Word Content and Behaviour Type main effects were qualified by a significant Behaviour Type x Word Content x Rating Category interaction, [$F(2,230) = 3.15, p < .05$]. This interaction, which is graphically depicted in Figure 3, was followed by post hoc tests which compared Type As and Bs at each level of Word Content and Rating Category. As can be seen from Figure 3, Type As recalled more no-rated positive adjectives as compared to

Figure 3. Mean adjusted recall of yes- and no-rated positive, hostile, and depressed content adjectives for SI-defined Type As and Bs.



Type Bs, but there were no A/B differences in recall for no-rated depressed or hostile content adjectives. More importantly and consistent with predictions, Type As recalled significantly more yes-rated hostile adjectives than did Type Bs. No differences between Type As and Bs were observed for either positive or depressed content yes-rated adjectives.

The Behaviour Type x Word Content x Rating Category interaction was further qualified by a marginally significant interaction of Behaviour Type, Word Content, Rating Category, and Feedback, [$F(2,230) = 2.84, p = .06$]. This interaction, which is represented in Table 7, was followed by post hoc tests comparing Type As and Bs at each level of Word Content, Feedback, and Rating Category. As can be seen from the table, the differences in recall of Type As and Bs for hostile content adjectives occurred only for yes-rated adjectives in the Feedback Condition. Thus post hoc tests showed that Type As recalled more yes-rated hostile content adjectives than Type Bs when they received noncontingent feedback, but recall for such words was not different when no feedback was given. The recall of Type As and Bs did not differ for both yes-rated positive and depressed content adjectives, as well as for no-rated positive, hostile, and depressed content adjectives under both Feedback and Nofeedback Conditions. These findings with SI-defined subjects are consistent with those obtained from JAS-defined groups.

Table 7

Mean proportion of recall of yes- and no-rated positive, hostile, and depressed content adjectives for SI-defined Type As and Bs in the Feedback and Nofeedback Conditions

Yes Ratings				
	<u>Feedback</u>		<u>Nofeedback</u>	
	Type A	Type B	Type A	Type B
<u>Word Content:</u>				
Positive	.24 (.12)	.23 (.10)	.26 (.11)	.26 (.11)
Hostile	.37 (.30)	.19 (.19)	.30 (.21)	.30 (.29)
Depressed	.18 (.30)	.21 (.24)	.18 (.27)	.10 (.17)
No Ratings				
	<u>Feedback</u>		<u>Nofeedback</u>	
	Type A	Type B	Type A	Type B
<u>Word Content:</u>				
Positive	.32 (.32)	.20 (.22)	.30 (.40)	.23 (.24)
Hostile	.22 (.21)	.21 (.10)	.20 (.13)	.20 (.12)
Depressed	.19 (.12)	.15 (.11)	.17 (.11)	.19 (.09)

Note. Numbers in parentheses are standard deviations.

While not predicted from theoretical considerations, there was a significant interaction of Word Content and Rating Category, [$F(2,230) = 3.96, p < .025$], with post hoc comparisons showing that yes-rated hostile adjectives (Mean = .29) were better recalled than no-rated hostile adjectives (Mean = .21). No differences were found for yes- and no-rated positive or depressed content adjectives. As well, there was a significant interaction of Word Content, Rating Category, and Length, [$F(2,230) = 4.41, p < .025$]. Post hoc tests compared recall under Brief and Extended Exposure Conditions for both yes- and no-rated adjectives. It was found that for no-rated positive adjectives, there was better recall under Brief than under Extended Exposure Conditions, but the theoretical significance of this finding is unclear.

In summary, as predicted, Type As who received noncontingent failure feedback recalled more self-descriptive hostile content adjectives as compared to Type Bs. The length of feedback seemed to have little impact on recall, and the predicted interaction between length of noncontingent feedback, behaviour type, and the differential recall of hostile and depressed content adjectives did not occur.

Post-experimental Questionnaires. The three scales of the MAACL were subjected to separate 2 (Length) x 2

(Feedback) x 2 (Behaviour Type) x 2 (Repeated measure - Time) ANOVAs. On the anxiety scale, there was a significant interaction of Length, Feedback, and Time, [$F(1,115) = 3.90$, $p = .05$], as well as an interaction between Length, Behaviour Type, and Time factors, [$F(1,115) = 4.05$, $p < .05$]. However, post hoc comparisons of theoretical interest were not significant. On the hostility scale, there was a significant effect of Time, [$F(1,115) = 5.44$, $p \leq .05$], with more hostility evident following the experimental manipulations (Mean = 8.54) than at baseline testing (Mean = 7.24). In contrast, there were no differences in levels of depression at difference times of testing, nor at different levels of the experimental manipulations.

In contrast to the higher scores for JAS-defined Type As as compared to Bs on the Dysfunctional Attitude Scale, the differences between SI-rated Type As (Mean = 123.33) and Type Bs (Mean = 116.45) were not statistically significant.

For the suspiciousness ratings, Chi square analyses were performed to test the independence of Suspiciousness and Behaviour Type, as well as Suspiciousness and Length of Exposure. Consistent with results using JAS-defined groups, Suspiciousness was found to be independent of both factors. An ANOVA of the recall rates revealed a significant effect of Suspiciousness, [$F(1,115) = 4.07$, $p < .05$], with suspicious subjects recalling more adjectives (Mean = .26)

than nonsuspicious subjects (Mean = .22). However, Suspiciousness did not interact with Length, Behaviour Type, Word Content, or Rating Category, and thus, did not significantly affect content specific recall.

Subjects' attributions were analyzed with a 2 (Length) x 2 (Behaviour Type) ANOVA. The mean attributions for Type As and Bs in the Brief and Extended Exposure Conditions are presented in Table 8. Consistent with results based on JAS-defined subjects, the attributions of Type As and Bs were similar, as were the attributions of subjects in the Brief and Extended Exposure Conditions.

The control judgements of subjects were analyzed with 2 (Length) x 2 (Feedback) x 2 (Behaviour Type) ANOVAs. Consistent with expectations, and the judgements of JAS-defined groups, subjects that received feedback estimated having less control over the test outcome (Mean = 37.29) than subjects receiving nofeedback (Mean = 54.44), [$F(1,97) = 13.72$, $p < .001$]. No other effects were significant.

Table 8

Mean attributional ratings of SI-defined Type As and Bs in the Brief and Extended Exposure Conditions

	Brief Exposure		Extended Exposure	
	Type A	Type B	Type A	Type B
Difficult Task	3.84 (1.17)	4.33 (1.56)	4.50 (1.65)	4.06 (1.39)
Poor Effort	3.00 (1.76)	3.33 (1.50)	3.28 (1.87)	3.06 (1.20)
Bad Luck	2.74 (1.79)	2.58 (1.88)	2.83 (1.62)	2.53 (1.84)
Lack of Skill and Ability	3.68 (1.63)	3.67 (2.02)	3.39 (1.65)	3.53 (1.66)

Note. Numbers in parentheses are standard deviations.

Discussion

The major observation of the present experiment was that when Type As were exposed to noncontingent failure feedback they recalled more hostile content adjectives than did Type Bs. While A/B differences in self-reported hostility were not evident prior to the experimental manipulation, JAS-defined Type As reported more hostility than did Bs following the noncontingent feedback. Although the differences in recall were observed with both SI and JAS-rated groups, differences in self-reported affect, both pre- and post-experimentally, were limited to JAS-defined Type As and Bs.

Prior to the experimental manipulation, Type As and Bs evidenced differing levels of self-reported affect. JAS-rated Type As reported more trait anxiety and more depressed affect during the week prior to testing than did Type Bs. However, levels of self-reported trait hostility did not differ among Type As and Bs.

The observation of enhanced levels of depression in Type As relative to Bs is inconsistent with reports that under normal circumstances, Type A behaviour is unrelated to depression (cf. Chesney et al., 1981; Chesney & Rosenman, 1980; Dresel, 1984; Janisse, Dyck, & Malcolm, 1985; Janisse et al., 1986) or anxiety (Glass, 1977; Nielson & Dobson, 1980). However, the observation of higher levels of

anxiety for As is consistent with Francis' (1981) observation that at various points throughout the academic year, JAS-defined Type As reported feeling more anxious than Type Bs. It is interesting to note that Francis failed to observe differences in anxiety levels on the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970). The current investigation failed to reveal Type A/B differences in anxiety as assessed by the State-Trait Personality Inventory (Spielberger et al., 1983), many of whose anxiety items overlap with the State-Trait Anxiety Inventory. Francis also found that Type As had higher levels of depression and hostility (as assessed by the MAACL) throughout the year. While the Type As in the present study were more depressed than Type Bs, the differences were limited to the Beck Depression Inventory, and were not found on the MAACL.

While it is generally thought that Type As are hostile, aggressive individuals, it appears as though they themselves do not ordinarily consider themselves to be hostile. Type As and Bs described themselves similarly on the hostility scales of both the MAACL and the STPI. The current observations are consistent with those of Herman et al. (1981), who reported that SI-defined Type As tended to describe themselves in the more socially acceptable terms of 'dominance' and 'assertiveness', rather than in the less flattering terms of 'hostility', 'irritability', and other

such terms. The adjectives of the MAACL are not socially acceptable descriptions of aggressiveness (e.g., hotheaded, mean, irritated), and were probably less likely to be endorsed by Type As. Alternatively, it is possible that angry affect emerges only under provocation. This possibility will be discussed with respect to observations made following the administration of the experimental treatment.

Although the differences between Type As and Bs on the Burger Control Scale were not significant, they were in the same direction as that reported by Dembroski, MacDougall, and Musante (1984). Dembroski and associates found that Type A behaviour was related to the need to control, as measured by the Desirability of Control Scale. The current results are also consistent with observations that in some situations, Type As report having more control than Type Bs (Dyck et. al., 1986). It has been suggested that the perceptions of control by Type As reflects the motivation to enhance self-esteem (Strube, 1985; Strube & Lott, 1985). The current results and those of Dembroski et al. (1984) are also consistent with a motivational interpretation, as the Desirability of Control Scale is an index of the need to control rather than the perceptual processes involved in control judgements.

In contrast to the perception of enhanced negative affect reported by JAS-rated Type As, SI-defined Type As and Bs did not differ on any of the self-report measures of affect. More generally, there was a consistent tendency for JAS-defined Type As to report different attitudes and mood states as compared to Type Bs, while SI-defined As and Bs did not differ in their self-reports. Prior to the experiment, JAS-defined Type As reported that they were generally more depressed, anxious, and more curious than Type Bs. Following the experience of noncontingent failure, JAS-defined As reported more hostility and endorsed more dysfunctional attitudes than Type Bs. Finally, on the self-report measure of the self-schematic processing paradigm, JAS-defined Type As endorsed more hostile content adjectives than Type Bs. In contrast, SI-defined Type As and Bs did not differ in their endorsements of hostile content adjectives, dysfunctional attitudes, or self-reports of anxiety, depression, hostility, or curiosity. However, both JAS- and SI-defined Type As and Bs evidenced differences when the assessment method was not dependent on self-report. That is, both JAS- and SI-defined Type As who were exposed to noncontingent failure feedback recalled more hostile content adjectives than Type Bs. Thus self-report indices paralleled the more unobtrusive incidental recall measure for JAS- but not SI-defined groups.

The observation that JAS-defined Type As and Bs differed in their self-reports while SI-defined groups did not is consistent with Chesney's observations that the JAS subscales show a higher correlation with self-reported distress (as assessed by the Symptom Distress Checklist; Derogatus, 1977) than with the SI itself (Chesney et al., 1981). Chesney interpreted the differences between JAS and SI derived findings as suggestive of compromised validity of the JAS. Others have suggested that SI ratings may be more sensitive to physiological differences between Type As and Bs than the JAS (Dembroski, MacDougall, Herd, & Shields, 1979; MacDougall et al., 1981). And, it is possible that the JAS is more sensitive than the SI to psychological dimensions (Janisse et al., 1986; Musante et al., 1984). In addition, there may be method congruence differences between the dependent variables and the two assessment instruments. That is, since the JAS classification relies on self-report, there is likely to be agreement between what people self-report on the JAS and on other conceptually similar self-report indices of affect and attitudes. Conversely, the stylistic features which are heavily weighted in the SI classification may represent different dimensions than those assessed through self-report (e.g., less conscious, more automatic processes, such as response latency, vocal intonations, and frequency of interruptions of the interviewer). Thus methodologically, the SI classification

method and self-report measures are not closely linked, and they likely assess different aspects of Type A behaviour.

Self-Schema Theory. The results from the self-referencing paradigm have important implications for both self-schema theory and for theories of Type A behaviour. The two sets of theoretical considerations will be discussed separately.

Consistent with research utilizing the self-referencing task with positive and depressed content adjectives in nondepressed subjects (Derry & Kuiper, 1981; Kuiper & Derry, 1982; Dyck et al., 1983), it was found that positive words were endorsed as self-descriptive more frequently than both depressed and hostile content adjectives. Overall, positive content adjectives were also recalled more frequently than depressed content adjectives. While the differences in recall of positive and depressed content adjectives failed to reach significance at each level of treatment, differences were in the expected direction. It is likely that the large number of pairwise comparisons rendered the post hoc procedure less powerful in detecting statistical differences.

The observation that in general, positive words were more frequently endorsed and better recalled than depressed adjectives replicates the performance of nondepressed university student control groups exposed to the self-

referencing recall task in investigations of self-schematic processing and depression (Hammen et al., 1986; Ingram, Smith, & Brehm, 1983; Kuiper & Derry, 1982). Thus, despite procedural differences (e.g., inclusion of hostile adjectives, use of the self-referent rating task alone, prior exposure to the SI and experimental manipulations), the current observations are consistent with past research. This suggests that the paradigm employed in the present study allowed for the assessment of self-schema processing.

Researchers investigating depressive information processing phenomena have noted that nondepressed control subjects tend to retain a warm self-enhancing illusory glow (Lewinsohn, Mischel, Chaplin, & Barton, 1980). Nondepressed individuals have been shown to: describe themselves in more positive terms than others describe them (Lewinsohn et al., 1980); describe themselves in more positive terms than they describe others (Kuiper & Cole, 1983; Tabachnik, Crocker, & Alloy, 1984); believe that they maintain more personal control over outcomes than they actually do (Alloy & Abramson, 1979; Martin, Abramson, & Alloy, 1984); and, pay more attention to and recall their positive personality attributes more than their negative ones (Mischel, Ebbesen, & Zeiss, 1976). Thus the present observation that subjects endorsed and recalled more positive adjectives may reflect the tendency for individuals to describe themselves in a self-enhancing manner and to better recall positive information about themselves.

From the viewpoint of self-schema theory, the warm illusory glow would suggest that nondepressed individuals retain positive self-schemata. In the current study, the observation of enhanced recall for positive adjectives would be interpreted as evidence that the task of rating positive personality descriptors on a self-referent dimension activated positive self-schemata. And, because encoding of the positive adjectives occurred within the context of a congruent cognitive structure (i.e., a positive self-schema), recall was facilitated.

From an integrated self-schema and associative network model, the observation that Type As who experienced noncontingent failure best recalled hostile content materials would be interpreted as evidence that for these subjects, encoding of the adjectives occurred in the context of hostile self-schemata. In other words, for Type A participants, the experience of threats to control via noncontingent failure resulted in the activation of a hostile self-schema which promoted the recall of hostile content materials.

It is known that cognitive events cause changes in mood (cf. Goodwin & Williams, 1982; Sherwood, Schroeder, Abrami, & Alder, 1981; Velten, 1968) and that mood changes affect cognition (Teasdale, 1983). Thus it is possible that Type As were angered by the presentation of noncontingent failure

feedback, and that angry mood at the time of processing and recall activated tangentially connected hostile content cognitive nodes (i.e., a hostile self-schema). Alternatively, it is possible that the cognitive representation of loss of control primed hostile self-schemata, which in turn, activated tangentially connected hostile content emotion nodes.

Irrespective of the mode by which hostile self-schemata were primed, the current results are clear in their demonstration of individual differences in either the presence or activation of self-schemata. The evidence supports the view that only Type As retained hostile self-schemata which were, in the present case, activated by control threats. This interpretation would be analogous to Dyck et al.'s (1983) observation that priming experiences activated depressive self-schemata in depressed students, but had no effect in nondepressed control subjects. In other words, priming experiences were effective in activating depressive self-schemata only in individuals who already had a well developed depressed content self-schema. In the current study, it is suggested that threats to control primed hostile self-schemata in Type As but not Bs because Type As had well developed hostile self-schemata while Bs did not. From associative network theory, it was expected that Type As but not Bs retained well developed hostile self-schemata because they were more likely than Bs

to have had a long history of reacting to various situations with hostility. However, it is possible that Type Bs did have hostile content self-schemata, but that their schemata are primed by experiences other than loss of control.

An alternate interpretation of the emergence of the hostile self-schemata in Type As but not Bs is the possibility that a threshold level of anger need be reached before the self-schema is activated (cf. Teasdale, 1983) and that the threshold is lower for Type As than it is for Type Bs. Hence, even though Type As and Bs had similar levels of hostility, the level of hostility experienced by As was sufficient to invoke their hostile self-schemata, but the level of hostility for Bs was not. A lower threshold for hostility would result from the existence of a network of strong linkages between cognitive and emotional events; in other words, an already well developed hostile self-schema.

The observation of hostile content self-schemata in Type As who were exposed to noncontingency supports and extends Strube et al.'s (1986) recent demonstration of content relevant self-schemata in Type As and Bs. While the focus of Strube et al.'s investigation was on more generalized Type A self-schemata, the current research focussed on the hostile component of Type A self-schematic processing. In contrast to Strube et al.'s observations of Type A content self-schemata both prior to and following

challenge, there was no evidence of A/B differences in hostile content self-schemata for subjects receiving nofeedback. Rather, it was necessary for the hostile self-schemata of As to be primed by the experience of noncontingency. Thus it may be that while more general Type A self-schemata are accessible to Type As under all circumstances, the emergence of hostile content self-schemata is dependent on evocative experiences.

The failure to observe enhanced recall for depressed content adjectives in Type As exposed to noncontingent failure feedback is neither consistent nor inconsistent with self-schema theory. While expectations based on Glass' theory were that Type As who experienced prolonged noncontingency would be depressed, there was no evidence that either As or Bs were depressed following treatment. Given that subjects were not depressed, depressive self-schemata would not be expected to emerge.

Kuiper and associates initially suggested that depressive self-schemata should be detectable in individuals who are vulnerable to depression (Kuiper et al., in press). In the present experiment, Type As as a group, were found to have attitudes which rendered them vulnerable to depression (Weissman & Beck, 1978; Weissman, 1980). From this view, then, it was expected that Type As would have depressive self-schemata (e.g., show enhanced recall for depressed

words). While evidence from experiments probing depressive self-schemata in vulnerable individuals did not support Kuiper's initial hypothesis, Riskind and Rholes (1984) argued that depressive cognition in vulnerable individuals is detectable only when negativistic cognitions are primed by situations similar to the experiences in which the negativistic cognition originally occurred. In the present experiment, depressive cognition was primed by the exposure to noncontingent failure, and thus, based on Riskind and Rholes' (1984) analysis, depressive self-schemata were expected to emerge in vulnerable individuals.

Interestingly, it may be that dysfunctional attitudes do confer vulnerability, but to a broader base of affective states than simply depression. In the current study, Type As endorsed more dysfunctional attitudes that are presumed to confer vulnerability to depression. However, priming experiences (i.e., exposure to noncontingent failure) resulted in hostility rather than depression. These results would actually be predicted by associative network theory on the basis of the past history of Type As. According to Teasdale (1983), specific affects are associatively linked with classes of cognitive events, and these linkages are strengthened through repeated associations during development. Thus, for example, it is expected that children who react to adversity with sad affect will, as adults, react to aversive events with depression, while

those who are angry as children, experience hostility rather than depression as adults. Accordingly, it is possible that the Type As in the present study had a history of reacting to aversive events with hostility rather than depression. And, when the contractual conditions of their dysfunctional beliefs were unmet (by the experience of noncontingent failure), they became hostile rather than depressed. This analysis is, of course, limited to findings observed with JAS-defined Type As, since only here did As and Bs differ in their endorsement of dysfunctional attitudes.

In summary, the present observations are, for the most part, consistent with an integrated associative network and self-schema model. Based on theoretical considerations, it was hypothesized that the TABP is an identifiable vulnerability factor to hostility, and, under certain circumstances, to depression. While an association between depressive self-schema responding and the TABP was not observed, there was clear evidence to support the existence of well-developed hostile self-schemata for Type As. The current results thus extend the scope of individual differences to which self-schematic processing can be applied, from the relatively limited focus on depressive self-schemata to Type A behaviour. Thus it has been shown that the TABP can be viewed as an individual difference variable, characterized by a well developed hostile content self-schema which is activated by the experience of

noncontingent failure. It is important to note that the hostile self-schema was not evident in all Type As, but rather, was limited to those who experienced noncontingent failure. Thus, consistent with recent suggestions that an approach focussing on schema by event interactions need be considered in the identification of depressive self-schemata (Hammen & Marks, 1983), the current results suggest that a similar schema by event approach need be applied in the identification of hostile self-schemata in Type As.

At present, there is little research following the developmental course of self-schemata, likely because of the difficulty in economically identifying appropriate variables and samples to study (e.g., identifying children who are at high risk for depression as adults, or the environmental conditions which are hypothesized to consistently evoke given emotions). However, TABP theory is very specific about the identification of vulnerable individuals, the types of events that provoke emotional responding, and, the predominant affect that results. And, methodologies have been provided for both self-schema (Nasby & Yando, 1983) and Type A assessment (Matthews, 1982) in children. Thus either longitudinal or cross-sectional research focussing on the developmental aspects of the TABP and hostile self-schemata could prove to be a valuable vehicle for the investigation of self-schema development.

Finally, the current results are suggestive of the utility of employing the self-referencing paradigm in elucidating information which may not be accessible through self-report indices. It has been proposed that self-schematic processing represents a more automatic and less controlled form of information processing (Kuiper, MacDonald, & Derry, 1983; MacDonald & Kuiper, 1984), as compared to public self-description. Thus it would be expected that self-schematic processing would be less influenced by factors such as social desirability, or other motivational variables. Diamond (1982), for example, noted the difficulty in assessing anger through self-report measures, citing excessive use of denial and rigid control over emotional experience as interfering with accurate self-report. The use of the self-referencing methodology presently employed provided a more sensitive index of mood states, relative to self-report. This was particularly true of SI-defined As and Bs, where A/B differences in self-report were not found, even after noncontingent feedback. Yet the recall measure clearly indicated that Type As were reacting with more hostility than Type Bs.

Type A Behaviour Theory. Glass' (1977) theory suggests that Type As and Bs differ in their sensitivity to perceived control of objective contingencies. Recent investigations have challenged this notion (Dresel, 1984; Strube & Lott, 1985), and our results concur. Type As and Bs did not

differ in their judgements of the degree to which they could control the test outcome. Yet Type As reacted differently to the perception of uncontrollability. Thus it appears that A/B differences along the controllability dimension lie in the reaction to, rather than the perception of noncontingency.

Results from the self-referencing paradigm measures provide partial support for Glass' (1977) theory of Type A behaviour. According to Glass, brief exposure to uncontrollable outcomes results in hyperresponsiveness while extended exposure results in hyporesponsiveness. Based on Glass' (1977) application of the Wortman and Brehm (1975) model, the affective concomitants of hyperresponsiveness were presumed to be anger, while the affect associated with hyporesponsiveness was hypothesized to be depression. The present observation of hostility but not depression thus provides support for the hyper but not hyporesponsive portion of Glass' (1977) biphasic response curve.

While several studies have documented the occurrence of enhanced performance by Type As following brief exposure to uncontrollability (cf. Glass, 1977; Glass & Carver, 1980), there have been few studies which assessed concomitant changes in mood. Carver and Glass (1978) and Strube et al. (1984) documented enhanced aggression by Type As who were exposed to noncontingent failure feedback. The current

results are in agreement, and provide further support for the notion that Type A aggression following noncontingent failure feedback is not necessarily instrumental aggression (Strube et al., 1984), but rather, likely reflects heightened hostility (see also Check & Dyck, in press).

The documentation of an organized self-schema with hostile content is consistent with the hypothesized pathophysiological processes implicated in the TABP. It has been proposed that the cardiovascular reactivity which occurs with the evocation of anger contributes to lesions in the atherosclerotic arteries (cf. Diamond, 1982). Given that Type As retain well developed hostile self-schemata, it is likely that there are a variety of associatively linked cognitive (e.g., perception of noncontingency, failure) and emotional (e.g., anger) nodes which evoke the self-schema, and, according to Teasdale (1983), further intensify hostile mood. Thus it is suggested that Type As are more likely than Bs to become angry to a wider variety of situations, both more frequently and more intensely. Frequent evocation of hostility is hypothesized to be related to the pathological processes of cardiovascular reactivity and hemodynamic stress.

There is yet another way in which hostile self-schemata could contribute to the development of CHD. Smith and Anderson (1986) and Smith and Rhodewalt (in press) recently

proposed an interactional biopsychosocial model of Type A behaviour and CHD. It was argued that not only do Type As react to stressful stimuli with enhanced physiological responsivity, they also "systematically construct an environment that is subjectively and objectively rich in those classes of stimuli known to elicit overt Type A behaviours and enhanced reactivity" (Smith & Anderson, 1986, p.3). In terms of hostility, it was suggested that Type As elicit challenging hostile behaviour from others, which they in turn, react to in an aggressive manner. The description of Type As as creating the challenging environment which they then react to parallels the function of schemata. According to Taylor and Crocker (1981), schemata are hypothesized to serve as a guide for attention and information processing, and as a basis for anticipating events and activating behaviours accordingly. In other words, schemata have a self-fulfilling function. Translating this function as it applies to a hostile self-schema, it would be suggested that Type As are more apt to attend to interpersonal events which they interpret as provocative, and to react to such events in what they feel is a deserving manner (i.e., with hostility). Hostile behaviour on the part of Type As would, in turn, promote hostile reactions from others. Thus the hostile self-schema promotes both the creation of and reaction to a hostile environment. Similarly, following Smith and Anderson's

(1986) model, it could be hypothesized that Type As retain self-schemata with achievement oriented content. An individual with an achievement oriented schema would tend to view situations in terms of personal challenges, and would consequently create the stressful challenges which they then react to in a physiologically injurious manner.

The failure of the present investigation to document heightened depressed affect in Type As following extended exposure to noncontingent failure feedback is inconsistent with the hyporesponsive phase predicted by Glass' (1977) biphasic function. Several alternate interpretations are possible. First, it may be that the Extended Exposure Condition employed in the present study was too short to induce the learned helplessness effects proposed by Glass' (1977) model. However, the number of items on the aptitude test far exceeded the number of trials employed by Glass (1977). Moreover, Dresel (1984) observed that the duration of exposure to uncontrollability did not differentially affect Type As' perceptions of control or their mood. While the current duration of exposure is consistent with durations reported by previous research documenting the performance deficits associated with hyporesponsiveness (Glass, 1977), it is possible that depressed affect does occur after prolonged daily exposure to uncontrollable outcomes. Unfortunately, the demonstration of depressed affect occurring under such conditions would be difficult in a laboratory experiment.

A second interpretation of the failure to observe depressed mood is that with extended exposure, subjects became more suspicious about the bogus feedback, and hence more hostile than depressed. However, suspiciousness did not interact with length of exposure to affect recall. Moreover, analyses of the numbers of suspicious subjects in the Brief and Extended Exposure Conditions suggested that there were equal proportions of suspicious subjects in both conditions. Thus it is unlikely that extended exposure to the noncontingent feedback resulted in a greater probability of subjects' questioning the veracity of the feedback.

The failure to observe enhanced depressed affect in Type As relative to Bs coincides with the lack of attributional differences observed here. That is, according to learned helplessness theory, depressed affect occurs when attributions for uncontrollable aversive outcomes are made to internal, stable causes. Unfortunately, the current investigation did not include a comparison group that received contingent feedback. Thus it is not possible to assess whether the groups receiving noncontingent failure feedback made attributions to more internal, stable, and global causes. However, it is known that Type As and Bs in the present study did not differ in attributions for their performance, and it is therefore not surprising that they also did not differ in level of depressed affect.

Glass' assertion that the hyporesponsiveness in the performance of Type As reflects learned helplessness led researchers to hypothesize that the attributions of Type As for aversive outcomes were similar to those of depressives (i.e., stable, global and internal attributions for failure; cf., Brunson & Matthews, 1981; Musante, MacDougall, & Dembroski, 1984; Rhodewalt, 1984). Others have suggested the opposite; that the attributions of Type As would tend to be more self-serving and ego protective than those of Type Bs (Janisse et al., 1986; Strube, 1985). Accordingly, Type As would be expected to make external attributions for failure and internal attributions for success. Based on the self-esteem hypothesis, it was anticipated that the attributions of Type As exposed to brief uncontrollability would be external and unstable. And, from Glass' position, it was expected that Type As who experienced prolonged uncontrollability would attribute their performance to more internal and stable causes, as compared to Type Bs. However, given the failure to observe A/B differences in attributions, the current attribution data cannot provide support for either learned helplessness or egotism positions.

It is not clear why the attributions of Type As and Bs did not differ, although the direction of differences reported in the literature has gone both ways. It is possible that the wording of the attribution questionnaire

items was revealing of the deception, and resulted in biased responding on the part of all subjects. Alternatively, it is possible that the attributions were determined more by suspiciousness about the experimental manipulation than by individual differences in behaviour type. Future research which utilized a less transparent deception and a better attribution questionnaire may help to clarify this issue.

The large number of suspicious subjects in this experiment led to the exploration of the effects of suspiciousness on self-schematic processing measures. It was observed that suspiciousness enhanced recall for all adjectives. It is not clear as to why suspiciousness would facilitate recall. One possibility is that suspicious subjects were in a state of perceptual alertness, waiting to critically analyze every step of the experiment. Accordingly, they may have paid more attention to the experimental procedures (e.g., the adjectives that were presented in the self-referencing task). The greater attention paid toward the adjectives would likely have facilitated subsequent recall. However, because content specific recall was unaffected, suspiciousness did not pose a threat to the interpretability of experimental effects.

In summary, current observations provide partial support for Glass' (1977) theory of Type A behaviour. The emergence of a hostile self-schema for Type As exposed to

noncontingent failure feedback supports the hyperresponsiveness phase of the biphasic curve, while the failure to observe depressed affect or self-schema responding suggests that the formulation of the hyporesponsiveness phase needs revision.

Areas of follow-up research were discussed, and it was suggested that the self-schema approach was a more valid index of affect in Type As and Bs, and should be utilized either concurrently or in lieu of self-report indices. Moreover, it was argued that under normal circumstances, Type As and Bs displayed similar levels of hostility. However, it was suggested that because of their well developed hostile self-schemata, Type As became angry more frequently and more intensely than Bs. The current research delineated one situation which evoked the hostile self-schema of Type As, that is, the experience of loss of control. Others have demonstrated the emergence of heightened hostility and aggressiveness in Type As exposed to interpersonal provocation (Check & Dyck, 1985; Strube et al., 1984). Future research should be directed at exploring other situational cues and experiences that are provocative of hostile self-schemata. For example, it is possible that Type As are also more hostile than Bs under conditions of competitive challenge or time pressure. The self-referencing task currently employed could readily be implemented following most any experimental manipulation of

challenge or time pressure. Given the significant role that anger is presumed to play in the development of coronary heart disease (cf. Diamond, 1982), it would be valuable to identify the circumstances under which As are aroused, so that therapeutic interventions could be targeted appropriately. Until recently, therapy for Type As has focussed on reducing anxiety rather than hostility (cf. Jenni & Wollersheim, 1979; Roskies, Spevack, Surkis, Cohen, & Gilman, 1978; Suinn & Bloom, 1978); yet typically, Type As do not report feeling more anxious than Bs (cf. Matthews, 1982). The lack of A/B differences in anxiety may be due to the biases associated with self-report, and the use of a self-referencing paradigm which incorporated anxious content adjectives would be helpful in clarifying this issue.

Self-schema measures could also be utilized in evaluating Smith and Anderson's (1986) biopsychosocial model of Type A behaviour and CHD. For example, it would be interesting to determine whether Type As with hostile content self-schemata expect more hostile interactions with others; and, once engaged in an interpersonal encounters, do they interpret social cues as more provocative than Type Bs and As who do not retain hostile self-schemata? Here, self-schema measures utilizing social scripts (cf. Taylor & Crocker, 1981) could be utilized as assessment tools. Furthermore, Smith and Anderson's (1986) model would predict that Type As, as compared to Bs, more readily react to cues

which they interpret as provocative with heightened hostility. Again, self-schema measures could be utilized in the measurement of hostility (e.g., using the self-referencing paradigm following interpersonal encounters). Finally, from Smith and Anderson's (1986) model and from Type A theory in general, it would be expected that Type As retain achievement oriented self-schemata. To test this notion, the self-referencing paradigm with achievement oriented content adjectives could be used. As well, other self-schema measures (e.g., recall of schema congruent behaviours; cf. Markus, 1977) could readily be applied to the assessment of both hostile content and achievement oriented self-schemata in Type As.

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Appendix I

ABSTRACT REASONING and ABILITY

CANADIAN TESTING SERVICES

TORONTO, CANADA

FEBRUARY, 1985

GENERAL INSTRUCTIONS

This aptitude test has been developed for use in universities and schools across Canada as a measure of student ability and as a predictor of future success in university. The content of the test is more culturally appropriate than other similar aptitude tests such as the Scholastic Aptitude Test, Graduate Record Examination, or Millers Analogies Test.

The format of the Abstract Reasoning and Ability Test (ARAT), is somewhat different than most. A special answer sheet has been devised which provides you with immediate feedback about the correctness of your answer.

For each question, there are four alternatives a, b, c, and d. Beside each alternative there are parentheses. When you have chosen the response alternative you think is correct, lightly shade between the parentheses with the special marker provided. Mark only one response per question, and do not wander out of the brackets with the marker. The marker will reveal either an 'x' or a 'c'. If an 'x' shows up, that means you have chosen an incorrect response. If a 'c' shows up, that means you have chosen the correct answer.

The test is composed of three separate sections, each with a different type of question. The first section is composed of 10 verbal analogy questions. You will be allowed 5 minutes to complete the first section. The second section is made up of quantitative questions and the time limit for the 5 questions is 5 minutes. Sentence completion questions are found in the third section. You will be allowed 3 minutes to answer the 5 questions.

Please remember to choose the one response that best answers the question. Think carefully before answering because questions having more than one response selected will be considered incorrect.

PLEASE TURN TO THE INSTRUCTIONS FOR SECTION 1

Section 1

VERBAL ANALOGIES

1.1 INSTRUCTIONS

The analogy tests your ability to recognize relationships to other words, and is essentially a test of your ability to think clearly.

In each question you will find three (3) capitalized words and in parentheses, a group of four (4) non-capitalized words lettered a, b, c, d. You are to select from the four (4) alternatives, that single word which best completes the analogy with the three capitalized words.

An example of an analogy question would be : TRIANGLE is to SQUARE as PENTAGON is to (a.octogon b.heptagon c.hexagon d.parallelogram).

The correct answer is c. hexagon. A triangle has three sides, a square has four, a pentagon five, and a hexagon has six sides.

Some more examples of analogy questions are:

A. WORM : BIRD :: MOUSE : (a.man b.snake c.rodent d.lion)

The correct answer is b. snake. Birds like to eat worms; snakes like to eat mice.

B. ORIGINAL : COPY :: GENIUNE : (a.diamond b.imitation c.legal d.reputable).

The correct response is b. imitation.

There is no penalty for an incorrect answer so it is advisable to answer all questions. Choose the one response that best completes the analogy. Questions having more than one alternative selected will be considered incorrect.

PLEASE WAIT FOR INSTRUCTIONS TO BEGIN

1. SOLDIER : (a. uniform b. army c. country d. barracks)
:: APE : MENAGERIE
2. WALL : (a. paper b. curtain c. paint d. floor) ::
TAPESTRY : CARPET
3. 25 : 36 :: 49 : (a. 53 b. 63 c. 94 d. 64)
4. CANINE : (a. feline b. bovine c. pachyderm d. crustacean)
:: DOG : ELEPHANT
5. LINEN : FLAX :: BURLAP : (a. jute b. cotton c. cloth
d. fiber)
6. RACQUET : FOOTBALL :: NET : (a. tennis b. volleyball
c. baseball d. ping-pong)
7. (a. spirit b. preacher c. medium d. ghoul) : SEANCE
:: EVANGELIST : REVIVAL
8. MAP : (a. scale b. atlas c. legend d. reference) ::
TEXT : FOOTNOTE
9. WAGON : (a. adolescence b. birth c. youth d. travel)
:: HORSE : CHILDHOOD
10. LION : COWARDICE :: DOVE : (a. war b. peace c. olive
d. love)

STOP END OF SECTION 1

Section 2

QUANTITATIVE QUESTIONS

2.1 INSTRUCTIONS

In this section you will find quantitative questions. You do not need an advanced mathematics background to answer these questions. Very few of the questions require training beyond high school algebra and geometry.

The following questions are a sample of the type of questions you may encounter.

A. The number 1729 is the sum of the cubes of two numbers. One of these numbers is 10. What is the other number?

- a. 17 b. 13 c. 9 d. 3

The answer is (c.) 9.
 $1729 - 1000 = 729$. 729 is 9 cubed.

B. A certain type of siding for a house cost \$10.50 per square yard. What does it cost for the siding for a wall 4 yards by 60 feet long?

- a. \$800 b. \$840 c. \$2520 d. \$3240

The answer is (b.) \$840.
The area of the wall = 4 yds by $(60 \text{ ft}/3) = 4 \text{ yds. by } 20 \text{ yds.}$
= 80 sq. yds.
The cost = $80 \times \$10.50 = \840 .

PLEASE WAIT FOR INSTRUCTIONS TO BEGIN

11. A cylindrical oil tank is $\frac{1}{3}$ full. If 30 more litres are added, the tank will be half-full. What is the capacity in litres of the tank?
- a. 150
 - b. 160
 - c. 170
 - d. 180
12. A prime number is a number that can be divided only by itself and one. Which is not a prime number?
- a. 23
 - b. 37
 - c. 53
 - d. 87
13. Three litres of water are added to 5 litres of a 20% solution of sulphuric acid. What percent of the resulting solution is pure sulphuric acid?
- a. 23%
 - b. 17%
 - c. $12\frac{1}{2}\%$
 - d. $33\frac{1}{3}\%$
14. A set of papers is arranged and numbered from 1 to 40. If the paper numbered 4 is drawn first and every seventh paper thereafter is drawn, what will be the number of the last paper drawn?
- a. 40
 - b. 39
 - c. 38
 - d. 37
15. What is the smallest positive number which, when it is divided by 3, 4, or 5, will leave a remainder of 2?
- a. 42
 - b. 62
 - c. 22
 - d. 182

STOP END OF SECTION 2

Section 3

SENTENCE COMPLETION QUESTIONS

3.1 INSTRUCTIONS

In the following section you will be required to complete a sentence in which one or two words are missing and represented by blank spaces. It is necessary to select from the lettered words or set of words, the word or words which best complete the meaning of the statement as a whole. You must determine which choice completes the sentence so that the sentence makes good sense. Below is an example of this type of question.

The Citizens Budget Task Force criticized the proposed legislation as _____ and wasteful.

- a. helpful
- b. completed
- c. praiseworthy
- d. illogical

After filling each choice into the blank, you will arrive at the conclusion that (d) ILLOGICAL is the only reasonable choice.

PLEASE WAIT FOR INSTRUCTIONS TO BEGIN

16. In Hindu mythology, _____ referred to a _____ to earth.
- a. autoclave - reference
 - b. dipsomania - prayer
 - c. divagation - bowing
 - d. avatar - descent
17. The _____ effects of the drug made her very weary.
- a. succinct
 - b. spurious
 - c. soporific
 - d. supine
18. In certain tropical areas, malaria is an _____ disease.
- a. endocrine
 - b. introversive
 - c. interstitial
 - d. endemic
19. The strenuousness of the 48-hour week is further _____ when it is compared with the schedule of other police forces in our Canadian cities.
- a. inculcated
 - b. accentuated
 - c. demoralized
 - d. cauterized
20. The appearance of corruption in Ottawa clearly shows the need for closer scrutiny and stricter _____ in selecting people to direct our government.
- a. discipline
 - b. criteria
 - c. coercion
 - d. decisions

STOP END OF SECTION 3

ABSTRACT REASONING and ABILITY

CANADIAN TESTING SERVICES

TORONTO, CANADA

FEBRUARY, 1985

GENERAL INSTRUCTIONS

This aptitude test has been developed for use in universities and schools across Canada as a measure of student ability and as a predictor of future success in university. The content of the test is more culturally appropriate than other similar aptitude tests such as the Scholastic Aptitude Test, Graduate Record Examination, or Millers Analogies Test.

The format of the Abstract Reasoning and Ability Test (ARAT) is somewhat different than most. A special answer sheet has been devised which provides you with immediate feedback about the correctness of your answer.

For each question, there are four alternatives a, b, c, and d. Beside each alternative there are parentheses. When you have chosen the response alternative you think is correct, lightly shade between the parentheses with the special marker provided. Mark only one response per question, and do not wander out of the brackets with the marker. The marker will reveal either an 'x' or a 'c'. If an 'x' shows up, that means you have chosen an incorrect response. If a 'c' shows up, that means you have chosen the correct answer.

The test is composed of four separate sections, each with a different type of question. The first section is composed of 30 verbal analogy questions. You will be allowed 15 minutes to complete the first section. The second section is made up of quantitative questions and the time limit for the 10 questions is 10 minutes. Sentence completion questions are found in the third section. Again you will be allowed 15 minutes to answer the 30 questions.

Please remember to choose the one response that best answers the question. Think carefully before answering because questions having more than one response selected will be considered incorrect.

PLEASE TURN TO THE INSTRUCTIONS FOR SECTION 1

Section 1

VERBAL ANALOGIES

1.1 INSTRUCTIONS

The analogy tests your ability to recognize relationships to other words, and is essentially a test of your ability to think clearly.

In each question you will find three (3) capitalized words and in parentheses, a group of four (4) non-capitalized words lettered a, b, c, d. You are to select from the four (4) alternatives, that single word which best completes the analogy with the three capitalized words.

An example of an analogy question would be : TRIANGLE is to SQUARE as PENTAGON is to (a.octagon b.heptagon c.hexagon d.parallelogram).

The correct answer is c. hexagon. A triangle has three sides, a square has four, a pentagon five, and a hexagon has six sides.

Some more examples of analogy questions are:

A. WORM:BIRD :: MOUSE : (a.man b.snake c.rodent d.lion)

The correct answer is b. snake. Birds like to eat worms; snakes like to eat mice.

B. ORIGINAL : COPY :: GENUINE : (a.diamond b.imitation c.legal d.reputable).

The correct response is b. imitation.

There is no penalty for an incorrect answer so it is advisable to answer all questions. Choose the one response that best completes the analogy. Questions having more than one alternative selected will be considered incorrect.

PLEASE WAIT FOR INSTRUCTIONS TO BEGIN

1. SOLDIER : (a. uniform b. army c. country d. barracks)
:: APE : MENAGERIE
2. AGNOSTIC : ATHEIST :: (a. yes b. maybe c. only d. many)
: NO
3. EXILE : TAX :: EXCOMMUNICATION : (a. pope b. exclusion
c. cannon d. tithe)
4. DUNGEON : (a. torture b. prison c. castle d. basement)
:: CELLAR : HOME
5. (a. puzzle b. alternative c. label d. sphinx) : ENIGMA
:: LABYRINTH : MAZE
6. WALL : (a. paper b. curtain c. paint d. floor) ::
TAPESTRY : CARPET
7. SILVER : PAPER :: TARNISH : (a. wrinkle b. yellow
c. rust d. age)
8. 25 : 36 :: 49 : (a. 53 b. 63 c. 94 d. 64)

9. RUBY : TOMATO :: EMERALD : (a. rose b. gem c. shamrock
d. squash)
10. FOOD : FUEL :: BODY : (a. gasoline b. mechanic c. legs
d. engine)
11. IRON : CORRUGATION :: (a. brow b. wart c. toad d. age):
WRINKLE
12. CANINE : (a. feline b. bovine c. pachyderm d. crustacean)
:: DOG : ELEPHANT
13. TREADLE : LOOM :: PEDAL : (a. piano b. pusher
c. bicycle d. medal)
14. THEATRE : (a. burlesque b. tragedy c. thespian d. in-the-round)
:: POETRY : DOGGEREL
15. LINEN : FLAX :: BURLAP : (a. jute b. cotton c. cloth
d. fiber)
16. RACQUET : FOOTBALL :: NET : (a. tennis b. volleyball
c. baseball d. ping-pong)

17. (a. second b. minute c. time d. day) : HOUR :: YARD : FOOT
18. HUMP : DOME :: (a. mound b. circle c. arch d. entrance)
: CRESCENT
19. CAR : SLIM :: CARE : (a. lithe b. little c. core d. slime)
20. FLAUNT : (a. slyly b. ostentatiously c. brazenly
d. boastfully) :: BETRAY : FAITHFULLY
21. (a. spirit b. preacher c. medium d. ghoul) : SEANCE
:: EVANGELIST : REVIVAL
22. HARVEST : MARKET :: MANUFACTURE : (a. wholesale b. sell
c. store d. purchase)
23. HAND : (a. brow b. back c. leg d. eye) :: MANACLE :
MONOCLE
24. MAP : (a. scale b. atlas c. legend d. reference) ::
TEXT : FOOTNOTE

25. TILE : MOSAIC :: (a. song b. note c. piano d. color)
: MELODY
26. WAGON : (a. adolescence b. birth c. youth d. travel)
:: HORSE : CHILDHOOD
27. LION : COWARDICE :: DOVE : (a. war b. peace c. olive
d. love)
28. SMOKE : IRON :: SCREEN : (a. cross b. curtain c. band
d. will)
29. FLEECE : SHEEP :: PLUMMAGE : (a. cheat b. feather
c. finery d. swan)
30. CYLINDER : MOTOR :: FOUNDATION : (a. brick b. house
c. basis d. chassis)

STOP END OF SECTION 1

Section 2

QUANTITATIVE QUESTIONS

2.1 INSTRUCTIONS

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The answer is (b.) \$840.
The area of the wall = 4 yds by $(60 \text{ ft}/3) = 4 \text{ yds. by } 20 \text{ yds.}$
= 80 sq. yds.
The cost = $80 \times \$10.50 = \840 .

PLEASE WAIT FOR INSTRUCTIONS TO BEGIN

31. Which number in the series below is in error?

3, 3, 6, 18, 72, 216, 2160

- a. 2160
- b. 216
- c. 72
- d. 6

32. If all P are S and no S are Q, it necessarily follows that:

- a. all Q are S
- b. all Q are P
- c. no P are Q
- d. some Q are P

33. The average of four number is 54. If one of the numbers is increased by 6, the average will remain unchanged if each of the other three numbers is reduced by:

- a. 2
- b. 1
- c. $3/4$
- d. 4

34. A cylindrical oil tank is $1/3$ full. If 30 more litres are added, the tank will be half-full. What is the capacity in litres of the tank?

- a. 150
- b. 160
- c. 170
- d. 180

35. A prime number is a number that can be divided only by itself and one. Which is not a prime number?

- a. 23
- b. 37
- c. 53
- d. 87

36. Three litres of water are added to 5 litres of a 20% solution of sulphuric acid. What percent of the resulting solution is pure sulphuric acid?

- a. 23%
- b. 17%
- c. $12 \frac{1}{2}\%$
- d. $33 \frac{1}{3}\%$

37. If a hat cost \$4.20 after a 40% discount, what was the original price?
- a. \$2.52
 - b. \$4.60
 - c. \$5.33
 - d. \$7.00
38. What is 40% of $10/7$?
- a. $2/7$
 - b. $4/7$
 - c. $1/28$
 - d. $1/2$
39. A prime number is one which is divisible only by itself and one. Which of the following are prime numbers?
- I. 19
 - II. 27
 - III. 51
 - IV. 87
 - V. 59
- a. I only
 - b. I and II only
 - c. III, IV, and V
 - d. I and V only
40. A boy receives grades of 92, 88, 84, and 76 in four of his major subjects. What must he receive in his fifth major subject in order to average 85?
- a. 85
 - b. 84
 - c. 86
 - d. 83

STOP END OF SECTION 2

Section 3

SENTENCE COMPLETION QUESTIONS

3.1 INSTRUCTIONS

In the following section you will be required to complete a sentence in which one or two words are missing and represented by blank spaces. It is necessary to select from the lettered words or set of words, the word or words which best complete the meaning of the statement as a whole. You must determine which choice completes the sentence so that the sentence makes good sense. Below is an example of this type of question.

The Citizens Budget Task Force criticized the proposed legislation as _____ and wasteful.

- a. helpful
- b. completed
- c. praiseworthy
- d. illogical

After filling each choice into the blank, you will arrive at the conclusion that (d) ILLOGICAL is the only reasonable choice.

PLEASE WAIT FOR INSTRUCTIONS TO BEGIN

41. The old man was so _____ that he refused to buy food.
- a. parsimonious
 - b. prescient
 - c. prolix
 - d. affluent
42. In Hindu mythology, _____ referred to a _____ to earth.
- a. autoclave - reference
 - b. dipsomania - prayer
 - c. divagation - bowing
 - d. avatar - descent
43. The lover of democracy has an _____ toward totalitarianism.
- a. antipathy
 - b. empathy
 - c. antipode
 - d. petard
44. He hated his father so intensely that he committed _____.
- a. patricide
 - b. fratricide
 - c. genocide
 - d. matricide
45. He is quite _____ and, therefore, easily _____.
- a. callow - deceived
 - b. gentle - perceived
 - c. open - conceived
 - d. limpid - received
46. The _____ effects of the drug made her very weary.
- a. succinct
 - b. spurious
 - c. soporific
 - d. supine

47. The chairman's _____ speech swayed the audience to favor his proposal.
- a. cursory
 - b. bombastic
 - c. auxiliary
 - d. cogent
48. His _____ remarks are too stupid to be taken _____.
- a. empyreal - lightly
 - b. puerperal - meaningfully
 - c. lacuanl - responsibly
 - d. vapid - seriously
49. In certain tropical areas, malaria is an _____ disease.
- a. endocrine
 - b. introversive
 - c. interstitial
 - d. endemic
50. Sometimes the single building is not particularly historic, but in _____ with other buildings it takes on meaning.
- a. detail
 - b. conjunction
 - c. correlation
 - d. design
51. We would certainly be _____ if we did not report the error.
- a. nominative
 - b. consonnant
 - c. derelict
 - d. eleemosynary
52. The strenuousness of the 48-hour week is further _____ when it is compared with the schedule of other police forces in our Canadian cities.
- a. inculcated
 - b. accentuated
 - c. demoralized
 - d. cauterized

53. His _____ had no place in our serious conversation.
- a. valence
 - b. decency
 - c. badinage
 - d. concatenation
54. The day will come when _____ will look back upon us and our time with a sense of superiority.
- a. prosperity
 - b. antiquity
 - c. ancestors
 - d. descendants
55. The appearance of corruption in Ottawa clearly shows the need for closer scrutiny and stricter _____ in selecting people to direct our government.
- a. discipline
 - b. criteria
 - c. coercion
 - d. decisions
56. She owes most of her success to her calm, measured, analytical attacks on the problems of advertising, making order out of _____.
- a. chaos
 - b. austerity
 - c. procedure
 - d. squalor
57. His _____ was so great that he became the _____ of all our disputes about art and music.
- a. skill - censor
 - b. contumely - reimburse
 - c. erudition - arbiter
 - d. pomposity - idolator
58. The canals in Venice are often _____ because the water does not circulate properly.
- a. malodorous
 - b. malformed
 - c. undulating
 - d. efflorescent

59. The one nice thing about the house is that it was situated on a _____ from which one could see all the city lights at night.
- a. proboscis
 - b. promontory
 - c. proscenium
 - d. preponderance
60. The great evangelist was able to convert men whom other preachers had found _____.
- a. normative
 - b. ameliorative
 - c. obdurate
 - d. lenient
61. His neighbors never liked him even though plaques and medals proved he had done very _____ work in the community.
- a. inconsequential
 - b. misanthropic
 - c. lambent
 - d. laudable
62. Fanatics and _____ often do their cause _____ because of their extremism.
- a. phlegmatics - spoliation
 - b. zealots - disservice
 - c. saprophytes - embrasure
 - d. zygotes - indisposition
63. The minister's _____ way of life seemed _____ with his professions of virtue.
- a. inductive - inextricable
 - b. metabolic - inductable
 - c. dissolute - inconstant
 - d. paternal - photogenic
64. In legislative investigations of _____ subjects, there will always be great risks that any standards set up will yield or be circumvented in one way or another.
- a. controversial
 - b. parsimonious
 - c. innocuous
 - d. subliminal

65. Her _____ manner embarrassed the others at the party.
- a. affable
 - b. sapid
 - c. tractable
 - d. gauche
66. Being very _____, he knew what was going on about him.
- a. circumlocutory
 - b. caustic
 - c. choleric
 - d. circumspect
67. His _____ features reminded me of the missing link.
- a. vigorous
 - b. ugly
 - c. simian
 - d. vertiginous
68. The fact is so _____ that no one has ever succeeded even in defining it.
- a. mastoidal
 - b. elusive
 - c. fragmentary
 - d. morbid
69. After seven hours of listening to his interminable story-telling, we finally escaped from the _____ old man.
- a. evasive
 - b. garrulous
 - c. replenished
 - d. surreptitious
70. Matty wanted nothing more than to _____ the pain.
- a. subordinate
 - b. allegate
 - c. increate
 - d. alleviate

STOP END OF SECTION 3

Post-Experimental Questionnaire

1. Consider your own performance on the problems that you were asked to solve at the beginning of the experiment. In your case, to what extent do you consider that your performance was due to each of the following causes: The fact that the task was too difficult; the fact that you did not try very hard; the fact that you were unlucky; and, the fact that you lack the necessary skill and ability. Circle the number below to indicate your answer to each of these questions.

DIFFICULT TASK

1	2	3	4	5	6	7
Not a cause			Somewhat a cause			Very much a cause

DID NOT TRY HARD

1	2	3	4	5	6	7
Not a cause			Somewhat a cause			Very much a cause

BAD LUCK

1	2	3	4	5	6	7
Not a cause			Somewhat a cause			Very much a cause

LACK OF SKILL AND ABILITY

1	2	3	4	5	6	7
Not a cause			Somewhat a cause			Very much a cause

2. Were you suspicious about any aspect of this experiment?

YES____ NO____

3. If your answer to question 2 was yes, could you explain why you were suspicious?
