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Running Head: PANIC ATTACKS AND HYPOCHONDRIACAL CONCERNS

Panic Attacks, Hypochondriacal Concerns, and Selective

Processing of Threat Cues

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Abstract

Cognitive theories of panic disorder and hypochondriasis were investigated using a modification of the Stroop Colour-naming Task. Sixty-two participants were divided into four groups (hypochondriacal panickers, non-hypochondriacal panickers, hypochondriacal non-panickers, and controls) on the basis of their responses to the Illness Behavior Questionnaire and the Panic Attack Questionnaire. Colour-naming times for neutral words and five categories of threat words (imminent physical, imminent mental, non-imminent, autonomic arousal, and non-autonomic arousal) were recorded in order to explore the hypotheses that the perceived imminence of the catastrophe and the types of symptoms that are feared are the key features that discriminate between panic disorder and hypochondriasis. Contrary to predictions, panickers and hypochondriacs did not exhibit selective processing for any category of stimulus items. That is, in comparison to neutral words, panickers did not take longer to colour-name the imminent physical catastrophe, imminent mental catastrophe, and autonomic arousal words, that were most relevant to the experience of panic attacks. Furthermore, subjects with hypochondriacal concerns did not exhibit greater Stroop interference for the non-imminent catastrophe or non-autonomic arousal words that were most closely associated with hypochondriacal ideation. The findings did indicate, however, that panickers and individuals with greater degrees of psychopathology, exhibited slower responding in general. Methodological differences between the present study and previous research with panickers may account for inconsistencies in the findings. Implications of these findings for cognitive theories of panic disorder and hypochondriasis are discussed and suggestions for future research are made.

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Introduction

According to a cognitive view of anxiety disorders (e.g., Beck, Emery, &

Greenberg, 1986), anxious states arise as a result of activity in cognitive structures

(schemata) that selectively process information related to personal danger. Beck et al.

(1986) suggest that "danger" schemata are hyperactive in individuals with anxiety

disorders. This sensitizes the individual for apprehending threatening material that is

consistent with the schemata and facilitates more rapid processing of this information

once it has been perceived (Beck et al., 1986).

Evidence for these structures is indirect, and their existence has been inferred

from reported thought content at times of increased anxiety (Mathews & MacLeod,

1986). Concerns about the validity of self report data, however, prompted some

researchers to seek converging evidence of these danger schemata using the methods of

cognitive psychology. The goal of these researchers was to look for selective detection,

processing, and/or recall, of threatening information in anxious individuals (e.g.,

MacLeod, Mathews, & Tata, 1986; Mathews & MacLeod, 1985; Mathews, Mogg, May,

& Eysenck, 1989; McNally, Amir, Louro, Lukach, Riemann, & Calamari, 1994; Mogg,

Mathews, & Weinman, 1987).

Strategies Used to Study Cognition in Anxiety-Disordered Individuals

Psychologists have used two general strategies to study cognition in anxiety

disordered patients (McNally, Reimann, & Kim, 1990). The first strategy involves the

investigation of thought content using questionnaires and structured interviews (McNally

et al., 1990). The limitations with these studies, however, arise from their exclusive

reliance on introspection and consequent assessment of only the conscious, verbalizable aspects of cognition (McNally et al., 1990).

The second strategy involves the investigation of information processing biases using methods employed by cognitive psychologists (Williams, Watts, Macleod, & Mathews, 1988). The core assumption guiding this approach is that people with anxiety disorders process information about threat differently than do people without these disorders (McNally, 1995). These paradigms are useful in that they do not rely on introspection, and are thus not restricted to conscious cognition (McNally et al., 1990). They have the advantage of exploring biases and information processing tendencies that the individuals themselves may not be consciously aware of and therefore may not report upon questioning.

The Stroop Colour-Naming Task

The Stroop colour-naming task is an example of a paradigm that has been used extensively to study the selective processing of threat cues in patients with various types of anxiety disorders. Subjects are shown words of varying emotional significance, and asked to name the colours in which the words are printed as quickly as possible, while ignoring the meanings of the words. Response latencies in colour-naming (interference effects) occur when the meaning of a word attracts the subject's attention despite his or her attempts to only attend to its colour (McNally et al., 1990).

At present, there is some doubt regarding the number and type of underlying mechanisms leading to Stroop interference. For instance, it may arise from an attentional bias, spreading activation among related representations, post-attentional rumination about the meaning of the word, or some combination of these things (McNally, Amir,

Louro, Lukach, Riemann, & Calamari, 1994). As a result of this uncertainty, the Stroop task cannot be used to demonstrate unequivocally that attention is drawn to threatening stimuli in anxious subjects (Mathews, 1990). It is generally agreed, however, that interference effects occur whenever cognitive representations of the irrelevant word content are simultaneously activated and thus compete for processing resources (Mathews & MacLeod, 1985). It is also the consensus that this format is a reliable and robust method of assessing current concerns and thus is a useful tool in the investigation of cognitive theories of anxiety (Mogg, Mathews & Weinman, 1989).

The Stroop Task and Information Processing Biases in Anxiety Disorders

For the most part, studies employing the Stroop paradigm have consistently illustrated that anxiety disordered individuals exhibit a selective processing bias for stimuli that is related to threat. Interestingly, this bias for threatening words seems to be specific to the particular fears of the individual. For example, relative to healthy controls, spider phobics are slower in colour-naming words related to spiders than neutral words (Watts, McKenna, Sharrock, & Trezise, 1986), social phobics are slower in colour naming social threat words (Hope, Rapee, Heimberg, & Dombeck, 1990), panic disorder patients are slower in colour-naming catastrophe words (McNally et al., 1990) and generalized anxiety disorder (GAD) patients reporting fears in predominantly physical realms are slower to name physical threat words than are a corresponding group reporting predominantly social fears (Mathews & MacLeod, 1985; Mogg et al., 1989). Conflicting results are found less frequently in the research literature (Williams, Mathews, & MacLeod, 1996) but include a recent study that failed to find expected interference effects for threat words associated with motor vehicle accidents in individuals with a

simple phobia of driving (Bryant & Harvey, 1995). Martin, Williams, and Clark (1991) also found no evidence of selective interference for anxious words, as opposed to neutral words, in high, medium or low trait anxious individuals.

The frequently reported worry-congruent interference effects that are found in anxious individuals support a schema based theory of anxiety (Beck et al., 1986). A schema model assumes that threatening stimuli attracts disproportionately more resources than neutral material due to the activation of specific knowledge structures reflecting personal threats. Moreover, according to a schema model, threat stimuli that are particularly relevant to the dominant danger schemata of anxious individuals would be most disruptive for performance on the Stroop Task since the individual would be more likely to attend to and process these stimuli (Mogg, et al., 1989).

Panic Attacks and Cognitive Psychology Paradigms:

Panic disorder is characterized by unexpected anxiety attacks which involve symptoms such as palpitations, shortness of breath, trembling or shaking, and fear of dying or losing control (American Psychiatric Association, [APA], 1994). Individuals with this disorder are persistently concerned about having another panic attack and worry about the possible implications or consequences of the next attack (APA, 1994). Some individuals fear that the attacks indicate the presence of an undiagnosed and life-threatening illness, while others worry that they are going to lose control or go crazy (APA, 1994). Persons who experience these attacks may also begin to avoid situations in which panic may prove incapacitating or embarrassing; in these cases, panic disorder with agoraphobia may be diagnosed (APA, 1994).

Panic disorder typically develops between late adolescence and the middle 30s and is often characterized by a chronic and fluctuating course (APA, 1994). It is a common condition with a life-time prevalence rate of between 1.5% and 3.5%. A large number of studies also indicate that infrequent panic is quite prevalent in the general population (e.g., Donnell & McNally, 1990; Norton, Dorwood, & Cox, 1986; Telch, Lucas, & Nelson, 1989). Furthermore, studies have reported similarities between nonclinical panic (experience of panic attacks but without a panic disorder diagnosis) and panic disorder on dimensions such as panic symptomatology and familial aggregation of panic in first degree relatives (e.g., Donnell & McNally, 1990; Rapee, Ancis, & Barlow, 1988)

Paradigms that do not rely exclusively on conscious cognition are particularly useful for studying panic attacks since the accuracy associated with introspection and delayed recall of the circumstances associated with an attack is questionable for a number of reasons. First of all, cognitive theorists have hypothesized that panic attacks can occur as a result of the individual's response to anxiety-related stimuli without conscious awareness of these stimuli (Beck, 1988; Clark, 1988). Clearly, if unconscious processes do play a role in the arousal of panic, assessments employing questionnaires or interviews will not be comprehensive since they will only reveal the processes associated with panic that are accessible upon introspection.

Secondly, many researchers (e.g., Beck, 1988; Clark, 1988) suggest that panic attacks that seem to occur "out of the blue" are not really spontaneous, but instead reflect circumstances for which the individual is unable to identify the triggering stimuli; often, upon extensive questioning, an internal or external trigger can be discerned (Ottaviani &

Beck, 1987). Clark (1986), for example, describes spontaneous panic attacks by suggesting that their trigger can be an emotional state or some innocuous event such as suddenly getting up from sitting (dizziness) or exercise. Once perceived, the body sensation is interpreted in a catastrophic fashion and a panic attack results (Clark, 1986). In spontaneous attacks, the individual fails to distinguish between the triggering body sensation and the subsequent attack and so perceives the attack as having no cause and occurring "out of the blue" (Clark, 1986). The phenomenon of spontaneous panic attacks suggests that panickers often lack insight regarding the triggers of their attacks and if this is the case, results obtained using structured interviews and questionnaires may not be particularly enlightening.

Limitations, such as those described above, highlight the usefulness of cognitive psychology paradigms in the study of panic disorder and a number of studies have recently been conducted in this area (e.g., Carter, Maddock,& Magliozzi, 1992; Chen & Rosenbaum, 1994; Cloitre, Shear, Cancienne, & Zietlin, 1994; Ehlers & Margraf, 1988; McNally, Amir, Louro, Lukach, Riemann, & Calamari, 1994; McNally, Reimann, & Kim, 1990; McNally, Riemann, Louro, Lukach, & Kim, 1992; Otto, McNally, Pollack, & Rosenbaum, 1994). In general, the findings of these studies are consistent with previous research employing anxious individuals and reveal that panickers demonstrate a selective processing bias for threat-related words. More specifically, these studies have illustrated that panickers show selective processing biases for threat words associated with physical catastrophe, bodily sensations, and fear, all of which represent domains that are specifically related to the experience of panic.

These results support the assumptions that form the basis for cognitive theories of

panic disorder and suggest that panic attacks occur as a result of the catastrophic

misinterpretations of bodily sensations (Beck, 1988; Clark, 1986, 1988). Moreover, they

are consistent with studies which have examined the conscious cognitions associated with

panic attacks (i.e., by interview, questionnaire, or self-monitoring) and have illustrated

that onset of panic is associated with thoughts related to physical and mental catastrophe

and the misattribution of somatic or psychological experiences (Ottaviani & Beck, 1987;

Westling & Ost, 1993).

Research Findings

The earliest study that examined the selective processing biases of panickers

required subjects to colour-name *neutral* words, *physical threat* words, *separation*

words, and *embarrassment* words. The threat words were all chosen based on their

conceived relevance to the experience of panic (Ehlers et al., 1988). The authors reported

that both panic patients and non-clinical panickers took significantly longer to colour-

name physical threat words as opposed to neutral words. This interference, however, was

restricted to the physical threat words, since both types of social threat words (separation

and embarrassment) did not cause significant interference in colour-naming times for the

panickers. Specifically, panickers colour-named separation words and embarrassment

words as quickly as they colour-named neutral words indicating that these types of words

did not appear to be selectively processed.

The authors also divided the patient and control groups according to the threat

domain that the individuals reported as the most worrisome (physical or social). In

contrast to the results of Mathews and MacLeod (1985), who found a relationship (in

GAD patients) between the reported domain of worry and interference effects, Ehlers et al. (1988) found that all panic disorder patients, including those who reported social worries as their primary concern, showed increased interference in colour-naming physical threat words. Ehlers et al. (1988) concluded that it is unclear if the selective processing of threat words in panic disorder patients is reflective of the reported domains of concern.

In another study, McNally et al. (1990) had subjects colour-name *neutral* words (e.g., typical), *fear* words (e.g., panic), *bodily sensation* words (e.g., heartbeat) and *catastrophe* words (e.g., heart attack) and reported that, in contrast to controls, panic patients exhibited greater Stroop interference for all threat words, especially those associated with catastrophe. This study was particularly interesting in that the control group consisted of Ph. D. level clinical psychologists who were experienced in the treatment of panic disorder; thus, the possibility that the interference effect was due to familiarity with threatening information could be ruled out.

A third study tested the hypothesis that the emotional Stroop Task could discriminate between panic disorder and major depression and required subjects to colour-name *neutral* words, *physical threat* words, words related to *depression*, and *panic threat* words (Carter et al., 1992). The results indicated that, compared with the control group and the depressed group, the panic disorder patients showed significantly more interference when colour-naming only panic-related threat words. They did not find the same effect with depressives for the depressed word content.

Furthermore, McNally et al. (1994) attempted to assess the specificity of the findings for panic disorder by comparing panic patients to patients with obsessive

compulsive disorder (OCD) and normal controls on a computerized emotional Stroop task. Subjects were required to colour-name *panic threat* words (e.g., collapse), *general threat* words (e.g., infectious), *positive words related to panic* (e.g., relaxed) and *neutral* words (e.g., sleepy). In accordance with their prediction, panic patients, but not OCD patients, exhibited greater interference for panic threat words than for positive words related to panic and for neutral words.

In another study, panic-disordered patients, obsessive compulsive patients, and normal control subjects were exposed to either a high (e.g., exercise) or low arousal manipulation prior to performing a computerized version of the modified Stroop colour-naming paradigm (McNally et al., 1992). Subjects named the colours of *neutral* words, *positive* words and threat words associated with *fear, bodily sensations*, and *catastrophe.* Panic disorder patients took significantly longer to colour-name catastrophe words than bodily sensation words, fear words, and positive words. No effects involving the arousal variable were significant, which was inconsistent with the researchers' hypothesis that arousal might enhance interference for threat cues in panic disorder subjects.

Finally, Cloitre et al. (1994) investigated explicit (cued recall) and implicit memory (word completion) bias for catastrophic associations among individuals with panic disorder. Compared to the control groups (clinician controls and normal controls), panic disorder patients showed biased explicit and implicit memory for catastrophic associations to bodily sensation words relative to positive and neutral word pairs of equal relatedness. They reported that their findings were consistent with cognitive theories of panic disorder which propose that these patients have a biased memory for catastrophic associations and that these types of associations can occur with and without awareness.

Moreover, since one of the control groups consisted of clinicians who were experienced in the treatment of panic disorder, the possibility that the memory biases were a function of familiarity with threatening information was ruled out.

In summary, the results of the studies to date on panic disorder patients and non-clinical panickers indicate that both groups exhibit selective processing of threat-related stimuli. Moreover, the type of threatening stimuli that cause interference are consistent with what would be predicted on the basis of a cognitive-behavioural conceptualization of panic.

Limitations of Previous Research

(1) *Importance of mental catastrophe as well as physical catastrophe:*

In terms of the typical fears and cognitions associated with panic attacks, there are some areas that this research literature has not yet addressed. For instance, the studies have generally included a dimension of physical catastrophe (e.g., heart attack) but have failed to consider fears of mental catastrophe, which predominate in many individuals. Ottaviani and Beck (1987) studied the cognitions associated with panic in 30 panic disorder patients and reported that in all cases, arousal of panic was associated with thoughts related to physical and / or mental catastrophe. The verbal ideation and imagery concerning physical catastrophe included fainting, heart attacks, choking, suffocating, and dying, whereas images of mental catastrophe included fears of losing control or going crazy. For some patients, fears of mental catastrophe were absent and physical catastrophe was the only concern; for others, the reverse was true. Finally, some individuals reported thoughts and images associated with both types of catastrophe. Ottaviani and Beck (1987) also reported that social humiliation concerned a proportion of

the panickers, however this was secondary to the fears of physical or mental catastrophe since these patients feared humiliation would follow the attack, occurring as a consequence of the feared physical or mental catastrophe. These findings suggest that in order to adequately capture the central fears experienced by panickers, future studies should ensure that the threatening stimuli included are representative of catastrophe in both physical and mental domains. While social threat words could also be used, they are probably less relevant since they are not central to the experience of panic and they tend to involve fears that are secondary to the imminent physical or mental catastrophe experienced by the panickers.

(2) Hypochondriacal fears and panic disorder:

In terms of the specific fears associated with panic attacks, the information processing research literature has also failed to explore the relationship between hypochondriacal fears and panic disorder. The essential feature of hypochondriasis is preoccupation with a belief in or fear of having a serious illness (Warwick & Salkovskis, 1990). These fears are associated with the perception of bodily signs and sensations which are perceived as evidence of a serious illness. This definition suggests a similarity with the cognitive-behavioural conceptualizations of panic attacks since both groups tend to interpret bodily sensations as indicators of catastrophic physical or mental illness (Warwick & Salkovskis, 1990).

Hypochondriacal concerns which range from disease phobias to bodily preoccupations have been identified in 50-70% of panic disorder patients (Buglass, Clark, Henderson, Kreitman, & Presley, 1977; Sheehan, Ballenger, & Jacobson, 1980). Moreover, these concerns have been shown to decrease with effective treatment (Fava,

Kellner, Zielezny, & Grandi, 1988; Noyes, Reich, Clancy, & O'Gorman, 1986; Sheehan

et al., 1980). Recent cognitive research also suggests similarities in the pathogenesis of

the two conditions (Barsky, Barnet, & Cleary, 1994). Researchers have reported that

amplification of benign bodily sensations occurs prominently in hypochondriacal patients

(Barsky, 1992; Barsky & Wyshak, 1990). Moreover, panic attacks have been

characterized as acute hypochondriacal states in which the patient mistakenly attributes

the benign sensations of physiological arousal to a serious medical disease and

catastrophizes them (Clark, 1986; Beck et al., 1985; Hibbert, 1984). Although studies of

panic disorder and hypochondriasis frequently report co-occurrence and overlap between

these two disorders, the nature of this association remains uncertain (Noyes et al., 1986).

Distinction Between Panic Disorder and Hypochondriasis

It has been suggested that the two disorders differ from one another on the basis

of the imminence of the harm (Clark, 1988; Warwick & Salkovskis, 1990). For example,

in hypochondriasis, the harm is believed to exist in the future as opposed to the present,

whereas in panic disorder, the anticipated harm is perceived as much more imminent.

That is, whereas hypochondriacal patients typically tend to believe that the symptoms

indicate a more insidious course, patients experiencing panic attacks believe that the

anticipated catastrophe is happening already, or is about to happen in a few moments

(Warwick & Salkovskis, 1990). Moreover, panic patients typically fear conditions that

occur suddenly, such as heart attacks or strokes, whereas hypochondriacal fears may

involve diseases such as cancer or multiple sclerosis. After reviewing studies by Beck et

al. (1974) and Ottaviani and Beck (1987), Beck (1988) concluded that when the

individual's fear is of some condition that is not immediately threatening to survival, such as gastrointestinal, musculoskeletal, or kidney disease, panic is less likely to occur.

It has also been noted that the types of symptoms which are feared are different for hypochondriasis and panic disorder. Panic patients tend to misinterpret autonomic symptoms, which are mostly (but not invariably) those involved in the acute anxiety response; this provides an obvious feedback mechanism by which anxiety may rapidly escalate. On the other hand, hypochondriacal individuals are more likely to misinterpret a wider range of bodily stimuli, many of which are not commonly occurring elements of the anxiety response and therefore not subject to direct amplification (e.g., aches, lumps, and blemishes) (Clark, 1986; Warwick & Salkovskis., 1990). Moreover, the feedback mechanism is more likely to be behavioural and longer-term; for example, the individual may maintain focus on particular parts of the body by repeated checking of the area (Warwick & Salkovskis, 1990).

Cognitive Perspective on Health Anxiety

A cognitive perspective of health anxiety, panic attacks, and hypochondriasis suggests that bodily signs and symptoms are perceived as more dangerous than they really are (Beck, 1988; Clark, 1986, 1988; Salkovskis, 1989; Warwick & Salkovskis, 1989). The cognitive hypothesis suggests that catastrophic interpretations associated with health can lead to one of two patterns of anxiety (Warwick & Salkovskis, 1990). If the sensations or signs are not those which increase as a result of anxiety, or the patient does not regard the feared catastrophe as immediate, then the reaction will be hypochondriacal anxiety about health. On the other hand, if the symptoms that are misinterpreted are those which occur as part of the anxiety response, and if the individual interprets these

symptoms as signs of immediate catastrophe, a further immediate increase in symptoms

results and a panic attack is the more likely response (Warwick & Salkovskis, 1990).

It is important to note the implications associated with this suggested distinction

between hypochondriacal ideation and panic ideation. Firstly, this conceptualization

suggests that hypochondriacal anxiety about health is generally associated with the

misinterpretation of symptoms that are not part of the anxiety response, and therefore not

subject to direct amplification. It also implies, however, that hypochondriacal anxiety

can occur in association with autonomic types of symptoms, so long as the danger

associated with these symptoms is not considered to be imminent. If the danger is

considered to be imminent, then a panic attack is the more likely result. Thus, according

to this differentiation, the imminence of the perceived danger seems to be the key

discriminator between hypochondriacal ideation and panic ideation.

One should also consider that this distinction does not preclude the coexistence of

hypochondriacal ideation and panic ideation in the same individual. That is, individuals

may fear symptoms associated with both imminent threat (e.g., palpitations signifying a

heart attack) as well as long term threat (e.g., palpitations signifying a heart problem, or

an unusual lump indicating cancer). Noyes et al. (1986) noted that hypochondriasis

seems to be a prominent feature of panic disorder, indicating that despite the differences

in the types of symptoms and time course of the feared illness, the ideation in panic and

hypochondriasis is similar and the two presentations frequently overlap.

Do Hypochondriacal Panickers Differ from Non-hypochondriacal Panickers?

A logical research question that follows from this, and has yet to be addressed,

concerns a determination of the differences between individuals who exhibit both

hypochondriacal and panic ideation, as opposed to panickers without hypochondriacal fears. As mentioned previously, these two subgroups seem to exist, since not all panickers score highly on measures of hypochondriasis (Noyes et al., 1986). In line with the suggestion that hypochondriacal ideation is associated with fears of long-term harm, whereas panic ideation concerns fear of imminent catastrophe, it is plausible to suggest that hypochondriacal panickers should be characterized by fears of both immediate *and* long-term danger. Thus, worries about insidious illnesses such as cancer or multiple sclerosis, should occur in association with worries about immediate catastrophe such as having a heart attack or a stroke. On the other hand, panickers who are not characterized by hypochondriacal ideation, should be fearful of imminent catastrophe, but not preoccupied with worries about getting (or having) a serious illness.

In line with these predictions, it could also be suggested that individuals who obtain high scores on measures of hypochondriasis, but do not panic, should be characterized by fears of future illness or harm, but not by worries of imminent physical or mental catastrophe. Moreover, the misinterpretations of these individuals should be more likely to occur when evaluating symptoms that are not part of the anxiety response; however if autonomic symptoms are misinterpreted, fears of imminent catastrophe associated with these symptoms should be absent (otherwise, we would expect these individuals to be panicking). Using methods of cognitive psychology to study the information processing biases of this group should be particularly interesting since, to date, these types of paradigms have not been incorporated into studies of hypochondriasis or somatoform disorders in general.

Purpose of the Present Study

The purpose of the present study was to use the Stroop Task to further explore the phenomenon of selective processing of threat cues in individuals who panic. In particular, the relationship between hypochondriasis and panic attacks was explored by comparing the information processing biases of individuals who were characterized by both hypochondriacal ideation and panic ideation to individuals who panicked, but did not exhibit hypochondriacal anxiety about health. The main question being addressed concerned the importance of the imminence of the catastrophe as the main discriminator between panic disorder and hypochondriasis.

Based on the proposed distinction between hypochondriasis and panic disorder, it was predicted that hypochondriacal panickers should be slower than controls in colour-naming threat-words associated with imminent physical and / or mental catastrophe (e.g., heart attack, psychotic) and future catastrophe (e.g., cancer). On the other hand, non-hypochondriacal panickers should be slower than controls in colour-naming only those threat words associated with imminent or immediate harm (e.g., heart attack, stroke, etc.).

In line with the cognitive perspective on hypochondriasis, it was also hypothesized that non-panickers who experienced hypochondriacal ideation should show processing biases (evidenced by slower colour-naming times) for non-imminent threat words (e.g., cancer), however, they should not show processing biases for stimuli associated with immediate catastrophe (e.g., heart attack, stroke, etc.).

In terms of the autonomic sensations that are associated with panic attacks (e.g., palpitations, sweating, etc.), panickers of both types (e.g., hypochondriacal and non-hypochondriacal) were expected to selectively process threat words describing these

types of symptoms since they are part of the anxious response. On the other hand, hypochondriacal non-panickers were expected to be less likely to selectively process these type of threat cues; however, if selective processing was evident, it was not expected to be accompanied by fears of immediate catastrophe, otherwise one would expect this group to be panicking.

Finally, it was predicted that the control group would colour-name all the words at an equal rate since they should not selectively process any of the word types. The control stimuli (coloured, meaningless stimuli, e.g., XXX, XXXX) were expected to produce the least amount of interference for each of the experimental groups since these were non-words. Neutral stimulus words were expected to produce the next smallest amount of interference (Appendix A).

<div align="center">Method</div>

Subjects

Subjects were recruited from undergraduate psychology classes and the general student population at Lakehead University. Students in introductory psychology classes were recruited through brief oral descriptions of the project that were given by the author, before or after regular lectures. They were compensated by one bonus point towards their final mark in the course. Volunteers from the general university population were recruited using posters which were displayed around campus. In total, 62 subjects were recruited and tested. The sample was composed of 20 (32.3%) males and 42 (67.7%) females with a mean age of 22.53 (SD = 7.14) years.

Subjects were assigned to groups on the basis of their responses to the questionnaire measures which consisted of the Panic Attack Questionnaire (Norton et al.,

1985) (Appendix B) and the Illness Behaviour Questionnaire (IBQ) (Pilowsky & Spence,

1983) (Appendix C). Subjects who reported experiencing at least one panic attack in the

past year were classified as hypochondriacal panickers or non-hypochondriacal panickers,

depending on their score on the Illness Behaviour Questionnaire. If their scores on the

Whiteley Index (Appendix D) of the IBQ were greater than or equal to five (with 14

being the maximum possible score), they were placed in the hypochondriac / panic group.

This resulted in a sample of 10 subjects with a mean score on the Whiteley Index of 8.00

(SE = 0.80). Eight of these panickers had experienced more than one panic attack in the

past year, and the mean number of panic attacks experienced by this group in the past

year was 8.70 (SE = 4.69). Panickers with scores on the Whiteley Index that were less

than 5 were placed into the panic group, which also resulted in a sample of 10 subjects.

The mean score on the Whiteley Index for this group was 2.20 (SE = 0.44). Nine of these

subjects had experienced more than one panic attack in the past year and the mean

number of panic attacks experienced by the entire group in the past year was 8.2 (SE =

4.69).

Subjects who did not report experiencing panic attacks and had scores that were

greater than or equal to 5 on the Whiteley Index of the IBQ were classified as

hypochondriacs. This group also consisted of 10 subjects with a mean Whiteley Index

score of 6.40 (SE = 0.58).

Finally, the initial control group was composed of subjects who did not report

experiencing panic attacks in the last year (but may have experienced panic attacks more

than a year ago) and had scores of less than 5 on the Whiteley Index. Thirty-two of the

62 subjects belonged to this group. The control group was later modified such that it only

contained subjects who had scores of less than 2 on the Whiteley Index. This was to ensure that subjects in the control group exhibited very little, if any, hypochondriacal concern. In addition, subjects who had experienced a panic attack at anytime in their life were removed from the control group. This resulted in a sample consisting of 19 subjects. Finally, 3 of these subjects were removed from this sample due to concerns about the accuracy of their classification. More specifically, upon completion of the computer task, one of these subjects reported difficulties differentiating between yellow and green. A second subject indicated that they had experienced panic attacks but did not fill in the rest of the questionnaire and the third subject reported that they had never experienced panic attacks, but later described symptoms that were consistent with one. Removal of these subjects resulted in a final control sample that consisted of 16 subjects.

Comparisons of the four groups on the basis of age [$F(3, 42) = 2.17$, $p = .11$], sex [$X^2(3) = 3.68$, $p = .30$] and education level [$F(3, 42) = 1.07$, $p = .37$] indicated that there were no significant differences between the groups on any of these demographic measures. Percentages of males and females in each group, and group means for age and education are presented in Table 1.

Questionnaires

Subjects completed the Illness Behavior Questionnaire and the Panic Attack Questionnaire for the purposes of classifying them into one of 4 groups: a *control* group (consisting of non-hypochondriacal non-panickers), a *hypochondriac* group (consisting of hypochondriacal non-panickers, a *panic* group (consisting of non-hypochondriacal panickers, and a *hypochondriac / panic* group (consisting of hypochondriacal panickers).

Table 1

Mean Age and Education Level and Percentage of Males and Females in Each Group

	Age (in years) (Standard Error)	Education Level (in years) (Standard Error)	Sex (%)
Control Group (n=16)	19.94 (0.35)	14.31 (0.18)	male = 50% female = 50%
Hypochondriac Group (n=10)	20.60 (0.83)	14.30 (0.15)	male = 30% female = 70%
Panic Group (n=10)	22.7 (2.63)	14.80 (0.49)	male = 20% female = 80%
Hypochondriac / Panic Group (n=10)	26.30 (3.46)	14.90 (0.38)	male = 20% female = 80%

Illness Behavior Questionnaire. The Illness Behavior Questionnaire is a 62 item

self-report questionnaire that is designed to measure a respondent's attitudes, ideas,

affects and attributions in relation to illness. Fourteen of the items, known as the

Whiteley Index of Hypochondriasis (Appendix D), have been shown to discriminate

between hypochondriacal and non-hypochondriacal patients (Pilowsky, 1967). The IBQ

has good reliability with one to twelve week test-retest correlations that range from .67 to

.87 for the subscales. Test-retest correlations for the Whiteley Index, specifically, have

been reported to equal .85 (Pilowsky & Spence, 1994). The IBQ also has good face and

content validity and, in several studies, has distinguished predictably between criterion

groups (Pilowsky & Spence, 1994). As discussed previously, for the purposes of this

study, subjects with a score greater than or equal to 5 on the Whiteley Index of the IBQ

were classified as hypochondriacs.

Panic Attack Questionnaire. The Panic Attack Questionnaire (Norton, Dorward &

Cox, 1986; Norton, Harrison, Haunch & Rhodes, 1985) is also a self-administered

instrument that has been used extensively, particularly in non-clinical populations, to

identify individuals with history of panic (e.g., Brown & Cash, 1989; Cox, Endler,

Swinson, & Norton, 1992; Cox, Endler, & Swinson, 1991; Wilson, Sandler, Asmundson,

Ediger, Larsen, & Walker, 1992). The revised edition requests demographic information

and also contains a detailed description of panic to which respondents can compare their

experience (Whittal, Suchday, & Goetsch, 1994). The questionnaire also includes items

concerning the number of panic attacks the individual has experienced, the spontaneity of

panic, the type of harm that is feared (i.e., mental or physical), symptoms associated with

the most severe panic attack, extent of agoraphobic avoidance, and familial history of

panic. In order to be classified as panickers, subjects in this study were required to have experienced at least 1 panic attack in the past year. The attacks must have also included at least 5 of the 26 symptoms with an average symptom severity rating of at least 2 (moderate severity).

Stimulus Words for the Stroop Task

The words that were used in the Stroop colour-naming task were selected to be representative of one of 7 categories (imminent physical threat, imminent mental threat, non-imminent threat, autonomic arousal symptoms, non-autonomic arousal symptoms, neutral, and control). To obtain the threat and neutral words, a list of 130 words was generated using previous research on panic disorder and hypochondriasis, as well as a dictionary and a thesaurus. Two clinical psychology graduate students were then asked to sort the 130 words into each of the categories. Only words for which the categories were unanimously agreed upon were selected for final consideration.

In making the final selection, Thorndike and Lorge's (1944) book of word frequency counts was employed to ensure that the average frequency of the words in each of the categories was similar. Words were also selected such that the average length (i.e., number of letters) of the words comprising each category was similar.

In order to control for the possibility that stimulus items which consist of two words (e.g., cardiac arrest) may result in significantly different response latencies than one word (e.g., coronary) items, whenever possible, words in each category of threat words were chosen such that they consisted of a similar number of two-word and one-word stimulus items. In addition, the neutral words were chosen to reflect both one-word

and two-word stimulus items to allow comparisons of interference indices for each stimulus type.

The final word list was comprised of 77 items with 11 items per category (Appendix E). The *imminent physical threat* words described immediate physical catastrophe and were as follows: heart attack, asphyxiate, hemorrhage, suffocate, sudden death, aneurysm, stroke, coronary, choke, cardiac arrest, and seizure. The *imminent mental threat* words described immediate mental catastrophe and were: lose control, go crazy, demented, distraught, hysterical, insane, disoriented, deranged, delirious, psychotic, and frantic. The *non-imminent threat* words represented less immediate types of physical threats and the following stimulus items were used: diabetes, AIDS, heart disease, epilepsy, multiple sclerosis, cystic fibrosis, Alzheimer's, cancer, tuberculosis, malignant, incurable. The symptom words consisted of *autonomic arousal* words (panting, palpitations, flushes, breathless, gasping, shaky, sweating, dizzy, quivering, shivers, lightheaded) and *non-autonomic arousal* words (rash, headache, swelling, ache, sore, blotchy, lump, cramp, inflammation, bruise, scar). The *neutral* words (coffee table, assembly, semester, pledge, kilogram, sand box, magistrate, book shelf, dish soap, heighten) had no relevance at all to panic attacks or hypochondriacal concerns. Finally, the last category consisted of non-words (e.g., XXXXX, XXX) which were selected as control stimuli.

Apparatus

A computerized version of the modified Stroop colour-naming task was used. Words were displayed on a MacIntosh II/ci computer with a 13 inch screen. The stimulus words appeared in uppercase letters at the center of the screen and remained

there until subject verbally named the colour. The computer recorded response latencies (in milliseconds) using a voice activated microphone which stopped the computer's clock at the initiation of the subject's vocal response.

Procedure

Subjects were initially asked to sign a consent form to indicate their willingness to participate in the study (see Appendix F). They were then asked to complete the Illness Behavior Questionnaire and the Panic Attack Questionnaire. Following this, subjects were told that they were going to see a number of words written in blue, green, yellow, red, or brown. They were shown a screen with the five colours in order to familiarize them with each colour and ensure that they were able to discriminate between them. The subjects were further instructed that their task was to name out loud the colours in which the words were written, as quickly and accurately as possible.

When it was clear that the subjects understood the task they began a practice trial which involved colour-naming ten neutral words (different to the neutral words that comprised the experimental trials). Finally, they were asked if they had any further questions and if they did not, the experimental trials commenced immediately. Five experimental trials ensued, each consisting of 79 stimulus-item presentations. The first two words in each of the five experimental trials were actually items from the practice trials and were not considered in the statistical analyses. The other 77 items constituted the stimulus items which were chosen on the basis of the previously described selection procedure.

Stimulus words were presented in a different random order for each of the five trials (Appendix G) with the restriction that each word appeared in each of the different

colours and the same colour could not occur twice in succession. Previous researchers have employed either randomized or grouped formats of stimulus item presentation however, due to concerns about the potential influence of priming on the grouped format, randomized presentations were used in the present study.

Errors were recorded by the experimenter with five different situations constituting an error: (1) subject did not respond loudly enough to be recorded by the computer; (2) subject responded with the wrong colour; (3) subject responded by saying the stimulus word rather than the colour (4) and (5) miscellaneous errors (e.g., coughing, laughing, talking to the experimenter during stimulus item presentation).

Upon completion of the Stroop colour-naming task, subjects were debriefed and given a written (see Appendix H) and verbal explanation of the purpose of the study. Subjects were also encouraged to ask any questions that they may have. In addition, they were given the opportunity to obtain copies of the results of the study.

Data Analysis

Mean response times were calculated for each category of words averaged over the five presentations. Response latencies for items that were coded as errors were not included in these averages.

To control for individual differences in response latency, raw response latencies were also converted into response latency interference indices which were the difference between the mean latency of each category of stimulus words and the mean latency of the neutral stimulus words.

Results

<u>Preliminary Analyses</u>

To determine whether any extreme scores were present in the data, the score distributions for response times and interference indices were examined using z scores of greater than +3.00 or less than -3.00 as a criterion. No outliers were detected. In addition, normality of the score distributions for these variables was assessed in each of the four groups. More specifically, the significance of the skewness for the reaction time distributions was evaluated by dividing the skewness by the standard error of the skewness (Tabachnick & Fidell, 1996) and using z scores of greater than +3.00 or less than -3.00 as a criterion. With the exception of the mean difference scores for the autonomic arousal words (which were slightly positively skewed in the hypochondriac / panic group), and the mean difference scores for the imminent physical catastrophe words (which were slightly positively skewed in the hypochondriac group), no other instances of significant skewness were found (Tables 2 and 3). Since no outliers were detected, and skewness of the score distributions was not a significant problem, data transformations were not considered necessary.

Errors were rare and occurred on only 1.9 % of the total trials of the experiment. Consequently, no further error analyses were conducted and trials with errors were excluded from data analyses.

<u>Mixed ANOVA and Post Hoc Comparisons</u>

To examine group and word-type differences, mean response latencies were subjected to a 4 (groups) by 7 (word-type) mixed analysis of variance. Significant effects for group [F (3, 42) = 3.01, p = .041] and word-type [F (6, 252) = 47.71, p < .001] were

Table 2

Skewness and Standard Error of Skewness For Mean Response Times

Word Type

	Imminent Physical Threat	Imminent Mental Threat	Non-imminent Threat	Auto-nomic Arousal	Non-autonomic Arousal	Neutral	Control
Control Group	0.81 (0.56)	1.02 (0.56)	1.01 (0.56)	1.06 (0.56)	0.83 (0.56)	0.82 (0.56)	0.87 (0.56)
Hypochondriac Group	0.15 (0.69)	0.26 (0.69)	-0.36 (0.69)	-0.24 (0.69)	0.17 (0.69)	-0.12 (0.69)	0.06 (0.69)
Panic Group	-0.20 (0.69)	-0.07 (0.69)	-0.20 (0.69)	-0.23 (0.69)	0.01 (0.69)	0.01 (0.69)	0.25 (0.69)
Hypochondriac / Panic Group	0.34 (0.69)	0.34 (0.69)	0.19 (0.69)	0.61 (0.69)	0.74 (0.69)	0.23 (0.69)	0.13 (0.69)

Table 3

Skewness and Standard Error of Skewness For Mean Response Latency Interference
Indices

Word Type

	Imminent Physical Threat	Imminent Mental Threat	Non-imminent Threat	Auto-nomic Arousal	Non-autonomic Arousal	Control
Control Group	0.67 (0.56)	1.11 (0.56)	1.46 (0.56)	0.54 (0.56)	0.07 (0.56)	-0.57 (0.56)
Hypochondriac Group	2.44 (0.69)	-0.35 (0.69)	-0.20 (0.69)	-0.54 (0.69)	-0.84 (0.69)	-0.13 (0.69)
Panic Group	1.11 (0.69)	0.44 (0.69)	0.82 (0.69)	0.25 (0.69)	-1.30 (0.69)	-0.48 (0.69)
Hypochondriac / Panic Group	-0.58 (0.69)	-0.21 (0.69)	0.54 (0.69)	2.12 (0.69)	0.69 (0.69)	-0.01 (0.69)

revealed. The group by word-type interaction just failed to reach significance [F (18, 252) = 1.63, p = .054]. Newman-Keuls analyses (p < .05) were employed to determine which groups were significantly different from one another in terms of their mean response times. Surprisingly, these analyses revealed that none of the group means were significantly different from each other, calling into question the validity of the significant group effect. However, the least significant difference (LSD) test, which is a less conservative post hoc test than the Newman-Keuls, did detect significant group differences and indicated that mean response times for the hypochondriac / panic group were significantly longer than the mean response times for the control group and the hypochondriac group. Mean response times for the other groups did not significantly differ from one another. It is worth noting, however, that the means for each of the groups (Table 4) do exhibit a consistent pattern. The hypochondriacal panickers consistently exhibited longer mean response times for each category of stimulus items than did individuals in each of the other three groups. In addition, subjects in the panic group also appeared to demonstrate consistently longer response times for each category of stimulus items when compared to subjects in the hypochondriac and control groups.

Newman-Keuls analyses (p < .05) on the main effect of word-type revealed that mean response latencies for words in each of the six categories were significantly greater than mean response latencies for the control words. To further explore this effect, a second ANOVA was conducted after control stimuli (e.g., XXX) were removed. The results of this analysis indicated that the control items were the main contributors to the significant main effect of word-type since this effect failed to reach significance after removal of control stimuli [F (5, 210) = 1.59, p = .164].

Table 4

Mean Response Times (in milliseconds) and Standard Errors for Each Category of Stimulus Items

	Word Type							
	Imminent Physical Threat	Imminent Mental Threat	Non-imminent Threat	Auto-nomic Arousal	Non-auto-nomic Arousal	Neutral	Control	Mean Time
Control Group	634.21 (28.93)	638.93 (29.64)	653.36 (31.60)	635.66 (30.60)	645.38 (29.01)	636.26 (28.65)	586.71 (22.47)	632.93 (28.42)
Hypochondriac Group	626.48 (22.87)	630.48 (24.58)	644.06 (25.62)	635.06 (22.81)	641.58 (24.81)	642.18 (25.18)	592.04 (22.39)	630.27 (23.59)
Panic Group	728.40 (32.37)	717.08 (30.56)	730.82 (31.99)	725.08 (32.09)	724.72 (28.95)	718.54 (31.46)	659.50 (29.71)	714.88 (30.34)
Hypochondriac / Panic Group	759.58 (51.15)	755.76 (46.90)	747.16 (41.38)	757.4 (47.07)	757.02 (48.61)	739.64 (137.0)	668.48 (100.8)	740.72 (43.85)

In order to control for individual differences and facilitate comparisons of response latencies for different word-types, a third ANOVA, using response latency interference indices (difference scores calculated by subtracting the mean response latency for the neutral words from the mean response latency for each category of threat words) was conducted (Table 5). This procedure controls for general colour-naming speed while enabling between group comparisons of relative Stroop interference associated with the threat words (McNally et al., 1990). The goal of the analysis was to determine whether significant differences between groups on each of the word-types would be evident once overall differences between subjects had been controlled for. Stroop interference indices were initially subjected to a 4 (group) by 6 (word-type) mixed ANOVA. With control items left in the analysis, the main effect of group was no longer significant [$F_{(3, 210)} = 0.76$, $p = .524$], however the main effect of word-type [$F_{(5, 210)} = 55.82$, $p < .001$] remained highly significant and a significant group by word-type interaction [$F_{(15, 210)} = 1.75$, $p = .044$] was revealed. For the main effect of word-type, post hoc comparisons using Newman-Keuls analyses revealed that the mean response latency interference indices for the stimulus word groups were significantly greater than the mean response latency interference indices for the control items ($p < .01$). However, mean response latencies for each category of words were not significantly different from one another. Newman-Keuls analyses on the simple effects of the interaction showed that each of the groups exhibited greater mean response latencies for the stimulus words than for the control stimulus non-words ($p < .01$). However, response latencies for each category of stimulus words did not differ significantly. In addition, between group

Table 5

Mean Response Latency Interference Indices (in milliseconds) and Standard Errors for Each Category of Stimulus Items

Word Type

	Imminent Physical Threat	Imminent Mental Threat	Non-imminent Threat	Non-autonomic Arousal	Non-autonomic Arousal	Control	Mean Time
Control Group	-2.05 (8.05)	5.01 (5.77)	17.1 (8.23)	-0.60 (7.21)	9.11 (6.85)	-49.55 (9.35)	-3.60 (6.11)
Hypochondriac Group	-15.7 (5.61)	-9.76 (3.70)	1.88 (6.48)	-7.12 (6.52)	-0.60 (5.09)	-50.14 (9.57)	-13.57 (4.20)
Panic Group	9.86 (15.64)	-3.24 (9.59)	12.3 (6.21)	6.54 (7.17)	6.18 (4.75)	-59.04 (9.19)	-4.57 (6.63)
Hypochondriac / Panic Group	19.9 (14.40)	13.10 (9.07)	7.52 (10.07)	17.7 (11.13)	17.4 (13.06)	-71.06 (13.54)	0.76 (8.11)

comparisons of mean response times for each category of stimulus items revealed no significant differences between any of the groups for any of the categories.

These post-hoc findings were further supported when the control words were removed and the mean response latency interference indices were subjected to a 4 (group) by 5 (word-type) analysis of variance. The main effect of word-type [F (4, 168) = 1.47, p = .215] and the interaction between group and word-type [F (12, 168) = 1.21, p = .277] were no longer significant. Thus, the control non-words were the key contributors to the significant main effect of word-type and the significant group by word-type interaction.

A number of t-tests were also conducted to further explore the main effect of group and compare overall mean response times for each of the groups. In addition to corroborating the group differences revealed by the LSD test, the t-tests also revealed a difference between the hypochondriac group and the hypochondriac / panic group [t(18) = -2.20, p= .042, two-tailed] with the latter group exhibiting significantly longer mean response latencies. A corresponding difference between the control group (which, surprisingly, had a marginally higher overall mean response time than the hypochondriac group) and the panic group was not found. Since Bonferonni corrections were not made for these comparisons, the findings should be interpreted with caution.

Finally, since the neutral word category consisted of a disproportionate number of double-word and single word stimulus items, ANOVAs and post hoc comparisons were repeated on modified response time data. This was done in order to exclude the possibility that single-word and double-word items were associated with significantly different amounts of Stroop interference. More specifically, the data were modified to

ensure that the neutral word category consisted of the same proportion of double word

and single word items as the average proportions in each of the threat word categories.

Consequently, 4 of the double word items in the neutral word category were ignored in

this analysis and a total of 8 neutral items were considered. Stimulus words and response

times for each of the other categories remained unchanged. Repetition of the ANOVAs

and the post hoc comparisons on this slightly modified data set resulted in the same

conclusions as those made after the analyses that had been conducted on the original data

set, indicating that the single to double-word ratio had no significant effect on the

findings.

Three-Way Mixed ANOVA and Post Hoc Comparisons

Inspection of Table 4 strongly suggested that slower responding was associated

with the two panic groups. That is, subjects with panic attacks were slower to respond in

general. To evaluate this observation statistically, the data were reanalyzed using a 2

(panic versus non-panic) by 2 (hypochondriac versus non-hypochondriac) by 7(word-

type) mixed ANOVA. Individuals were classified as panickers or non-panickers, and

hypochondriacs, or non-hypochondriacs, in the same manner as has been previously

described; however, instead of comparing four groups, the present analysis permitted

comparisons of two groups at a time (panickers with non-panickers, and hypochondriacs

with non-hypochondriacs). The ANOVA revealed a significant main effect of panic $[F$

$(1, 42) = 8.58, p = .005]$, a significant main effect of word-type $[F (6, 252) = 47.71, p <$

$.001]$ and a significant panic by word-type interaction $[F (6, 252) = 3.46, p = .003]$.

Comparison of the means (Table 6) revealed that the main effect of panic resulted from

the significantly longer response times that were exhibited by the panickers in

Table 6

Mean Response Times (in milliseconds) and Standard Errors For Non-Panickers Versus
Panickers and Non-Hypochondriacs Versus Hypochondriacs

Word Type

	Imminent Physical Threat	Imminent Mental Threat	Non-imminent Threat	Auto-nomic Arousal	Non-auto-nomic Arousal	Neutral	Control	Mean Time
Non-Panickers (n = 26)	631.24 (19.55)	635.68 (20.22)	649.79 (21.46)	635.43 (20.44)	643.92 (19.91)	638.54 (19.77)	588.76 (16.00)	631.91 (19.37)
Panickers (n = 20)	743.99 (29.68)	736.42 (27.60)	738.99 (25.52)	741.24 (27.97)	740.87 (27.78)	729.09 (26.17)	663.99 (21.24)	727.80 (26.12)
Non-Hypochondriacs (n = 26)	670.44 (23.20)	668.98 (22.62)	683.15 (23.82)	670.05 (23.75)	675.89 (22.06)	667.91 (22.45)	614.71 (18.95)	664.45 (22.12)
Hypochondriacs (n = 20)	693.03 (31.25)	695.61 (26.47)	693.12 (29.54)	696.23 (29.07)	699.30 (20.68)	690.91 (26.83)	630.26 (20.89)	685.49 (27.34)

comparison to the non-panickers. Due to the previously demonstrated influence of the

control words, however, further investigations of the main effect of word-type and the

interaction were not conducted. Instead, control items were removed and the data were

subjected to a 2 (panic versus non-panic) by 2 (hypochondriac versus non-hypochondriac)

by 6 (word-type) mixed ANOVA. The results of this ANOVA, revealed a significant

main effect of panic [F (1, 42) = 8.63, p = .005] and a significant panic by word-type

interaction [F (5, 210) = 2.38, p = .040]. As expected, the main effect of word-type was

no longer significant [F (5, 210) = 1.59, p = .164]. Once again, the main effect of panic

resulted from the significantly longer mean response time (averaged across word-type)

exhibited by the panickers. Moreover, investigation of one set of simple effects for the

interaction (for which word-type was held constant) revealed that the longer mean

response times demonstrated by the panickers were evident for each category of stimulus

items. Thus, panickers took significantly longer than non-panickers when colour-naming

imminent physical threat [F (1, 44) = 10.85, p = .002], imminent mental threat [F (1,44) =

9.09, p = .004], non-imminent threat [F (1, 44) = 7.24, p = 0.010], autonomic arousal [F

(1, 44) = 9.71, p = .003], non-autonomic arousal [F (1, 44) = 8.49, p = .006], and neutral

[F (1, 44) = 7.93, p = .007] words. Subjection of the second set of simple effects (for

which group was held constant) to Newman Keuls analyses (p < .05), revealed that mean

response latencies, exhibited by the panickers, did not differ as a function of category of

stimulus items. On the other hand, non-panickers took significantly longer to colour-

name non-imminent threat words than neutral, imminent physical threat, autonomic

arousal, and imminent mental threat words. Thus, the selective interference effects

exhibited by the non-panickers seemed to be the key contributors to the significant

interaction. This finding was not consistent with the hypotheses of the present study, and in fact, cannot be accounted for by any existing theory of panic disorder.

In order to facilitate comparisons of response latencies for different word-types by controlling for individual differences in speed, additional ANOVAs were conducted using response latency interference indices (Table 7). Initially, control items were left in the analysis and the data were subjected to a 2 (panic versus non-panic) by 2 (hypochondriac versus non-hypochondriac) by 6 (word-type) mixed analysis of variance. The main effect of panic was no longer significant (F (1, 42) = 1.00, p = .324], while the main effect of word-type (F (5, 210) = 55.82, p < .01] and the panic by word-type interaction [F (5, 210) = 3.78, p = .003] remained significant. Once again, however, further investigations of the word-type effect and the simple effects of the interaction were not conducted due to the influence of the control items that had been included in this analysis.

Control items were removed, and the response latency interference indices were reanalyzed in a 2 (panic versus non-panic) by 2 (hypochondriac versus non-hypochondriac) by 5 (word-type) mixed ANOVA. The main effect of word-type was no longer significant [F (4, 168) = 1.47, p = .215)], and the panic by word-type interaction remained marginally significant [F (4, 168) = 2.42, p = .050]. Investigation of the first set of simple effects for the interaction, for which word-type was held constant, revealed that panickers and non-panickers did not exhibit significantly different response latencies for each category of stimulus items. Moreover, Newman-Keuls analyses (p < .05) on the second set of simple effects indicated that panickers did not show significantly different

Table 7

Mean Response Latency Interference Indices (in milliseconds) and Standard Errors for
Non-Panickers Versus Panickers and Non-Hypochondriacs Versus Hypochondriacs

Word Type

	Imminent Physical Threat	Imminent Mental Threat	Non-imminent Threat	Auto-nomic Arousal	Non-autonomic Arousal	Control	Mean Time
Non-Panickers (n = 26)	-7.30 (5.48)	-0.67 (4.03)	11.25 (5.74)	-3.11 (5.05)	5.38 (4.67)	-49.78 (6.71)	-7.37 (4.14)
Panickers (n = 20)	14.90 (10.41)	4.93 (6.69)	9.90 (5.79)	12.15 (6.57)	11.78 (6.88)	-65.10 (8.09)	-1.91 (5.14)
Non-Hypochondriacs (n = 26)	2.53 (7.69)	1.84 (5.06)	15.25 (5.53)	2.15 (5.18)	7.99 (4.53)	-53.20 (6.70)	-3.91 (4.46)
Hypochondriacs (n = 20)	2.12 (8.56)	1.67 (5.44)	4.70 (5.87)	5.32 (6.90)	8.39 (7.13)	-60.65 (8.42)	-6.41 (4.74)

response latency interference indices for any category of stimulus items. Non-panickers, on the other hand, exhibited significantly longer response latency interference indices for the non-imminent threat words than for the imminent mental threat, imminent physical threat, and autonomic arousal words. This was consistent with the previous findings for the mean response times of non-panickers. An additional selective interference effect, indicating longer interference indices for non-autonomic arousal words, as opposed to imminent physical catastrophe words, was also found.

Correlations

In order to further assess the relationship between scores on the questionnaire measures and response latencies for each category of stimulus items, standardized scores (z scores) for severity of panic, severity of hypochondriacal concern, and general distress were calculated. The z score for the severity of panic was based on the ratings that were given by panickers when asked to describe how severely they experienced each of 26 symptoms during a panic attack. Ratings were measured on a Likert scale with 0 indicating that they did not experience that symptom at all and 4 indicating that the symptom was experienced very severely. Severity of hypochondriacal concern was measured by the subject's score on the Whiteley Index of the IBQ, which ranged from 0 to 12. Finally, the general distress score was a composite score which was based on a subject's z score for the severity of panic and z score for the severity of hypochondriasis. Correlations of these scores with response times for each category of stimulus items and with overall mean response times were then calculated and are presented in Table 8 (alpha was set at .01 to control for Type I error).

Table 8

Correlations Among Self Report Measures and Mean Response Latencies for Each
Category of Stimulus Words

Word Type

	Imminent Physical Threat	Imminent Mental Threat	Non-imminent Threat	Auto-nomic Arousal	Non-auto-nomic Arousal	Neutral	Control	Mean Time
Panic Severity (standardized score)	.22	.21	.17	.21	.21	.19	.18	.20
Illness Behavior Questionnaire (standardized score)	.34**	.33**	.28*	.32*	.34**	.32*	.28*	.32*
Composite Distress (standardized score)	.36**	.35**	.29*	.34**	.35**	.33**	.29*	.34**

*   significant at p<0.05   ** significant at p<0.01

Preliminary inspection of the correlation matrix revealed that while the correlations were not all significant, they were all positive, indicating the absence of random relationships between scores on the questionnaire measures and response latencies. Correlations that were of primary interest included those between standardized scores for panic severity and response times for the imminent physical threat, imminent mental threat, and autonomic arousal words. Inspection of the correlation matrix revealed that none of these correlations were significant with $p < .01$ as a criterion. In addition, panic severity scores did not correlate significantly with response times for any of the categories of words, or with the overall mean response time.

Other correlations of primary interest were those between scores on the IBQ and response times for the non-imminent threat words and non-autonomic arousal (hypochondriacal) words. One of these correlations was significant at $p < .01$, indicating that higher scores on the Whiteley Index of the Illness Behaviour Questionnaire were associated with greater mean response latencies for non-autonomic arousal (hypochondriacal) threat words. It is important to note, however, that this relationship did not appear to be specific to the hypochondriacal threat words since a significant and positive correlation between scores on the IBQ and mean response times for the imminent physical threat, imminent mental threat, autonomic arousal, and non-autonomic arousal words was also evident using $p < .01$ as a criterion.

The global z score, which was intended to provide a measure of general distress, was significantly correlated with the neutral words and each of the threat word categories ($p < .01$) except for the non-imminent threat category. It also correlated significantly with the overall mean response time which was created by adding response times for each

of the categories and dividing that sum by the number of categories. This indicated that the degree of general distress that a subject experienced was associated with longer mean response latencies for the stimulus items. Comparisons of the size of the correlations for each measure of psychopathology (standardized scores for panic severity, hypochondriacal concern, and general distress) revealed that standardized scores for global distress correlated the most highly with response times for each category of words. This was followed by correlations between standardized scores on the IBQ and mean response times which were often significant, and finally correlations between standardized scores for panic severity and mean response times which were positive but not significant. Thus, global or general distress seemed to be most highly associated with longer mean response latencies..

Discussion

The purpose of the present study was to investigate the relationship between panic attacks and hypochondriasis by comparing the information processing biases of individuals who have experienced panic attacks and / or hypochondriacal concerns. Based on cognitive theories of panic disorder and hypochondriasis, it was postulated that the perceived imminence of the catastrophe was the key feature that discriminated between the two disorders. Consequently, panickers were expected to show greater interference for imminent catastrophe words and symptoms of autonomic arousal, whereas hypochondriacs were expected to exhibit greater interference for words describing non-imminent catastrophe. The findings of the present study did not support these predictions. Panickers did not take longer to colour-name imminent physical catastrophe, imminent mental catastrophe, and autonomic arousal words, which were

perceived to be most relevant to the experience of panic attacks. Furthermore, subjects who exhibited hypochondriacal concerns did not take longer to colour-name the non-imminent catastrophe or non-autonomic arousal words that were perceived to be most closely associated with hypochondriacal ideation. In fact, with the exception of the control non-words, which produced the least interference, panickers and hypochondriacs did not exhibit selective processing for any category of stimulus items.

The only evidence of selective processing that was revealed in the present study became apparent when specific comparisons between panickers and non-panickers were conducted. Surprisingly, however, these specificity findings were not associated with the panickers, but rather, with the non-panickers, who exhibited longer mean response latencies for words associated with hypochondriacal concerns (i.e., non-imminent threat and non-autonomic arousal) than for words associated with panic (i.e., imminent physical threat, imminent mental threat, and autonomic arousal words). These findings did not support the main hypotheses of the present study since, contrary to predictions, panickers did not exhibit selective interference for panic-related stimuli.

Comparisons With Previous Research

The findings for the panic groups were not consistent with those of other studies that have employed the Stroop paradigm and reported that panickers, and other anxiety-disordered individuals, show attentional biases to threatening information that is particularly relevant to their disorder (e.g., Carter et al., 1992; Ehlers et al., 1988). Failure to find evidence of selective processing for the hypochondriacal groups may be due to a number of factors (which will be discussed later), including the possibility that this paradigm is not applicable to the investigation of hypochondriasis. Since this

experiment represented the first attempt to extend the application of the Stroop paradigm

to somatoform disorders, comparisons with previous research in the area cannot be made.

Instead of finding evidence for the selective processing of threatening

information, the results of the present study indicated that panickers, and especially

hypochondriacal panickers, exhibited more Stroop interference for all categories of words

when compared to hypochondriacs and controls (who did not differ from each other).

This is consistent with previous research (e.g., Mathews & MacLeod, 1985; McNally, et

al., 1990) that has found anxious individuals to be slower than control subjects in colour-

naming all stimuli. The results of this study also suggested that greater degrees of

psychopathology and distress are associated with poorer task performance and slower

responding in general. Individuals in the hypochondriac / panic group, which one could

argue is representative of the greatest degree of psychopathology, took longer to colour-

name words in all of the categories when compared to individuals in the other three

groups. In addition, standardized measures of panic severity, hypochondriacal concern,

and general distress all correlated positively (and in the case of general distress, very

highly) with response latencies indicating that more severe psychopathology is associated

with poorer task performance and slower responding. This is consistent with well

established research findings which indicate that high levels of anxiety are associated

with slower responding and / or poorer performance on certain psychological tests, such

as poorer recall on the digit span subtest of the Weschler Adult Intelligence Scale (Lezak,

1983).

To summarize, the main findings of this study indicate that non-clinical panickers

and hypochondriacal panickers exhibit tendencies toward slower responding in general,

but do not selectively process threat cues that are particularly relevant to panic disorders or hypochondriasis. Before discounting the specificity hypotheses, however, it is important to consider some of the ways in which the present study differs from those that have found evidence for selective processing in individuals who experience panic attacks and a variety of other anxiety disorders.

One important difference between this study and others concerns the nature of the subject sample. Previous studies that have employed the Stroop paradigm to investigate anxiety, have often used clinical samples. This means that they studied individuals who were already *diagnosed* with a particular anxiety disorder (e.g., McNally et al., 1990; Mogg et al., 1989). The individuals in the present study, however, were recruited from an undergraduate and general university population. While individuals with a prior diagnosis of panic disorder were not excluded from this study, and while it is likely that some of the individuals who participated in this study experienced panic attacks of a severity and frequency that would qualify for a panic disorder diagnosis, the majority of these panickers would likely be less severe than those recruited from a clinical sample. If severity of anxiety is associated with stronger attentional biases and selective processing, it is plausible to suggest that the Stroop effect may not be present or, at least, not as strong for non-clinical samples (Martin, Williams, & Clark, 1991). In fact, however, studies of anxiety that have used non-clinical samples have reported inconsistent findings, some that support (e.g., Ehlers et al., 1988) and others that do not support (e.g., Bryant & Harvey, 1995; Martin et al., 1991) the phenomenon of selective processing for threatening information.

This study also differed from much of the previous research in terms of its methodology. In this experiment, words from each category were presented in a different random order for each of the five trials and response latencies were calculated for each stimulus item. Previous studies often used a blocked format in which stimulus items from the same category were presented as a group and colour-named consecutively (e.g., Carter et al., 1992; Ehlers et al., 1988; Mathews & MacLeod, 1985). Response latencies were then measured for the entire set of words rather than for each individual stimulus item. It is possible that presenting words in a randomized as opposed to a grouped format could contribute to inconsistencies in the findings.

Findings for grouped formats, for example, could be influenced by priming effects of one word on the next presentation of a word of the same theme (Williams et al., 1996). Priming effects would facilitate selective processing, and consequently slow down colour-naming, for *categories* of items (e.g., each category of threat words), but should not affect neutral items which do not reflect a single category. If priming effects play a key role in Stroop interference, randomized presentations of stimulus words should not result in such interference. On the other hand, randomized presentations of stimulus items may obscure selective interference effects. For example, if Stroop interference is caused by a combination of selective attention and then rumination about the meaning of a word, a particularly threatening word may cause extensive rumination that is still present when the subsequent word is presented. This may lead to longer response latencies for the subsequent item that are not related to that word itself, but rather, to the preceding threat word. Consequently, when mean response times are calculated for a

particular category of words, they will undoubtedly be effected by interference effects for stimulus items that recently preceded the words belonging to that category.

Despite the possibility that rumination may be associated with obscured effects when randomized presentations are used, this type of format appears to be the most methodologically sound approach to testing cognitive theories. Since the results of randomized presentations cannot be influenced by possible priming effects, conclusions based on the findings are easier to interpret and a less likely to be an artifact of the methodology. Furthermore, in addition to using the randomized format, the present study was characterized by a number of other methodological strengths. For example, after initial compilation of the word lists for each category, only words for which the categories were unanimously agreed upon by two independent raters were selected for final consideration. This ensured that each category consisted of words that were as representative as possible of that particular category. Moreover, in order to control for the possibility that word frequency or word length was associated with the degree of interference exhibited, care was taken to ensure that the average frequency and the average length of the words comprising each category was similar. These types of precautions served to enhance interpretability of the findings by controlling for factors that may plausibly influence interference effects.

Distinction Between Panic Disorder and Hypochondriasis

What do the present findings tell us about cognitive theories of panic disorder (e.g., Clark, 1988) and hypochondriasis (Warwick & Salkovskis, 1990) which suggest that these people selectively attend to illness relevant information while disregarding disconfirmatory information (Salkovskis & Clark, 1993)? Moreover, what do they tell us

about the theorized distinctions between the two disorders, particularly the arguments that the imminence of the threat and the types of symptoms feared are the key discriminators between the two disorders (Salkovskis & Clark, 1993)? The failure to find selective processing of illness relevant words, that differ on the aforementioned dimensions, may indicate that these predictions, and the theories on which they are based, are inaccurate, and that panickers, hypochondriacs, and hypochondriacal panickers cannot be distinguished on the basis of the types of catastrophes and symptoms that are feared. Perhaps a different set of stimulus items corresponding to different categories of concern would have elucidated significant differences between the groups. On the other hand, failure to find selective processing during the Stroop Task does not demonstrate unequivocally that the theory and its predictions are invalid; rather, it may indicate that this particular cognitive paradigm is incapable of adequately tapping these concerns. As mentioned previously, this is the first time that the Stroop paradigm has been applied with any of the somatoform disorders, and it is possible that it is not appropriate or applicable for the investigation of hypochondriasis. The applicability of the Stroop paradigm to the investigation of panic disorder has, however, been demonstrated by previous research (e.g., Ehlers et al., 1988; McNally et al., 1994) and reasons for inconsistencies between panickers in previous studies and the present study are unclear, but are possibly a function of methodological and sampling differences that have been previously discussed.

<u>Co-occurrence of Panic Attacks and Hypochondriacal Concerns</u>

In addition to allowing for the investigation of information processing biases that are associated with panic attacks and hypochondriasis, this study also afforded the

opportunity to assess the frequency of panic in a non-clinical population and the extent to which panic and hypochondriacal concerns co-occur. With regards to panic attacks, the findings of the present study are consistent with those of previous researchers who have reported that infrequent panic is quite prevalent in the general population (e.g., Donnell & McNally, 1990; Norton, Dorwood, & Cox, 1986; Telch, Lucas, & Nelson, 1989). The majority of subjects in this study were recruited from undergraduate psychology classes and approximately 40% of these people reported experiencing a panic attack at some time in their life. It is important to note, however, that recruitment procedures will have inflated this estimate. For example, a few subjects were solicited by posters that specifically requested the participation of individuals who had experienced panic attacks. Additionally, for those who were not recruited through posters, the experiment was described as a study about anxiety and health, and consequently, may have been more likely to attract volunteers who experienced anxiety, and possibly panic attacks.

In terms of the co-occurrence of panic anxiety and hypochondriacal ideation, 50% of the individuals who reported experiencing panic attacks also scored highly on the Whitely Index of the IBQ. This indicates that there is a high degree of overlap or comorbidity between the two disorders and is consistent with previous research that has identified hypochondriacal concerns, including disease phobias and bodily preoccupations, in 50-70% of panic disorder patients (Buglass et al., 1977; Sheehan et al., 1980). The findings highlight a close association between the two disorders that warrants further exploration.

Recommendations for Future Research

The utility of cognitive paradigms as a means of exploring the cognitions and concerns associated with various disorders, lies mainly in their ability to tap unconscious information that may not be accessible upon introspection. As discussed previously, this has particular relevance for panic disorder, since panickers are often unaware of the external and internal cues that trigger their attacks. Moreover, cognitive theories of panic disorder (e.g., Clark, 1988) and hypochondriasis (Warwick & Salkovskis, 1990), describe these disorders as being associated with attentional biases for specific types of threatening information. Consequently, it is reasonable to assume that cognitive psychology paradigms may help to clarify information processing tendencies associated with both types of psychopathology and would thus be a useful means of exploring the relationship between panic disorder and hypochondriasis.

Before using these information processing paradigms, however, future researchers in this area should consider a number of methodological issues. Firstly, the use of a clinical sample is highly recommended. Clinical panickers and hypochondriacs may differ in important ways (e.g., severity of their symptoms, frequency of panic attacks) from their non-clinical counterparts and use of a non-clinical sample may attenuate or obfuscate the findings. In addition, supposing that the Stroop paradigm is used, variations in the order of presentation of stimulus items (e.g., random, grouped, etc.) may be an important means of ensuring that the findings are not merely an artifact of the methodology.

The use of other cognitive tasks, instead of, or in addition to the modified Stroop, are also highly recommended. It is possible that cognitive factors which differentiate

between hypochondriasis and panic occur at a level of information processing that is not tapped by the Stroop, and thus, different cognitive paradigms (e.g., implicit or explicit memory tasks, visual probe experiments, dichotic listening tasks) may prove to be more useful.

Finally, it is important to consider that when an experimenter selects stimulus items that are expected to elicit selective processing, he or she chooses words that are consistent with his or her own notions (and sometimes those of independent, but non-disordered, raters) about which words belong in a particular category. It is possible that some words "fit" the category, or are more relevant to the particular disorder, than are other words. Thus, after having administered the Stroop, it would be useful to subsequently present subjects with all the stimulus and ask them to rate (e.g., on a Likert scale) the degree to which each word is consistent with their concerns. A second analysis could then be conducted to determine whether response latencies were greater for words that were most consistent with the subjects' concerns. Identifying the stimulus items that are most closely associated with the concerns of panickers, hypochondriacs, or individuals with any other type of psychopathology, would also be useful for future research since it would allow for the selection and administration of words that are most relevant to these disorders.

Summary and Conclusions

The results of the present study did not support the hypotheses that the perceived imminence of the threat and the types of symptoms that are feared are the key features that distinguish panic disorder and hypochondriasis. Instead, the main findings indicated that more severe psychopathology is associated with slower responding in general, as

evidenced by hypochondriacal panickers exhibiting the longest response latencies for all categories of stimulus items, and by the high positive correlation between standardized scores of general distress and mean response latencies. Additionally, panickers and hypochondriacal panickers consistently demonstrated longer response latencies when compared to their non-panicking counterparts, indicating that the experience of panic anxiety is associated with a generalized slowness in responding. Methodological issues, including sampling procedures and methods of stimulus-item presentation, may account for the discrepancies between the results of the present study and those of other studies that have found evidence of selective processing for panic-related threat words. The failure of the present study to find selective processing of words perceived to be associated with hypochondriacal concerns may also be rooted in these methodological issues, or may be demonstrative of the inapplicability of this type of paradigm to the investigation of somatoform disorders. Alternately, failure to find predicted specificity effects may be an indication that the theories, themselves, are invalid and require reformulation. It would be worthwhile for future researchers to continue to investigate the relationship between panic disorder and hypochondriasis from an information processing perspective. Cognitive theories for both disorders predict attentional biases for specific types of threatening stimuli and, if these predictions are correct, a corresponding attentional, processing, and/or memory bias should be apparent after the application of cognitive-psychology methods.

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APPENDIX A

Groups and Predictions

SUBJECT GROUPINGS

(1) Panickers:
(i) High Score on Hypochondriasis Measure
(ii) Low Score on Hypochondriasis Measure

(2) Non-Panickers:
(i) High Score on Hypochondriasis Measure
(ii) Low Score on Hypochondriasis Measure

PREDICTIONS

(1) PANICKERS:

Group (i): Longer response latencies for List I1A and/or I1B, I2, II1, II2
Group (ii): Longer response latencies for List I1A and/or I1B, II1

(2) NON-PANICKERS:

Group (i): Longer response latencies for List I2, II2, maybe II1.
Group (ii): Equivalent response latencies for all word types

APPENDIX B

Please take your time and read each question carefully. As you are probably aware, anxiety disorders are very complex and therefore the questionnaire is extensive and measures several different factors.

The Panic Attack Questionnaire
(Cox, Norton, & Swinson, 1992)

Age_____   Sex_____   Occupation_____

Education Level_____

Marital Status: _____single (never married)
                    _____married or cohabitating
                    _____separated/divorced/widowed

Today's Date_____

Were you ever treated in the past (drugs, psychotherapy, hospitalization) for any of the following?

YES   NO
___   ___   depression
___   ___   anxiety or nervous disorders
___   ___   other psychological disorders (Type? _____)
___   ___   heart problems (Type? _____)
___   ___   migraines
___   ___   tension headaches
___   ___   stress related disorders (eg. ulcers, hypertension)
___   ___   alcohol or drug problems
___   ___   neurological problems (eg. inner ear disturbance)

In this questionnaire we will be asking you questions regarding panic attacks and your history of anxiety problems.

A panic attack is the sudden onset of intense apprehension, fear, or terror, often associated with feelings of impending doom. Some of the most common symptoms experienced during an attack are: dizziness, shortness of breath, chest pain or discomfort, and trembling or shaking.

1.   To the best of your knowledge, have any of the following members of your family experienced panic attacks? If you do not have a son or daughter, etc., please check 'not applicable'. Please indicate if any of these persons (or you) were adopted.

		NOT	
YES	NO	APPLICABLE	
___	___	___	mother
___	___	___	father
___	___	___	brother(s)
___	___	___	sister(s)
___	___	___	son(s)
___	___	___	daughter(s)

2.   Have YOU ever had one or more panic attacks?   YES___   NO___

If you have experienced one or more panic attacks in the PAST YEAR please answer ALL the remaining questions. If you have not experienced a panic attack or have only experienced a panic attack in a life threatening situation, please go on to the next questionnaire.

a)   In the PAST YEAR approximately how many panic attacks have you had?   (please circle)

   1   2   3   4   5   6   7   8   9   10   more than 10

If more than 10, how many? _____

b)   In the PAST FOUR WEEKS how many panic attacks have you had?

   0   1   2   3   4   5   6   7   8   9   10   more than 10

If more than 10, how many? _____

c)   In the PAST WEEK how many panic attacks have you had?

   0   1   2   3   4   5   6   7   8   9   10   more than 10

If more than 10, how many? _____

3. a) For approximately how many MONTHS OR YEARS have you been experiencing panic attacks?

_____ years.   _____ months.

b) What age were you when you had your first panic attack? ___

4. a) Have panic attacks occured MORE frequently at some time in the past?   YES____   NO____

b) Do you think the panic attacks are becoming more frequent? YES____   NO____

C) Do you think the panic attacks are becoming more intense? YES____   NO____

5. What types of places or situations are you avoiding specifically because of fear of having a panic attack?

_____

_____

6. Please indicate how severely you experience each of the following symptoms WHEN YOU ARE HAVING a panic attack.

	DOES NOT OCCUR	MILD	MODERATE	SEVERE	VERY SEVERE
a) difficulty breathing	0	1	2	3	4
b) heart pounding	0	1	2	3	4
c) chest pain or discomfort	0	1	2	3	4
d) choking or smothering sensations	0	1	2	3	4
e) dizziness, vertigo, or unsteady feelings	0	1	2	3	4
f) feelings of unreality	0	1	2	3	4
g) tingling in hands or feet	0	1	2	3	4
h) hot and cold flashes	0	1	2	3	4
i) sweating	0	1	2	3	4
j) faintness	0	1	2	3	4

4

	DOES NOT OCCUR	MILD	MODERATE	SEVERE	VERY SEVERE
k) trembling or shaking	0	1	2	3	4
l) fears of death or serious illness	0	1	2	3	4
m) fear of going crazy	0	1	2	3	4
n) fear of doing something uncontrolled	0	1	2	3	4
o) feeling of nausea	0	1	2	3	4
p) visual difficulties eg. blurring	0	1	2	3	4
q) auditory difficulties eg. ringing in ears	0	1	2	3	4
r) difficulty concentrating	0	1	2	3	4
s) extremely rapid heartbeat	0	1	2	3	4
t) fear of causing a scene	0	1	2	3	4
u) feeling of anger	0	1	2.	3	4
v) thought of escape from scene of panic attack	0	1	2	3	4
w) flushing	0	1	2	3	4
x) fear of drawing attention to oneself	0	1	2	3	4
y) mouth feels dry	0	1	2	3	4
z) feeling of helplessness	0	1	2	3	4

other symptoms (please describe) _____

_____

7.   a) What is the __most severe__ panic symptom or symptoms you experience?_____

    _____

    b) What is the first panic symptom you notice?_____

5

c) What is the most frightening panic symptom or symptoms for you?_____

d) Please list any other feelings or sensations that signal the onset of a panic attack for you._____

_____

8. The following section consists of TWO PARTS:

1. On the LEFT HAND SIDE, please indicate in which of the following situations panic attacks have occurred by making checkmarks.

2. On the RIGHT HAND SIDE, please indicate, for each situation, how likely you feel a panic attack will occur at some time in the future. Please indicate this future likelihood even if you haven't panicked there in the past.

1. Panic attacks HAVE occurred (please place a checkmark √ where appropriate)	2. Likelihood of panic attacks occurring in EACH situation			
	NEVER			VERY LIKELY
___a) in life threatening situation	0	1	2	3	4
___b) when receiving injections or minor surgery	0	1	2	3	4
___c) eating or drinking with other people	0	1	2	3	4
___d) in hospitals or visits to a doctor	0	1	2	3	4
___e) travelling alone by bus or train	0	1	2	3	4
___f) walking alone in busy streets	0	1	2	3	4
___g) being watched or stared at	0	1	2	3	4
___h) going into crowded shops	0	1	2	3	4
___i) talking to people in authority	0	1	2	3	4
___j) sight of blood	0	1	2	3	4
___k) being criticized	0	1	2	3	4
___l) going alone far from home	0	1	2	3	4

1. Panic attacks HAVE occurred (check as many as necessary)	2. Likelihood of panic attacks occurring in EACH situation

	NEVER				VERY LIKELY
___m) thought of injury or illness	0	1	2	3	4
___n) speaking or acting to an audience	0	1	2	3	4
___o) large open spaces	0	1	2	3	4
___p) going to the dentist	0	1	2	3	4
___q) attacks occurred unexpectedly, "out of the blue"	0	1	2	3	4
___r) during or following relaxation	0	1	2	3	4
___s) during or following exercise	0	1	2	3	4
___t) while sleeping	0	1	2	3	4
___u) while under the influence of drugs	0	1	2	3	4
___v) prior to or during test or exams	0	1	2	3	4
___w) while driving a car	0	1	2	3	4
___x) walking alone at night	0	1	2	3	4
___y) sexually intimate situations	0	1	2	3	4
___z) during an interpersonal conflict (eg. argument with spouse/boss)	0	1	2	3	4
___aa) while meeting stranger(s)	0	1	2	3	4
___bb) being in an enclosed area	0	1	2	3	4
___cc) loss or separation from significant other (eg. divorce)	0	1	2	3	4
___dd) while under a lot of stress	0	1	2	3	4
___ee) subways	0	1	2	3	4
___ff) shopping malls	0	1	2	3	4
___gg) after consuming caffeine	0	1	2	3	4

___hh) during a hangover from alcohol   0   1   2   3   4

___ii) going a long period with
         little sleep   0   1   2   3   4

___jj) being the focus of attention   0   1   2   3   4

___kk) other (please explain)
         _____   0   1   2   3   4

9. a) In which situation are you most likely to have a panic
       attack? _____

    b) If you are in this situation, how probable is it that you
       will experience a panic attack (please circle):

    not very   somewhat   likely   very   absolutely
    likely   likely   likely   certain

    c) How many times have you been in this situation since your
       panic began? _____

    d) How many times have you panicked in this situation? _____

10. When a panic attack occurs, generally what is the time speed
    between the onset of the attack and when the panic is most
    intense?

    a) very rapid (less than 10 minutes)
    b) moderately rapid (10 - 30 minutes)
    c) moderately slow (30 minutes - 1 hour)
    d) slowly (more than one hour)

11. How long, on average, does a panic attack last (start to
    finish)?

    a) a few minutes (0-10 minutes)
    b) 10 - 30 minutes
    c) 30 minutes to one hour
    d) several hours
    e) more than one day

12. How much control do you think you have in preventing the
    OCCURRENCE of any panic attack? (Please circle a number)

    No Control   Some Control   Total Control

         0   1   2   3   4   5   6   7   8   9   10

13. How much control do you think you have in limiting the
     SEVERITY of any panic attack?   (Please circle a number)

No Control				Some Control					Total Control	
0	1	2	3	4	5	6	7	8	9	10

14. What do you think or fear might happen during a panic attack?
     Please describe _____

     _____

15. Do you think panic symptoms are in some way harmful to your

     physical health?   ___yes   ___no

     mental health?   ___yes   ___no

     If "yes", what type of harm do you think could happen?

     _____

16. How much distress do the panic attacks cause in your life?

None At All	Mildly Distressing	Moderately Distressing	Very Distressing	Extremely Distressing
1	2	3	4	5

17. To what degree have the panic attacks caused you to change or
     restrict you lifestyle (eg. everyday activities, places you
     go)?

No Change	Some Change	A Moderate Amount of Change	Quite a Bit of Change	Extreme Change
1	2	3	4	5

18. Can you successfully predict when and where most of your panic
     attacks will occur or are most of your panic attacks
     unpredictable? (please check)

     ____ can successfully predict when and where

     ____ attacks are unpredictable

19. Aside from panic attacks, some people with anxiety problems
     report feeling another type of anxiety that is less severe but
     more constant than panic attacks. This type of anxiety is
     related to worry or apprehension and occurs throughout much of
     the day. Do you ever feel like this? _____ yes _____ no

     If you answered "Yes", for approximately how long have you
     been feeling this way? _____ years _____ months

     If you do experience this type of anxiety at times other than
     during a panic attack, please answer the following questions.
     First, please indicate how severely you experience each of the
     following symptoms (when you are not having a panic attack).
     If you don't experience this type of anxiety please turn to
     page 11.

	DOES NOT OCCUR	MILD	MODERATE	SEVERE	VERY SEVERE
(a) trembling, twitching or feeling shaky	0	1	2	3	4
(b) muscle tension, aches, or soreness	0	1	2	3	4
(c) restlessness	0	1	2	3	4
(d) easily tired	0	1	2	3	4
(e) shortness of breath or smothering sensations	0	1	2	3	4
(f) palpitations or accelerated heart rate	0	1	2	3	4
(g) sweating or cold clammy hands	0	1	2	3	4
(h) dry mouth	0	1	2	3	4
(i) dizziness or lightheadedness	0	1	2	3	4
(j) nausea, diarrhea, or other stomach problems	0	1	2	3	4
(k) hot flashes or chills	0	1	2	3	4
(l) frequent urination	0	1	2	3	4
(m) trouble swallowing or "lump in throat"	0	1	2	3	4

10

	DOES NOT OCCUR	MILD	MODERATE	SEVERE	VERY SEVERE
(n) feeling keyed up or on edge	0	1	2	3	4
(o) easily startled or "jumpy"	0	1	2	3	4
(p) difficulty concentrating or "mind going blank"	0	1	2	3	4
(q) trouble falling or staying asleep	0	1	2	3	4
(r) feeling irritable	0	1	2	3	4

Is this type of anxiety you experience a less severe form of a panic attack or is it a different type of feeling? (please check)

_____ less severe form of panic _____ different type of anxiety

Is the worry and anxiety you experience concerned with your panic attacks or is it related to several aspects of your life (e.g. finances, relationships)? (please check)

_____ worry about panic attacks

_____ worry about several aspects of life

_____ worry over both panic attacks AND several aspects of life

Did these episodes of anxiety begin before or after your panic attacks? (please check)

_____ began before panic attacks developed

_____ began after panic attacks developed

_____ began around the same time as panic attacks developed

20. People who experience panic attacks may use a variety of ways to cope with an actual attack. Please indicate if you ever used each method during an attack by <u>circling YES or NO</u>. When you circle "YES" please also indicate how effective you found the method to be in reducing the severity of panic attacks.

Used this Strategy?	Totally Ineffective		Moderately Effective		Totally Effective
YES NO 1) Telling yourself that your anxiety sensations aren't harmful	1	2	3	4	5
YES NO 2) Reassuring yourself that it will be over soon	1	2	3	4	5
YES NO 3) Distracting yourself by focusing on something else	1	2	3	4	5
YES NO 4) Lying down on a couch or bed	1	2	3	4	5
YES NO 5) Reassuring yourself nothing bad will happen	1	2	3	4	5
YES NO 6) Breathing exercises	1	2	3	4	5
YES NO 7) Relaxation exercises	1	2	3	4	5
YES NO 8) Talking or being with a close friend or relative	1	2	3	4	5
YES NO 9) Telling yourself it will be OK because you've been through this before	1	2	3	4	5
YES NO 10) Smoking a cigarette	1	2	3	4	5
YES NO 11) Tackling the attack head on knowing you are going to learn to control it eventually	1	2	3	4	5
YES NO 12) Thinking of pleasant images	1	2	3	4	5
YES NO 13) Taking medication	1	2	3	4	5
YES NO 14) Getting out of the situation	1	2	3	4	5

12

**Used this
strategy?**

		Totally Ineffective		Moderately Effective		Totally Effective

YES NO 15) Giving in to the panic
        rather than fighting it   1   2   3   4   5

YES NO 16) Telling yourself
        "I can handle it"   1   2   3   4   5

YES NO 17) Focus on staying
        in the situation   1   2   3   4   5

YES NO 18) Seeking medical atten-
        tion   1   2   3   4   5

YES NO 19) Telling yourself people
        around won't judge you
        negatively.   1   2   3   4   5

YES NO 20) Looking about at the
        people, things and places
        before you   1   2   3   4   5

Other EFFECTIVE strategies (please describe) _____

_____

_____

21. Are you frightened by panic attacks more because of the
    immediate symptoms you experience or because you fear the
    symptoms may lead to something worse? (please check)

    ___ symptoms are frightening

    ___ symptoms may lead to something worse

    ___ both

22. Where were you and what were you doing during your first panic
    attack? _____

    _____

    _____

    _____

23. Were you experiencing any of the following stressful events at the time you had your first panic attack?

    YES___ NO___   Difficulties at work

    YES___ NO___   Loss of a loved one

    YES___ NO___   Birth of a child

    YES___ NO___   Surgery or injury

    YES___ NO___   Marital / family problems

    YES___ NO___   Life-threatening situation

    YES___ NO___   First attack occurred unexpectedly (out of the blue)

24. a) Do you ever use alcohol to help you cope with your panic attacks? ___ YES ___ NO

If you answered "YES":

b) Is alcohol effective in preventing the occurrence of panic attacks? ___ YES ___ NO

c) Is alcohol effective in reducing the severity of panic attacks? ___ YES ___ NO

d) Is alcohol effective for reducing worry and apprehension in your day-to-day life? ___ YES ___ NO

e) What type of alcohol do you drink and how much would you consume on average on a weekly basis? _____

25. a) Do you ever use NON-PRESCRIPTION drugs or over-the-counter medication to help you cope with your panic attacks? ___ YES ___ NO

If you answered "YES":

b) Is the drug effective in preventing the occurrence of panic attacks? ___ YES ___ NO

c) Is the drug effective in reducing the severity of panic attacks? ___ YES ___ NO

d) Is the drug effective for reducing worry and apprehension in your day-to-day life? ___ YES ___ NO

e) What types of non-prescription drugs do you take and how much per week?_____

26. Do you spend much of your time "on edge" worrying about future panic attacks? ___ YES ___ NO

27. a) Do you often feel very down or depressed because of your current anxiety problems? ____ YES ____ NO

   b) If "YES", are these feelings of depression because of: (please check)

   ___ frightening panic symptoms

   ___ the restrictions in your life

   ___ both panic symptoms and lifestyle restrictions

   ___ the feelings of depression began before the onset of panic

   c) In the past year have you thought a lot about death? ____ YES ____ NO

   d) In the past year have you felt like you wanted to die? ____ YES ____ NO

   e) In the past year have you felt so low at times that you thought about commiting suicide? ____ YES ____ NO

   f) In the past year have you attempted suicide? ___YES ___NO

   If yes, how many times? _____

   If yes, what did you do exactly?_____

   _____

   _____

   g) Have you ever attempted suicide at some other time in your life? ____ YES ____ NO

   If yes, please explain_____

   _____

   _____

APPENDIX C
APPENDIX A (i)   IBQ Form B for use in non clinical settings (Does not assume presence of illness)

HEALTH SURVEY B

On the following pages you will find a number of questions about your health and how it affects you.   For the purposes of our survey, it is important that you complete every question, even though some of them may not be directly applicable to you.

We thank you very much for your cooperation.

IBQ FORM B

Here are some questions about you and your health.   Circle either YES or NO to indicate your answer to each question.

1. Do you worry a lot about your health?   YES   NO

2. Do you think there is something seriously wrong with your body?   YES   NO

3. Do you have an illness which interferes with your life a great deal?   YES   NO

4. Are you easy to get on with when you are ill?   YES   NO

5. Does your family have a history of illness?   YES   NO

6. Do you think you are more liable to illness than other people?   YES   NO

7. If a doctor told you that he could find nothing wrong with you, would you believe him?   YES   NO

8. Is it easy for you to forget about yourself and think about all sorts of other things?   YES   NO

9. If you feel ill and someone tells you that you are looking better, do you become annoyed?   YES   NO

10. Do you find that you are often aware of various things happening in your body?   YES   NO

11. Do you ever think that you have an illness which is a punishment for something you have done wrong in the past?   YES   NO

12. Do you have trouble with your nerves?   YES   NO

13. If you feel ill or worried can you be easily cheered up by the doctor?   YES   NO

14. Do you think that other people realise what it's like to be sick?   YES   NO

15. Does it upset you to talk to a doctor about illness?   YES   NO

16. Are you bothered by many aches or pains?   YES   NO

17. Do you have an illness which affects the way you get on with your family or friends a great deal?   YES   NO

18. Do you find that you get anxious easily?   YES   NO

19. Do you have an illness which is the same as anybody you know has had?   YES   NO

20. Are you more sensitive to pain than other people?   YES   NO

21. Are you afraid of illness?   YES   NO

22. Can you express your personal feelings easily to other people?   YES   NO

23. Do people feel sorry for you when you are ill?   YES   NO

24. Do you think that you worry about your health more than most people?   YES   NO

25. Do you have an illness which affects your sexual relations?   YES   NO

26. Do you have an illness with a lot of pain?   YES   NO

27. Except for illness, do you have any problems in your life?   YES   NO

28. Do you care whether or not people realise when you are ill?   YES   NO

29. Do you find that you get jealous of other people's good health?   YES   NO

30. Do you ever have silly thoughts about your health which you can't get out of your mind, no matter how hard you try?   YES   NO

31.	Do you have any financial problems?	YES	NO
32.	Are you upset by the way people take your illness when you are sick?	YES	NO
33.	Is it hard for you to believe a doctor when he tells you there is nothing for you to worry about?	YES	NO
34.	Do you often worry about the possibility that you have got a serious disease?	YES	NO
35.	Are you sleeping well?	YES	NO
36.	When you are angry, do you tend to bottle up your feelings?	YES	NO
37.	Do you often think that you might suddenly fall ill?	YES	NO
38.	If a disease is brought to your attention (through the radio, television, newspapers or someone you know) do you worry about getting it yourself?	YES	NO
39.	Do you get the feeling that people are not taking your illness seriously enough when you are sick?	YES	NO
40.	Are you upset by the appearance of your face or body?	YES	NO
41.	Do you find that you are bothered by many different symptoms?	YES	NO
42.	Do you frequently try to explain to others how you are feeling?	YES	NO
43.	Do you have any family problems?	YES	NO
44.	Do you think there is something the matter with your mind?	YES	NO
45.	Are you eating well?	YES	NO
46.	Is bad health the biggest difficulty of your life?	YES	NO
47.	Do you find that you get sad easily?	YES	NO
48.	Do you worry or fuss over small details that seem unimportant to others?	YES	NO
49.	Are you always a cooperative patient?	YES	NO
50.	Do you often have the symptoms of a serious disease?	YES	NO
51.	Do you find that you get angry easily?	YES	NO
52.	Do you have any work problems?	YES	NO
53.	Do you prefer to keep your feelings to yourself?	YES	NO
54.	Do you often find that you get depressed?	YES	NO
55.	Would all your worries be over if you were physically healthy?	YES	NO
56.	Are you more irritable towards other people?	YES	NO
57.	Do you have symptoms which may be caused by worry?	YES	NO
58.	Is it easy for you to let people know when you are cross with them?	YES	NO
59.	Is it hard for you to relax?	YES	NO
60.	Do you have personal worries which are not caused by physical illness?	YES	NO
61.	Do you often find that you lose patience with other people?	YES	NO
62.	Is it hard for you to show people your personal feelings?	YES	NO

APPENDIX D

WHITELEY INDEX OF HYPOCHONDRIASIS
(From the Illness Behavior Questionnaire)

Subject answers "yes" or "no" to each question:

(1) Do you worry a lot about your health?

(2) Do you think there is something seriously wrong with your body?

(3) Is it easy for you to forget about yourself and think about all sorts of other things?

(4) If you feel ill and someone tells you that you are looking better, do you become annoyed?

(5) Do you find that you are often aware of various things happening in your body?

(6) Are you bothered by many pains and aches?

(7) Are you afraid of illness?

(8) Do you think that you worry about your health more than most people?

(9) Is it hard for you to believe the doctor when he tells you there is nothing for you to worry about?

(10) Do you often worry about the possibility that you have got a serious disease?

(11) If a disease is brought to your attention (through the radio, television, newspapers, or someone you know) do you worry about getting it yourself?

(12) Do you get the feeling that people do not take your illness seriously enough when you are sick?

(13) Do you find that you are bothered by many different symptoms?

(14) Do you often have the symptoms of a serious disease?

APPENDIX E

Word List

I. Time Scale of the Catastrophe:
1. Imminent Threat:
A: Physical Catastrophe
(1) heart attack
(2) asphyxiate
(3) hemorrhage
(4) suffocate
(5) sudden death
(6) aneurysm
(7) stroke
(8) coronary
(9) choke
(10) cardiac arrest
(11) seizure

B: Mental Catastrophe
(1) lose control
(2) go crazy
(3) demented
(4) distraught
(5) hysterical
(6) insane
(7) disoriented
(8) deranged
(9) delirious
(10) psychotic
(11) frantic

2. Non-imminent Threat
(1) diabetes
(2) AIDS
(3) heart disease
(4) epilepsy
(5) multiple sclerosis
(6) cystic fibrosis
(7) Alzheimer's
(8) cancer
(9) tuberculosis
(10) malignant
(11) incurable

II. Symptoms:

1. Autonomic Arousal

(1) panting
(2) palpitations
(3) flushes
(4) breathless
(5) gasping
(6) shaky
(7) sweating
(8) dizzy
(9) quivering
(10) shivers
(11) lightheaded

2. Non-Autonomic Arousal

(1) rash
(2) headache
(3) swelling
(4) ache
(5) sore
(6) blotchy
(7) lump
(8) cramp
(9) inflammation
(10) bruise
(11) scar

III. Neutral Words:

(1) coffee table
(2) assembly
(3) pledge
(4) semester
(5) kilogram
(6) sand box
(7) magistrate
(8) book shelf
(9) dish soap
(10) heighten
(11) book shelf

IV. Control Words:

(1) XXXXX

(2) XXXXXX
(3) XXXX
(4) XXXXX
(5) XXXXXX
(6) XXXX
(7) XXXXX
(8) XXXXXXX
(9) XXXXX
(10) XXXXXXX
(11) XXXX

APPENDIX F

CONSENT FORM

This is a study to identify information processing biases associated with health concerns and anxiety. You will be asked to complete two questionnaires (one relating to health, and one relating to anxiety) and then participate in a computerized task requiring you to name colours on a computer screen.

My signature on this sheet indicates that I agree to participate in this study by Nicola Keyhan, and it also indicates that I understand the following:

1. I am a volunteer and can withdraw at any time from the study without explanation and without penalty.
2. There are no known risks of physical or psychological harm.
3. Benefits of this study include an increased understanding of the information processing associated with health concerns and anxiety.
4. The data I provide will be confidential.
5. Data obtained in this research will be stored at Lakehead University by Dr. Dwight Mazmanian for seven years, as per standard university procedures.
6. I will receive a summary of the project upon request and following completion of the project. This information can be obtained from Nicola Keyhan or Dr. Dwight Mazmanian through the Lakehead University Psychology Department.

I have received explanations about the nature of the study, its purpose, and procedures.

_____   _____
Signature of Participant   Date

APPENDIX G

90	5	CAT	WORD	COLORS	one						
1	9	H	BRUISE	brown	53	39	2	C	XXXXX	blue	68
2	4	T	DIABETES	green	26	40	7	A	GASPING	yellow	40
3	10	H	RASH	brown	54	41	9	M	INSANE	brown	20
4	6	M	GO CRAZY	red	17	42	8	T	ALZHEIMER'S	yellow	30
5	2	T	INCURABLE	blue	24	43	4	P	CORONARY	green	4
6	3	A	PANTING	green	36	44	6	P	SEIZURE	red	6
7	8	C	XXXXX	yellow	74	45	9	A	BREATHLESS	brown	42
8	2	N	HEIGHTEN	blue	57	46	3	T	CYSTIC FIBROSIS	green	25
9	10	N	ASSEMBLY	brown	65	47	9	P	CARDIAC ARREST	brown	9
10	7	C	XXXXXX	yellow	73	48	1	T	MALIGNANT	blue	23
11	5	P	CHOKE	red	5	49	11	C	XXXXXXX	green	77
12	3	H	HEADACHE	green	47	50	7	N	BOOK SHELF	yellow	62
13	7	T	AIDS	yellow	29	51	10	C	XXXX	brown	76
14	4	N	PLEDGE	green	59	52	5	N	DISH SOAP	red	60
15	2	M	PSYCHOTIC	blue	13	53	9	T	TUBERCULOSIS	brown	31
16	5	C	XXXXXX	red	71	54	11	N	BOOK SHELF	blue	66
17	10	T	HEART DISEASE	brown	32	55	5	T	CANCER	red	27
18	4	H	SWELLING	green	48	56	10	P	SUDDEN DEATH	brown	10
19	6	H	ACHE	red	50	57	2	H	LUMP	blue	46
20	8	A	PALPITATIONS	yellow	41	58	7	M	DISORIENTED	yellow	18
21	5	H	SORE	red	49	59	3	C	XXXXXXX	green	69
22	2	A	FLUSHES	blue	35	60	9	N	SAND BOX	brown	64
23	8	H	SCAR	yellow	52	61	8	N	MAGISTRATE	yellow	63
24	1	H	BLOTCHY	blue	45	62	10	A	SHAKY	brown	43
25	4	M	DELIRIOUS	green	15	63	3	P	STROKE	green	3
26	11	T	EPILEPSY	red	33	64	7	H	CRAMP	yellow	51
27	1	P	HEART ATTACK	blue	1	65	11	H	INFLAMMATION	brown	55
28	10	M	DEMENTED	brown	21	66	4	C	XXXXXX	green	70
29	11	A	SWEATING	yellow	44	67	2	P	SUFFOCATE	blue	2
30	11	M	DISTRAUGHT	green	22	68	3	M	FRANTIC	green	14
31	11	P	ASPHYXIATE	blue	11	69	5	A	SHUDDERING	red	38
32	9	C	XXXXX	brown	75	70	8	M	DERANGED	yellow	19
33	6	C	XXXX	red	72	71	4	A	QUIVERING	green	37
34	1	A	LIGHTHEADED	blue	34	72	6	N	SEMESTER	red	61
35	6	T	MULTIPLE SCLEROSIS	red	28	73	1	C	XXXXXXX	blue	67
36	1	M	LOSE CONTROL	blue	12	74	6	A	SHIVERS	red	39
37	5	M	HYSTERICAL	red	16	75	3	N	COFFEE TABLE	green	58
38	8	P	HEMORRHAGE	yellow	8	76	7	P	ANEURYSM	yellow	7
						77	1	N	KILOGRAM	blue	56

5CAT		WORD	COLORS	two
1	11	P	ASPHYXIATE	green	11
2	9	T	TUBERCULOSIS	blue	31
3	3	N	COFFEE TABLE	red	58
4	2	A	FLUSHES	green	35
5	11	A	SWEATING	brown	44
6	3	H	HEADACHE	red	47
7	1	H	BLOTCHY	green	45
8	7	P	ANEURYSM	brown	7
9	11	H	INFLAMMATION	blue	55
10	6	T	MULTIPLE SCLEROSIS	yellow	28
11	9	M	INSANE	blue	20
12	4	T	DIABETES	red	26
13	10	M	DEMENTED	blue	21
14	6	A	SHIVERS	yellow	39
15	1	M	LOSE CONTROL	green	12
16	7	C	XXXXXX	brown	73
17	1	T	MALIGNANT	green	23
18	3	M	FRANTIC	red	14
19	11	T	EPILEPSY	yellow	33
20	8	A	PALPITATIONS	brown	41
21	10	C	XXXX	blue	76
22	6	C	XXXX	yellow	72
23	7	M	DISORIENTED	brown	18
24	9	C	XXXXX	blue	75
25	8	P	HEMORRHAGE	brown	8
26	5	A	SHUDDERING	yellow	38
27	4	C	XXXXXX	red	70
28	6	M	GO CRAZY	yellow	17
29	3	A	PANTING	red	36
30	2	T	INCURABLE	green	24
31	3	T	CYSTIC FIBROSIS	red	25
32	8	M	DERANGED	brown	19
33	6	P	SEIZURE	yellow	6
34	7	H	CRAMP	brown	51
35	5	M	HYSTERICAL	yellow	16
36	9	H	BRUISE	blue	53
37	1	P	HEART ATTACK	green	1
38	3	P	STROKE	red	3
39	10	P	SUDDEN DEATH	blue	10
40	5	P	CHOKE	yellow	5
41	10	A	SHAKY	blue	43
42	5	T	CANCER	yellow	27
43	4	H	SWELLING	red	48
44	5	C	XXXXXX	yellow	71
45	8	C	XXXXX	brown	74
46	10	N	ASSEMBLY	blue	65
47	8	H	SCAR	brown	52
48	11	C	XXXXXXX	red	77
49	9	P	CARDIAC ARREST	blue	9
50	7	A	GASPING	brown	40
51	4	P	CORONARY	red	4
52	5	H	SORE	yellow	49
53	2	N	HEIGHTEN	green	57
54	10	T	HEART DISEASE	blue	32
55	8	T	ALZHEIMER'S	brown	30
56	2	P	SUFFOCATE	green	2
57	4	M	DELIRIOUS	red	15
58	7	T	AIDS	brown	29
59	1	N	KILOGRAM	green	56
60	6	H	ACHE	yellow	50
61	11	M	DISTRAUGHT	red	22
62	10	H	RASH	blue	54
63	2	C	XXXXX	green	68
64	8	N	MAGISTRATE	brown	63
65	2	H	LUMP	green	46
66	6	N	SEMESTER	yellow	61
67	1	C	XXXXXXX	green	67
68	4	A	QUIVERING	red	37
69	5	N	DISH SOAP	yellow	60
70	9	A	BREATHLESS	blue	42
71	7	N	BOOK SHELF	brown	62
72	11	N	BOOK SHELF	green	66
73	4	N	PLEDGE	red	59
74	1	A	LIGHTHEADED	green	34
75	3	C	XXXXXXX	red	69
76	9	N	SAND BOX	blue	64
77	2	M	PSYCHOTIC	green	13

90	5	CAT	WORD	COLORS	three
1	10	N	ASSEMBLY	blue	65
2	1	T	MALIGNANT	red	23
3	9	A	BREATHLESS	green	42
4	3	N	COFFEE TABLE	yellow	58
5	10	A	SHAKY	blue	43
6	6	A	SHIVERS	brown	39
7	2	T	INCURABLE	red	24
8	6	H	ACHE	brown	50
9	3	P	STROKE	yellow	3
10	11	A	SWEATING	blue	44
11	3	C	XXXXXXX	yellow	69
12	7	P	ANEURYSM	blue	7
13	2	A	FLUSHES	red	35
14	10	T	HEART DISEASE	blue	32
15	4	T	DIABETES	yellow	26
16	1	C	XXXXXXX	red	67
17	10	H	RASH	blue	54
18	4	H	SWELLING	yellow	48
19	2	C	XXXXX	red	68
20	6	T	MULTIPLE SCLEROSIS	brown	28
21	10	P	SUDDEN DEATH	blue	10
22	9	P	CARDIAC ARREST	green	9
23	2	P	SUFFOCATE	red	2
24	7	C	XXXXXX	blue	73
25	4	M	DELIRIOUS	yellow	15
26	5	P	CHOKE	brown	5
27	8	A	PALPITATIONS	blue	41
28	3	T	CYSTIC FIBROSIS	yellow	25
29	9	M	INSANE	green	20
30	7	N	BOOK SHELF	blue	62
31	2	N	HEIGHTEN	red	57
32	7	M	DISORIENTED	blue	18
33	1	H	BLOTCHY	red	45
34	4	A	QUIVERING	yellow	37
35	2	H	LUMP	red	46
36	6	N	SEMESTER	brown	61
37	8	C	XXXXX	blue	74
38	3	A	PANTING	yellow	36
39	8	P	HEMORRHAGE	blue	8
40	3	M	FRANTIC	yellow	14
41	10	C	XXXX	blue	76
42	1	P	HEART ATTACK	red	1
43	7	A	GASPING	blue	40
44	9	N	SAND BOX	green	64
45	6	M	GO CRAZY	brown	17
46	8	N	MAGISTRATE	blue	63
47	1	N	KILOGRAM	red	56
48	4	N	PLEDGE	yellow	59
49	5	C	XXXXXX	brown	71
50	4	C	XXXXXX	yellow	70
51	5	H	SORE	brown	49
52	9	H	BRUISE	green	53
53	3	H	HEADACHE	yellow	47
54	11	P	ASPHYXIATE	red	11
55	6	C	XXXX	brown	72
56	8	H	SCAR	blue	52
57	2	M	PSYCHOTIC	red	13
58	10	M	DEMENTED	blue	21
59	11	C	XXXXXXX	yellow	77
60	5	M	HYSTERICAL	brown	16
61	11	N	BOOK SHELF	red	66
62	5	N	DISH SOAP	brown	60
63	4	P	CORONARY	yellow	4
64	8	T	ALZHEIMER'S	blue	30
65	1	M	LOSE CONTROL	red	12
66	9	T	TUBERCULOSIS	green	31
67	1	A	LIGHTHEADED	red	34
68	5	A	SHUDDERING	brown	38
69	7	H	CRAMP	blue	51
70	11	H	INFLAMMATION	green	55
71	7	T	AIDS	blue	29
72	5	T	CANCER	brown	27
73	9	C	XXXXX	green	75
74	11	T	EPILEPSY	brown	33
75	8	M	DERANGED	blue	19
76	6	P	SEIZURE	brown	6
77	11	M	DISTRAUGHT	yellow	22

90 5CAT			WORD	COLORS	four
1	6	P	SEIZURE	blue	6
2	3	C	XXXXXXX	brown	69
3	7	H	CRAMP	green	51
4	8	C	XXXXX	blue	74
5	4	M	DELIRIOUS	brown	15
6	2	H	LUMP	yellow	46
7	8	M	DERANGED	blue	19
8	2	M	PSYCHOTIC	yellow	13
9	5	M	HYSTERICAL	blue	16
10	11	P	ASPHYXIATE	yellow	11
11	10	M	DEMENTED	red	21
12	6	C	XXXX	blue	72
13	2	T	INCURABLE	yellow	24
14	4	H	SWELLING	brown	48
15	6	N	SEMESTER	blue	61
16	3	T	CYSTIC FIBROSIS	brown	25
17	5	T	CANCER	blue	27
18	1	M	LOSE CONTROL	yellow	12
19	3	H	HEADACHE	brown	47
20	2	C	XXXXX	yellow	68
21	9	A	BREATHLESS	red	42
22	11	T	EPILEPSY	blue	33
23	9	M	INSANE	red	20
24	2	A	FLUSHES	yellow	35
25	5	A	SHUDDERING	blue	38
26	1	C	XXXXXXX	yellow	67
27	8	P	HEMORRHAGE	blue	8
28	9	N	SAND BOX	red▸	64
29	8	T	ALZHEIMER'S	blue	30
30	1	P	HEART ATTACK	yellow	1
31	7	C	XXXXXX	green	73
32	11	C	XXXXXXX	brown	77
33	6	M	GO CRAZY	blue	17
34	10	T	HEART DISEASE	red	32
35	8	H	SCAR	blue	52
36	2	N	HEIGHTEN	yellow	57
37	7	T	AIDS	green	29
38	4	N	PLEDGE	brown	59
39	8	N	MAGISTRATE	blue	63
40	7	P	ANEURYSM	green	7
41	9	P	CARDIAC ARREST	red	9
42	3	M	FRANTIC	brown	14
43	5	H	SORE	blue	49
44	10	P	SUDDEN DEATH	red	10
45	4	A	QUIVERING	brown	37
46	6	A	SHIVERS	blue	39
47	9	T	TUBERCULOSIS	red	31
48	11	A	SWEATING	green	44
49	10	C	XXXX	red	76
50	4	P	CORONARY	brown	4
51	1	A	LIGHTHEADED	yellow	34
52	4	C	XXXXXX	brown	70
53	9	C	XXXXX	red	75
54	7	M	DISORIENTED	green	18
55	5	C	XXXXXX	blue	71
56	7	N	BOOK SHELF	green	62
57	11	M	DISTRAUGHT	brown	22
58	11	H	INFLAMMATION	red	55
59	5	N	DISH SOAP	blue	60
60	1	H	BLOTCHY	yellow	45
61	10	H	RASH	red	54
62	3	A	PANTING	brown	36
63	9	H	BRUISE	red	53
64	6	T	MULTIPLE SCLEROSIS	blue	28
65	1	N	KILOGRAM	yellow	56
66	6	H	ACHE	blue	50
67	11	N	BOOK SHELF	yellow	66
68	4	T	DIABETES	brown	26
69	1	T	MALIGNANT	yellow	23
70	3	N	COFFEE TABLE	brown	58
71	5	P	CHOKE	blue	5
72	7	A	GASPING	green	40
73	2	P	SUFFOCATE	yellow	2
74	10	A	SHAKY	red	43
75	3	P	STROKE	brown	3
76	8	A	PALPITATIONS	blue	41
77	10	N	ASSEMBLY	red	65

90	5CAT		WORD	COLORS	five
1	5	M	HYSTERICAL	green	16
2	1	M	LOSE CONTROL	brown	12
3	9	A	BREATHLESS	yellow	42
4	2	A	FLUSHES	brown	35
5	7	P	ANEURYSM	red	7
6	2	P	SUFFOCATE	brown	2
7	4	C	XXXXXX	blue	70
8	11	P	ASPHYXIATE	brown	11
9	11	M	DISTRAUGHT	blue	22
10	9	M	INSANE	yellow	20
11	8	A	PALPITATIONS	red	41
12	6	M	GO CRAZY	green	17
13	8	P	HEMORRHAGE	red	8
14	6	P	SEIZURE	green	6
15	2	N	HEIGHTEN	brown	57
16	11	H	INFLAMMATION	yellow	55
17	3	T	CYSTIC FIBROSIS	blue	25
18	10	H	RASH	yellow	54
19	2	C	XXXXX	brown	68
20	9	N	SAND BOX	yellow	64
21	8	N	MAGISTRATE	red	63
22	1	A	LIGHTHEADED	brown	34
23	5	N	DISH SOAP	green	60
24	4	H	SWELLING	blue	48
25	2	H	LUMP	brown	46
26	6	A	SHIVERS	green	39
27	11	N	BOOK SHELF	brown	66
28	7	C	XXXXXX	red	73
29	4	N	PLEDGE	blue	59
30	8	M	DERANGED	red	19
31	10	P	SUDDEN DEATH	yellow	10
32	2	M	PSYCHOTIC	brown	13
33	9	P	CARDIAC ARREST	yellow	9
34	6	N	SEMESTER	green	61
35	8	T	ALZHEIMER'S	red	30
36	5	T	CANCER	green	27
37	10	C	XXXX	yellow	76
38	4	P	CORONARY	blue	4
39	10	T	HEART DISEASE	yellow	32
40	5	P	CHOKE	green	5
41	9	H	BRUISE	yellow	53
42	1	T	MALIGNANT	brown	23
43	7	H	CRAMP	red	51
44	3	A	PANTING	blue	36
45	7	T	AIDS	red	29
46	5	A	SHUDDERING	green	38
47	9	C	XXXXX	yellow	75
48	1	N	KILOGRAM	brown	56
49	3	C	XXXXXXX	blue	69
50	6	T	MULTIPLE SCLEROSIS	green	28
51	7	N	BOOK SHELF	red	62
52	9	T	TUBERCULOSIS	yellow	31
53	1	P	HEART ATTACK	brown	1
54	4	A	QUIVERING	blue	37
55	7	M	DISORIENTED	red	18
56	4	M	DELIRIOUS	blue	15
57	11	T	EPILEPSY	green	33
58	3	M	FRANTIC	blue	14
59	1	H	BLOTCHY	brown	45
60	6	H	ACHE	green	50
61	3	N	COFFEE TABLE	blue	58
62	5	C	XXXXXX	green	71
63	10	N	ASSEMBLY	yellow	65
64	5	H	SORE	green	49
65	10	A	SHAKY	yellow	43
66	11	A	SWEATING	red	44
67	11	C	XXXXXXX	blue	77
68	8	H	SCAR	red	52
69	3	H	HEADACHE	blue	47
70	6	C	XXXX	green	72
71	10	M	DEMENTED	yellow	21
72	4	T	DIABETES	blue	26
73	2	T	INCURABLE	brown	24
74	7	A	GASPING	red	40
75	1	C	XXXXXXX	brown	67
76	8	C	XXXXX	red	74
77	3	P	STROKE	blue	3

APPENDIX H

TAKE HOME SHEET: ANXIETY, HEALTH CONCERNS AND INFORMATION PROCESSING

The first questionnaire was designed to determine whether you have experienced panic attacks. These can be defined as unexpected anxiety attacks involving symptoms such as palpitations, shortness of breath, trembling or shaking, and fear of dying or losing control. A large number of studies indicate that infrequent panic is quite common in the general population. For example, Norton, Harrison, Haunch & Rhodes (1985) administered this questionnaire to an undergraduate population and reported that 34.4% of their sample endorsed having a panic attack in the preceding year. The second questionnaire was designed to measure your attitudes, affects, and attributions in relation to illness.

The computer task that you competed is a modified version of the Stroop Colour-naming Task. This is an information processing paradigm that has been used to investigate selective processing biases in a variety of domains (e.g., Mathews & MacLeod, 1985; McNally, Reimann, & Kim, 1992). Numerous studies have illustrated that subjects take longer to colour-name words which have personal significance for them.

The purpose of the present study was to determine whether experiences with panic attacks and concerns about illness effect colour-naming times for words in each of these domains. It is hypothesized that individuals who have experienced panic attacks and worry about illness will take longer to colour-name illness and panic related words.

Thank you for your participation in this study. If you have any questions about the study, please contact Nicky Keyhan (344-0807) or Dr. Dwight Mazmanian (343-8257).

References
Mathews, A., & MacLeod, C. (1985). Selective processing of threat cues in anxiety states. Behavior Research and Therapy, 23, 563-569.

McNally, R. J., Riemann, B. C., & Kim, E. (1990). Selective processing of threat cues in panic disorder. Behavior Research and Therapy, 28, 407-412.

Norton, G. R., Harrison, B., Haunch, J., & Rhodes, L. (1985). Characteristics of people with infrequent panic attacks. Journal of Abnormal Psychology, 94, 216-221.

IMAGE EVALUATION
TEST TARGET (QA-3)

150mm

6"
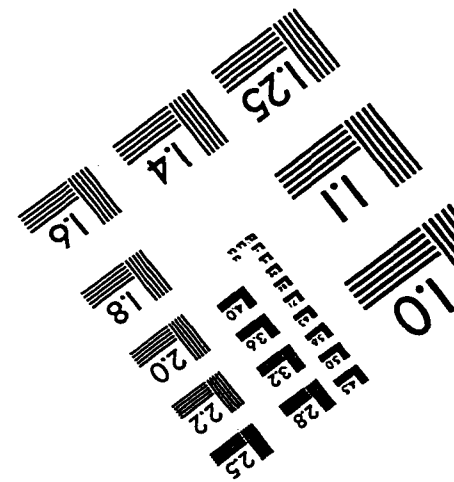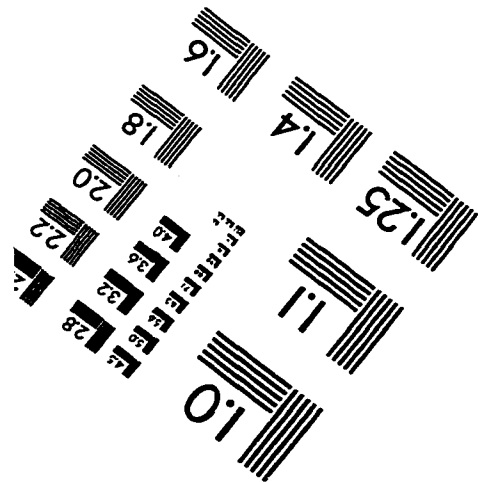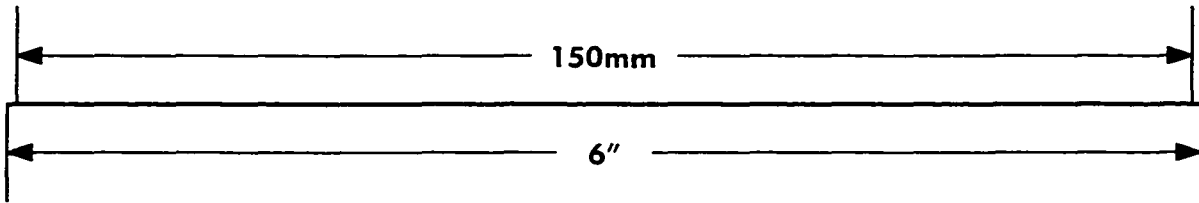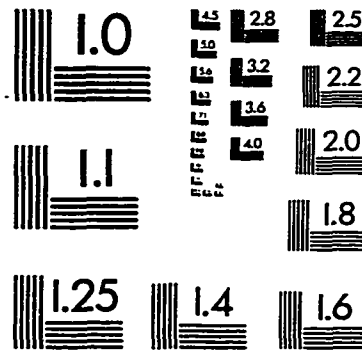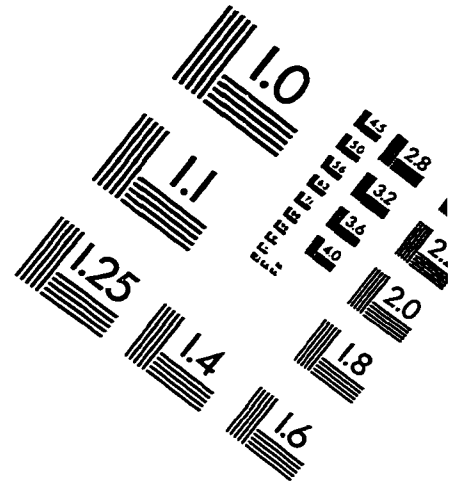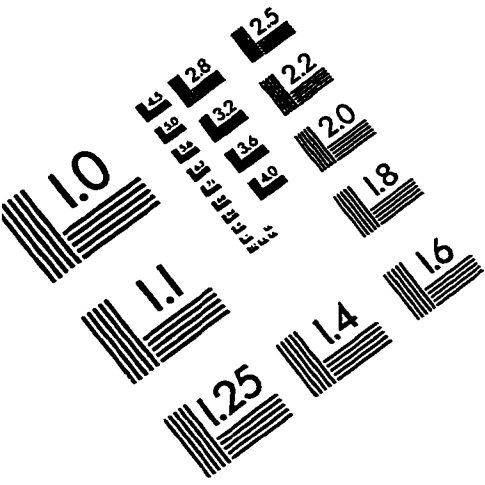
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